The frequency and nature of aggressive acts on Australian roads

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Key Findings

- Self reported aggressive driving behaviour and engagement in other risk-taking behaviours were reported by a representative sample of drivers in Australia;
- Aggression was relatively common, particularly among younger males;
- One third of male drivers aged 26-39 reported having chased another driver when angry;
- Associations were found between aggression, speeding, mobile phone use, drink-driving and crashes.

Abstract

To understand the current prevalence of aggressive acts on Australian roads, a large cross-sectional survey was conducted inviting drivers from all Australian jurisdictions to participate. A stratified sampling procedure was undertaken to ensure the age and gender distributions were representative of each jurisdiction. Participants were asked to report the frequency of aggressive driving behaviours as well as speeding, drink-driving and mobile phone usage while driving. Recent crash history was also obtained. The sample consisted of 2,916 drivers (males = 45%) with an average age of 42 (±16) years. Minor aggressive behaviours such as expressing annoyance to other drivers and sounding the horn in anger were reported by the majority of the sample (60% and 70% respectively). More extreme behaviour such as chasing another driver when angry was less common, however still reported by 18% of the overall sample. Aggressive driving behaviours were more common in younger, male drivers with 36% of drivers aged 22 to 39 reporting extreme aggression. Associations were found between aggressive driving with crash involvement and other forms of risky driving behaviour. The results show that aggressive driving is a problem on Australian roads. Further research is warranted to explore where aggressive driving fits within an overall risky driving pattern of behaviour, what attitudes drivers hold toward aggressive driving, and how to target the reduction of these behaviours.

Keywords

Aggressive driving, Tailgating, Speeding, Risky driving behaviour

Introduction

Driver aggression poses a problem to road safety as it manifests in deliberate behaviours that increase the crash risk for the perpetrator and other road users (Tasca, 2000). While aggression can range on a continuum from mild acts of aggressive expression to criminal acts of violence or 'road rage', common aggressive driving behaviours of particular concern include excessive speeding, tailgating (Deffenbacher, Lynch, Oetting, & Swaim, 2002) and dangerous lane changing (Shinar & Compton, 2004). Most researchers agree that aggressive driving behaviours are distinct from other aberrant behaviours in that they are usually motivated by negative emotions such as anger, irritation and frustration (Björklund, 2008; Deffenbacher, Richards, & Lynch, 2004; Parker, Lajunen, & Summala, 2002) and are dependent upon the current driving environment (Shinar, 1998).

The reporting of aggressive driving within road agency statistics is limited and tends to be captured through other offence categories. For instance, in the absence of a specific all-encompassing aggressive driving offence, in Australia, drivers can be charged for some forms of aggressive behaviours depending upon their level of severity (such as tailgating, dangerous driving, culpable driving). Consequently, the affective motivation is not captured and hence aggressive driving is not clearly represented in offence data or crash statistics. Given this, it is hard to understand the prevalence of aggression, yet this understanding is fundamental to targeting strategies aimed at reducing these behaviours. This is particularly so, given the intentional nature of the behaviours and the likelihood that that i) there might be certain drivers who are more aggressive than others and ii) aggressive driving may be emblematic of broader driving issues.

Based on survey data, aggressive driving behaviours appear to be common on the roads. In a global poll of drivers from 23 Countries (N = 13,673; 2003), approximately half of

the drivers surveyed in the US (66%), Europe (48%) and Australia (51%) had been subjected to aggression from other drivers in the past year. Further, 68%, 51% and 60% respectively reported being an aggressive driver at least once during that time period (EOS Gallup Europe, 2003). A 2004 study by insurer AAMI in Australia showed that 93% of those surveyed (N = 1,880) had been subjected to aggression from other motorists during their driving lifetime, while 43% had perpetrated aggressive driving in retaliation to the behaviour of others (AAMI, 2004). More recent, yet smaller and more localised studies, also show that most drivers report being aggressive at some time while driving. Data from drivers in the British Isles show that 72% reported being a victim of aggressive driving and 62% reported being an aggressor (Stephens & Sullman, 2014). Similarly, data from drivers in Malaysia show the majority of drivers surveyed had been victims of aggressive driving (66%) and also been an aggressive driver (55%; Sullman, Stephens & Yong, 2014). Taken together, these studies indicate that drivers are likely to either experience or witness aggression while driving and the majority are also likely to be aggressive at some point.

