

The effect of lockout and last drinks laws on non-domestic assaults in Sydney: An update to September 2016

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Aims: To assess the longer-term effects of the 2014 NSW liquor law reforms on levels of violence in the inner Sydney area.

Method: Interrupted time series models were used to examine the effects of the legislative reforms introduced in January 2014. Police recorded non-domestic assaults were analysed over the period January 2009 and September 2016. Separate analyses were carried out for the Kings Cross Precinct (KXP); the Sydney CBD Entertainment Precinct (CBD); an area contiguous with KXP and CBD called the proximal displacement area (PDA); a group of entertainment areas not far from KXP and CBD called the distal displacement area (DDA) and the rest of NSW.

Results: Following the reforms statistically significant reductions in non-domestic assault incidents occurred in both the Kings Cross (down 49%) and CBD Entertainment Precincts (down 13%). There was evidence of geographical displacement to surrounding areas with increases in non-domestic assault observed in both the PDA (up 12%) and the DDA (up 17%). The reduction in the combined Kings Cross and CBD Precincts (930 fewer non-domestic assaults) was much greater than the increase in the combined proximal and displacement areas (299 more non-domestic assaults).

Conclusion: Restrictions on the availability of alcohol appear to have reduced non-domestic assault in the target Precincts. Continued research is needed to monitor if displacement of these assaults increases further.

Keywords: alcohol, assault, lockout and last drinks laws, trading hours, time series models, displacement

INTRODUCTION

In January 2014 the NSW Government introduced the Liquor Amendment Act 2014 which placed a number of new restrictions on licensed premises. The intended aim of these legislative changes was to reduce alcohol-related violence and improve public safety. The restrictions, which took effect on 24 February 2014, included:

1. 1.30am lockouts at hotels, registered clubs, nightclubs and karaoke bars in two designated areas: the Sydney CBD Entertainment Precinct and Kings Cross Precinct;
2. 3.00am cessation of alcohol service in venues in these Precincts;
3. A freeze on new liquor licences and approvals for existing licences across the Sydney CBD Entertainment Precinct and continuation of the existing freeze in the Kings Cross Precinct;
4. A ban on takeaway alcohol sales after 10.00pm across NSW;

5. The extension of temporary and long-term banning orders issued to designated 'trouble-makers' to prevent them entering most licensed premises in the Kings Cross and Sydney CBD entertainment precincts.

Most of these changes targeted licensed premises in the Kings Cross and Sydney CBD Entertainment precincts, after a number of high-profile deaths and injuries had occurred at licensed venues in these locations in the months preceding the reforms. The only exception was the reduced hours for takeaway alcohol sales; a reform which was applicable across the State.

Menéndez, Weatherburn, Kypri and Fitzgerald (2015) examined the impact of these reforms on the incidence of assault in the Kings Cross and Sydney CBD Entertainment Precincts in the immediate 8-month period following the enactment of the legislative changes. They also examined evidence for geographical displacement (or diffusion of benefits) of violence to the surrounding areas where the lockout and last drinks laws did not apply. A time-series analysis of monthly counts of non-

domestic assaults recorded by the NSW police over the period January 2009 through September 2014 found evidence for substantial reductions in areas where the restrictions applied. Assaults fell by 32% in the Kings Cross area and 26% in the Sydney CBD Entertainment area. The reforms were also associated with small decreases in assaults in areas immediately adjacent to the target sites (e.g. The Star casino, Ultimo, Surry Hills) and in a group of entertainment areas within easy reach of Kings Cross and the Sydney CBD (e.g. Double Bay, Newtown, and Bondi among others), but none of these declines were statistically significant. The only area where there was evidence for an increase in assaults after the introduction of the liquor law reforms was in and around *The Star* casino, although the increase observed in this area also was small and not statistically significant.

Further analyses undertaken by Menéndez, Kypri and Weatherburn (in press) shed some light on which parts of the reforms were having the greatest impact. Using a time-series structural modelling approach, with a 17-month follow-up period, they demonstrated that the reductions in assault observed after the licensing restrictions came into effect in February 2014 were not uniformly distributed across time. In the Kings Cross and Sydney CBD Precincts the decline in assaults was greater after 1:30am when the lockouts commenced and was particularly pronounced after 3am when alcohol service ceased. No changes in assault were observed between 6pm and 1:30am (when alcohol restrictions were not in effect) in the Sydney CBD, though small but significant declines were observed in the Kings Cross precinct during this period on weekdays. Again they found no evidence for displacement of violence to areas adjacent to or within easy reach of the Precincts for any time-periods examined. These results suggest last drinks and lock-outs in the target Precincts were potentially the biggest contributor to the observed reductions, though reduced visitor numbers to Kings Cross is also a likely factor, at least in that area.

The results from these analyses are broadly consistent with previous studies examining the effect of liquor licence restrictions on alcohol-related harm. Jones, Kypri, Moffatt, Borzycki and Price (2009), for example, found that regulatory restrictions on the trading hours of 14 licensed premises in the Newcastle area in 2008 resulted in significant reductions in the incidence of violence in the vicinity of these premises; with no evidence of temporal displacement or geographical displacement to other licensed premises/neighbouring areas. Indeed there is some evidence that these reductions were maintained up to 5 years after the restrictions on closing times were imposed (Kypri, McElduff & Miller, 2014). Similar work conducted in other Australian states and internationally (e.g. Chikritzhs & Stockwell, 2002; Palk, Davey & Freeman, 2010; Voas, Romano, Kelly-Baker & Tippetts, 2006; and for a review see Stockwell & Chikritzhs, 2009) have confirmed these effects.

A limitation of BOCSAR's previous evaluations of the 2014 NSW Liquor Licensing Reforms is that they have only focused on the short-term impact of the initiatives. In the case of Menéndez et al. (2015), the follow-up period used to assess intervention

effects included just eight months of recorded crime data. This was later extended to 17 months in Menéndez et al. (in press). This follow-up is still relatively short and thus limits our ability to assess the durability of the 2014 reforms. It is quite possible that the intervention has an abrupt and immediate impact in the target sites but the effect gradually decays and assaults eventually return to their previous levels. It is also possible that violence may not immediately be displaced to surrounding areas but over time as more patrons discover new late-night drinking venues, levels of alcohol-related harm begin to rise in nearby areas. In fact, a more recent investigation of non-domestic assaults recorded at *The Star* casino revealed just this. The previous statistically insignificant rise in assaults at *The Star* which was observed 8-months after the 2014 reforms was significant once recorded crime data over a longer period became available (though the increase was still very small in comparison to the reduction in assaults in the Kings Cross and CBD entertainment precincts; Donnelly, Weatherburn, Routledge, Ramsey & Mahoney, 2016).

