Submission No 766

SYDNEY'S NIGHT TIME ECONOMY

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Date Received: 5 July 2019

The Hon. Natalie Ward MLC
Committee Chair
Joint Select Committee on Sydney's night time economy

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Dear Ms Ward

SUBMISSION TO THE *INQUIRY INTO SYDNEY'S NIGHT TIME ECONOMY:* Prof Peter Miller

Thank you for the opportunity to provide a response to the Joint Select Committee on Sydney's night time economy. I welcome the Government's actions to address this important issue.

Alcohol-fuelled violence in New South Wales is significant. The harms from this violence affect individuals, families and communities. I point you to the submissions of Prof Kypri, NSW police, St Vincent's Hospitals and the Bureau for Crime Statistics and Research as excellent sources for consideration regarding the level of harm.

Importantly, I would also point you to the economic analyses of different night-time economies across Australia (License, Edwards, & Bevan, 2018) which shows that Sydney's nightlife is flourishing and provides a wide range of entertainment options to locals and visitors.

As the lead investigator five of the largest studies conducted into alcohol-related harm around night-time economies, I wish to add information regarding the nature of alcohol-related violence, point you to our most recent evaluation of last drinks measures put in place in Queensland and our assessments of other measures such as 24hr transport in Melbourne. I have addressed a number of elements in detail below.

As discussed with the Secretariat, I have recently completed a massive report on the measures implemented in Queensland, some elements of which are described below. Unfortunately, the timing of your review is while the Government is still building their response to the 45 recommendations (which of course requires careful consideration and planning). The Queensland government is unable to release the report just yet, but I will make a copy available as soon as it is released.

Of relevance to the committee, I also thought it would be helpful for them to consider reviews we have conducted into what works to reduce alcohol related harm. While there have been a number of advances in the field around some interventions, the review remains accurate for the interventions covered (Curtis et al., 2017; Miller, Curtis, Chikritzhs, & Toumbourou, 2015).

I am happy to supply a briefing in person if that would be of assistance.

Yours sincerely

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QUANTEM

In 2015, I led an application to the Australian Research Council which involved six other universities and a range of leading specialist and local academics, which was announced as successful in May 2016. The QUANTEM project is aligned with a Linkage Grant funded by the Australian Research Council. The Linkage Grant includes investigators from many Australian universities, including Deakin University, The University of Queensland, James Cook University, Curtin University, The University of Newcastle, Monash University, and Latrobe University. There are also four partner investigators: The Foundation for Alcohol Research and Education, Lives Lived Well, Turning Point Alcohol and Drug Centre, and the Australian Rechabite Foundation.

In addition, and subsequent to, the original ARC Linkage grant, members of the core research team (excluding partner investigators) successfully bid for a tender released by the Queensland government to evaluate the Tackling Alcohol-fuelled Violence legislation. This tender is shorter in duration and allows for the addition of specific components and sites not included in the original ARC grant. The existence of the ARC grant allows for significant savings in terms of the overall budget, and a much more comprehensive project to investigate the trends and drivers associated with the TAFV legislation.

The research team is: Peter Miller, Jason Ferris, Kerri Coomber, Renee Zahnow, Nicholas Carah, Heng Jiang, Kypros Kypri, Tanya Chikritzhs, Alan Clough, Michael Livingston, Dominique de Andrade, Robin Room, Sarah Callinan, Ashlee Curtis, Richelle Mayshak, Nicolas Droste, Belinda Lloyd, Sharon Matthews, Nicholas Taylor, Meredythe Crane, Michael Thorn and Jake Najman

The original project design was outlined in a peer-reviewed protocol, available at:

With the addition of the Queensland government tender, a number of additional elements were evaluated and datasets were made available.

We have produces a number of relevant publications thus far from the intervention which document the evaluation method (Miller et al., 2017), six month findings (Ferris, Zahnow, Miller, & Coomber, 2017) and short-term changes in nightlife attendance (Coomber et al., 2018).

Future reviews and evaluation

One of the key lessons from the conduct and reporting of the QUANTEM evaluation has been the clear benefit of providing comprehensive, bespoke and ongoing evaluative research designed to answer key questions surrounding the different impacts of such legislation. In the debates surrounding liquor legislation in Sydney and around Australia, there are a range of highly motivated parties seeking to achieve their desired outcomes; be that reducing violence, increasing profit or being allowed to drink very late at night. Having pre-defined and consistently measured outcomes independently analysed and peer-reviewed should be considered minimum best-practice.