Aggressive driving (or behaviours that can also be classified as aggressive but for which the intent is not known) has been associated with crash risk. As noted above, crash data however tend to not include the intention of the driver and therefore aggressive-type behaviours (ie speeding, tailgating and failing to give way) are used as a proxy for aggressive driving. When done and defined as potentially aggressive driving, this has been identified as a major contributing factor to crash involvement (American Automobile Association, 2009). Although examining aggressive-type behaviours is likely to overestimate the contribution of aggression to crashes, the findings are largely supported by other methodologies. Questionnaire studies have shown strong associations between aggressive expressions of anger while driving and self-reported crash involvement (Deffenbacher, Lynch, Filetti, Dahlen, & Oetting, 2003; Stephens & Sullman, 2015; Wickens, Mann, Ialomiteanu, & Stoduto, 2016). Simulator studies also confirm direct effects of aggressive behaviours on driving performance (Ellison Potter, Bell, & Deffenbacher, 2001). It is clear that reducing the incidents of aggressive behaviour will have both a direct and indirect benefit to road safety.

However, reducing the incidents of aggressive driving relies on understanding both who is aggressive and the frequency of these aggressive behaviours. This is because aggressive behaviour is the result of a complex interaction between the person and the situation (Anderson & Bushman, 2002). Aggression results from a combination of how a driver is feeling and the assessments made of the driving situation and outcomes for the aggressive action. Current data are lacking on the prevalence of aggression on Australian roads. Further, there is limited understanding of the "perpetrator" and the context in which these behaviours are exhibited. Data from outside of Australia show that aggressive driving decreases with age (Paleti, Eluru, & Bhat, 2010; Roberts & Indermaur, 2005) and is more prevalent in males (Shinar & Compton, 2004; Vanlaar, Simpson, Mayhew, & Robertson, 2008). Research has also indicated that aggressive drivers are also likely to commit other traffic infringement offenses (Vanlaar et al., 2008) and engage in other dangerous behaviours, such as failure to wear a seat belt (Eluru & Bhat, 2007). This suggests that aggressive driving sits within a constellation of other poorer road behaviours. Given the above, it can be postulated that, in Australia, aggressive driving is common, dangerous and especially evident in younger and thereby less experienced drivers. Further, the question of whether this behaviour is emblematic of the driving culture or the broader societal culture is interesting, but to date unexplored other than in recent media.

The aim of this paper was to explore self-reported aggressive driving behaviours of a representative sample of Australian drivers and to understand who is likely to be an aggressive driver. A further aim was to explore the associations these behaviours have with crash involvement as well as other dangerous behaviours, such as speeding, drink-driving and illegal mobile phone use. The latter will provide understanding of where aggressive driving sits within a broader range of aberrant behaviours.

Methods

Participants and Procedure

Data were taken from a large National Survey of drivers in Australia designed to understand driving behaviours and attitudes towards road safety. The survey was developed by the Victorian Transport Accident Commission in collaboration with Monash University Accident Research Centre and conducted by Ipsos Social Research Institute. Participants were recruited through the Ipsos online panel of members. A stratified sampling procedure was incorporated using targets based on the age and gender distributions of the Australian adult population as recorded in the 2011 census (ABS, 2011). The survey was distributed in two phases (see Figure 1 and Stephens & Fitzharris; 2016) for more details) with attitudinal data, self-reported speeding behaviour and crash involvement being recorded in Phase 1, and self-reported aggressive driving and drink-driving obtained in Phase 2. Although separating the research across two phases leads to a marked reduction in participants, it avoids potential common method biases related to reporting aggression and crash involvement at the same time-point.

The final sample contained 2,916 participants (see Figure 2 for sampling distribution) all of whom reported driving a car within the last year. Overall, 55% of the sample were female and their age ranged from 16 to 75 years (M = 42.72 ±16.45). Recent Australian census data shows broadly similar age and gender distributions for Australian residents (Australian Bureau of Statistics, 2014).

