The Crash Risk of Disqualified/Suspended and Other Unlicensed Drivers

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Background

Unlicensed driving remains a serious problem in many countries, despite ongoing improvements in traffic law enforcement practices and technology. In the USA, over 10% of the drivers involved in fatal crashes do not hold a valid licence, while approximately 20% of all fatal crashes involve at least one of these drivers (1, 2). In Australia, unlicensed drivers represent over 5% of the drivers involved in fatal crashes. The crashes involving unlicensed drivers and riders account for almost 10% of the national road toll (3).

Unlicensed driving represents a major problem for road safety in two respects. Firstly, it undermines the effectiveness of driver licensing systems by preventing the allocation of demerit points and reducing the impact of licence loss, which has otherwise been demonstrated to be a very effective deterrent to illegal behaviour (4, 5). Secondly, there is a growing body of evidence linking unlicensed driving, particularly disqualified driving, to a cluster of high-risk behaviours including drink driving, speeding, failure to wear seat belts and motorcycle use (1, 6, 7). Consistent with this, the crashes involving unlicensed drivers tend to be more severe than those involving licensed drivers, resulting in higher rates of fatality and serious injury (7).

While the above data suggest that unlicensed drivers engage in more risky behaviour than licensed drivers, it does not necessarily confirm that they have a higher crash risk. This is because the crash data does not take into account possible differences in the exposure patterns of unlicensed drivers. Indeed, there is a common assumption in the literature that unlicensed drivers drive in a more cautious manner, or at least restrict their driving, to avoid detection. For example, Hurst (8) proposed the existence of a *disqualified driver effect*, whereby disqualified and other unlicensed drivers are rewarded for driving safely and inconspicuously because it reduces the threat of detection. Similarly, Scopatz *et al* (2) suggest that the lower rates of drink driving reoffences among drivers who fail to have their licence reinstated (compared with those who do become reinstated) may not necessarily be due to these people giving up driving altogether. Rather, it may be the product of continued driving which is less frequent and more cautious. However, others have questioned the assumption that unlicensed drivers drive in a more cautious manner. Warren (9) argued that the behaviour of unlicensed drivers is primarily motivated by the desire to avoid apprehension, rather than to drive safely.

In an attempt to clarify the crash risks associated with unlicensed driving, DeYoung, Peck and Helander (10) examined the fatal crash involvement of different drivers in California. Given the difficulty in obtaining accurate exposure data, they used a quasi-induced exposure procedure to estimate the exposure and subsequent fatal crash rates of licensed and unlicensed drivers. This procedure involves dividing the proportion of at-fault drivers in a particular group by the proportion of innocent drivers to calculate an estimated crash rate. It is based on the assumption that the proportion of crash-involved innocent drivers should be indicative of their overall representation in the driving population. Based on the method, DeYoung *et al* (10) estimated that suspended/revoked drivers and other

unlicensed drivers were over-involved in fatal crashes by a factor of 3.7:1 and 4.9:1, respectively, compared to licensed drivers.

The objectives of the current study were two-fold. The first was to replicate the quasi-induced exposure method used by DeYoung *et al* (10) to estimate the crash risks associated with unlicensed driving in the Australian state of Queensland. The second objective was to confirm whether the crashes involving unlicensed drivers tend to be more severe than those involving licensed drivers, after controlling for driver-related characteristics such as age, gender and vehicle driven.

Method

The data used in this study was extracted from Queensland Transport's road crash database for the years 1994-98. This database contains records for all crashes reported to the police in the state (which is required in cases where the crash results in either a death or injury to a person or property damage exceeding $2,500). Among the information provided for each crash was: the age, gender and licence status for all drivers of motorised vehicles (including cars, car derivatives, trucks, buses and motorcycles) involved in the crash; and information relating to the severity of the crash. The categories of unlicensed drivers identified in the database included: drivers with an *expired* licence; *disqualified*/*suspended* drivers; drivers with an *inappropriate class of licence*; drivers who have *never held a licence*; and *other unlicensed* drivers.

