COVER SHEET

THE CRASH INVOLVEMENT OF INTERSTATE DRIVERS IN QUEENSLAND

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ABSTRACT

Previous research has suggested that driving interstate is more hazardous than driving in one's home state. However, the increased risk does not appear to be due to greater risk-taking by these drivers, but due to the greater distances they travel, particularly on rural roads, and associated problems such as fatigue. To further examine this issue, an analysis was undertaken of all reported crashes involving interstate drivers that occurred in Queensland between 1993 and 1998. During this period, interstate drivers represented 5% of all drivers involved in fatal and serious injury crashes in Queensland. The analysis indicated that the crashes involving interstate drivers were no more likely to involve factors such as alcohol, speeding, inattention/negligence or inexperience. Rather, the crash involvement patterns of interstate drivers appear to relate more to the type and location of their driving. For example, in Queensland interstate drivers are over-represented in crashes involving: open road driving; driver fatigue; the overturning and sideswiping of vehicles; and weekend travel. Interstate drivers were also more likely to be considered at fault for the crashes they were involved in, compared with local drivers.

INTRODUCTION

In one of the few detailed Australian reports on interstate driving, the Federal Office of Road Safety (FORS) (1996) examined fatal crashes for the years 1988, 1990 and 1992. They found that 1 in 16 fatalities on Australian roads arose from crashes involving at least one driver with an interstate licence. It was estimated by FORS (1996) that the fatality rate per 100 million vehicle kilometres travelled for interstate drivers (3.47 fatalities) was twice as high as that for local drivers (1.44). The two jurisdictions in Australia with the largest share of interstate drivers involved in fatal crashes were the Northern Territory (18.2% of all drivers) and the Australian Capital Territory (16.9%). In both these cases the statistics are probably indicative of relatively high levels of tourist travel compared with local driving. The two states with the largest share of interstate drivers involved in fatal crashes were New South Wales (8.7%) and Queensland (8.1%).

The FORS (1996) report did not provide specific information relating to the number of crashes involving interstate drivers. However, it did compare the relative involvement of interstate and local drivers (ie. those driving within their home state) in different types of crashes. Compared to local drivers, interstate drivers were more likely to be involved in fatal crashes in rural areas (72% for interstate drivers versus 43% for local drivers), to be driving a four-wheel drive or minibus (14% versus 9%) and to have a crash during the day (69% versus 56%). The report also found that interstate drivers were more often involved in single vehicle crashes (35% versus 27%) and overturning their vehicles (28% versus 15%). Fatigue emerged as a causal factor for 19% of interstate drivers involved in fatal crashes, compared to only 8% for local drivers.

On the other hand, the FORS research suggests that interstate drivers are less likely to engage in certain high-risk driving behaviours. For example, the fatal crashes involving interstate

drivers were less likely to involve alcohol (17% versus 23%) and speed (20% versus 23%) than those involving local drivers. In addition, there was little evidence to suggest that interstate drivers were more likely to make driving errors, with failure to observe signals or road rules being equally prevalent among local (17%) and interstate (20%) drivers. In summary, while the FORS (1996, p.3) study acknowledges that alcohol, speed and driver error all play a part, "*what distinguishes crashes involving interstate drivers are factors relating to long holiday trips*".

Similar findings were reported by FORS (1995) for international drivers, suggesting that both international and interstate drivers are more likely to experience problems related to driving in an unfamiliar environment rather than as a result of reckless or high-risk behaviour. Several recent studies by the authors have extended the FORS (1995) research on international drivers, using fatal and injury crash data from Queensland. For example, Wilks et al (1999, 2000) found that alcohol use was under-represented in serious casualty crashes involving international drivers, compared with those involving Australian drivers, while there was no significant difference in relation to speeding. In contrast, international drivers were over-represented in serious crashes involving driver fatigue, 'failure to keep left', 'head-on' collisions and 'overturning'.

An extensive search of the literature failed to identify any other published studies examining the crash involvement of interstate drivers in Australia. In particular, there appears to have been little attention given to non-fatal crashes involving interstate drivers. Consequently, the aim of the current study was to investigate the factors contributing to both fatal and injury crashes involving interstate drivers in Queensland. Based on the limited research conducted to date, it was expected that interstate driver crashes would be less likely to involve high-risk or

reckless driving than those involving locals. Rather, they would be more likely to involve factors associated with 'holiday' driving and driving in an unfamiliar environment.