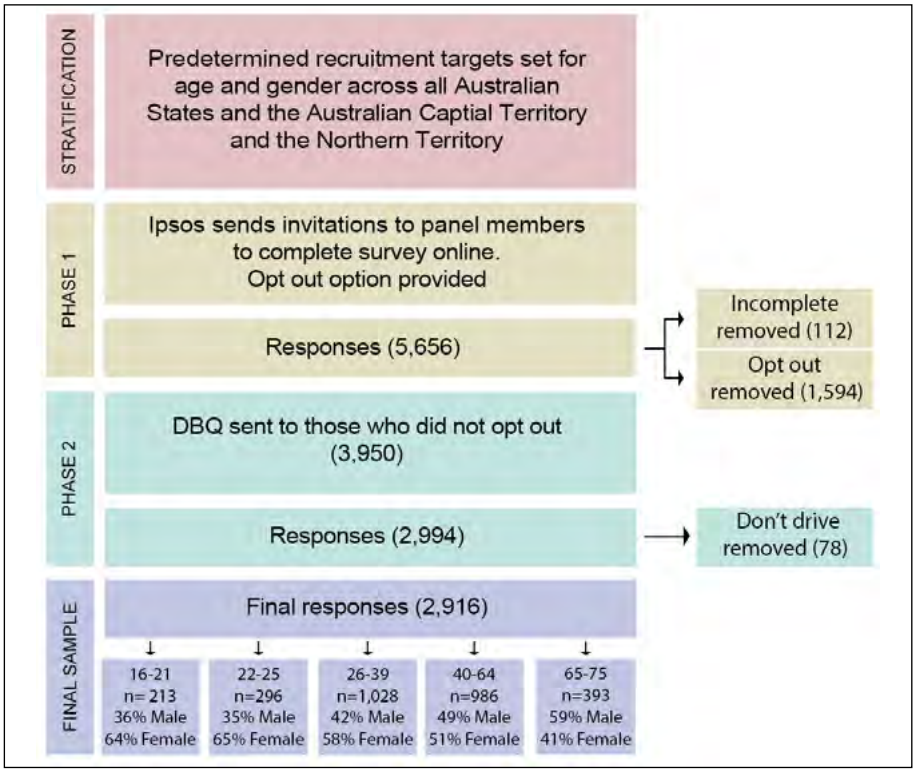

Figure 1. Two-phased sampling procedure

Materials

Aggressive driving

Four aggressive driving behaviours were examined, via the following survey questions:

Thinking about your driving/riding in the last 2 years, how often would you say you…?

- Use your horn to indicate your annoyance to another road user;
- Get angry at a certain type of driver and express your anger any way you can;
- Become angry at another driver and chase them with the intention of showing them how angry you are;
- Drive so close to the car in front that it would be difficult to stop in an emergency.

These four items are taken from the Driver Behaviour Questionnaire (DBQ: Reason et al., 1990). Although the time windows differed between crash and DBQ items, all drivers reported driving a car within the past 12 months, suggesting DBQ frequencies are a reflection of the previous year and therefore align with crash information.

For each item, a 6-point likert response was required, ranging from 1 (never) to 6 (almost always). However, to avoid cases with thin cells, responses were later recoded into never (1 on the likert scale), infrequently (2 on the likert scale representing hardly ever), occasionally (3 and 4 representing occasionally and quite often) and frequently (5 and 6 being frequently and nearly all the time responses).

Other dangerous driving behaviours

The following behaviours were also assessed:

Drink-driving: "Have you driven or ridden a vehicle over the last 3 months when you think you may have been over the legal Blood Alcohol Concentration (BAC)?" and yes / no responses were provided.

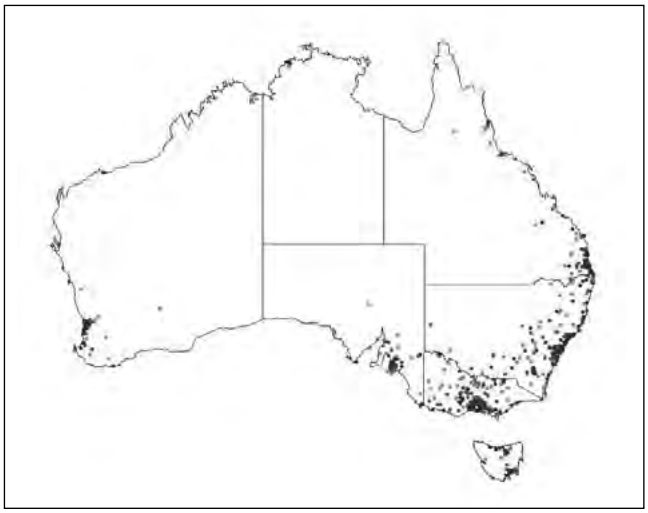

Figure 2. Sampling distribution across Australia

Mobile phone use while driving: "How often do you use a hand-held mobile phone for texts or calls while driving?" Responses were on an 8 –point scale (daily to never).

Speeding: Speeding was assessed with a question: "What speed do you normally drive or ride in …" repeated across four speed zones of 40, 50,60 and 100 km/h) - In a 40 km zone. For each one, drivers selected either, below or at the speed limit, up to 5km/h over, 6 to 10 km/h over or 11 or more km/h over.

For analysis, the dangerous driving behaviours were recoded as binary variables (yes / no).

Demographic information

Information was also obtained regarding age, gender and mileage. Postcode data were obtained and used to identify urban or rural residence as well as a proxy for socio-economic status following the classifications published by the Australian Bureau of Statistics (ABS; 2011), Socio-Economic Indexes for Areas (SEIFA), Australia, 2011. Each postcode has a percentile for the Index of Relative Socio-economic Advantage and Disadvantage (IRSAD) with lower scores representing disadvantaged (0 – 50) and higher scores representing advantaged areas (51 – 100). These were then classified into quartiles (disadvantaged 0 – 25; moderately disadvantaged 26 – 50; moderately advantaged 51 – 75 and advantaged 76 – 100).