Unfortunately, the crash database does not distinguish between those drivers who have been disqualified by a court for drink driving, dangerous driving or unlicensed driving and those who have had their licence suspended for accumulation of demerit points (typically for speeding). Consequently, it was not possible to disaggregate the *disqualified* and *suspended* drivers. The *other unlicensed* category is used by the police in cases where drivers are detected contravening special licence restrictions (*eg.* driving outside the hours permitted by a restricted licence) or when they are satisfied that the driver does not hold a valid licence but the exact circumstances are unclear.

As noted earlier, the quasi-induced exposure method is based on the assumption that drivers who are considered innocent in a crash are largely incidental to the event and thus represent a random sample of drivers. The method involves the calculation of two rates:

$$\text{Involvement rate (IR)} = \frac{\%\ \text{at fault}}{\%\ \text{innocent}} \qquad \text{Crash (ratio) rate} = \frac{\text{IR for unlicensed drivers}}{\text{IR for licensed drivers}}$$

The involvement rate (IR) is calculated for each licence class by dividing the percentage of drivers considered to be at fault in multi-vehicle crashes with the percentage who were innocent. A crash (ratio) rate can then be derived for unlicensed drivers (or particular types of unlicensed drivers) by dividing their IR with that calculated for licensed drivers (10).

In order to facilitate the use of the quasi-induced exposure method with the Queensland data it was necessary to: (i) identify those drivers considered at fault for a crash; and (ii) differentiate between multi-vehicle and single vehicle crashes. The first of these requirements was met by examining the unit number for each of the drivers included in the database. The standard practice of the police in Queensland (during the study period) was to assign unit number one to the road user that they considered most at fault for the crash. The selection of multi-vehicle crashes was based on the vehicle movements recorded for each crash, with all angle, head-on, rear-end and side-swipe crashes included. Five years of data was analysed to ensure that general trends were identified and to provide sufficient numbers to permit meaningful comparisons between the various

groups of drivers. Consequently, the sample size used in some of the analyses is very large. In light of this and the multiple analyses undertaken, it was decided to set the significance level (α) for the statistical tests at .01.

Results

Risk of Involvement in a Crash

Table 1 summarises the risk of involvement in a multi-vehicle crash for variety of different driver groups, based on the quasi-induced exposure method. The risk of being involved in a crash is expressed as an odds ratio with the licensed drivers representing the primary reference category. Odds ratios are provided for each of the different crash severities, as well as for total crashes, with the 99% confidence limits shown in brackets. Due to the small number of unlicensed drivers involved in fatal multi-vehicle crashes (n = 47), a fatal crash odds ratio was only calculated for unlicensed drivers as a whole rather than for each of the sub-groups.

Table 1: Risk of involvement in a multi-vehicle crash by driver type and crash severity for Queensland: 1994-98 (99% CI)

Driver group	Risk of involvement in a crash				
	Fatal crash	**Serious injury crash**	**Other injury crash**	**Property damage only (PDO)**	**Total crashes**
Licensed drivers[1]	1.00 - n=1191	1.00 - n=15348	1.00 - n=46801	1.00 - n=58955	1.00 - n=122295
All unlicensed drivers	2.72 (0.53 – 13.97) n=47	**2.03** (1.29 – 3.20) n=558	**2.75** (1.91 – 3.97) n=925	**3.80** (2.61 – 5.53) n=1030	**2.90** (2.32 – 3.62) n=2560
Never licensed drivers		**5.43** (1.24 – 23.72) n=81	**3.93** (1.29 – 12.00) n=117	**7.52** (2.17 – 26.12) n=142	**5.38** (2.63 – 10.99) n=343
Disqualified/ suspended drivers		**2.73** (1.06 – 7.05) n=138	**3.38** (1.58 – 7.23) n=235	**5.48** (2.42 – 12.39) n=267	**3.84** (2.39 – 6.16) n=654
Other unlicensed drivers		1.86 (0.83 – 4.17) n=173	**2.72** (1.49 – 4.98) n=339	**3.24** (1.83 – 5.73) n=414	**2.73** (1.90 – 3.93) n=938
Expired licence drivers		1.26 (0.42 –3.79) n=87	**2.74** (1.14 – 6.61) n=161	**2.33** (1.06 – 5.12) n=188	**2.13** (1.28 – 3.56) n=442
Inappropriate class of licence drivers		1.14 (0.36 – 3.61) n=79	1.02 (0.30 – 3.46) n=73	4.62 (0.25 – 84.20) n=19	1.33 (0.62 – 2.84) n=183