The current work extends the analyses of Menéndez et al. (2015; 2016) to include an additional 15-months of follow-up data in order to assess the longer-term effect of the 2014 NSW liquor law reforms. Specifically this work set out to answer three research questions;

- (1) Was the reduction in the incidence of non-domestic assault in the Kings Cross Precinct (KXP) and Sydney CBD Entertainment Precinct (CBD) after the 2014 liquor laws were enacted sustained during the 32-month post-reform period?
- (2) Was there an increase in the incidence of non-domestic assault during the 32-month post-reform period in areas either proximal to Kings Cross and the CBD Entertainment Precincts (proximal displacement area) or in other night-time locations which while further away are still within easy reach by taxi or public transport (distal displacement area)?
- (3) If there was evidence for displacement of non-domestic assault to the proximal and/or distal locations, did the increase offset any reductions observed in the target sites (KXP and CBD)?

To assess the influence of other factors which may have affected drinking and violent behaviour during the post-reform period, trends in non-domestic assault for the rest of the NSW (excluding the two target sites and the two displacement areas) were also examined.

METHOD

AREAS OF INTEREST

Figure 1a shows the two target areas where the lockout and last drinks laws apply: the Kings Cross Entertainment Precinct (KXP) and the Sydney CBD Entertainment Precinct (CBD). This figure also shows the Proximal Displacement Area (PDA)

Figure 1a. The two target areas, Sydney CBD Entertainment and Kings Cross Precincts, together with the proximal displacement area

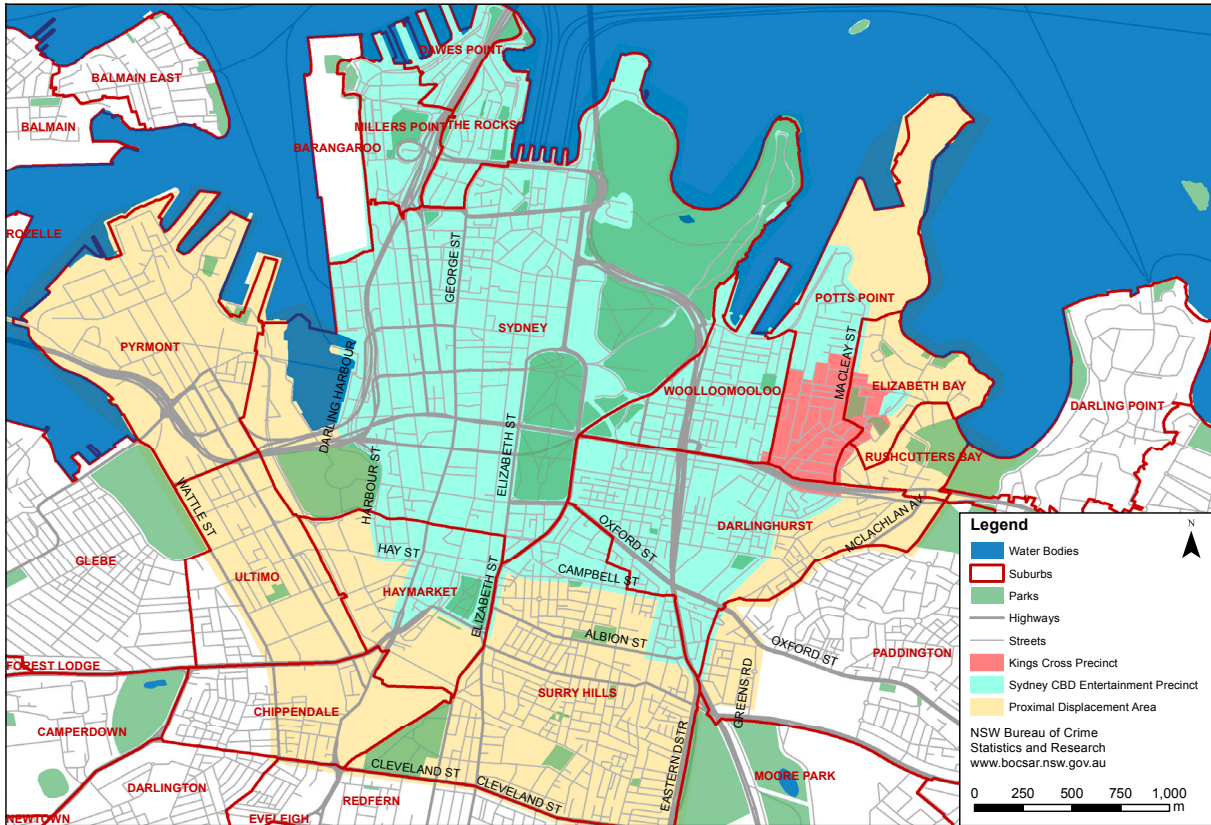
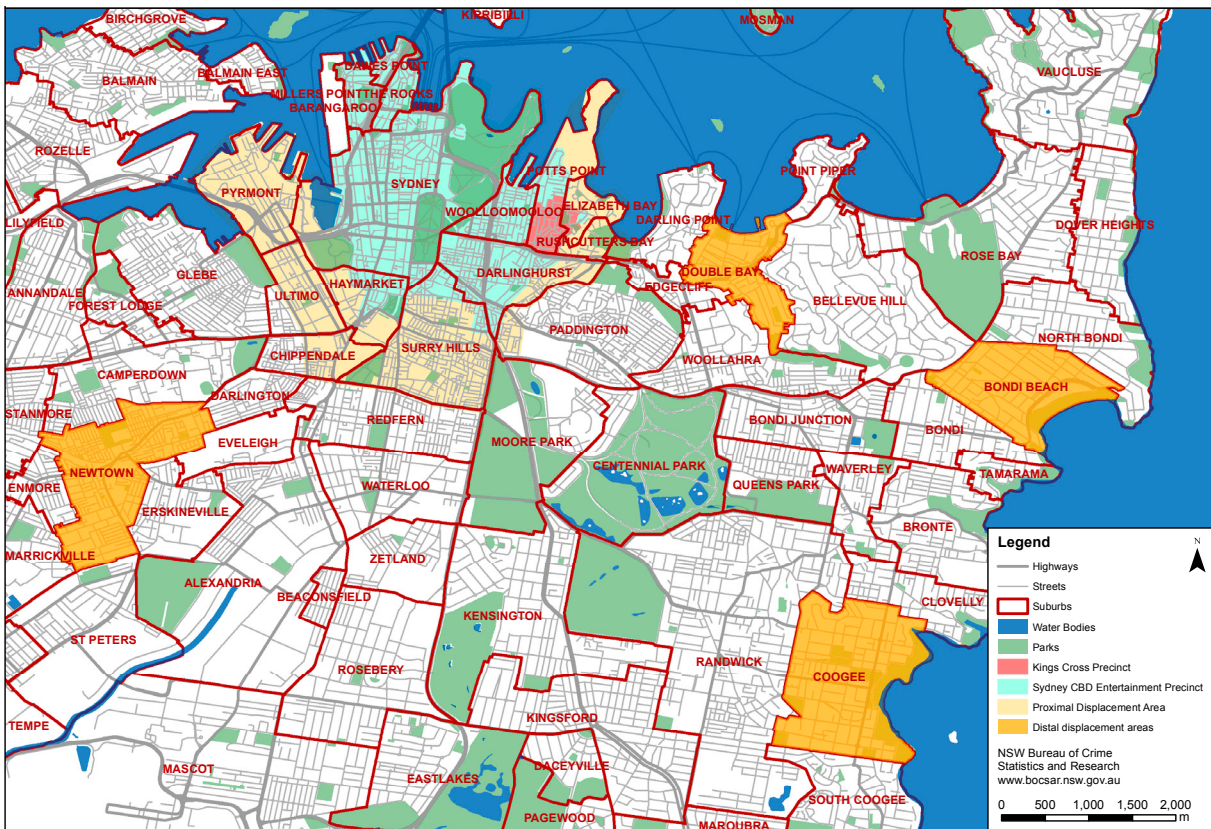