Data analysis

Data were analysed with SPSS v. 22 and Stata v.14. Chi-square tests were used to explore relationships between aggressive driving, age and gender. Effect sizes were measured with Phi (φ) for 2 x 2 tables and Cramer's V (φ_c) for larger tables. Values of 0.10; 0.30 and 0.50 represent small, medium and large effects respectively (Cohen, 1992). Post hoc tests were performed with adjusted standardised residuals and for tables larger than 2x2, a conservative significance level was set at .01 (±2.58) to account for multiple comparisons. In situations where more than 20% of the cells in the chi-square analysis had an expected count less than 5, and therefore an assumption of the Pearson chi-square test was violated, the Fisher's exact test p value is reported instead.

Logistic regression was conducted to explore associations between demographic variables (age, gender, SEIFA score, rural or urban residence) with engagement in aggression (yes / no). Initial univariate models with inclusion criteria set at $p < .25$ were conducted and exclusion was set at .05 for subsequent multivariate models (Hosmer, Lemeshow & Sturdivant, 2013). Both a main effects model and interaction model were tested and model evaluation and diagnostics were conducted. There was no evidence of collinearity. Adjusted odds ratios were calculated for each independent variable at a 95% confidence interval (Hosmer, et al., 2013).

Results

Driving frequency and mileage

Over half of the participants reported driving daily (58%) and a further 28% drove more than twice a week. Five-percent of the sample drove infrequently (either at least once a month, 2%, every couple of months 1% or rarely, 2%). Therefore, the majority of the sample (93%) were frequent drivers, driving at least once a week but most driving daily.

Participants reported an average weekly mileage of 281 kms (± 426; range 1 to 9,000, median = 200) and annual mileage of 15,766 kms (± 18,657; range 5 to 250,000; median = 10,000).

Frequency of aggressive behaviours

Table 1 shows the self-reported frequency of the four aggressive behaviours. As expected, the most frequently reported behaviour was sounding the horn to indicate annoyance. Almost 71% of the sample reported doing this behaviour at least once in the past two years and 30.9% of the sample reported doing this occasionally. Tailgating also emerged as behaviour reported at least once by almost half of the respondents (44.8%), however if done, this was mostly infrequent (31.6%). Further, more than half of the sample (59.3%) reported expressing annoyance at other drivers "any way they can" with one quarter doing this occasionally to often (23.7%) or frequently (2.2%). Most concerning, however is that 17.7% of the sample reported chasing another driver with the intention of expressing their anger at least once across the two-year period.

Aggressive behaviours across gender and age

Figure 3 shows the relationships between gender and self-reported frequency of aggressive behaviours across five age groups. No significant differences were found for using

Table 1. Frequency of aggressive driving behaviours across the total sample (N=2,916)

	Never (%)	Infrequently (%)	Occasionally (%)	Frequently (%)
Use your horn to indicate annoyance	28.8	38.2	30.9	2.1
Get angry at a certain type of driver and indicate your annoyance anyway you can	40.7	33.4	23.7	2.2
Chase another driver when angry	82.3	11.4	5.4	0.9
Follow another driver too closely	56.2	31.6	11.2	1.0