1. Primary reference category

The significant ($p < .01$) crash odds ratios are shown in bold

Overall, unlicensed drivers were significantly more likely to be involved in a crash than licensed drivers, at various crash severities. The highest risk related to PDO crashes [3.8:1], while the lowest was for serious injury crashes [2.03:1]. Although the risk of an unlicensed driver being involved in a fatal crash [2.72:1] was not significant, it was very similar to that for total crashes [2.9:1]. As will be discussed later, these results are not that dissimilar to those obtained by DeYoung *et al* (10).

In addition, the pattern of results for the unlicensed driver sub-groups was relatively stable across the other crash severities. While there is some movement up and down in the ratios, the ordering of the sub-groups generally remains consistent, with the *never licensed* drivers having the highest risk followed by the *disqualified/suspended* drivers. In all but one case, the lowest ratios were found for the drivers with an *inappropriate class of licence* followed by those with an *expired* licence. Although not significant, one exception to this pattern is the ratio for the drivers with *inappropriate class* of licence involved in PDO crashes [4.6:1]. This ratio is substantially higher than the other ones for this group and may in part reflect the relatively small size of the group [n=19].

Risk of death and serious injury in the event of a crash

As noted earlier, previous research has indicated that crashes involving unlicensed drivers tend to be more severe than those involving licensed drivers. However, the exact reasons for this remain unclear. Firstly, it is possible that the results partly reflect the underreporting of minor crashes among unlicensed drivers. This is plausible, given the illegal nature of the behaviour, particularly in the case of single-vehicle crashes. Secondly, it is possible that it is more indicative of the characteristics of the people who decide to drive without a licence and the types of vehicle they drive (*eg.* a motorcycle), rather than the nature of unlicensed driving *per se.* To explore this issue, a logistic regression was conducted to examine the contribution of these factors to the severity of road crashes. The dependent variable in this analysis was a dichotomous variable measuring whether the crash resulted in a serious casualty (*ie*. a fatality or serious injury) vs. a minor injury or property damage only (PDO). The independent variables were: gender; age (measured using dummy variables corresponding to the age categories 12-20, 21-29, 30-49, 50-69, 70 and over); vehicle type (motorcycle vs. car/truck/bus) and licence status (licensed vs. unlicensed and licensed vs. the various groups of unlicensed drivers).

The results of the logistic regression are reported in Table 2. As can be seen, gender was a significant predictor of crash severity with females having a lower risk than males of being involved in a serious casualty crash. The relationship between age and crash severity appeared to be linear, with older drivers having a greater risk of being involved in a more severe crash. The higher risk experienced by the drivers aged 70 and over [1.52] is consistent with the effects of frailty on injury outcomes. The type of vehicle driven appears to exert a particularly strong influence on the severity of crashes. Riding a motorcycle was associated with four and half times [4.58] the risk of a crash resulting in a serious casualty rather than a minor injury or PDO. Finally, being unlicensed was associated with an increased likelihood [1.82 times] of being involved in a serious casualty crash. Among the unlicensed drivers, the group with the highest odds ratios were the *never licensed* drivers [2.01] and the *disqualified/suspended* drivers [1.96].

Discussion

The results obtained using the quasi-induced exposure method indicate that unlicensed drivers are two to three times more likely to be involved in crashes of various severities compared to licensed drivers. Overall, the risk of an unlicensed driver being involved in a crash of any severity was almost three times [2.9:1] higher than that for licensed drivers. It is difficult to directly compare these results to those obtained by DeYoung *et al* (10) in California, since only fatal crashes were examined in that study and a different definition was used for unlicensed driving. Consequently, the only groups that appear directly comparable are the suspended/revoked group from the DeYoung *et al* (10) study and the *disqualified/suspended* drivers in the current study. Given this, it is interesting to note that the fatal crash ratio obtained for the suspended/revoked drivers [3.7:1] in the Californian

study was quite similar to the total crash ratio calculated for the *disqualified/suspended* drivers in this study [3.84:1].