Figure 1b. Distal Displacement areas in orange including Bondi Beach, Coogee, Double Bay and Newtown



which contains suburbs such as Pymont, Ultimo, Chippendale, Surry Hills, Elizabeth Bay and *The Star* casino area. Figure 1b shows the location of the four areas which comprise the Distal Displacement Area (DDA) which are located further away from the KXP and CBD but can still be easily reached by transport. The DDA includes Bondi Beach, Coogee, Double Bay and Newtown.

DATA

The outcome for this analysis is the number of non-domestic assaults incidents per month recorded by police which occurred in the five locations over the period January 2009 to September 2016 (KXP, CBD, PDA, DDA and rest of NSW). In total, 93 months were analysed comprising 61 months prior to and 32 months after the new liquor laws came into effect.

STATISTICAL ANALYSES

Augmented Dickey-Fuller tests showed that in each of the five locations non-domestic assault was trend stationary and did not require differencing (Enders, 2015). There were two ways in which the liquor law reforms may have influenced assaults. One is a change in the level of assaults. The second is a change to the trend in assaults. The ARIMA time series models therefore included: (i) a term measuring the underlying trend; (ii) a term measuring any change in the level of non-domestic assault incidents after the liquor law reforms commenced and; (iii) a term measuring any change in trend after the laws commenced (Box, Jenkins, & Reinsel, 1994; Chatfield, 2004).

Within each of the five locations, the mean and median values of monthly non-domestic assault incidents were similar in magnitude and the distribution(s) were not skewed. ARIMA time series analyses were conducted using PROC ARIMA in SAS. Residuals from the time series were examined using autocorrelation function (ACF) and partial autocorrelation function (PACF) plots. This indicated whether autocorrelation also needed to be controlled for using either autoregressive (AR) or moving average (MA) terms at particular lags. Seasonality in the data was also taken into account using either binary terms for particular months of the year (when assault is higher) or stochastically using AR or MA terms of lag 12 (Hyndman & Athanasopoulos, 2014). Generally, the ARIMA models with seasonal terms produced better fitting models. For each of the time series models reported in each of the five locations, the full regression estimates including seasonal terms are shown in separate tables in Appendix A.

The Ljung-Box test was used to determine whether the residuals from the model were randomly distributed. The final ARIMA model for each location had non-significant Ljung-Box chi-square statistics at lags of 6, 12, 18 and 24 showing adjustment for autocorrelation. Goodness of fit was measured using the Akaike Information Criterion (AIC) (Akaike, 1974). Each final model had the smallest AIC value indicating a better fit to the data compared with alternative models.

The predicted values from the ARIMA models were graphed as the estimated trend along with the observed non-domestic assault values. The percentage change in non-domestic assault following the introduction of the new laws was calculated by comparing the values estimated from the full model with those forecast from ARIMA models built on the pre-intervention data only (i.e. 32 time points were forecast for the post-reform period). The volume of the decrease or increase of total non-domestic assaults post intervention was also calculated.

RESULTS

Figure 2 shows the monthly number of non-domestic assaults for each of the five locations over the 93-month observation period. The dotted vertical line is February 2014 which is the month in which the amendments to the liquor laws made in January 2014 took effect. All points to the right of the line are the post-liquor law reform period. These time series are presented for the two target sites (KXP and CBD), the two displacement sites (PDA and DDA) and the rest of NSW.

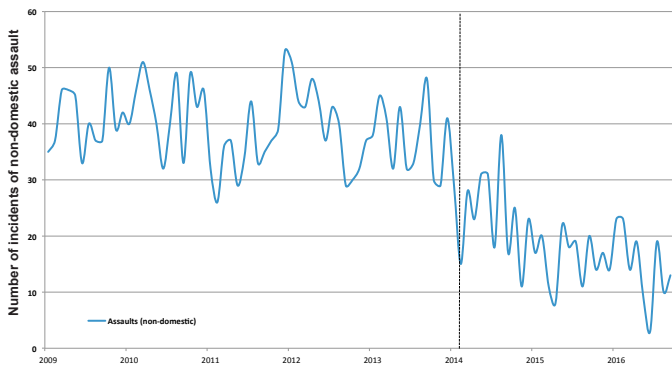
The results from the final time series analyses modelling the monthly number of non-domestic assaults in the target areas, displacement areas and the rest of NSW are shown in Table 1. The rows show the underlying trend in assaults prior to the 2014 reforms, the change in the level of assaults after the laws began, the change in the trend post law reform and the diagnostics associated with each model. The columns show these results for each of the areas examined.

In the KXP the onset of the liquor law reforms was associated with a significant sudden decline in the level of the series in February 2014 by around 12 non-domestic assaults, dropping from 35 to 23 ($p < .001$). There was also a sharper declining trend post liquor law reform which was statistically significant ($p = .007$). Figure 3 shows a sharp drop in assaults when the laws commenced and an acceleration of the downward trend. Overall, we estimated a 48.7% decline in the number of non-domestic assaults which meant that there were 553 fewer non-domestic assaults in KXP during the 32-month post-reform period compared with what was forecast from the pre-existing trend.