Our study showed major benefits and considerations regarding some of the key data which needs to be collected. I highlight a number of these for consideration of what is lacking in the current considerations but can prove very important.

Patron self-report and BAC information

Our studies have consistently shown the importance of recording intoxication levels and experience of harm information from patrons on the street. This information provides a much more sensitive measure of harm experienced, especially in terms of unwanted sexual attention, unrecorded injury and drink driving. One key element is that much of alcohol-related harm such as injuries or assault go mostly unrecorded as people seek

treatment from GPs or do not report assaults to police. Previous research suggests around 60% of violence goes unreported to police (Miller et al., 2016).

Openly available and independently analysed Live Music data

Our experience of cleaning and analysing Live Music data suggests that there are very substantial challenges associated with the data recorded and potential for coding and analysis inconsistencies. We would strongly recommend that any such data be made publicly available (with appropriate anonymization) and independently analysed by individuals with relevant statistical expertise.

Foot traffic counting

A range of methods are now available to cheaply and continuously record the number of people moving through areas (Taylor et al., 2019). This data has been very valuable in understanding the trends in people attending entertainment precincts and providing understandings about how these change over time, but also how trends throughout the night change with different interventions, but also in relation to outcomes such as assaults and injuries.

Uber data

The advent of Uber has made significant impacts on nightlife precincts in terms of the ability of people to get in and out of the city, but also in a personalised matter with the identifiability of drivers being a key safety consideration for patrons. Our QUANTEM report documents some of the important trends, but there are important considerations in terms of documenting how people move in and out of nightlife precincts and also in relationship to personal safety.

Tourism data

Considering Tourism data is important as well. There have been consistent claims regarding the impact of liquor legislation on tourism. However, these occur in a data-free zone, and our analysis of Queensland data provides important understanding not only about how different groups of tourists respond to safety considerations versus some people wish to go out very late at night. Importantly, consideration of the financial value different tourist groups should be made in understanding the difference between vocal minorities and the majority of tourists and who spends money where.

QUANTEM conclusion

The final 998 page report to government of the 2 year evaluation will be available within the next month or so for assessment. It holds relevant information regarding the wide range of benefits and culture changes that have occurred in Queensland in relation to the intervention and will hopefully assist the Committee with its deliberations. I am happy to supply a briefing in person if that would be of assistance.

24 hr public transport

Recent discussion have also discussed the idea of providing 24 hour public transport as a means of reducing alcohol-related harm. This aspect of nightlife has certainly changed since the advent of Uber and our QUANTEM study demonstrates that most people in the nightlife now use Uber as a safer and more convenient way of travelling after dark.

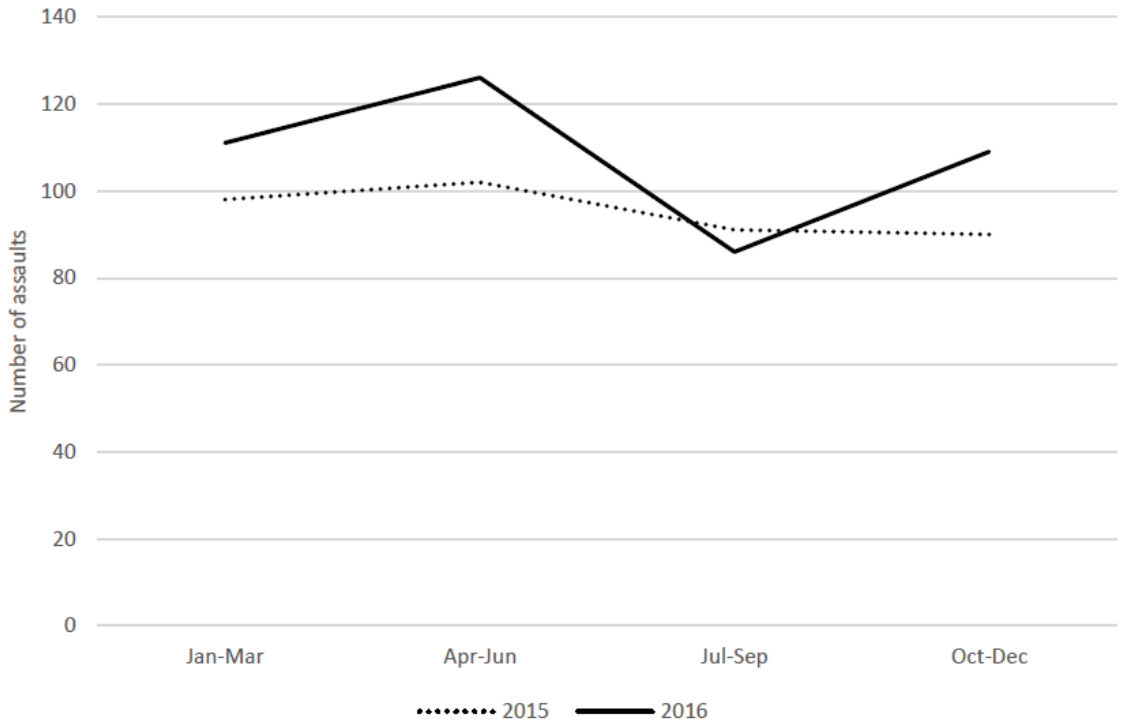
Further, we have recently published 2 articles evaluating the Melbourne's ongoing trial of 24 hour public transport, which are attached to this submission.