Table 2: Logistic regression of the severity of crashes as a function of driver licence status and selected driver-related variables (n=162,168)

Variables	*B*	Std. error	Wald test	Odds Ratio	99% CI for Odds ratio	
					Upper	Lower
Gender						
Male	0			1.00		
Female	-.08	.02	31.2*	0.92	0.88	0.96
Age						
12-20	0			1.00		
21-29	.02	.02	1.0	1.02	0.97	1.08
30-49	.06	.02	8.8	1.06	1.01	1.12
50-69	.14	.02	35.7*	1.16	1.09	1.23
70 and over	.42	.03	151.6*	1.53	1.40	1.67
Vehicle type						
Car/truck/bus	0			1.00		
Motorcycle	1.52	.03	3163.6*	4.57	4.27	4.90
Licence status						
Licensed	0			1.00		
All unlicensed drivers	.60	.03	321.5*	1.82	1.67	1.98
Never licensed	.70	.07	87.9*	2.01	1.66	2.43
Disqualified/suspended	.67	.06	115.1*	1.96	1.67	2.31
Inappropriate class	.63	.12	27.7*	1.88	1.38	2.56
Expired	.57	.09	41.4*	1.76	1.41	2.21
Other unlicensed	.49	.06	73.8*	1.63	1.41	1.89

Full model vs. constant-only model: χ^2 (*df*11) = 3762.0, $p < .001$; Nagelkerke $R^2 = .04$; * $p < .001$

This study has also confirmed that being unlicensed increases the likelihood of being involved in a serious casualty crash (rather than a minor crash) even after taking account of key driver characteristics like gender, age and type of vehicle driven. This was most evident among the *never licensed* and *disqualified/suspended* drivers, who both had a risk approximately double that of licensed drivers. Interestingly, this pattern of results is largely consistent with those obtained from the quasi-induced exposure method.

A full discussion of the strengths and weakness associated with the quasi-induced exposure method are beyond the scope of this paper. However, it is important to note that the method introduces a range of potential biases. Firstly, it assumes that the results obtained for multi-vehicle crashes are representative of all crashes. Secondly, it is possible that unlicensed drivers considered innocent by the police may represent a more crash-prone group than the innocent licensed drivers because many of them "*are young, male, risk takers*" (13, p.20). In other words, the actions of unlicensed drivers may be more likely to contribute to a crash, even in cases where they are considered the innocent party. This would in effect overestimate the number of unlicensed drivers on the road (because some of the at-fault unlicensed drivers would have been misclassified as innocent drivers), resulting in an IR rate that is too low for the group. Thirdly, it is possible that the police may be more likely to find an unlicensed driver at fault for a crash, not

specifically due to their driving behaviour, but because they have already broken the law by driving without a valid licence *(ie.* a negative halo effect) (10). This would tend to inflate the percentage of unlicensed drivers considered at fault and their corresponding IR rate. Consequently, while the extent of these biases is difficult to estimate, it is possible that they mitigate against each other (10). It is also possible that the results relating to the severity of crashes are, in part, indicative of the under-reporting of minor crashes involving unlicensed drivers. Accordingly, some caution should be exercised when interpreting the results of the current study, until they are replicated in other jurisdictions using a variety of methods.

Conclusion

The results of this study suggest that unlicensed drivers are at a higher risk of crashing than licensed drivers and that their crashes tend to be more severe. This is most pronounced among the *never licensed* and *disqualified/suspended* drivers. The results are consistent with other studies that have shown an over-involvement of risky driving behaviours, such as drink driving, speeding and motorcycle use, in the crashes involving unlicensed drivers. Together, the results question the common assumption that unlicensed drivers drive in a more cautious manner to avoid detection. While many unlicensed drivers may reduce their overall driving exposure in order to avoid detection, this does not appear to result in *safer* driving. While it remains possible that unlicensed drivers tend to act more cautiously than they would otherwise, this does not render them as *safe* as licensed drivers. Consequently, further efforts are required to reduce the incidence of unlicensed driving, particularly among *never licensed* and *disqualified/suspended* drivers.

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