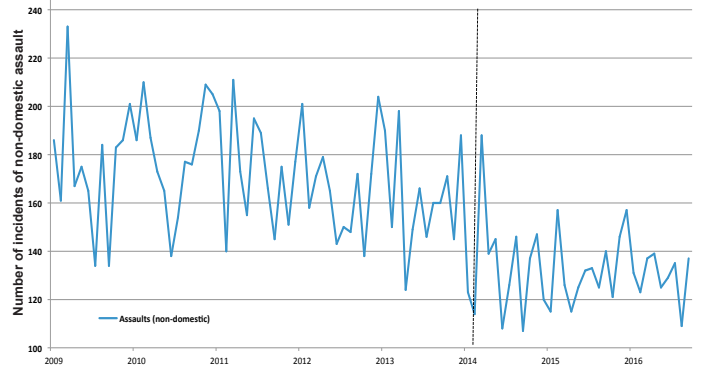
In the CBD there was a significant step reduction in the level of non-domestic assaults after January 2014 by around 20 ($p < .001$). There was, however, no change in the underlying trend; which suggests that after the reform assaults continued to fall by around 1.7 every four months. After taking account of this decreasing underlying trend and seasonal effects, the change in level means there were on average 20 less non-domestic assaults per month during the post-law reform period. This change in the non-domestic assault level in the CBD area is shown graphically in Figure 4. After the onset of the lockout and last drinks laws there was an overall decline of 12.6% in the number of non-domestic assaults; in total around 613 fewer assaults over the 32-month post-reform period than forecasted from the pre-existing trend.

Figure 2. Time series of the number of non-domestic assaults for Kings Cross Precinct, Sydney Entertainment Precinct, proximal and distal displacement areas and the rest of NSW: Jan 2009-Sep 2016

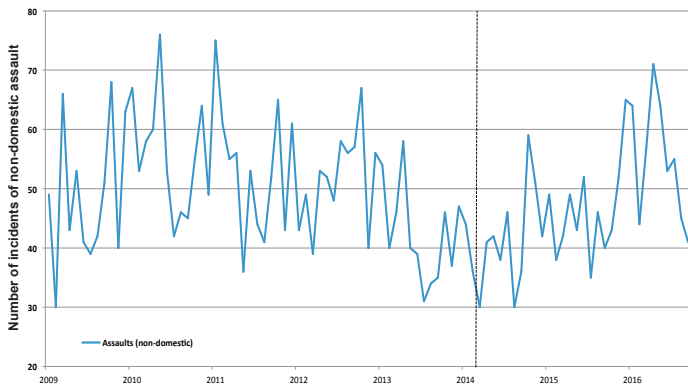
Kings Cross Entertainment Precinct (KXP)



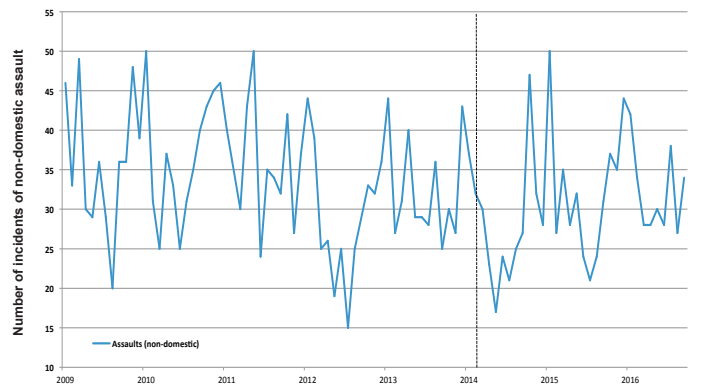
Sydney CBD Entertainment Precinct (CBD)



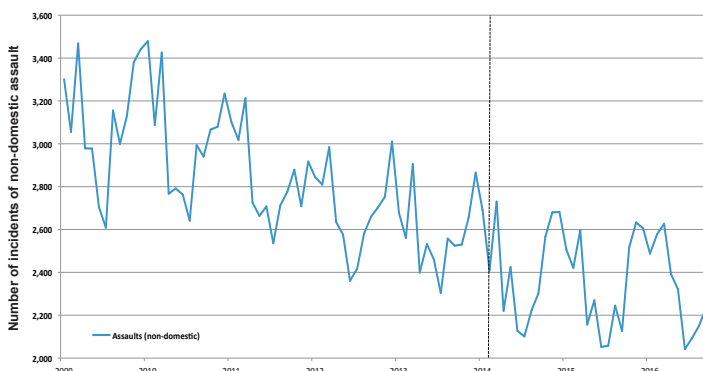
Proximal Displacement Area (PDA)



Distal Displacement Area (DDA)



Rest of NSW



Vertical line indicates commencement of Liquor Amendment Act 2014

Table 1. Final model estimates of changes in non-domestic assault incidents by area

	KXP	CBD	PDA	DDA	Rest of NSW
Underlying trend	-0.085 $p = .031^*$	-0.417 $p < .001^*$	-0.162 $p = .013$	-0.151 $p < .001^*$	-11.101 $p < .001^*$
Level change	-11.994 $p < .001^*$	-20.033 $p < .001^*$	-8.160 $p = .040^*$	-	-
Trend change	-0.330 $p = .007^*$	-	0.785 $p < .001^*$	0.292 $p = .002^*$	7.252 $p = .043^*$
Ljung-Box test	$\chi^2_{23} = 22.4$ $p = .497$	$\chi^2_{22} = 27.2$ $p = .205$	$\chi^2_{24} = 25.6$ $p = .374$	$\chi^2_{23} = 16.5$ $p = .835$	$\chi^2_{22} = 19.3$ $p = .627$
AIC	610.515	799.523	678.897	604.077	1162.365
Intervention effect type	Level & Trend	Level	Level & Trend	Trend	Trend
Seasonality?	No	Yes	Yes	Yes	Yes

Ljung-Box test based on first 24 autocorrelation lags of the residuals

Figure 3. Estimated trend for the number of non-domestic assaults in the Kings Cross Entertainment Precinct (KXP): Jan 2009-Sep 2016

