The effects of licence disqualification on drink-drivers: Is it the same for everyone?

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The effects of licence disqualification on drink-drivers:  
Is it the same for everyone?


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Abstract

Drink-driving remains a major road safety concern that creates a significant social burden. Licence disqualification continues to play a key role in drink driving deterrence and sanctions together with police enforcement to address the problem in most motorised countries. However, on-going questions remain regarding the differing effect of licence disqualification periods between first time and repeat offenders, and between other sub-groups of offenders. As a result, this study aimed to determine whether: (a) differences exist in re-offence rates of convicted drink-drivers between: the period between committing the drink-driving offence and licence disqualification (pre-licence disqualification), during the period of licence disqualification, and after being re-licensed (post-licence restoration); and (b) differential effects of offence rates are evident based on Blood Alcohol Content (BAC), gender, age, repeat offender status and crash involvement at the time of offence. The sample consisted of 29,204 drink-driving offenders detected in Victoria, Australia between 1 January 1996 and 30 September 2002. The analysis indicated that licence disqualifications were effective as drink-driving offenders had a significantly lower rate of offending (both drink-driving and other traffic offences) during licence disqualifications compared to pre-licence disqualification and post-licence restoration periods. The influence of licence disqualification appeared to extend beyond the disqualification period, as offence rates were lower during post-licence restoration than during pre-licence disqualification. Interestingly, the highest rate of offending (both for drink-driving and other traffic offences) was during the pre-licence disqualification period, which suggests offenders are particularly vulnerable to drink and drive while waiting to be sanctioned. A consistent pattern of results was evident across genders and age groups. Additionally,
those who were involved in a crash at the same time as their index offence had lower
offence rates (compared to those who were not involved in a crash) for all periods,
although for general traffic offences, the offence rate was highest in the post-licence
restoration period for those who had a crash at index offence. This indicates that being
involved in a crash may deter these offenders, at least in the short-term. The
implications of the results for managing both first time and repeat offenders are
discussed.

**Keywords:** drink-driving, drunk-driving, licence disqualification, sanctions, offences

**Highlights**

- 6.5 years of offence history data for 29,204 drink-driving offenders was considered.

- Licence disqualification was effective at reducing drink-driving offence rates, as well as reducing general traffic offences.

- Licence disqualification had residual benefits as offence rates were lower post-than pre-disqualification.

- Offences were most prevalent in the lag time between offence and application of sanction.

**1. Introduction**

Drink-driving continues to be a serious and persistent problem in all motorised
jurisdictions, as alcohol-related crashes result in substantial fatalities, injuries and
property damage. Alcohol-related crashes are one of the leading causes of death on the
roads, for example in Victoria, Australia 32% of driver fatalities between 2008 and
2011 had a Blood Alcohol Concentration (BAC) over zero. In fact, 28% of driver
fatalities had an illegal BAC (≥ .05) and 10% had a BAC over .2. Nearly 23% of motorcyclist fatalities had a BAC over zero (18% of motorcyclist fatalities had an illegal BAC (≥ .05) and 4% had a BAC over .2) (Coroners Prevention Unit, 2013). The legal BAC limit in Victoria is less than .05. Of particular concern is the proportion of repeat drink-driving offenders, for example within Victoria 30% of detected drink-drivers had a previous drink-drive conviction (Boorman, 2012). In regards to crashes, research has also demonstrated that repeat offenders are disproportionately represented in crash statistics (Beirness, Mayhew, & Simpson, 1997; Brewer et al., 1994).

The gravity of the problem is reflected in the enormous amount of literature that has focused on the personal and economic cost of drink-driving, as well as the development and implementation of various countermeasures to reduce the prevalence of the offending behaviour (Beirness et al., 1997). Countermeasures to address drink-driving vary across different jurisdictions, although licence disqualification has historically formed the foundation of many legislative responses to such offending behaviours. The application of licensing sanctions has consistently proven an effective general and specific deterrent (Peck, 1991; Ross, 1991), although questions remain as to whether the sanction improves general driving behaviour for offenders post relicensing. General and specific deterrence stem from the Classical Deterrence Doctrine, which remains the mostly widely cited model for the study of sanctions effect(s) within road safety (Freeman et al., 2015). Specific deterrence is the process whereby an individual who has been apprehended and punished for a criminal act refrains from further offending behaviour for fear of incurring additional punishment (Homel, 1988). This phenomenon will remain the primary focus of the current study, in particular, the effect of licence disqualification.
While there has been considerable focus on the impact of sanctions (Wagenaar, & Maldonado-Molina, 2007), there has been limited consideration as to whether apprehended drink-drivers re-offend during the period of time between apprehension and application of sanction, despite waitlisting times to appear in court often being long (e.g. six to twelve months on average). However, it is noted that some preliminary research has focused on the positive impact of changes to administrative suspension laws that has resulted in a reduction in the penalty application timeframe (McArthur, & Kraus, 1999; Voas, Tippets & Fell, 2000). What is known is that drink-drivers are not a homogenous group (Nochajski & Wieczorek, 2000), as research has demonstrated that first time and repeat offenders often differ in both characteristics and treatment needs (Stewart, Boase, & Lamble, 2004). These two groups display a tendency to respond differently to the application of sanctions (Ferguson, Sheehan, Davey, & Watson, 1999; Freeman, 2004), in particular, Norther American research has demonstrated that the application of licence sanctions on repeat offenders (in isolation) is relatively ineffective (Beirness et al., 1997; Coben & Larkin, 1999).