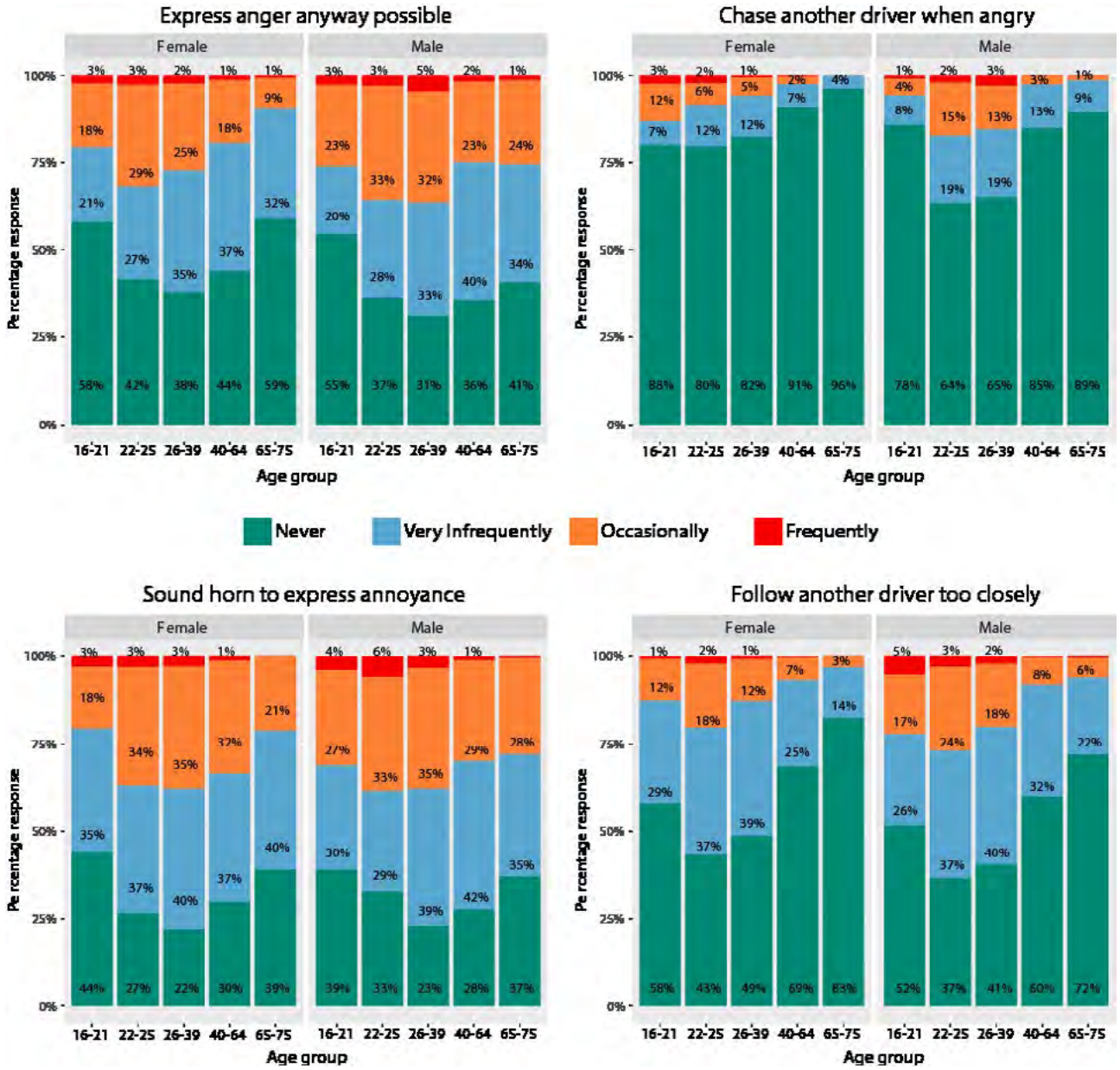

Figure 3. Relationships between gender and aggressive driving behaviours across age groups

the horn to indicate annoyance (ps >.05), indicating that males and females across all age groups do this behaviour with similar frequency. Overall, females were less likely to engage in any of the three other aggressive types of behaviours, and this was indicated by a significantly higher percentage of females in the never categories relative to males. No gender differences in self-reported aggression were observed for drivers aged 16 to 21 years, which may reflect the licencing conditions of this cohort.

Most notably in Figure 3 is that 36% of males aged 22 to 25 years and 35% of males aged 26 to 39 years reported chasing another driver when angry at least once over the past two years, when compared to 19% and 18% of similarly aged females. These gender differences were significant at the .01 level (by Fisher's exact tests). Further, 15% and 13% of males in these age groups did this behaviour occasionally, while 2% to 3% respectively, reported frequently chasing other drivers when angry.

Males also reported expressing anger toward certain types of drivers more frequently than females, although this relationship was not evident across all age groups. In particular, 32% of males aged 26 to 39 reported occasionally doing this behaviour compared to 25% of females in this age group and this difference was significant (χ^2 (3) = 11.52, p <.001, $\varphi_{c=}$.11). For drivers aged 65 to 75 years, 24% of male drivers expressed anger towards certain types of road users occasionally, while only 9% of similarly aged females reported occasionally expressing anger anyway possible (χ^2 (3) = 22.68, p <.001, $\varphi_{c=}$.09).