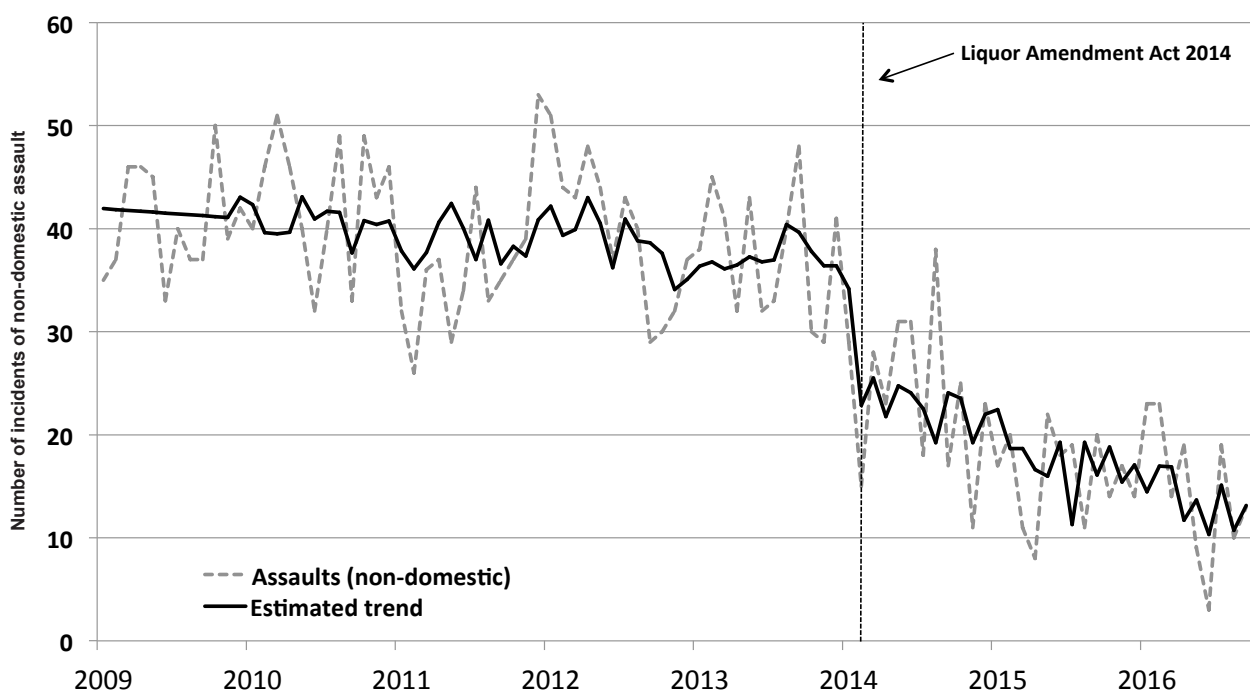


Figure 4. Estimated trend for the number of non-domestic assaults in the Sydney CBD Entertainment Precinct (CBD): Jan 2009-Sep 2016

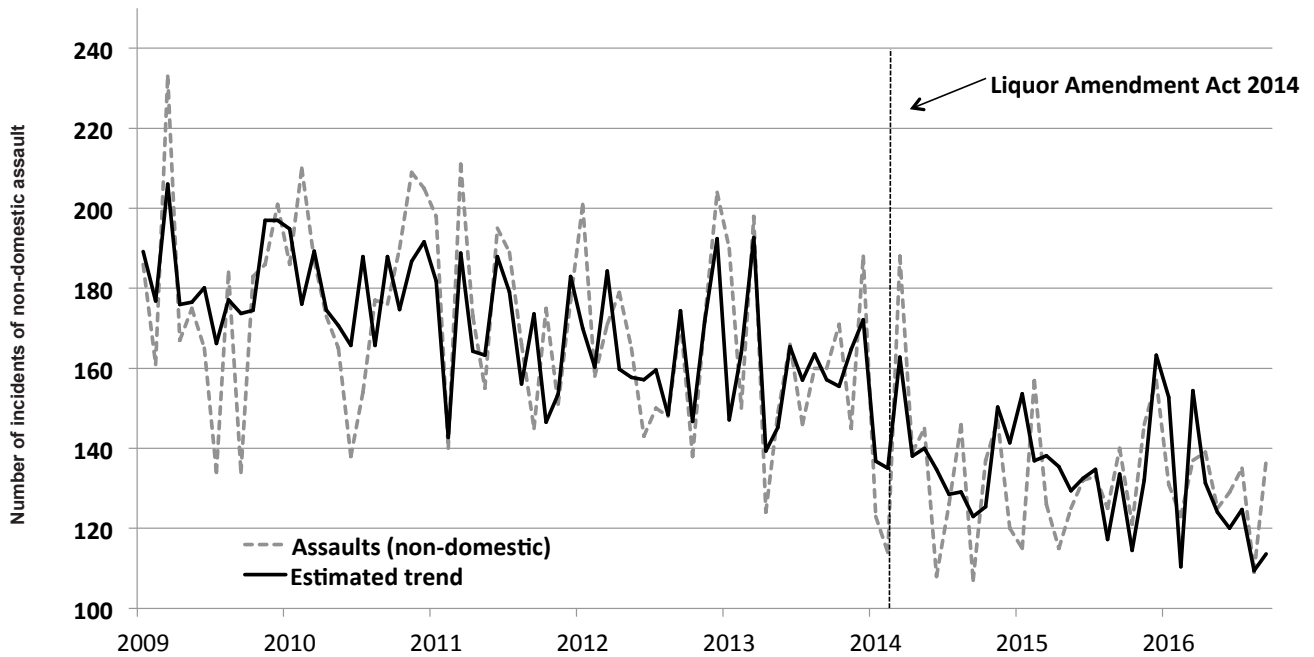


Table 1 shows the final time series model for non-domestic assaults in the Proximal Displacement Area (PDA), including *The Star* casino. In the five years prior to the 2014 liquor law reforms non-domestic assaults were falling in the PDA by almost one assault every six months. When the law reforms commenced there was a significant decline in the average level of the series in February 2014 by eight non-domestic assaults from 43 to 35 ($p = .040$). There was also a significant change to the trend in non-domestic assaults, whereby assaults began to increase

after the reforms ($p < .001$). The effect is shown in Figure 5. After the law reforms there was an 11.8% increase in the number of non-domestic assaults with 158 additional assaults occurring in the PDA (including *The Star* casino) than would have been expected from the pre-liquor law reform forecast. Time series analyses were also conducted for the PDA excluding *The Star*. These confirmed a statistically significant increase in assaults during the post-reform period in the PDA but one which was less pronounced in terms of percentage change and volume increase.¹

Figure 5. Estimated trend for the number of non-domestic assaults in the Proximal Displacement Area including *Star* casino (PDA): Jan 2009 - Sep 2016