Thus far, it has cost more than $300 million.

In the first study we conducted covert observations of four nightclub venues in Melbourne, from 12am to 4am, in the year prior to, and after the introduction of 24 hour public transport. When we matched the months, to account for changes in season, we found that levels of intoxication of patrons inside venues increased after 24 hour public

transport. This evaluated whether the availability of public transport throughout the night impacted on the number of people attending licensed venues, and the proportion of people in licensed venues who were consuming alcohol and drugs.

Our second study utilised police assault data, alcohol and drug related ambulance attendance data, road crash data from the areas serviced by public transport, Myki touch on data, and pedestrian count data to determine the impact of the 24 hour public transport on alcohol-related harms in the city.



This was then followed by a temporary reduction, but the most recent data made available from the Victorian Crime Statistics Agency (shown in below Table) demonstrated that assaults have continued to increase within the city.

	Jan to Dec 2016	Jan to Dec 2017	Jan to Dec 2018
Assault and related offences	669	738	757

Our findings suggest the money spent on 24hr public transport is associated with increases in intoxication and violence.

This contrasts strongly to good news story seen in Sydney of declining assaults and sexual harassment.

Recent analysis reported in Sydney Morning Herald

In a recent article in the Sydney Morning Herald, a junior Sydney University academic was reported as having conducted a novel type of analyses on BOCSAR data and that the findings suggest a lack of impact of 'the lockout laws'.

I was deeply concerned that they released the analysis when it had not been through peer-review and that there was no accompanying information or report that provided the most basic scientific information regarding the way

in which the data has been interpreted, the assumptions that have been made or the parameters that have been set. Nor indeed what variables have been input into the model. While the statistical method used had been used on completely different data, this is not a defensible strategy for an entirely different dataset, and set of variables and outputs. Simply saying the model has been peer-reviewed is like defending the use of a t-test; it's all about what you have and have not considered.

In subsequent communication with Sydney University and the author's Centre, I requested this most basic information in the way it would be in a journal article, so that I could make a considered response.

They have refused to supply this most basic scientific information.

This matters because simple choices such as the specific outcome, or indeed the variables you control for matter. In a recent paper, Nepal and colleagues demonstrated that "The volume of missing data and lack of specification concerning the substance use status of offender preclude valid estimation of trends in alcohol-related assault using the police indicator. Our analysis demonstrates how misleading results can be produced by changes in police practices, that is, so-called service delivery variables." (Nepal, Kypri, Attia, Chikritzhs, & Miller, 2019)

Further, I have communicated with three biostatisticians regarding the use of this model to assess the impact of a specific intervention. They report very substantial doubts about the applicability of such a model as the modelling technique is data-driven and identifies it's own change time points. This is appropriate if you are trying to find out when something changed, but not if you are assessing an intervention which had a specific implementation date, and an identified lag-time. Unfortunately, without the information being transparently provided, it is impossible to know ho robust the model was, and whether the authors made appropriate assumptions regarding input and output variables. Given they have no experience in alcohol policy or crime reporting, there is substantial likelihood of error.