METHOD

An exploratory investigation was undertaken into the crash involvement of interstate drivers in Queensland during the period 1993-98. It was decided to focus on Queensland for two reasons. Firstly, the FORS (1996) data had indicated that interstate drivers represented a relatively high share (8.1%) of the total drivers involved in fatal crashes in that state. Secondly, it complemented a study the authors had recently completed into the crash involvement of international drivers within Queensland (Wilks et al, 1999; 2000).

The data was extracted from Queensland Transport's road crash database that contains records for all crashes reported to the police in the state. Age, gender and licence information was obtained for all controllers of motorised vehicles (including cars, car derivatives, trucks, buses and motorcycles) involved in crashes during the period, irrespective of whether they were judged by the police to be at fault for the crash or not. This ensured that the overall crash involvement of interstate drivers was assessed and avoided any biases related to the reporting or prosecution practices of the police. The identification of interstate drivers was based on the status of their licence recorded in the database. In addition, a range of information was obtained relating to the circumstances of the crashes, including the day, time, location, prevailing road and traffic conditions, and the contributing factors cited by the attending police. The term 'driver' is generally used in the paper to cover all controllers of motorised vehicles, including car, truck and bus drivers, as well as motorcycle riders.

Six years of data was analysed to ensure that general trends were identified and to provide sufficient numbers to permit meaningful comparisons among sub-groups of interstate drivers

(eg. experienced car drivers). In light of the multiple statistical tests undertaken, a conservative alpha (α) level of .005 was adopted for all analyses. The data was analysed using SPSS for Windows V.8.

RESULTS

During the period 1993-98, there were 168 interstate drivers involved in fatal crashes on Queensland roads. This represented 5.7% of all the drivers involved in fatal crashes during the period. A further 1,561 interstate drivers were involved in crashes resulting in a hospitalisation (5.1%) and 3,240 in crashes resulting in minor injury (4.4%). In total, there were 9,433 (4.6%) interstate drivers involved in crashes of all severity.

Figure 1 provides a breakdown of the state or territory from which the interstate drivers originated (ie. the state/territory which issued their driver's licence). The percentage shown represents each state's share of interstate drivers involved in crashes during the period. As can be seen, New South Wales provides the largest source of interstate drivers involved in crashes in Queensland, followed by Victoria. This distribution is not surprising given the proximity of these states to Queensland and their relatively large populations.

Insert Figure 1 about here

Table 1 examines the differences between interstate and local drivers involved in crashes in Queensland, in terms of a range of driver-related variables. A contingency chi-square (χ^2) test was conducted for each variable to determine whether there were any significant differences in the characteristics of the interstate and Queensland drivers. Post-hoc analyses were then undertaken within each variable using an adjusted standardised residual statistic ($\hat{e}$). The adjusted standardized residual indicates the relative difference between the observed and

expected frequencies for a particular cell, adjusted for row and column totals. This statistic can be used to identify those cells with observed frequencies significantly higher or lower than expected. Adjusted standardized residuals are approximately normally distributed with a mean of 0 and a standard deviation of 1, and can be interpreted as Z-scores (Haberman, 1978).

Insert Table 1 about here

As can be seen, there was a significant difference between the interstate and Queensland drivers in terms of licence status. The interstate drivers were more likely to be experienced, with the large majority (89.8%) holding an open licence. While the interstate drivers were less likely to be unlicensed, they were more likely to be of an unknown licence status. This presumably reflects the difficulties that the police sometimes face in identifying the status of a non-Queensland issued licences. The majority of the interstate driver crashes (87.4%) involved passenger cars. However, there was a significantly higher involvement of articulated trucks in these crashes (5.9% vs 1.8%). This is likely indicative of the high proportion of interstate travel undertaken by articulated truck drivers.

The interstate drivers were more likely to be males (72.2% vs 65.8%) and older, with the majority (62.5%) falling into the 25-59 age category. This is consistent with the interstate drivers being more experienced licence holders and probably reflects the profile of interstate tourists who decide to drive in Queensland. For example, the results suggest that among interstate tourists, males undertake a greater share of the driving than compared with local drivers. Interestingly, when only open licence holders are considered, the age distribution of the drivers changes. The experienced interstate drivers involved in crashes are more likely to

be under 25 or 60 and over. Once again, this probably reflects the relatively greater capacity of these age groups to engage in interstate travel.