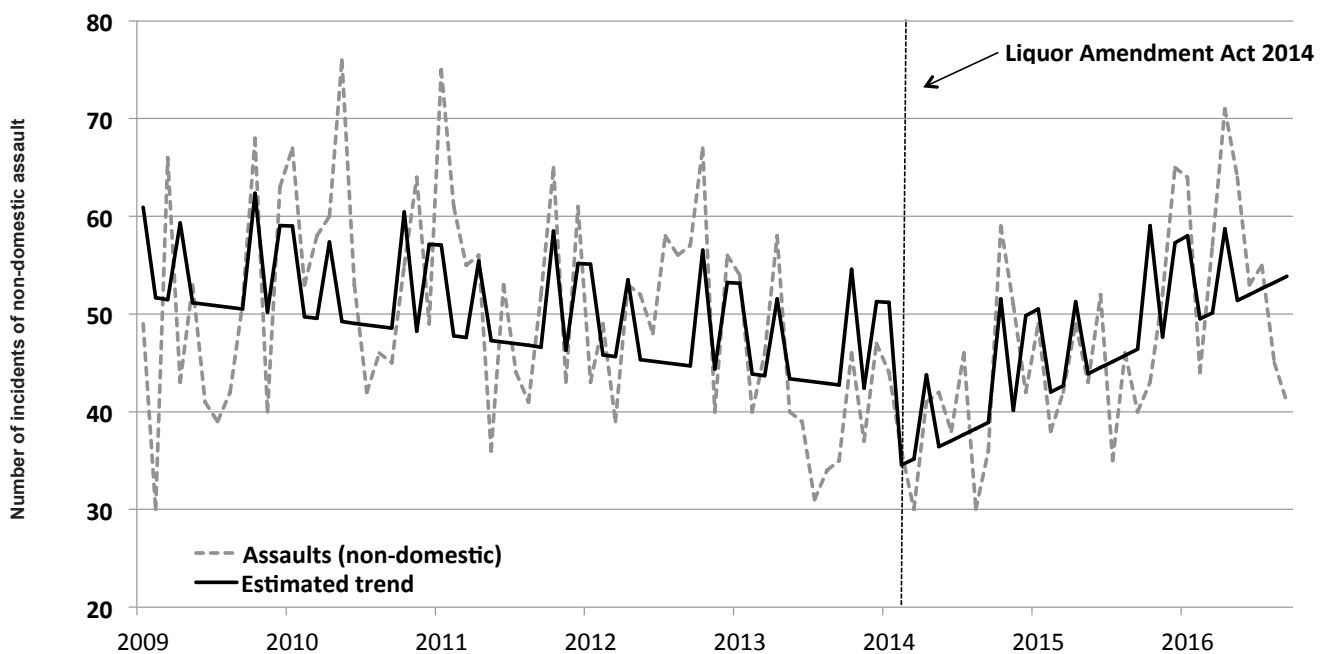
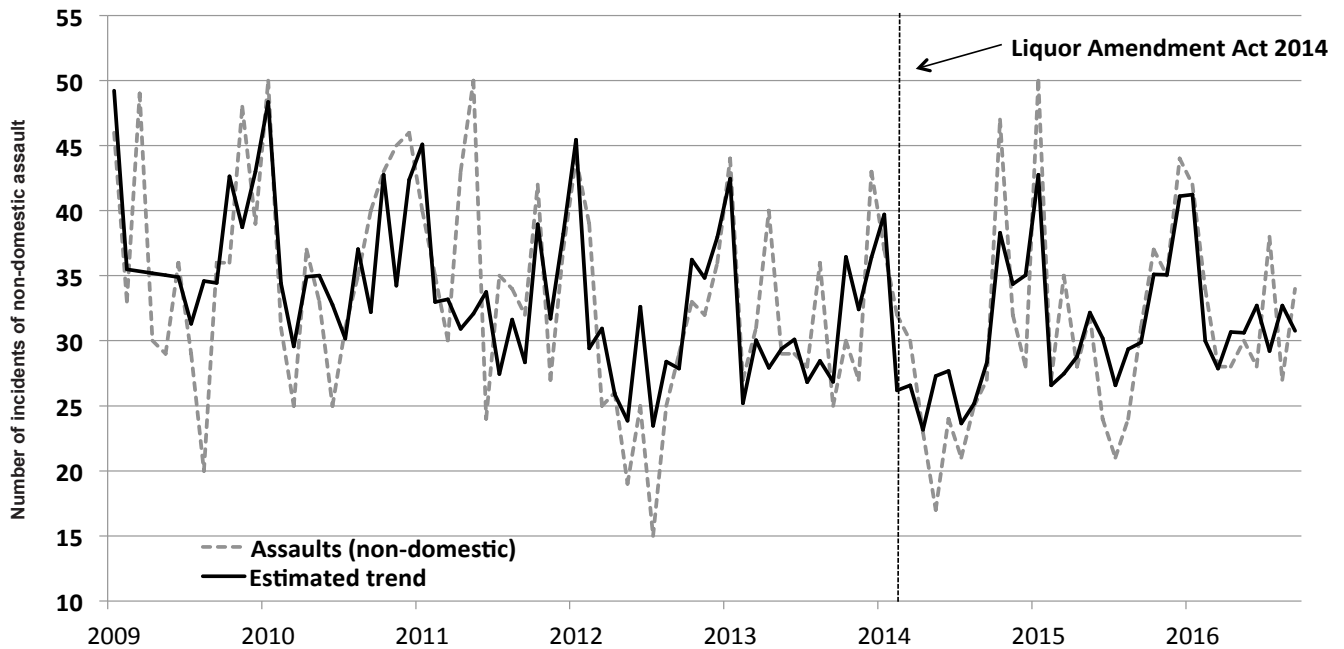


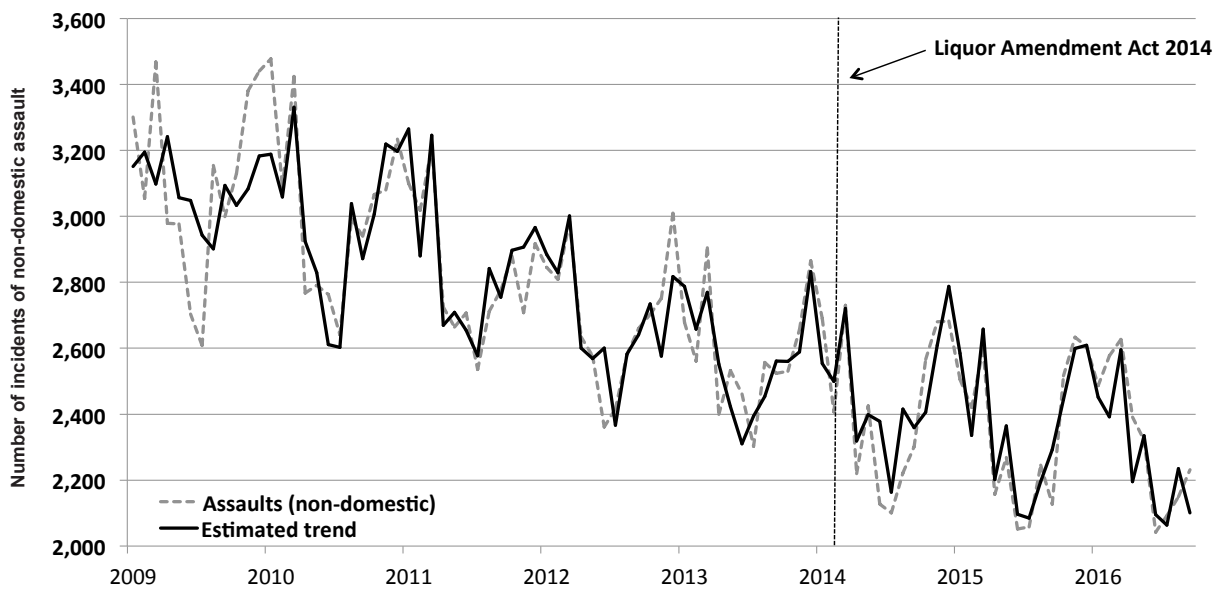
Figure 6. Estimated trend for the number of non-domestic assaults in the Distal Displacement Area (DDA): Jan 2009-Sep 2016