Table 2. Associations between driver characteristics and aggressive driving

	Aggression Yes	OR	95% CI	p-value	Adjusted OR	95% CI	p-value
Age group							
16 – 21	74%	Referent (1.0)			Referent (1.0)		
22 – 25	86%	2.17	1.38.3.40	.001	2.18	1.39,3.42	.001
26 – 39	88%	2.56	1.79,3.67	<.001	2.57	1.79,3.69	<.001
40 - 59	84%	1.88	1.32,2.67	<.001	1.92	1.35,2.73	<.001
60 – 75	77%	1.14	0.77,1.67	0.51	1.18	0.80,1.73	0.41
Gender							
Males	85%	Referent (1.0)					
Females	83%	0.88	0.72,1.07	0.21			
SEIFA score (IRSAD)							
Disadvantaged 0 – 25	80%	Referent (1.0)					
Moderately disadvantaged 26 – 50	82%	1.15	0.87,1.54	0.32			
Moderately advantaged 51 – 75	87%	1.71	1.27,2.32	<.001			
Advantaged 76-100	86%	1.50	1.13,1.98	.005			
Residence							
Urban	85%	Referent (1.0)					
Rural	81%	0.73	0.59,0.89	.003	0.74	0.60,0.92	.006
Mileage (kms)							
Low (0 – 9,000)	84%	Referent (1.0)					
Medium (9,001 – 15,000)	87%	1.32	0.99,1.77	0.06			
High (15,001+)	88%	1.39	1.01,1.90	0.04			

Further, a greater percentage of male drivers aged 26 to 39 (18%) reported occasionally tailgating when compared to female drivers of the same age (12%; $\chi^2(3) = 13.00$, $p < .01$, $\varphi_{c=}.11$). Therefore showing that male drivers particularly those aged 26 to 39 more frequently engage in aggressive type behaviours when compared to similar aged females.

Driver factors associated with aggressive behaviours

Table 2 shows the associations between age, gender, SEIFA scores, residence (rural v. urban) and mileage (low, medium and high) with self-reported aggressive driving. A combined outcome variable was created for those who reported any of the five aggressive behaviours (yes group) and those who had not (no group).

As can be seen in Table 2, when adjusting for age, the odds of aggressive driving decreased for those in rural areas, with drivers in these areas having 26% lower odds of aggression compared to drivers in urban areas, where arguably there is more exposure to other drivers and situations conducive to expressing aggression. Further, as expected, the odds of aggressive driving increased with age. Relative to young drivers aged 16 to 21, the odds of aggressive driving were approximately twofold for drivers aged 22 to 25 years (ORadjusted: 2.18; 95%CI: 1.39,3.42); 26 to 39 years (ORadjusted: 2.57; 95%CI: 1.79,3.69) and 40 to 59 years (ORadjusted: 1.92; 95%CI: 1.35,2.73**).**

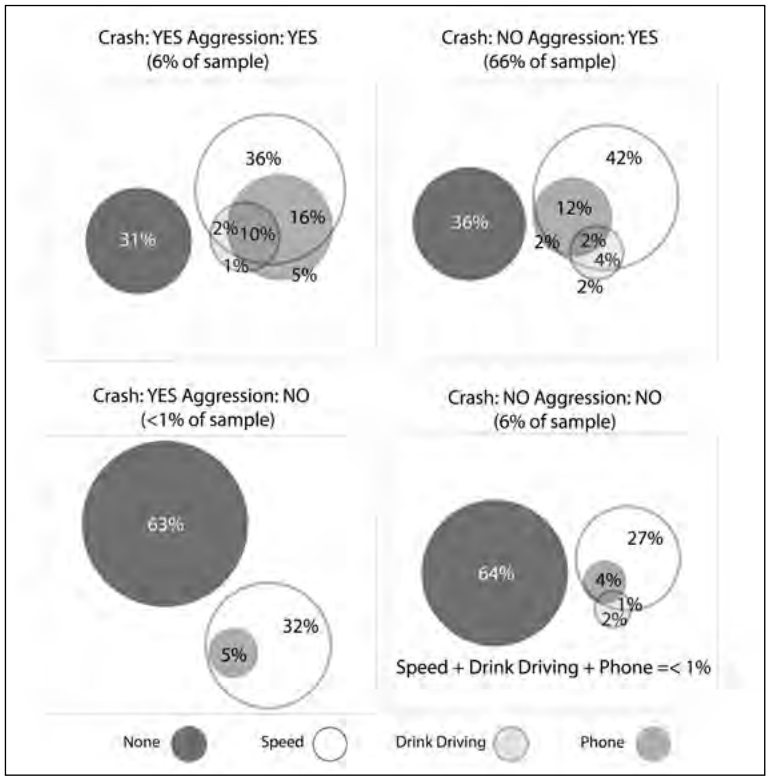

Figure 4. Relationships between speeding, drink-driving and use of a hand-held mobile phone while driving across crashes and self-reported aggression

Aggressive behaviours and their association with other dangerous driving behaviours

Table 3 shows the relationships between the dichotomised aggressive driving variable and responses with hand-held mobile phone use while driving, drink-driving, speeding behaviour and crashes. Significant relationships were found between all variables and aggressive driving. In comparison to drivers who did not report any aggressive type behaviours, drivers who reported expressing aggression were more likely to report:

a. using a hand-held mobile phone while driving (18% cf. 5%);
b. having driven when over the legal BAC limit in the past three months (9% cf. 4%); and
c. normally driving in excess of the posted speed limit (60% cf. 33%).