The lack of information provided by the author and his University, and the lack of ethical practice around dissemination of findings which have no transparency and have not been through peer-review leads me to recommend that this analysis is not credible and should not be considered as reliable until basic scientific good practice and transparency is adhered to.

Recent article by Devilly et al. on pre-drinking in Queensland

I would also take this opportunity to review a recent article which obtained significant coverage in the national media. Devilly, Hides and Kavanaugh produced an article in the pay-to-publish journal *Plos One*, after it was rejected from specialist journals such as *Addiction*, which are knowledgeable in the issues. The article, entitled, "A big night out getting bigger: Alcohol consumption, arrests and crowd numbers, before and after legislative change", contains major factual errors and was methodologically unable to assess the measures it purports to.

There are a number of factual errors which I believe you journal will want to see corrected, as well as some wider quality issues with the paper. I'm not sure what mechanisms you have to respond to those.

I should note that the lead author, Grant Devilly and I have a history of conflict – I won a large tender from the Queensland Government on this topic in competition with him – and we have not agreed on much since . I have no desire to be in communication with him. I still collaborate with one of the other authors.

As the successful tenderer, we have a very detailed knowledge of the legislation and believe it is important for any journal article to be accurate, at least in the basics which it describes. While I believe the studies themselves are deeply flawed, I understand it has been through peer review and your journal must be satisfied that the reviews were of sufficient quality. If you're not, my other concerns are listed below my signature – but again –

this email is to correct the factual errors, which go beyond something would simply go in the Comments section you provide.

The main factual error, and a substantial misrepresentation on the authors part, is their description of the policy. Devilly and colleagues state:

"The new legislation imposed a 2-hour reduction in trading hours for alcohol sales in venues within specific NEDs (from 5am to 3am), a reduction in maximum trading

hours for venues outside NEDs (with a maximum 2am closing time), the banning of 'rapid intoxication drinks' (e.g. shots) after 12am, and no new approvals for trading hours beyond 10pm for the sale of takeaway alcohol. These aspects of the legislation came into effect on 1st July 2016."

The way the author presents these changes in the manuscript suggest these were the 'ONLY' changes. We have provided a table of all the changes that were proposed

However, in fact, the Tackling Alcohol Fuelled Violence policy included:

Measure	**Initiative**
Changes to very-late-night liquor trading hours	Wind back of alcohol service hours for late night liquor trading venues
	Temporary permits for extended liquor trading hours
	1 am lock out
	A ban on the sale of rapid intoxication drinks after midnight No further late night approvals for takeaway liquor trade
Targeted policing activities	Intelligence-led policing Breathalysing intoxicated or disorderly patrons for the possible prosecution of licensees
	Paramedics in watch-houses initiative
Education	Community education about safe drinking practices
	Support for Mr Danny Green's coward's punch campaign
	Education in schools
Liquor licensing and compliance	Increased compliance activity by liquor licensing officers to address alcohol-fuelled violence
	Increased licence fees for high risk venues
	Publishing information on liquor licensing, compliance and enforcement activity
Precinct management	Safe Night Precincts
	Mandatory networked ID scanners
	Strategies to ensure industry staff are safe when travelling to and from work in the early hours
Police and court powers	Targeted referrals to drug and alcohol information and counselling
	Banning troublemakers from pubs, clubs and precincts

Monitoring and measuring	Implementation oversight
	Evaluation

This Table is an abbreviated version of the full description in the attached '. Importantly, the authors definitely had this information as it was a part of the tender they applied for.

Of course, the article's description of what was put in place misrepresents the very broad-natured government response. The later critique of the measures fails to discuss any of the elements of the legislation such as the education campaigns, interventions for offenders and ID scanner provisions to target problematic drinkers.

Further, and critically, Devilly and colleagues study purport to evaluate the intervention, but the data collection was concluded before two major elements came into play. In February 2017 (when their data collection ended), the government closed a loophole which meant venues had been still trading until 5am. The industry had co-ordinated so that there was always at least one venue open in Fortitude Valley, and therefore, the intervention had not yet been properly put in place. The author either doesn't know this (like the Cairns issue) or has failed to mention it in the paper. Either way, it represents a factual error in the paper and also means the study doesn't actually assess what it claims-the cessation of alcohol service at 3am.