Table 2 explores some of the key circumstances surrounding the crashes involving interstate and Queensland drivers. As can be seen, there was a significant difference in the location of the crashes involving the two groups of drivers. Interstate drivers were more likely to be involved in crashes on roads with 100 km/h or 110km/h speed limits (27.5% vs 17.2%) and, conversely, less likely on roads with a speed limit of 60 km/h or less (62.4% vs 72.8%). It is unlikely that these findings are indicative of any differences in driving skills *per se*. Rather, they likely reflect the greater tendency of interstate drivers to travel more on open roads (predominantly rural roads in Queensland) and less on urban roads. Interestingly, there was no difference between interstate and local drivers in terms of the 'time of day' the crash occurred. However, the interstate drivers were slightly more likely to be involved in crashes on weekends (26.2% vs 24.4%), possibly indicative of greater holiday-time driving.

Insert Table 2 about here

Consistent with the FORS (1996) findings, there were few significant differences between the interstate and Queensland drivers in terms of driving behaviour. There were no differences in the case of: alcohol or drugs; exceeding the speed limit or excessive speed for the conditions; inattention or negligence; or failure to keep left. Indeed, while there was a difference between the drivers in terms of inexperience/lack of expertise, the interstate drivers were significantly less likely to be judged by the police to be inexperienced (6.3% vs 13.0%). This is probably indicative of the higher representation of open licence holders among the interstate drivers.

Nonetheless, the police were significantly more likely to consider interstate drivers at fault for the crashes they were involved in than local drivers (59.7% vs 54.1%). This suggests that there are contributing factors to interstate driver crashes that do not fall into the high-risk categories discussed above. One potential factor is driver fatigue, which although only cited in a small proportion of crashes was significantly more likely to be involved in those crashes involving interstate drivers (2.0% vs 1.1%). Fatigue is notoriously difficult to identify as a factor in crashes and is more likely to be involved in serious crashes. Hence, to better examine the role of driver fatigue, a comparison was made between interstate and Queensland passenger car drivers (holding open licences) involved in serious casualty crashes (ie. crashes resulting in either a fatality or a hospitalisation). It was found that the experienced interstate car drivers were significantly more likely to be involved in a serious casualty crashes involving driver fatigue than their local counterparts (3.9% vs 2.0%; χ^2 (df1) = 19.4, $p <$ .001). In addition, the proportion of these interstate drivers involved in serious casualty crashes climbed to over 7.1% (compared with 5.4% for Queensland drivers) when only crashes on 100 km/h or 110 km/h roads were considered.

To further explore this issue, Table 3 compares the serious casualty crashes involving interstate and Queensland drivers in terms of the nature of the crash. As can be seen, the serious casualty crashes involving interstate drivers were significantly more likely to involve sideswipes, hitting fixed obstructions and, in particular, vehicle overturning. In contrast, interstate drivers were less likely to be involved in serious crashes involving angle movements, hitting a parked car and rear-end collisions. Together, these differences tend to suggest that interstate drivers are more likely to experience difficulties in rural rather than urban road environments. In particular, the incidence of overturning crashes among interstate drivers dramatically increases in open road conditions. For example, the incidence of

overturning in serious casualty crashes on 100 km/h and 110 km/h roads was much higher among interstate car drivers than local drivers (28.9% vs 18.0%; $\hat{e} = 5.8$, $p < .001$).

Insert Table 3 about here

DISCUSSION

The results of this study both confirm and extend the findings of previous research by FORS (1996) based on interstate driver fatalities. The findings also support the growing body of evidence suggesting that crashes involving both interstate and international drivers are less likely to be a product of risk-taking *per se*, but rather a lack of familiarity with certain driving conditions, particularly driving in rural and regional areas (Higgins, 1995; Wilks et al., 1999, 2000; Outback Safety Working Group, 2000). For example, interstate driver crashes were no more likely to involve factors such as alcohol, speeding, inattention/negligence or inexperience. Rather, the crash involvement patterns of interstate drivers appear to relate more to the type and location of their driving: they are over-represented in crashes involving open road driving, driver fatigue, the overturning and sideswiping of vehicles, and weekend travel. These findings support the FORS (1996) conclusion linking interstate driver crashes with long holiday trips. It is also possible that the higher incidence of overturning reflects a lack of familiarity with vehicle handling in adverse driving conditions.