An important consideration for the current study was to not only identify the effectiveness of licence disqualification, but also to assess the impact of this approach on different groups of offenders. Currently, questions also remain regarding the impact of licence disqualification periods on gender, age and BAC level at time of apprehension. That is, whether motorists respond differently to the sanction depending on their gender, age and level of alcohol consumption. Therefore, the project focuses on drink-driving outcome data and also considers the general demographics of the population (e.g., age, sex, drink-driving history). Without such a comprehensive
investigation, a deeper understanding into the specific impact of licence sanction on re-
offence rates cannot be achieved. This project considers all facets in order to maximise
the potential to obtain large safety gains through the on-going sanctioning of drink-
drivers.

The aims of this study were to determine whether:

- drink-drivers differ in re-offence rates during the licence period between offence
  incidence and licence disqualification (pre-licence disqualification), during the
  period of licence disqualification, and after being re-licensed (post-licence
  restoration); and

- effects of licence disqualification on offence rates are differential based on BAC,
  gender, age, repeat offender status and crash involvement at the time of offence.

2. Method

Drivers and riders convicted of a drink-driving offences committed between
1 January 1996 and 30 September 2002 (inclusive) were considered eligible persons for
analysis (N = 29,204). The time period was determined as part of a larger project to
coincide with a period prior to alcohol ignition interlocks coming into effect. This was
so that the unique effect of licence disqualification (without the influence of interlocks)
could be assessed. Data files relating to all offences, licence status changes,
disqualifications from driving, licence conditions, and driver and rider demographics
were provided from the VicRoads Driver Licensing System (DLS).

For each offender, the index drink-driving offence between 1 January 1996 and 30
September 2002 (the first drink-driving offence recorded) was identified. Offence rates
were calculated for the period between the index offence and the licence disqualification
(pre-licence disqualification period), the licence disqualification period, and the post-
licence restoration period. The rates of offences (drink-driving and other traffic
offences) were calculated per thousand person-years for all the licence/sanction periods.
This approach was based on previous research by Siskind (1996) to account for the
different length of disqualification periods for offenders (i.e. as a form of exposure
control). Other offences included speeding, unlicensed driving, using a mobile phone
while driving, violations of road rules and red-lighting running. In order to test for
statistical significant differences in these rates across the different licence/sanction
periods, rate ratios were calculated separately for drink-driving and general traffic
offence rates for:

- Licence disqualification versus pre-licence disqualification;
- Licence disqualification versus post-licence restoration; and
- Post-licence restoration versus pre-licence disqualification.

In order to determine the statistical significance of the rate ratios, confidence intervals
for all rate ratios were calculated as follows:

\[ 95\% \text{ Lower confidence level} = \exp \left( \ln(\text{Rate Ratio}) - 1.96 \times SE \right) \]
\[ 95\% \text{ Upper confidence level} = \exp \left( \ln(\text{Rate Ratio}) + 1.96 \times SE \right) \]

Where: \[ SE = \sqrt{\frac{1}{X_1} + \frac{1}{X_2}} \]

Where: \( X_1 = \text{Number of offences in period 1} \) and \( X_2 = \text{Number of offences in period 2} \).
Statistical significance was determined by the confidence interval not including 1.
Rate ratios were calculated and compared for each period by index offence BAC level category (Low-range – between .001 and .070; Mid-range – between .071 and .149; High-range – .150 and above), gender, age group (16-24, 25-49, 50+), repeat offender status (at index) and involvement in a crash at index offence.

The weighted mean of the rate ratios across the strata (e.g., male versus female) was calculated using the Cochran-Mantel-Haenzel for incidence rates. The rate ratios for each variable stratum were then compared to the Cochran-Mantel-Haenzel rate ratio using a Chi-square test for homogeneity. The formula is as follows:

\[
\frac{\sum a_i (PY_{oi}) / PY_i}{\sum c_i (PY_{ei}) / PY_i}
\]

Where: \(a_i\) is the number of offences/crashes for period 1 and \(c_i\) is the number of offences/crashes in period 2, \(PY_{oi}\) and \(PY_{ei}\) are the person-years in each period and \(PY_i\) is the total person-years for the stratum.

Then this average (pooled) rate ratio was used to calculate a Chi-square test for homogeneity to determine if the rate ratios differ across strata. The formula for this was as follows:

\[
\chi^2 = \sum \frac{(R_i - \hat{R})^2}{V_i}
\]

Where \(R_i\) = stratum specific rate ratio; \(\hat{R}\) = estimated pooled rate ratio; and \(V_i\) = the variance \((V_i = \sum \frac{1}{x_i})\) with \(x_i\) = number of offences in the stratum. The Chi-square was then assessed at a significance level of .05.

3. Results
The characteristics of the drink-driving offenders in the licence period are outlined in Table 1. The majority of offenders were male. There was a greater prevalence of first time than repeat offenders. Approximately, 5% of offenders were involved in a crash at the time of their index offence.