A second factual error is that the article proposes that Cairns city closes at 2am, when in fact it closes at 3am. The paper uses Cairns as a comparison then to draw conclusions from regarding assaults, painting a false picture of situation. Another key flaw in this comparison is that while the authors note the high tourist population there, it omits any discussion of a large itinerant aboriginal population. This group of people unfortunately engage is substantial levels of anti-social harm and any consideration of harm in Cairns needs to account for this dynamic, as it occurs 24hrs a day, 7 days a week. It is also subject to forces outside a single alcohol policy change and could easily account for all or the changes described in the paper.

Finally, as mentioned before, the Tackling Alcohol Fuelled Violence legislation included the introduction of mandatory identification scanning at all venues. This was introduced in July 2017 and the authors have completely omitted this major element of the strategy from any of their discussion or consideration, but knew it was a key part of the strategy and that it targeted earlier in the night.

Five key quality issues:

1. The study is irrelevant to the measures. The reported findings all come from pre-April 2017, when the government closed a loophole in the legislation in Feb 2017. The loophole meant that the industry had been using extended trading permits (XTPs) to always have venues inside SNPs trading until 5am. Thus, last drinks hadn't been enacted yet. He fails to mention this at all. See: Ferris, J., Zahnow, R., Miller, P., & Coomber, K. (2017). Impact of the last drinks and lockouts: Prepared for the Queensland Government by University of Queensland and Deakin University. Available at: https://www.thepremier.qld.gov.au/newsroom/alcohol-fuelled-violence-six-mth-report.aspx

2. The methods used between studies changes. In Study 1, police actually recruit patrons. In the other time periods they are not even in attendance. He claims it has no impact, but this scientifically and logically indefensible.

3. The Big Night Out study, which a lot of the claims are based on, came from a single night of data collection in 2016 compared to a single night in 2017. The authors note this, and admit the difference could be completely random.

4. The key finding of the paper is that pre-drinking increased, but the authors claim significance by using a one-tailed t-test. However, you should only use a one-tailed test when it is impossible for something to vary in both directions (e.g., your first time point is only 1%, therefore could really only go up). Devilly and colleagues based their one-tailed test on Study 1, where patrons said 'Yeah, I'd probably pre-drink more', right? This is ok to specify a hypothesis, but I would still run a two-tail test as pre-drinking could feasibly also go down. This is would be especially important given the methodological changes between the two studies.

5. The definition of pre-drinking is different to every other study ever conducted and fatally flawed-inflating rates because they include drinking at pubs, clubs or restaurants, as long as they are outside SNPs. All other studies use 'drink before attending a licensed premise'. So, in Brisbane, an individual can be out drinking at a pub/club outside an SNP and be classed as 'pre-drinking' But if you are in Cairns or Rockhampton or many other SNPs, the majority of restaurants/clubs etc are inside the SNP (indeed it applies inside Brisbane as well), and Devilly's study will determine you have NOT been pre-drinking. Indeed, the successful 'small bars' policies enacted in NSW would resulted in a substantial increase in pre-drinking according to the definition used by Devilly.

Finally, regarding assaults, the authors discuss the findings inaccurately. There was a decline in Fortitude Valley, and an increase in the CBD. He avoids this entirely in the discussion and abstract, just reporting an increase. But the Casino is in the CBD – and is the major source of violence. It trades 24/7.

Industry rhetoric creating a self-fulfilling prophecy

A key issue throughout the past five years which I believe is relevant for the Committee to consider has been the consistent message of the alcohol industry and affiliated groups such as Keep Sydney Open has been the overwhelming message form them that Sydney's nightlife is dead, when the reality is very much the opposite. Rather than trying to constructively change culture and focus on providing excellent entertainment and service and showing patrons that nightlife culture can be both safe and fun, the narrative from these bodies has only been negative and has clearly had an underlying message to consumers that they should go elsewhere. It is impossible to know, but I believe a concerted message selling the Sydney nightlife as being reborn, fun and safe, would have gone a long way to bringing the right types of people into Sydney's centre and building a very different type of culture; one that is seen in many cities around the world that cease alcohol service in the early hours such as San Francisco, Vancouver, Amsterdam and New York.