Although not a large problem in absolute terms, it is of concern that articulated trucks drivers represent nearly 6% of the interstate drivers involved in crashes on Queensland roads, compared with only 1.8% of local drivers. While this over-involvement may be mainly indicative of higher driving exposure, these drivers warrant special attention. They are a road

user group with distinct characteristics who are, in general, over-represented in serious crashes (Queensland Transport, 2000).

It is also important to acknowledge a potential constraint of the study that may have affected the findings. The identification of interstate drivers was based on their licence status, rather than place of residence. As such, it was impossible to distinguish between drivers who represented genuine interstate travellers and those who may have been longer-term visitors or new residents who had failed to obtain a local licence. While this may lead to some uncertainty, it is likely that the large bulk of these drivers were short-term visitors. In addition, the ratio of interstate visitors to residents should remain relatively stable over time, enhancing the reliability of trends.

Nonetheless, future research in the area should attempt to obtain more information about the travel patterns of interstate drivers, particularly those involved in crashes. This would provide more insight into the possible role of factors such as long-distance driving in crashes. In addition, it would be interesting to examine the perceptions of interstate drivers towards traffic law enforcement. For example, it may be the case that some interstate drivers feel less concerned about being detected for breaking the law, due to the belief that the information will not be passed onto their home state or that they won't later be traced.

Finally, it remains unclear to what extent the results obtained in this study are indicative of interstate driver crashes in other jurisdictions. Queensland is a relatively large state with a wide variety of driving conditions. In addition, the state has a number of centres with high levels of tourist activity. Nonetheless, it is likely that the driving conditions encountered in Queensland are reasonably indicative of many other parts of Australia, particularly those jurisdictions with extensive urban and rural road networks.

IMPLICATIONS FOR COUNTERMEASURE DEVELOPMENT

The present study has confirmed a number of priorities for reducing the incidence of crashes involving interstate drivers. While the effects of alcohol and speeding remain concerns for all road users, effort needs to be directed at reducing the problems that interstate drivers experience while driving in unfamiliar environments, particularly in open-road, rural environments. Central among these difficulties is driver fatigue and the overturning of vehicles.

As a consequence, interstate drivers would benefit from continued improvements to rural road conditions, particularly those targeting driver fatigue such as the use of audible edgelines, the widening of road shoulders and the enhancement of rest areas. Educational initiatives in the area should focus on:

- the dangers associated with long distance driving;
- the need for realistic trip planning;
- the need for regular rest stops to counter driver fatigue;
- the selection of a vehicle appropriate for the driving tasks being undertaken; and
- the relevance of traffic law enforcement programs to interstate drivers.

In addition, this study has highlighted the continuing need to develop countermeasures specifically targeting the drivers of articulated trucks.

ACKNOWLEDGEMENTS

This research was supported by funds from the Motor Accident Insurance Commission (Queensland). The authors would like to thank Queensland Transport for providing the crash data, especially Geoff Meers, Wayne Dale and Tim Lebsanft for their assistance.