Table 1: Characteristics of the drink-driving offender sample

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>25,391</td>
<td>86.9</td>
</tr>
<tr>
<td>Female</td>
<td>3,813</td>
<td>13.1</td>
</tr>
<tr>
<td>Age group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16-24</td>
<td>11,474</td>
<td>39.3</td>
</tr>
<tr>
<td>25-49</td>
<td>15,687</td>
<td>53.7</td>
</tr>
<tr>
<td>50+</td>
<td>2,043</td>
<td>7.0</td>
</tr>
<tr>
<td>BAC level (index offence)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low-range (between .001 and .070)</td>
<td>3,269</td>
<td>11.2</td>
</tr>
<tr>
<td>Mid-range (between .071 and .149)</td>
<td>15,705</td>
<td>53.8</td>
</tr>
<tr>
<td>High-range (.150 and above)</td>
<td>4,155</td>
<td>14.2</td>
</tr>
<tr>
<td>Licence type</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Learner</td>
<td>813</td>
<td>2.8</td>
</tr>
<tr>
<td>Probationary</td>
<td>8,138</td>
<td>27.9</td>
</tr>
<tr>
<td>Open</td>
<td>20,253</td>
<td>69.4</td>
</tr>
<tr>
<td>Offender status at index</td>
<td></td>
<td></td>
</tr>
<tr>
<td>First time offender</td>
<td>24,641</td>
<td>84.4</td>
</tr>
<tr>
<td>Repeat offender</td>
<td>4,563</td>
<td>15.6</td>
</tr>
<tr>
<td>Crash at index offence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>1,540</td>
<td>5.3</td>
</tr>
<tr>
<td>No</td>
<td>27,664</td>
<td>94.7</td>
</tr>
</tbody>
</table>

Table 2 shows the re-offence and crash rates (drink-driving and other) for all drink-driving offenders. The highest rates of re-offending were in the licence period between
the index offence and the licence disqualification, followed by the period post-licence restoration.

Table 2: Offence rates (per 1,000 person years) for all offenders for each licence period

<table>
<thead>
<tr>
<th>Time period</th>
<th>Drink-driving offences</th>
<th>General traffic offences¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Period between index offence and licence disqualification (pre-licence disqualification)</td>
<td>93.7</td>
<td>914.4</td>
</tr>
<tr>
<td>Period during licence disqualification</td>
<td>28.3</td>
<td>307.5</td>
</tr>
<tr>
<td>Period post-licence restoration</td>
<td>53.7</td>
<td>664.0</td>
</tr>
</tbody>
</table>

¹ Excluding drink-driving offences

As shown in Table 3 below, all drink-driving offenders had a statistically significantly lower rate of offending (both drink-driving and other traffic offences) during licence disqualifications compared to the pre-licence disqualification and post-licence restoration periods. Also, the post-disqualification licensed period had a statistically significantly lower rate of offending compared to the pre-licence disqualification period.

Table 3: Offence rate ratios all drink-drivers

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Rate ratio (95% CI)</th>
<th>Drink-driving offences</th>
<th>Other traffic offences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence disqualification vs. Pre-licence disqualification</td>
<td>0.30* (0.27 – 0.33)</td>
<td>0.34* (0.33 – 0.35)</td>
<td></td>
</tr>
<tr>
<td>Licence disqualification vs. Post-licence restoration</td>
<td>0.53* (0.49 – 0.57)</td>
<td>0.46* (0.45 – 0.48)</td>
<td></td>
</tr>
<tr>
<td>Post-licence restoration vs. Pre-licence disqualification</td>
<td>0.57* (0.53 – 0.62)</td>
<td>0.73* (0.71 – 0.74)</td>
<td></td>
</tr>
</tbody>
</table>

*Statistically significant rate ratios (p < .05)

Gender

As shown in Table 4, males had higher rates of offending for all licence periods. The pattern of offending across periods was similar however, with both males and females having the highest rate of offending (both drink-driving and other traffic offences) in the
pre-licence disqualification period, followed by the post-licence restoration period and then the licence disqualification period.

Table 4: Offence rates (per 1,000 person years) by gender for each licence period

<table>
<thead>
<tr>
<th>Period</th>
<th>Male</th>
<th>General traffic&lt;sup&gt;1&lt;/sup&gt;</th>
<th>Female</th>
<th>General traffic&lt;sup&gt;1&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between index offence and licence disqualification (pre-licence disqualification)</td>
<td>96.3</td>
<td>952.7</td>
<td>75.3</td>
<td>643.0</td>
</tr>
<tr>
<td>During licence disqualification</td>
<td>29.0</td>
<td>314.2</td>
<td>23.0</td>
<td>259.4</td>
</tr>
<tr>
<td>Post-licence restoration</td>
<td>56.2</td>
<td>690.3</td>
<td>37.3</td>
<td>493.9</td>
</tr>
</tbody>
</table>

<sup>1</sup> Excluding drink-driving offences

Table 5 shows the rate ratios for drink-driving and other offences for each licence period comparison stratified by gender. Chi-square tests for the homogeneity showed no statistically significant differential effects of gender for any licence period comparisons.