Sydney is a vibrant nightlife

The data presented in this report, and the conclusions reached, mirror the independent work of others. In the recent "*Measuring the Australian Night Time Economy 2016-17*" report (License et al., 2018), it was reported that:
"*Sydney's Core NTE is a clear strength for the LGA*"

Indeed, Sydney is doing so well, that:

"*The greatest growth over this period was in the Drink sub-sector, with increases in establishments (+4.9%), employment (+8.7%) and turnover (+6.5%), well above the NSW and national averages.*"

The report also found that there had been increases in the number of establishments, the employment within the industry and in the annual turnover (gross sales) of industry (from 6.3%). Whilst it was identified as being the key sector within the night-time economy, entertainment and drink accounted for only around one third of its income. Profiles of both Brisbane and the Gold Coast highlighted the continued growth of the night-time economy, especially in relation to most of the value being in food, rather than drink and entertainment.

Conclusion

As reference material, I have attached journal articles and major reports generated by our research along with a number of key peer-reviewed articles which have subsequently been produced. Within the reports there are a wide range of recommendations for further measures which can be taken to reduce alcohol-related violence.

It is clear from the material presented that Sydney's nightlife is doing very well and that the safety afforded by the current range of interventions provides a fundamentally attractive entertainment option to the vast majority of patrons (rather than a vocal and well-funded minority). The savings to taxpayers and reduced drain on emergency services can only be matched by the sustained reductions in trauma and tragedy in Sydney.

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Impact of the last drinks and lockouts

Prepared for the Queensland Government

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Acknowledgments

The authors wish to acknowledge and thank the Queensland Police, Queensland Health, Queensland Ambulance Service, and The Queensland Office of Liquor and Gaming Regulation for providing the assault data for this study.

Table of Contents

Table of Tables

Table of Figures

1 Executive Summary

On the 1st July 2016, the following measures commenced as part of the Queensland Government's Tackling Alcohol-fuelled Violence Policy:

- A state-wide cessation of the service of alcohol at 2am unless the venue is in a Safe Night Precinct (SNP: see Appendix 4 for list of SNPs);
- 3am last drinks in Safe Night Precincts;
- A ban on the sale of rapid intoxication, high alcohol-content drinks after midnight;
- Publishing information on liquor licensing, compliance and enforcement activity.

This report focuses on the impact of these introduced measures by examining trends in administrative data from three emergency services: The Queensland Police Service, Queensland Heath Emergency Department and the Queensland Ambulance Service. We also include data from The Queensland Office of Liquor and Gaming Regulation. As only six months of data is available following the introduction of the Policy it is too early to be able to make any definitive statements regarding whether any changes in trends post-implementation are statistically significant. However, a number of important conclusions can be noted:

- It is very important to note that there has been virtually no fidelity to the last-drinks at 3am in SNPs across Queensland due to the systematic and widespread use of extended trading permits;
- Since 1st July 2016, there has not been a single weekend night where all venues in the Fortitude Valley have ceased the service of alcohol at 3am;
- There has been no obvious reduction in alcohol-related assaults in the period 1 July 2016 to 31 December 2016, either in SNPs, or Queensland-wide;
- For the hours of 20:00 to 06:00 there has been a continuing downward trend in common and serious assaults in Queensland and for the hours of 03:00 and 06:00 a continuing downward trend in ambulance attendances in SNPs and a continuing downward trend in common assaults in the Fortitude Valley. This downward trend includes the period since the introduction of the Policy.
- There has been no significant change in injury presentations at Emergency Departments during high alcohol hours;
- Lack of notable change in trends since the introduction of the Policy also suggests the provision of extended trading permits (allowing the sale of alcohol until 5am) has compromised the impact of the Policy.

The current research evidence suggests that the introduction of lockouts (one-way doors) is not likely to significantly change current trends (except for pre-drinking).

Current available evidence reinforces the need for restricted trading hours to be actuated; suggesting modifications to current extended trading hours permits are necessary for the Policy to be deemed effective.

The lack of change in alcohol-related harms during earlier hours also indicates that measures used to reduce harm earlier in the night such as ID scanners, and banning orders for repeat offenders continue to be warranted.