Table 3. Associations between aggressive driving and other dangerous behaviours

		Total	Aggressive driving	
			Yes	No
Hand-held mobile use while driving $\chi^2(1) = 49.45, p < .001, \varphi = .13$	Yes	16.2%	18.3%	5.2%
	No	83.8%	81.7%	94.8%
Drink-drive in the past three months $\chi^2(1) = 12.97, p < .001, \varphi = .07$	Yes	7.8%	8.6%	3.7%
	No	92.2%	91.4%	96.3%
Exceed the speed limit $\chi^2(1) = 119.79, p < .001, \varphi = .20$	Yes	56%	60.4%	32.9%
	No	44%	39.6%	67.1%
Crash involvement in previous 12 months $\chi^2(1) = 5.49, p = .02, \varphi = .04$	Yes	6.6%	7.0%	4.1%
	No	93.4%	93.0%	95.9%

A relationship was also observed for aggressive driving and crash involvement, with 7% of drivers who reported aggressive behaviours also reporting crash involvement in the previous 12 months. This is compared to only 4% of drivers not reporting aggressive type behaviours. Although while statistically significant (p =.02), this was considered as a small effect using Cohen's statistics reported in the Method section.

Figure 3 shows the relationships between drink-driving, hand-held mobile phone use and speeding separated across crash involvement and aggressive behaviours. Aggressive drivers were more likely to also engage in other dangerous behaviours compared to drivers reporting no aggression and this is demonstrated by a higher percentage of drivers who engaged in all three behaviours (10% for those who had crashed and 3% for those who had not crashed) as well as a lower percentage of drivers who reported engaging in none of the three behaviours (31% for those who had crashed and 36% for those who had not crashed). In comparison, a higher percentage of drivers who reported no aggression did not report any of the three dangerous behaviours (63% and 64%).

Discussion

This paper presents self-reported aggressive driving from a representative sample of drivers in Australia. The results show that aggressive driving is relatively common with approximately 60 to 70% of the sample reporting minor aggressive acts such as sounding the horn in anger and using other unspecified mechanisms to express anger. More concerning, almost half of the drivers sampled reported following another driver too closely while almost one fifth of drivers reported chasing another driver when angry. Previous, albeit now dated research, has shown that approximately 60% of drivers in Australia report acts of aggression while driving (EOS Gallup Europe, 2003). The results broadly align with these findings and show a trend for more frequent minor aggressive acts from the majority of the sample yet some extreme dangerous acts of aggression from a subset of this group.

Self-reported engagement in aggression was found to differ across driver age and gender. With the exception of sounding the horn when angry, males reported significantly more aggressive driving behaviours than females. This was exacerbated for younger drivers. In particular, over one third (35-36%) of male drivers aged 22 to 39 years reported having chased another driver when angry with the intention of showing them their anger. In comparison, 18 to 19% of female drivers in this age range reported chasing another driver when angry. Although considerably lower than the male cohort, this is still an alarmingly high proportion of drivers to report this behaviour.

Interestingly, although male drivers reported more extreme aggression, traditionally females drivers tend to report higher propensities to become angry while driving (Deffenbacher, Stephens & Sullman, 2016). Hence, there may not always be a direct link between anger and aggression on the roads. While data in this regard are lacking from an Australian sample, there is convincing evidence to suggest that this dichotomy may result from other driver characteristics, including gender roles (Sullman, Stephens, & Hill, 2016), aggressive tendencies (Lajunen & Parker, 2001) or risk taking propensities (Yagil, 1998). Indeed, in the current sample, the profile of more aggressive drivers was the same as those found to engage in other risky driving behaviours. These include, more frequent speeding behaviour (Stephens, Nieuwesteeg, Page-Smith & Fitzharris), drink-driving (Stephens, Bishop, Liu & Fitzharris, 2017) and hand-held mobile phone usage while driving (Lansdown, 2012).

It was also found that SEIFA scores were associated with aggressive driving. Those in moderately advantaged or advantaged areas had higher odds of being aggressive than those in disadvantaged areas. This finding might provide evidence of additional factors that mediate the relationships between anger and aggression. This might be due to specific attitudes, type of vehicles driven or main areas driven in, levels of stress, etc. This is worthy of further investigation especially with the use of alternative SIEFA measures, including the index of education and occupation (IEO) and the index of economic resources (IER). These would provide additional understanding of potential underpinning factors for aggression.