Table 5: Offence rate ratios by gender

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Male</th>
<th>Other traffic offences</th>
<th>Female</th>
<th>Other traffic offences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Licence disqualification vs. pre-licence disqualification</td>
<td>0.30*</td>
<td>0.33*</td>
<td>0.31*</td>
<td>0.40*</td>
</tr>
<tr>
<td></td>
<td>(0.27 – 0.33)</td>
<td>(0.32 – 0.34)</td>
<td>(0.22 – 0.42)</td>
<td>(0.34 – 0.45)</td>
</tr>
<tr>
<td>Licence disqualification vs. Post-licence restoration</td>
<td>0.52*</td>
<td>0.46*</td>
<td>0.62*</td>
<td>0.53*</td>
</tr>
<tr>
<td></td>
<td>(0.48 – 0.55)</td>
<td>(0.45 – 0.47)</td>
<td>(0.49 – 0.77)</td>
<td>(0.47 – 0.56)</td>
</tr>
<tr>
<td>Post-licence restoration vs. Pre-licence disqualification</td>
<td>0.58*</td>
<td>0.72*</td>
<td>0.50*</td>
<td>0.77*</td>
</tr>
<tr>
<td></td>
<td>(0.54 – 0.64)</td>
<td>(0.71 – 0.74)</td>
<td>(0.38 – 0.64)</td>
<td>(0.71 – 0.84)</td>
</tr>
</tbody>
</table>

*Statistically significant rate ratios for licence periods (p < .05)
As shown in Table 6, those offenders aged 16-24 years had the highest rate of offending in all licence periods, followed by those aged 25-49 years. The pattern of offending across periods was similar however, with all age groups having the highest rate of offending (both drink-driving and other traffic offences) in the period between index offence and the licence disqualification, followed by the post-licence restoration period, and then the licence disqualification period.
Table 6: Offence rates (per 1,000 person years) by age group for each licence period

<table>
<thead>
<tr>
<th></th>
<th>16-24</th>
<th>25-49</th>
<th>50+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drink-driving offences</td>
<td>97.2</td>
<td>92.0</td>
<td>88.7</td>
</tr>
<tr>
<td>General traffic offences1</td>
<td>1187.8</td>
<td>773.8</td>
<td>579.5</td>
</tr>
<tr>
<td>Period between index offence and licence disqualification</td>
<td>97.2</td>
<td>92.0</td>
<td>88.7</td>
</tr>
<tr>
<td>Period during licence disqualification</td>
<td>35.9</td>
<td>24.6</td>
<td>20.8</td>
</tr>
<tr>
<td>Period post-licence restoration</td>
<td>57.8</td>
<td>52.1</td>
<td>42.6</td>
</tr>
</tbody>
</table>

1 Excluding drink-driving offences

Table 7 shows the rate ratios for drink-driving and other offences for each licence period comparison stratified by age group. For drink-driving and other traffic offences, Chi-square tests for the homogeneity showed no statistically significant differential effects of age.
Table 7: Offence rate ratios by age group

<table>
<thead>
<tr>
<th>Comparison</th>
<th>16-24 years</th>
<th>25-49 years</th>
<th>50 years+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drink-driving offences</td>
<td>Other traffic offences¹</td>
<td>Drink-driving offences</td>
</tr>
<tr>
<td>Licence disqualification vs. Pre-licence disqualification</td>
<td>0.37* (0.32 – 0.43)</td>
<td>0.36* (0.35 – 0.38)</td>
<td>0.27* (0.23 – 0.31)</td>
</tr>
<tr>
<td>Licence disqualification vs. Post-licence restoration</td>
<td>0.62* (0.56 – 0.69)</td>
<td>0.51* (0.50 – 0.53)</td>
<td>0.47* (0.43 – 0.52)</td>
</tr>
<tr>
<td>Post-licence restoration vs. Pre-licence disqualification</td>
<td>0.59* (0.52 – 0.68)</td>
<td>0.71* (0.68 – 0.73)</td>
<td>0.57* (0.51 – 0.63)</td>
</tr>
</tbody>
</table>

*Statistically significant rate ratios for licence periods (p < .05)
¹ Excluding drink-driving offences
As shown in Table 8, those offenders with a low-range index BAC had higher rates of offending across all licence periods, followed by those with a mid-range index BAC, with the lowest rates of offending for offenders with a high BAC index offence. Again, the pattern of offending was similar across licence periods with all BAC levels having the highest rate of offending (both drink-driving and other traffic offences) in the period between index offence and the licence disqualification, followed by the post-licence restoration period, and then the licence disqualification period.