2 Executive Findings

Table 1 and Table 2 summarise the findings of this report. Table 1 present trends in events occurring during high alcohol hours, defined here as: Friday 20:00 to Saturday 06:00 and Saturday 20:00 to Sunday 06:00. In the Fortitude Valley and in SNPs across Queensland trends in common assaults, serious assaults and ambulance attendances during HAH remained flat and stable between January 2014 and December 2016. There was no evidence of a change in these trends since 1st July 2016. Across Queensland, outside of SNPs, there was evidence that common and serious assaults during HAH have been stable but trending downwards since January 2014 while ambulance attendances during HAH have been stable but following an upward trend. There was no evidence of a change in these trends since 1st July 2016. The trend in emergency department injury presentations during HAH remained flat and stable across the time series. This trend has not changed since the 1st July 2016.

Table 1: Summary of findings: High Alcohol Hours (HAH)

	Fortitude Valley	SNPs	Rest of Queensland
Common assaults	Jan2014-Dec2016 Flat trend (see Figure 9, p 30)	Jan2014-Dec2016 Flat trend (see Figure 1,p 14)	Jan2014-Dec2016 Downward trend (see Figure 3,p 18)
Serious assaults	Jan2014-Dec2016 Flat trend (see Figure 10,p 32)	Jan2014-Dec2016 Flat trend (see Figure 2,p 16)	Jan2014-Dec2016 Downward trend (see Figure 4,p 20)
Alcohol-related injuries			Jan2014-Dec2016 Flat trend (see Figure 13,p 39)
Ambulance attendances	Jan2014-Dec2016 Flat trend (see Figure 19,p 52)	Jan2014-Dec2016 Flat trend (see Figure 15,p 44)	Jan2014-Dec2016 Upward trend (see Figure 16,p 46)

Table 2 presents trends in events occurring between 03:00 and 06:00 on Saturday and Sunday. Trends in common and serious assaults occurring between 03:00 and 06:00 on Saturday and Sunday in SNPs and across Queensland remained flat and stable between January 2014 and December 2016. The trend in serious assaults in the Fortitude Valley, also remained flat and stable across the time series. In the Fortitude Valley common assaults followed an upward trend between January 2014 and December 2015. This increase was followed by a downward trend between December 2015 and December 2016, There was no evidence that trends in common or serious assaults in the Fortitude Valley, SNPs or

Queensland changed after the 1st of July 2016. Ambulances attendances between 03:00 and 06:00 on Saturday and Sunday remained stable between January 2014 and December 2016. These data revealed an upward trend across Queensland, a downward trend in SNPs and a flat trend in the Fortitude Valley across the series. There was no evidence that trends in ambulance attendances between 3:00 and 06:00 on Saturday and Sunday changed after 1st July 2016. Similarly, injury presentations at Queensland Emergency Departments between 03:00 and 06:00 on Saturday and Sunday remained stable pre and post 1st of July 2016.

Table 2 also presents the number of OLGR approved applications for extended trade until 5am. Since 1st July 2016, there has not been a single weekend night without approved trading until 5am. In the Fortitude Valley, the total number of approved applications for extended trade until 5am from the 2 July until 4 January 2017 was 280, with a weekly average of 10.4. Across all SNPs in Queensland the total number of applications during the six month period was 844, with a weekly average of 31.26. Across all of Queensland, there was a total of 931 approved applications for extended trade until 5am and the weekly average was 34.48.

Table 2: Summary of findings: 3:00 and 06:00 Saturday and Sunday

	Fortitude Valley	**SNPs**	**Rest of Queensland**
Common assaults	Jan2014-Dec2015 Upward trend Dec2015- Dec2016 Downward trend (see Figure 11,p 34)	Jan2014-Dec2016 Flat trend (see Figure 5,p 22)	Jan2014-Dec2016 Flat trend (see Figure 7,p 26)
Serious assaults	Jan2014-Dec2016 Flat trend (see Figure 12,p 36)	Jan2014-Dec2016 Flat trend (see Figure 6,p 24)	Jan2014-Dec2016 Flat trend (see Figure 8,p 28)
Alcohol-related injuries			Jan2014-Dec2016 Flat trend (see Figure 14,p 41)
Ambulance attendances	Jan2014-Dec2016 Flat trend (see Figure 20,p 5414)	Jan2014-Dec2016 Downward trend (see Figure 17,p 48)	Jan2014-Dec2016. Upward trend (see Figure 18,p 50)
Total approved ext. trade 5am (2 Jul 2016-4 Jan 2017)	280	844	931
Weekly average ext. trade 5am (2 Jul 2016-4 Jan 2017)	10.4	31.26	34.48