The ARIMA time series model for non-domestic assaults in the DDA is shown in Table 1 and the estimated trend from this model is displayed in Figure 6. In the years prior to the liquor law reforms non-domestic assaults were in significant decline in the DDA by around one assault per seven months. Enactment of the reforms did not change the level of the series. However there was a significant change in the trend, with evidence for a statistically significant increase in assaults ($p = .002$). After the new liquor laws commenced we estimate that there was a 16.7% increase in the number of non-domestic assaults in the DDA; which equates to an additional 141 incidents during the 32-month period than would have been expected from the pre-liquor law reform forecast.

The time series model for the rest of NSW excluding the target and displacement areas is shown in Table 1. The estimated trend from this model is displayed in Figure 7. Prior to the onset of the liquor law reforms there was a strong declining trend in non-domestic assault incidents of around 11 less assaults per month ($p < .001$). There was no change in the level of the series after the new laws commenced however there was a significant reduction in the magnitude of the declining trend ($p = .043$). While from Figure 7 it can be seen that the overall trend in non-domestic assaults is continuing its downward trend since the liquor law reforms commenced the magnitude of the decline is now only four less assaults per month. We estimate that there has been an increase in the number of non-domestic assaults during the post law reform period in the rest of NSW of 0.8% compared with what was forecast from the pre-intervention period.

Figure 7. Estimated trend for the number of non-domestic assaults in the rest of NSW which excludes target and displacement areas: Jan 2009-Sep 2016



Did geographical displacement offset the reductions in non-domestic assault in the target areas?

From these analyses there was a clear reduction in non-domestic assault incidents in KXP and CBD; the areas which were most affected by the 2014 amendments. Notably there were also increases in non-domestic assaults in the two displacement areas (PDA and DDA). We therefore sought to determine whether the increase in violence in the PDA and DDA offset the reductions observed in the target sites. Since there is some spatial overlap (i.e. a shared boundary) between the KXP and Sydney CBD areas we cannot simply sum the reductions in both areas to obtain an overall reduction in the target sites.

To deal with this we also conducted time series analyses where the KXP and CBD areas were combined. The results from the ARIMA analysis are shown in Table A7. There was a significant reduction in the level of the series after the law reforms commenced where there were on average 30 less non-domestic assaults per month ($p < .001$). There was no change to the underlying trend. Compared with the forecasts from the pre-intervention period there was a 16.7% reduction in non-domestic assaults after the law reforms. In total there were 930 fewer assaults in the combined KXP and CBD areas compared with the 299 assault increase observed in the displacement areas during the 32-month post-law reform period. This suggests that the rise in domestic assaults in the proximal and distal displacement sites was not as large as the reductions observed in the target sites.

DISCUSSION

This study extends the earlier work of Menéndez et al. (2015; in press) to examine the longer-term effects of the 2014 NSW liquor law reforms on levels of violence in the inner Sydney area. Our results confirm previous analyses in demonstrating substantial reductions in non-domestic assaults in the King Cross and Sydney CBD areas immediately after the 2014 lockout and last drinks laws came into effect and, importantly, evidence that these lower levels of assaults were sustained over the 32-month post-reform period. After the new liquor laws came into effect, we estimate that there was a 49% decline in the number of non-domestic assaults in the King Cross area and a 13% decline in non-domestic assaults in the Sydney CBD Entertainment Precinct. The decline estimated for Kings Cross is comparable to previous estimates based on a shorter 17-month follow-up period (49% vs. 45%), but the decline for the Sydney CBD area is somewhat smaller than previous calculations indicated (13% vs. 22%). Given the higher volume of non-domestic assaults in the Sydney CBD area, however, the drop in absolute terms is still comparatively large (approximately 613 fewer assaults over the 32-month follow-up in Sydney CBD compared with 553 fewer assaults in the Kings Cross Precinct).

Notably, the current analyses also found evidence for geographical displacement of assaults to areas immediately adjacent to the Kings Cross and Sydney CBD areas, as well as to other areas that were in easy reach of these Precincts. In

both the Proximal Displacement Areas (which includes *The Star* and other venues around Ultimo and Surry Hills) and the Distal Displacement Areas (which includes Double Bay, Newtown, and Bondi among others) there was a 12% and 17% increase, respectively, in non-domestic assaults after the liquor law reforms took effect; an increase that was not evident to the same extent across other areas of NSW over the same period. While this suggests there has been a shift in violence away from the target sites to the surrounding areas, it should be remembered that the reductions in assault in the Kings Cross and Sydney CBD far outweigh the observed increases in the displacement sites; supporting the conclusion that, overall, there was a net reduction in violence during the 32-month post-reform period.

The new evidence to emerge for geographical displacement of violence over the longer-term is, nevertheless, of concern. A recent independent review of the NSW liquor law amendments commissioned by the NSW State Government proposed trialling a relaxation of the licensing restrictions in the target Precincts, at least in relation to genuine entertainment venues, in an attempt to balance community safety and the adverse impact of the restrictions on the night-time economy. The Callinan review acknowledged that such a trial carried risks, including greater density and increased alcohol consumption in the Precincts, but indicated that such measures may be necessary to restore vibrancy and employment opportunities to the affected areas (Review of Amendments to the Liquor Act 2007 (NSW), 2016). The NSW Government has now implemented a two-year trial of a later lockout (to 2am) and last drinks (to 3.30am) for venues in the CBD and KXP which offer live entertainment. Our results suggest that any loosening of the restrictions in the Precincts may also carry significant risks for the broader inner Sydney area and for entertainment areas within easy reach of the CBD.