Table 8: Offence rates (per 1,000 person years) by BAC level for each licence period

<table>
<thead>
<tr>
<th></th>
<th>Low-range</th>
<th>Mid-range</th>
<th>High-range</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drink-driving</td>
<td>General traffic</td>
<td>Drink-driving</td>
</tr>
<tr>
<td></td>
<td>offences</td>
<td>offences¹</td>
<td>offences</td>
</tr>
<tr>
<td>Period between index</td>
<td>90.4</td>
<td>1284.3</td>
<td>84.3</td>
</tr>
<tr>
<td>offence and licence</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>disqualification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period during licence</td>
<td>49.2</td>
<td>644.1</td>
<td>21.8</td>
</tr>
<tr>
<td>disqualification</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Period post-licence</td>
<td>62.7</td>
<td>805.9</td>
<td>39.6</td>
</tr>
<tr>
<td>restoration</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

¹ Excluding drink-driving offences
Table 9 shows the rate ratios for drink-driving and other offences for each comparison period stratified by BAC level at index offence. For other traffic offences, Chi-square tests for the homogeneity showed some statistically significant differential effects of BAC level. Specifically, low-range and high-range BAC offenders had higher rate ratios for other traffic offending for the licence disqualification period versus the pre-licence disqualification period [$\chi^2 (2) = 14.18, p < .001$]. Further, for other traffic offences, high-range BAC offenders had no statistically significant effect for post-licence restoration period versus the pre-licence disqualification period, while low- and mid-range offenders had lower other traffic offence rates during post-licence restoration period compared to the pre-licence disqualification period [$\chi^2 (2) = 10.65, p < .001$]. For drink-driving offences, there was a differential effect for the licence disqualification period versus the post-licence restoration period [$\chi^2 (2) = 9.78, p = .008$] with low-range BAC offenders having a higher rate ratio of offending compared with mid- and high-range offenders.
### Table 9: Offence rate ratios by BAC level at index offence

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Low-range BAC</th>
<th>Mid-range BAC</th>
<th>High-range BAC</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drink-driving offences</td>
<td>Other traffic offences</td>
<td>Drink-driving offences</td>
</tr>
<tr>
<td>Licence disqualification vs. Pre-licence disqualification</td>
<td>0.54* (0.42 – 0.71)</td>
<td>0.50* (0.47 – 0.54)</td>
<td>0.26* (0.23 – 0.29)</td>
</tr>
<tr>
<td>Licence disqualification vs. Post-licence restoration</td>
<td>0.80* (0.65 – 0.95)</td>
<td>0.78* (0.76 – 0.84)</td>
<td>0.55* (0.50 – 0.61)</td>
</tr>
<tr>
<td>Post-licence restoration vs. Pre-licence disqualification</td>
<td>0.69* (0.56 – 0.87)</td>
<td>0.63* (0.59 – 0.67)</td>
<td>0.47* (0.42 – 0.52)</td>
</tr>
</tbody>
</table>

*Statistically significant rate ratios for licence periods (p < .05)

1 Excluding drink-driving offences
Repeat and first offenders

Repeat offenders had lower offence rates compared to first offenders for all periods except the post-licence restoration period (Table 10). The pattern of offending across licence periods, however, was consistent as per all drink-drivers and the previous comparison groups.

Table 10: Offence rates (per 1,000 person years) by repeat offender status at index for each licence period

<table>
<thead>
<tr>
<th></th>
<th>First offenders</th>
<th>Repeat offenders</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drink-driving offences</td>
<td>General traffic offences¹</td>
</tr>
<tr>
<td>Period between index offence and licence disqualification</td>
<td>97.1</td>
<td>938.7</td>
</tr>
<tr>
<td>Period during licence disqualification</td>
<td>30.2</td>
<td>332.8</td>
</tr>
<tr>
<td>Period post-licence restoration</td>
<td>53.2</td>
<td>663.3</td>
</tr>
</tbody>
</table>

¹ Excluding drink-driving offences

Table 11 shows the rate ratios for drink-driving and other offences for each licence period comparison stratified by whether the offender was a repeat or first offender at index offence. For drink-driving offences, Chi-square tests for the homogeneity showed a statistically significant effect for the licence disqualification versus the post-licence restoration period [$\chi^2(1) = 4.50$, $p < .001$]. Specifically, while both groups had lower drink-driving offence rates during a disqualification in comparison with post-licence restoration, the rate ratio was lower for repeat drink-driving offenders at index offence. For other traffic offences, Chi-square tests for the homogeneity showed no statistically significant effect.
Table 11: Offence rate ratios by repeat and first offender at index offence

<table>
<thead>
<tr>
<th>Comparison</th>
<th>First offenders at index</th>
<th>Repeat offender at index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drink-driving offences</td>
<td>Other traffic offences¹</td>
</tr>
<tr>
<td>Licence disqualification vs. Pre-licence disqualification</td>
<td>0.31*</td>
<td>0.35*</td>
</tr>
<tr>
<td></td>
<td>(0.28 – 0.35)</td>
<td>(0.34 – 0.37)</td>
</tr>
<tr>
<td>Licence disqualification vs. Post-licence restoration</td>
<td>0.57*</td>
<td>0.50*</td>
</tr>
<tr>
<td></td>
<td>(0.52 – 0.61)</td>
<td>(0.49 – 0.51)</td>
</tr>
<tr>
<td>Post-licence restoration vs. Pre-licence disqualification</td>
<td>0.55*</td>
<td>0.71*</td>
</tr>
<tr>
<td></td>
<td>(0.50 – 0.60)</td>
<td>(0.69 – 0.73)</td>
</tr>
</tbody>
</table>

*Statistically significant rate ratios for licence periods (p < .05)
¹ Excluding drink-driving offences