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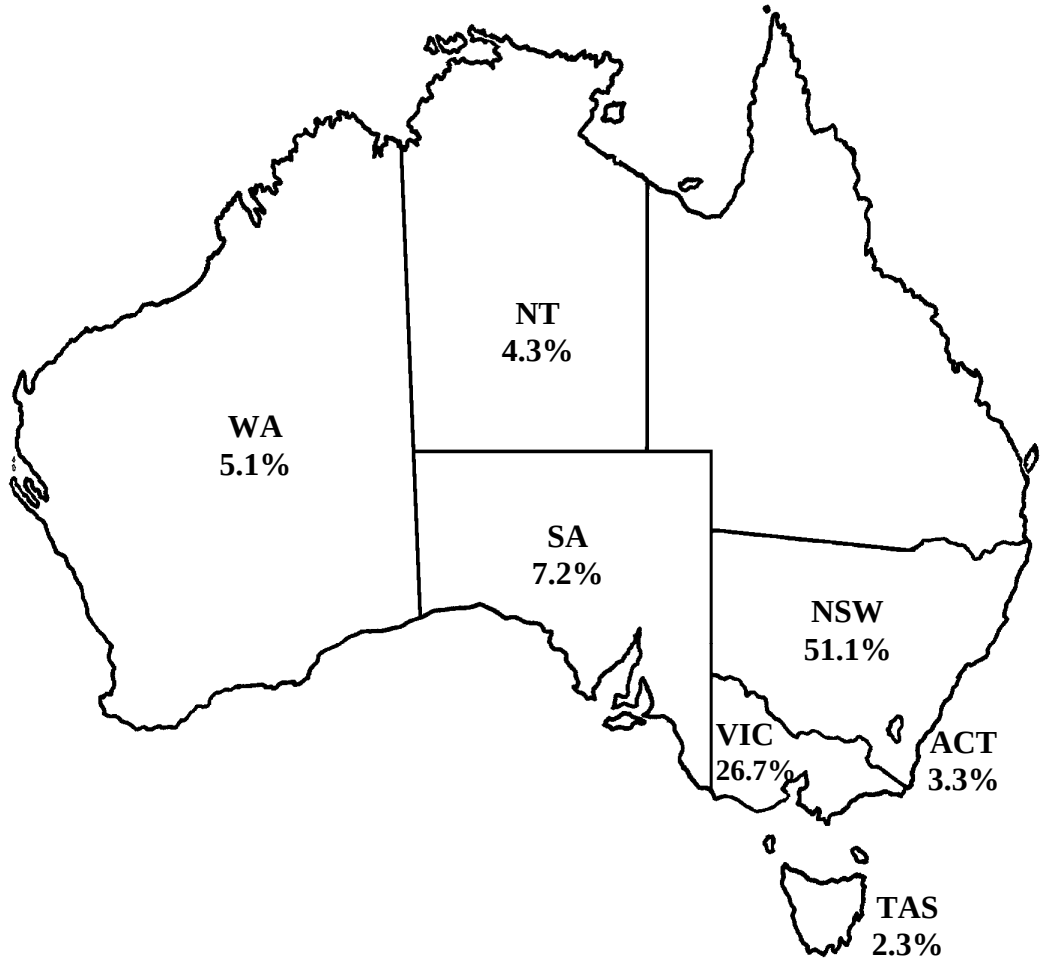

Figure 1: Origin of interstate drivers involved in crashes in Queensland 1993 -1998

TABLE 1: INTERSTATE VS QUEENSLAND DRIVERS BY KEY DRIVER-RELATED VARIABLES FOR ALL CRASHES: 1993-1998

VARIABLE	DRIVER CLASSIFICATION		Significance level[1]
	Interstate (%)	Queensland (%)	
Licence status	(N=9433)	(N=181540)	χ^2 (df4) = 2995, $p < .001$*
Open	89.8	78.3	$\hat{e}$ = 26.6, p < .001
Provisional	6.0	18.2	$\hat{e}$ = 30.3, p < .001
Learner	0.7	2.0	$\hat{e}$ = 8.5, p < .001
Unlicensed	0.5	1.3	$\hat{e}$ = 7.2, p < .001
Unknown & restricted	3.0	0.2	$\hat{e}$ = 44.5, p < .001
Vehicle type	(N=9423)	(N=180845)	χ^2 (df4) = 809.2, $p < .001$*
Passenger cars	87.4	90.9	$\hat{e}$ = 11.3, p < .001
Truck	1.7	2.7	$\hat{e}$ = 6.3, p < .001
Articulated truck	5.9	1.8	$\hat{e}$ = 27.7, p < .001
Bus	0.7	0.7	
Motorcycles	4.3	3.8	
Gender (N=31936)	(N=9431)	(N=181524)	χ^2 (df1) = 160.6, $p < .001$*
Males	72.2	65.8	$\hat{e}$ = 12.7, p < .001
Females	27.8	34.2	$\hat{e}$ = 12.7, p < .001
Age (All drivers)	(N=9362)	(N=181521)	χ^2 (df2) = 220.2, $p < .001$*
Under 25	25.2	31.7	$\hat{e}$ = 13.3, p < .001
25 - 59	62.5	58.9	$\hat{e}$ = 7.0, $p < .001$
60 and over	12.3	9.4	$\hat{e}$ = 9.3, p < .001
Age (Open licence holders only)	(N=8427)	(N=142147)	χ^2 (df2) = 147.1, $p < .001$*
Under 25	20.9	16.4	$\hat{e}$ = 10.8, p < .001
25 - 59	65.9	71.7	$\hat{e}$ = 11.5, p < .001
60 and over	13.3	11.9	$\hat{e}$ = 3.7, p < .001

[1] The results of all chi-square (χ^2) tests are shown, with significant results marked with an asterisk (*). Only the significant adjusted standardised residuals ($\hat{e}$) are shown.