The results from the current study also highlight the relationships between speeding behaviour, drink-driving, using a hand-held phone and crash involvement. Of those who reported aggressive driving, 7% also reported a crash. This is compared to only 4% of those who did not report aggressive driving. Further, a higher percentage of drivers who reported crash involvement and aggression also reported speeding, drink-driving and driving while using a hand-held mobile phone when compared to those who reported crash involvement and no aggression. Further, not one of the non-aggressive drivers who had been involved in a crash reported speeding or drink-driving; again highlighting that aggressive driving may be part of a broader pattern of dangerous driving behaviours.

A trend in road safety is to silo behaviours and only examine for example, aggression, speeding, drink-driving or mobile phone usage. However, the data reported in this paper suggest the risk profiles of drivers who engage in these behaviours may be broadly similar. Therefore, interventions for aggressive driving may lie in the published literature regarding motivations and attitudes toward other types of risky behaviour. For example, drivers who drink and drive and also those who speed tend to do this when they perceive they can get away with it and if they have friends and family who also engage in these behaviours (Stephens et al., 2017). This speaks to the social acceptability of these behaviours and the perceived enforcement for failure to comply with road safety rules. Indeed, research using the theory of planned behaviour (Ajzen, 1991) on DBQ items for aggressive driving, has shown that attitudes and beliefs regarding aggression and its outcomes predict intentions to aggress (Parker, Lajunen & Stradling, 1998). While, drink-driving, speeding and mobile phone use are all identifiable illegal behaviours, aggressive driving may appear less so for drivers. This is because charges for aggressive driving can

be covered by a number of different traffic offenses targeting specific behaviours, rather than aggressive intent. Further, at least in Australia, unlike speeding, drink-driving and mobile phone usage, aggressive driving has not been the subject of extensive road safety media campaigns and therefore less may be known about enforcement consequences. More research is clearly needed to understand where aggressive driving fits within an overall risky driving pattern of behaviour, what attitudes drivers hold toward aggressive driving and how to target the reduction of these.

While the results show that aggressive driving is also a current problem on Australian roads, the findings are based on self-reported behaviours. Self-reports can be criticised for socially desirable responses (e.g. Paulhus, 1991). However, research has shown strong correlations between self-reported anger tendencies and anger provoked during simulated driving (Stephens & Groeger, 2009). More recent research has also shown the scores on the DBQ factors are related to how drivers drive both in simulated and on-road driving (Helman & Reed, 2015). Given the items for aggressive driving used for this study were from the DBQ, we can be confident that the self-reports reflect aggression while driving in the current sample.

An additional limitation of the current study is that the definition aggression itself was limited to only a small number of aggressive type behaviours. Further, the time-periods were different across reports of aggression and other illegal driving behaviours. A recent cognitive debrief of the DBQ (Social Research Centre, 2014) has shown that drivers tend to report driving styles, rather than frequencies across specific time frames. Therefore, the different time frames given to participants for different activities, while not ideal, are unlikely to reduce the strength of the actual relationships.

The current findings provide avenues for additional research. Additional research ought to explore various types of aggressive behaviours to gain further understanding of the prevalence of aggression per kilometre travelled. It is likely that aggressive behaviours are reciprocal on the road and hence it is important understand the prevalence and impacts of both perpetrated and received aggression, its context, and the consequences these have on subsequent driver behaviour. Further research could also explore more comprehensively the factors that influence whether a driver engages in aggression, considering this as a fluid process that changes according to the driver's current personal circumstance and the driving situation. Naturalistic driving studies might provide a rich data source to address this question. In addition, a research focus on the driver, their broader circumstances and current attitudes towards aggression will also be important. This would allow understanding of whether aggression is part of a broader problem outside of driving and what attitudes could be targeted for its reduction. International research using the TPB has shown that attitudes toward aggressive driving are associated with more frequent engagement (Parker et al., 1998). This has yet to be explored in Australia.

Conclusions and Practical Implications

The frequency of engagement in a number of self-reported aggressive acts was obtained from a representative sample of drivers in Australia. The results showed that aggression was relatively common, particularly among younger male drivers. One third of male drivers aged 26 to 39 reported having chased another driver when angry. Further, associations were found between self-reported aggression with other dangerous behaviours such as speeding, illegal mobile phone use and drink driving as well as with crashes. This suggests that aggression may be part of a broader problem related to aberrant behaviours on the roads.

While further research is warranted to understand the motivations of aggressive behaviours, the findings suggest a pattern of behaviour which may result from a social acceptability of aggression coupled with positive reinforcement towards aggressive outcomes. Law enforcement, with specific regulations or enforcement programs targeting aggressive driving, is likely to be an effective strategy for changing these attitudes.

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