Crash at index offence

Those who were involved in a crash at the same time as their index offence had lower offence rates for all licence periods compared to those that did not have a crash at index offence (Table 12). The pattern of results across licence periods was somewhat consistent. However, for general traffic offences, the offence rate was highest in the post-licence restoration period for those who had a crash at index offence (although still a lower rate than those who were not involved in a crash at index).
Table 12: Offence rates (per 1,000 person years) by crash at index offence status for each licence period

<table>
<thead>
<tr>
<th>Crash involved</th>
<th>Non-crash involved</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drink-driving</td>
</tr>
<tr>
<td></td>
<td>offences</td>
</tr>
<tr>
<td>Period between index offence and licence disqualification</td>
<td>45.0</td>
</tr>
<tr>
<td>Period during licence disqualification</td>
<td>14.4</td>
</tr>
<tr>
<td>Period post-licence restoration</td>
<td>41.7</td>
</tr>
</tbody>
</table>

¹ Excluding drink-driving offences

Table 13 shows the rate ratios for drink-driving and other offences for each licence period comparison stratified by whether the offender was involved in a crash at the index offence or not. For other traffic offences, Chi-square tests for the homogeneity showed a statistically significant effect for the post-licence restoration period versus the pre-licence disqualification period \[\chi^2 (1) = 14.51, p < .001\]. Specifically, those offenders who were involved in a crash at the time of their index offence had a higher other offence rate during the post-licence restoration period compared to the pre-licence disqualification period, while those who were not involved in a crash had lower other offence rates during the post-licence restoration period. There were no other differential effects based on crash involvement at index offence.
Table 13: Offence rate ratios by crash involvement at index offence

<table>
<thead>
<tr>
<th>Comparison</th>
<th>Crash involved at index</th>
<th>Not crash involved at index</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drink-driving offences</td>
<td>Other traffic offences</td>
</tr>
<tr>
<td>Licence disqualification vs. Pre-licence disqualification</td>
<td>0.32*</td>
<td>0.39*</td>
</tr>
<tr>
<td></td>
<td>(0.20 – 0.53)</td>
<td>(0.34 – 0.45)</td>
</tr>
<tr>
<td>Licence disqualification vs. Post-licence restoration</td>
<td>0.35*</td>
<td>0.33*</td>
</tr>
<tr>
<td></td>
<td>(0.23 – 0.51)</td>
<td>(0.30 – 0.37)</td>
</tr>
<tr>
<td>Post-licence restoration vs. Pre-licence disqualification</td>
<td>0.93</td>
<td>1.18*</td>
</tr>
<tr>
<td></td>
<td>(0.63 – 1.36)</td>
<td>(1.05 – 1.32)</td>
</tr>
</tbody>
</table>

*Statistically significant rate ratios for licence periods (p < .05)

1 Excluding drink-driving offences

4. Discussion

The primary aims of this project were to determine: (a) whether drink-drivers’ re-offence rates differed during the period between offence incidence and licence disqualification (pre-licence disqualification), the period of licence disqualification and the post-licence restoration period; and (b) identify if there are any differential effects of licence disqualification on re-offence rates based on BAC, gender, age, repeat offender status and crash involvement at the time of offence. The offences analysed were drink-driving offences and other traffic offences.

Key findings that emerged will be sequentially discussed below.

Re-offending Between Apprehension and Sanctioning

In regards to the rate of offending, the highest rate of offending (both drink-driving and other traffic offences) was during the period between the index offence and the commencement of the licence disqualification (pre-licence disqualification). This is a key finding to emerge from the study that needs to be re-examined with other traffic offence data in other jurisdictions in the future. In Victoria, we found that offenders are at the highest risk of
drink-driving (or committing other traffic offences) after they have been apprehended, but before they receive the corresponding sanctions. This finding supports the assertion that the celerity of punishment (in regards to deterrence models) is an important factor in maximising a deterrent effect. However, the celerity of sanction application is commonly overlooked with deterrence-based research (Freeman, 2004), except for preliminary research that has focused on the positive impact of changes to administrative suspension laws (McArthur, & Kraus, 1999; Voas, Tippets & Fell, 2000; Zador et al., 1988). For example, Wagenaar & Maldonado-Molina (2007) reviewed the impact of mandatory preconviction licence suspension laws in 46 American states and reported the policy had a statistically significant reduction in alcohol-related crash involvement. This is despite models of learning and experimental psychology reinforcing that the time between stimulus and response is vital for learning new behaviours (Nagin & Pogarsky, 2001).