TABLE 2: INTERSTATE VS QUEENSLAND DRIVERS BY KEY CRASH CIRCUMSTANCE VARIABLES FOR ALL CRASHES: 1993-1998

VARIABLE	DRIVER CLASSIFICATION		Significance level[1]
	Interstate (%)	Queensland (%)	
Speed limit	(N=9433)	(N=181540)	χ^2 (df2) =671.2, p < .001*
60 km/h or less	62.4	72.8	$\hat{e}$ = 22.1, p < .001
70 – 90 km/h	10.1	10.0	
100 – 110 km/h	27.5	17.2	$\hat{e}$ = 25.5, p < .001
Time of day	(N=9433)	(N=181540)	χ^2 (df1) = 0.04, p > .005
Day (6:00am - 5:59pm)	76.3	76.4	
Night (6:00pm – 5:59am)	23.7	23.6	
Day of week	(N=9433)	(N=181540)	χ^2 (df1) = 14.9, p < .001*
Weekday	73.8	75.6	$\hat{e}$ = 3.9, p < .001
Weekend	26.2	24.4	$\hat{e}$ = 3.9, p < .001
Alcohol or drugs	(N=9429)	(N=181457)	χ^2 (df1) = 3.1, p > .005
Yes	3.8	3.5	
No	96.2	96.5	
Exceed speed limit & excessive speed for conditions	(N=9429)	(N=181457)	χ^2 (df1) = 0.4, p > .005
Yes	2.2	2.1	
No	97.8	97.9	
Driver fatigue	(N=9429)	(N=181457)	χ^2 (df1) = 67.9, p < .001*
Yes	2.0	1.1	$\hat{e}$ = 8.2, p < .001
No	98.0	98.9	$\hat{e}$ = 8.2, p < .001
Inattention or negligence	(N=9433)	(N=181540)	χ^2 (df1) = 1.3, p > .005
Yes	0.1	0.1	
No	99.9	99.9	
Inexperience / lack of expertise	(N=9433)	(N=181540)	χ^2 (df1) = 364.5, p < .001*
Yes	6.3	13.0	$\hat{e}$ = 19.1, p < .001
No	93.7	87.0	$\hat{e}$ = 19.1, p < .001
Considered at fault by Police	(N=9433)	(N=181540)	χ^2 (df1) = 113.2, p <.001
Yes	59.7	54.1	$\hat{e}$ = 10.6, p < .001
No	40.3	45.9	$\hat{e}$ = 10.6, p < .001
Failure to Keep Left	(N=9433)	(N=181540)	χ^2 (df1) = 1.4, p > .005
Yes	1.1	1.0	
No	98.9	99.0	

1 The results of all chi-square (χ^2) tests are shown, with significant results marked with an asterisk (*). Only the significant adjusted standardised residuals ($\hat{e}$) are shown.

TABLE 3: NATURE OF CRASHES INVOLVING INTERSTATE VS QUEENSLAND DRIVERS, FOR SERIOUS CASUALTY CRASHES: 1993-1998

NATURE OF CRASH	DRIVER CLASSIFICATION		Significance level[1]
	Interstate (%) N=9433	**Queensland (%)** N=181540	χ^2 (df9) = 446.7, $p < .001$
Angle	36.3	40.8	$\hat{e}$ = 8.7, p < .001
Sideswipe	6.8	5.8	$\hat{e}$ = 4.2, p < .001
Head-on	4.3	3.9	
Hit fixed obstruction	12.4	11.3	$\hat{e}$ = 3.5 p < .001
Hit pedestrian	2.1	2.4	
Hit parked vehicle	1.8	2.4	$\hat{e}$ = 4.1, p < .001
Hit animal	1.2	0.9	
Overturned	8.2	4.2	$\hat{e}$ = 18.5, p < .001
Rear-end	25.7	27.3	$\hat{e}$ = 3.5, p < .001
Miscellaneous	1.3	1.1	

[1] Only the significant adjusted standardised residuals ($\hat{e}$) are shown.