It is difficult from an aggregate-level time-series analysis such as ours to identify the mechanism(s) by which the new liquor laws affected levels of violence in the target sites. We can be confident that the decline in Kings Cross and Sydney CBD was not due to a pre-existing downward trend in assaults in these areas or because of seasonal variation. The statistically significant rise in the surrounding and nearby suburbs, as well as the generally stable state-wide trend in non-domestic assaults, lend further support to the proposition that the drop in the target sites was due to the specific licensing restrictions affecting those sites rather than other unmeasured factors (e.g. economic conditions) or other components of the liquor law reforms (e.g. bottle shop closures). Menéndez and colleagues (2016) have previously shown that pedestrian traffic in the Kings Cross area also dropped during the post-reform period and that there were fewer assaults in this Precinct at times when the restrictions did not apply; suggesting that fewer visitors is also a partial explanation for the drop in violence in Kings Cross. This reduction in visitor numbers combined with the subsequent closure of a number of high profile licensed venues in the Kings Cross area during the post-reform period (Review of Amendments to the Liquor Act 2007 (NSW))

may also explain our finding that the effect size associated with the intervention was sustained over the longer term in the Kings Cross area but attenuated in the Sydney CBD area as time passed. Further examination of trends in patronage or liquor sales at affected venues and/or new licences issued in the surrounding areas during the 32-month post-reform period would better our understanding of the various factors influencing these long-term trends in violence. So too would a more detailed analysis of non-domestic assaults by time of day in both the Precincts and the displacement areas. These avenues of research are currently being explored by BOCSAR.

What is clear from the current study is that the impact of the NSW 2014 liquor law reforms on levels of violence in the inner Sydney area needs to be regularly reviewed and continually monitored. It cannot be assumed that the initial positive impact achieved by the lockouts and last drinks laws, which was clearly evident immediately after the changes were enacted, will be maintained over the longer term or that enforcing the current licensing restrictions in the Kings Cross and Sydney CBD Entertainment precincts will have no adverse impact on surrounding neighbourhoods. The extent to which a future net benefit can be achieved with the more relaxed lockouts and last drinks now being trialled in the Sydney CBD and Kings Cross Precincts is, as yet, unknown.

ACKNOWLEDGEMENTS

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NOTES

1. This additional analysis found that the underlying trend prior to the reforms was one less assault every six months ($p = .003$). The commencement of the liquor laws was associated with a significant decline in the level of the series in February 2014 by 11 non-domestic assaults from 39 to 28 ($p = .003$). There was also a significant change to the trend in non-domestic assaults so it was now increasing ($p < .001$). Over the post law reform period there was an 8.1% increase in the number of non-domestic assaults in the PDA (excluding Star casino) with around 97 extra assaults during the post-reform period compared with what was forecast.

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APPENDIX

Final ARIMA time series models for each area

Table A1. ARIMA time series model of non-domestic assaults in Kings Cross Entertainment precinct (KXP), January 2009 - September 2016

	Estimate	Standard Error	p value
Constant	42.021	1.355	<.001 *
Underlying trend in assaults	-0.085	0.039	=.031 *
Liquor law reforms: Level change	-11.994	2.736	<.001 *
Liquor law reforms: Trend change	-0.330	0.122	=.007 *
Moving Average (Lag 11)	0.325	0.108	=.003 *

Table A2. ARIMA time series model of non-domestic assaults in Sydney CBD Entertainment precinct (CBD), January 2009 - September 2016

	Estimate	Standard Error	p value
Constant	177.638	2.799	<.001 *
Underlying trend in assaults	-0.417	0.085	<.001 *
Liquor law reforms: Level change	-20.033	4.992	<.001 *
January	11.992	3.260	<.001 *
March	29.691	3.099	<.001 *
November	9.434	3.382	=.005*
December	28.068	3.394	<.001*
Autoregressive (Lag 4)	-0.285	0.105	=.007*
Moving Average Seasonal (Lag 12)	0.600	0.121	<.001 *

Table A3. ARIMA time series model of non-domestic assaults in Proximal Displacement Area (PDA) including Star casino, January 2009 - September 2016

	Estimate	Standard Error	p value
Constant	51.978	2.398	< .001 *
Underlying trend in assaults	-0.162	0.065	= .013 *
Liquor law reforms: Level change	-8.160	3.963	= .040 *
Liquor law reforms: Trend change	0.785	0.183	< .001 *
January	9.127	3.362	= .007 *
April	8.000	3.357	= .017 *
October	12.020	3.568	< .001 *
December	9.038	3.573	= .011 *

Table A4. ARIMA time series model of non-domestic assaults in Proximal Displacement Area (PDA) excluding Star casino, January 2009 - September 2016

	Estimate	Standard Error	p value
Constant	49.576	2.272	<.001 *
Underlying trend in assaults	-0.186	0.062	=.003 *
Liquor law reforms: Level change	-11.081	3.754	=.003 *
Liquor law reforms: Trend change	0.844	0.174	<.001 *
January	7.776	3.185	=.015 *
April	7.770	3.180	=.015 *
October	10.394	3.380	=.002 *
December	7.284	3.384	=.031 *

Table A5. ARIMA time series model of non-domestic assaults in Distal Displacement Area (DDA), January 2009 - September 2016

	Estimate	Standard Error	p value
Constant	35.804	1.257	<.001 *
Underlying trend in assaults	-0.151	0.032	< .001 *
Liquor law reforms: Trend change	0.292	0.096	= .002 *
January	13.576	1.605	< .001 *
July	-3.437	1.606	= .032 *
October	8.343	1.720	< .001 *
November	4.588	1.718	= .008 *
December	9.004	1.718	< .001 *
Moving Average Seasonal (Lag 12)	0.322	0.112	= .004 *

Table A6. ARIMA time series model of non-domestic assaults in rest of NSW, January 2009 - September 2016

	Estimate	Standard Error	p value
Constant	3,162.600	90.328	< .001 *
Underlying trend in assaults	-11.101	1.699	< .001 *
Liquor law reforms: Trend change	7.252	3.589	= .043 *
Autoregressive (Lag 1)	0.364	0.094	< .001 *
Autoregressive Seasonal (Lag 12)	0.828	0.049	< .001 *

Table A7. ARIMA time series model of non-domestic assaults in the combined Sydney CBD and Kings Cross Entertainment precincts (CBD & KXP), January 2009 - September 2016

	Estimate	Standard Error	p value
Constant	205.450	3.265	< .001 *
Underlying trend in assaults	-0.480	0.095	< .001 *
Liquor law reforms: Level change	-30.230	5.487	< .001 *
January	9.452	4.635	= .041 *
March	30.410	4.655	< .001 *
December	28.003	4.908	< .001 *
Autoregressive (Lag 4)	-0.287	0.106	= .007 *
Moving Average Seasonal (Lag 12)	0.380	0.116	= .001 *