The Positive Effect while Disqualified

More encouragingly, drink-driving offenders had statistically significantly lower rates of offending (both drink-driving and other traffic offences) during disqualification periods compared to the pre-licence disqualification and post-licence restoration periods. In regards to first time versus recidivist offenders, both groups had lower drink-driving offence rates during disqualification in comparison with post-licence restoration. High BAC offenders also had low rates of re-offending during disqualification relative to other BAC offender groups contrary to perceptions that they are less responsive to countermeasures. This finding is consistent with a large body of research that has generally demonstrated licence disqualification periods to be one of the most effective methods for reducing further drink-driving offences (Jones & Lacey, 1991; McArthur & Kraus, 1999; Nichais & Ross, 1991; Sadler & Perrine, 1984; Wagenaar, Zoeck, Williams & Hingson, 1995). In fact, compared to other sanctions, disqualification periods have proven to be the most effective short-term
countermeasure that can be applied to drink-drivers (Nichais & Ross, 1991; Sadler & Perrine, 1984; Siskind, 1996; Watson, 1998). The current finding is particularly encouraging in relation to high BAC and recidivist offenders, as ongoing questions have remained regarding the efficacy of applying sanctions to persistent offenders (Freeman, Liossis, & David, 2006) and high BAC offenders who are perceived as difficult to influence – in contrast this study clearly shows an impact of licence sanction on drink driving offenders during and following licence disqualification for most detected offenders. However, there still was evidence that a small minority of individuals were detected again for drink-driving even while disqualified from driving as found for 4% of the sample. That is, they combined drink-driving with unlicensed driving, demonstrating that licence disqualification does not have a positive impact on all individuals. This is again consistent with research that has reported unlicensed driving is often combined with other illegal behaviours such as drink-driving (Griffin & DeLaZerda, 2000; Watson, 2004).

Further analyses revealed that there was in fact a greater effect of the disqualification on repeat drink-driving offenders compared to first time offenders, as well as for high BAC offenders. This is contrary to previous research that has demonstrated that licence sanctions are least effective for repeat offenders (Beirness et al., 1997; Coben & Larkin, 1999). Different theories can account for this finding. Firstly, it is possible that (for the current sample) repeat offenders reduced their frequency of driving to a greater extent than first time offenders, perhaps due to a magnified deterrence effect, as they had already been caught and sanctioned more than once, and thus were more aware of the probability of apprehension e.g., objective certainty. Another hypothesis proposed by Pogarsky and Piquero (2003), that needs to be further investigated, is whether first time offenders experience a “resetting effect” after apprehension, whereby offenders believe they are less likely to be apprehended again soon after coming in contact with the police. However, the above results should be interpreted with
caution as there is no comparison group; so, for example, it is not possible to tell if a
disqualification period is the most effective sanction compared to any other sanction (e.g.,
immediate interlock condition).

*Post Licence periods*

Another key finding was that there was also a statistically significantly lower rate of
offending (both drink-driving and other traffic) in the post-licence restoration period
compared to the pre-licence disqualification period (40% lower), both for first time and
repeat drink-drivers. In regards to first time offenders, this is consistent with previous
research that has demonstrated licence disqualifications have a specific deterrent effect post
licence restoration. (Homel, 1988; Siskind, 1996). That is, convicted offenders are less likely
to re-offend due to experience with the consequences of penalties. The results were also
positive for repeat offenders. While there has generally been consensus in the literature that
the application of legal sanctions alone does not produce long-term behaviour change for this
group (Ahlin, Rauch, Zador, Baum, & Duncan, 2002; Beirness et al., 1997; Brewer et al.,
1994; Frank, Raub, Lucke, & Wark, 2002; Homel, 1988; Marques, Voas, & Hodgins, 1998;
Yu, 2000), the current study has provided evidence that disqualifications can have a
corrective effect on tendencies to drink and drive among recidivist offenders. However, it
should be noted, that as there was no control group for this analysis (i.e., offenders who did
not have licence sanctions applied) the changes in offending rates may have been due in part
to other influences (e.g., enforcement practices). Furthermore, while the offending rate
decreased post-sanction, it is not possible to tell if this is a genuine positive effect of
experiencing the sanction or if, for example, offenders improved their ability to avoid
detection once they have experienced this sanction. In regards to the latter, previous research
has found that offenders, particularly repeat offenders, can drink and drive on numerous
occasions whilst avoiding detection (Wiliszowski, Murphy, Jones, & Lacey, 1996). For
example, Smith (2003) interviewed a small sample of repeat offenders who reported regularly
drink-driving whilst avoiding apprehension (e.g., ratios up to 100:1) as well as actively
attempting to evade police enforcement (e.g., Random Breath Testing).

Differential Effects

In regards to the differential offence rate effects, the second aim of the study, males had
higher rates of drink-driving offending for all licence periods, which is consistent with
previous research that has demonstrated that males are disproportionately represented in
drink-driving statistics (Beirness et al., 1997; Stewart et al., 2004; Voas & Tippettts, 2002).
However, while absolute rates of offending differed by gender and between age groups, the
pattern of rates of offending across the three study periods for each of these subgroups was
similar. No subgroups were more likely to drink and drive (or commit other traffic offences)
in the pre-licence disqualification period, the post-licence restoration period or the licence
disqualification period. The current findings indicate that disqualifications can have a positive
effect on both genders as well as motorists of all ages. This is one of the first studies to
specifically examine offence rates with respect to age and gender, and therefore further
research is required to confirm this finding.

There were however, some statistically significant differential effects of BAC level and of
repeat offender status. While all BAC groups demonstrated a reduction in drink-driving
offence rates during the licence disqualification period compared to the post-licence
restoration period, low-range BAC offenders had a higher offence rate ratio compared with
mid- and high-range offenders. Therefore, the disqualification period appeared to have a
lesser impact on the low-range BAC group for drink-driving and other traffic offences. This
could be considered an unexpected finding, as a higher range BAC could be considered
evidence of an alcohol problem, which has been demonstrated to be a significant predictor of
recidivism (Freeman et al., 2006). While it remains unclear why this was found, two possible
explanations can be proposed. Firstly, it may be because the disqualification period this group received was not as severe (compared to high BAC range offenders) and thus, less of a specific deterrent effect was experienced for the less severe sanction. Secondly, this group may have experienced less of an overall experiential effect (e.g., number of times exposed to punishment), and thus, have yet to be sufficiently deterred from drink-driving. Further research is required to determine the significance of this finding, as it has historically been hypothesised that low-range BAC groups predominantly involve social drinkers who may make a judgement error in their decision to drive after drinking (Ferguson et al., 1999; Howard & McCaughrin, 1996). As a result, these drivers are usually deterred from committing further offences by their experience of both formal and informal sanctions such as fines and licence loss, as well as peer disapproval from friends and family (Ferguson et al., 1999). However, some low-range BAC offenders (apprehended in the morning) may have consumed large quantities of alcohol the night before, and this phenomenon also deserves further exploration.

There were also some differential effects for other traffic offending. High-range BAC offenders had no statistically significant effect for post-licence restoration period versus the pre-licence disqualification period, while low- and mid-range offenders had lower offence rates during the post-licence restoration period compared to the pre-licence disqualification period.

Importantly, offenders who were involved in a crash at the time of their index offence had a higher general traffic offending rate during the post-licence restoration period compared to the pre-licence disqualification period, while those who were not involved in a crash had lower offence rates during the post-licence restoration period compared to the pre-licence disqualification period. It is not clear whether this is a direct result of the disqualification or a bias of having experienced a crash. For example, crash involved offenders may be injured
and unable to drive, or without a vehicle in the immediate period following the crash. These
factors may have a greater impact on influencing driving behaviour than the actual sanction.

There were a number of limitations associated with this study that need to be considered.
Firstly, as with any study of this nature, the sample only includes those who are caught for an
offence. It is possible that some offenders are not captured as they are able to avoid detection.
For example, an earlier study by Voas (1982) reported that the drinking driver is arrested
once out of every 5000 miles (approximately 8,000 kilometres) driven under the influence of
alcohol. A similar estimation in the Australian context offered by Homel, Carseldine, and
Kearns (1988) suggested that only 0.5% to 1.5% of intoxicated drivers are detected by the
police at any one time. While more recent calculations are not available, the deleterious
impact of ‘punishment avoidance’ on intentions to re-offend is well documented (Freeman &
Watson, 2006; Watling, Freeman, Palk, & Davey, 2011). In the current context, this would
result in an under-estimate of the drink-driving problem. It is also possible that particular
types of offenders are better at avoiding detection and thus the study may not capture all
types of drink-driving offenders. Some offenders within the study sample may also avoid
detection some of the time or even improve their avoidance over time. This may impact on
the re-offence rates for some of these offenders and bias the results to some extent if
particular types of offenders (e.g., repeat offenders) become better at detection avoidance
than others.

It should be noted that the BAC level for classification may lack some sensitivity to offender
differences within BAC groups. While BAC groupings in this study were consistent with the
legislative levels relating to sanctions as well as reflecting escalating trauma risk with higher
BAC levels, it could be argued that there may be some distinct differences within these level
classifications that were not able to be explored. For example, there may be little difference
between an offender with a BAC of .14 and one with a BAC of .15 (in different categories)
and a large difference between a person with a BAC of .08 and one with a BAC of .12 (in the same category for some analyses). Research suggests that drink-driving offenders are not a homogenous group even within these categorisations of low-, mid- and high-range BACs (Fetherston, Lenton, & Cercarelli, 2002; Nadeau, 2002; Nochajski & Wieczorek, 2000). Thus, differences explored between these groups may lack sensitivity. Additionally, some of the study’s findings may be unique to the data set (and time period), and thus, the study methodology needs to be implemented with different datasets.

The present study has provided further confirmatory evidence that licence disqualification periods are effective at reducing drink-driving offending, both while drivers are disqualified as well as post relicensing. Encouragingly, the application of the sanction also had a positive effect on general traffic offending, recidivist drink-drivers and the effectiveness of the approach was not diluted by gender or age group. High BAC offenders had lower re-offence rates than moderate BAC offenders who both had lower rates than low BAC offenders. However, the study identified a significant area of concern. Specifically, the highest rate of offending (both for drink-driving and other traffic offences) was during the pre-licence disqualification period, which suggests offenders are particularly vulnerable to drink and drive whilst waiting to be sanctioned. There is a need to develop effective methods to deal with offenders when they are first apprehended, including consideration of immediate licence disqualification which has been shown to be effective in studies where such an administrative sanction has been applied and evaluated (National Highway Traffic Safety Administration, 2014). An additional method may involve a brief behaviour change intervention program, which has previously been suggested in Shults et al (2001) review of drink driving countermeasures. The importance for early intervention is also evident in the corresponding offending histories of motorists involved in alcohol-related crashes, which may again be utilised as a screening tool for referral to additional services.
The findings of this study show that the application of licence disqualification periods for drink-drivers of all types appears to be an effective response to improve road safety. The study was able to identify areas of opportunity where countermeasures could be applied to further improve offenders’ compliance with BAC limits, specifically the period immediately following police detection, compliance by lower BAC and first offenders, and following the licence disqualification period.

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