3 Limitations and caveats

We note a number of important limitations of the data snapshots reported here:

- Data are aggregated to monthly counts. Due to only have 6 data points available post-1st July introduction of the Queensland Government's Tackling Alcohol-fuelled Violence Policy, we cannot state that any trends are significant or are associated with the Policy. This does not mean the Policy had no effect only that there is not enough data points to adequately detect an effect.
- Given the 6 data points post-1st July introduction of the policy, we have not controlled for seasonal effects or the effects of specific events that may be associated with increases/decreases in alcohol-related events (e.g. Winter, Summer, Christmas, New Year, Football finals).
- We cannot control for changing in police behaviour or procedures over time; especially any police procedural changes or increased presence in SNPs that may have occurred due to the death of Mr Cole Miller or as a result of the Policy.
- We note that all data are counts of alcohol-related events. As counts are used any increases may simply be reflective of an increased population.
- Previous research has shown that culture change takes time and that there is often an initial push-back by patrons to restrictions. It is reasonable to expect that the full impact of any measures would not be seen yet.

4 Ethics

This project has been granted ethical approval by Deakin University Ethics Review Committee.

5 Methods and data sources

5.1 Statistical analyses

Standard descriptive statistics and a time series analysis using Joinpoint regression software (Statistical Research and Applications Branch, 2013) were undertaken (see Appendix 1 for more detail on joinpoint regression). Joinpoint regression (or piecewise regression) is a method of analysis used for both linear and non-linear models to identify significant changes in trend at one or more values of an independent variable, usually in a time series (Kim et al., 2000).

All descriptive analysis and the regression analysis (and associated diagnostics) estimates were undertaken using Stata (StataCorp, 2013). Figures depicting time-series trends were produced using Stata.

Details of monthly percentage change segments for a particular series will be presented in the form of a point estimate, an associated confidence interval to signify significance at alpha= 0.05 (i.e., $p<0.05$). In the following example 1.43% (0.64% to 2.22%; $p<0.001$) the value 1.43 represents the point estimate for monthly percentage change; the values 0.64% to 2.22% represents the 95 per cent confidence interval of the point estimate. As the p-value is less than 0.05 the segment is statistically significant. For ease of reading the p-value is presented as either the value of p if p is greater than 0.001 or $p<0.001$. A statistically significant monthly percentage change indicates that the slope of the segment differs statistically from zero. A 'true' zero slope is neither increasing nor decreasing over time. A positive point estimate indicates that the slope is increasing whilst a negative point estimate indicates that the slope is decreasing. If the confidence interval spans zero this suggests that the true point estimate could be zero and therefore the test cannot reject that the true slope is not zero.

6 QPS Data Snapshot

We explore Queensland Police Service data for trends in non-domestic violence (NDV) related, assaults occurring during high alcohol hours (HAH). The data are sourced from the Queensland Police Records and Information Management Exchange (QPRIME) database. QPRIME is an administrative by-product database. QPRIME records information based on incidents which are referred to as 'occurrences' within the QPRIME system. Occurrences are required to be created in respect of the commission or suspected commission of any indictable offence, simple offence of a serious nature or any regulatory offence. This is inclusive of 'assault', which is an act considered to be in breach of the criminal law.

The QPRIME data contains a unit level record of the assault event which includes: 1) time and date of the offence; 2) location of the offence; 3) assault classifications (e.g., Grievous Bodily Harm) and; 4) a domestic violence indicator. QPRIME data contains nine assault classifications. Here we delineate between common and serious assaults. Common assaults include: assaults, common and assaults, minor (not elsewhere classified). Serious assaults include: assault occasioning bodily harm; assault, aggravated (Non-sexual); assault, police (PPRA); assault, serious (other); grievous bodily harm; wounding.

Data presented here are restricted to:

1. Assaults (exl. driving causing grievous bodily harm and assault (community by-law) occurring during HAH (full list of assaults classifications included in the data please see Appendix 2);
2. Assaults (exl. driving causing grievous bodily harm and assault (community by-law) occurring between 03:00 and 06:00 on Saturday and Sunday.

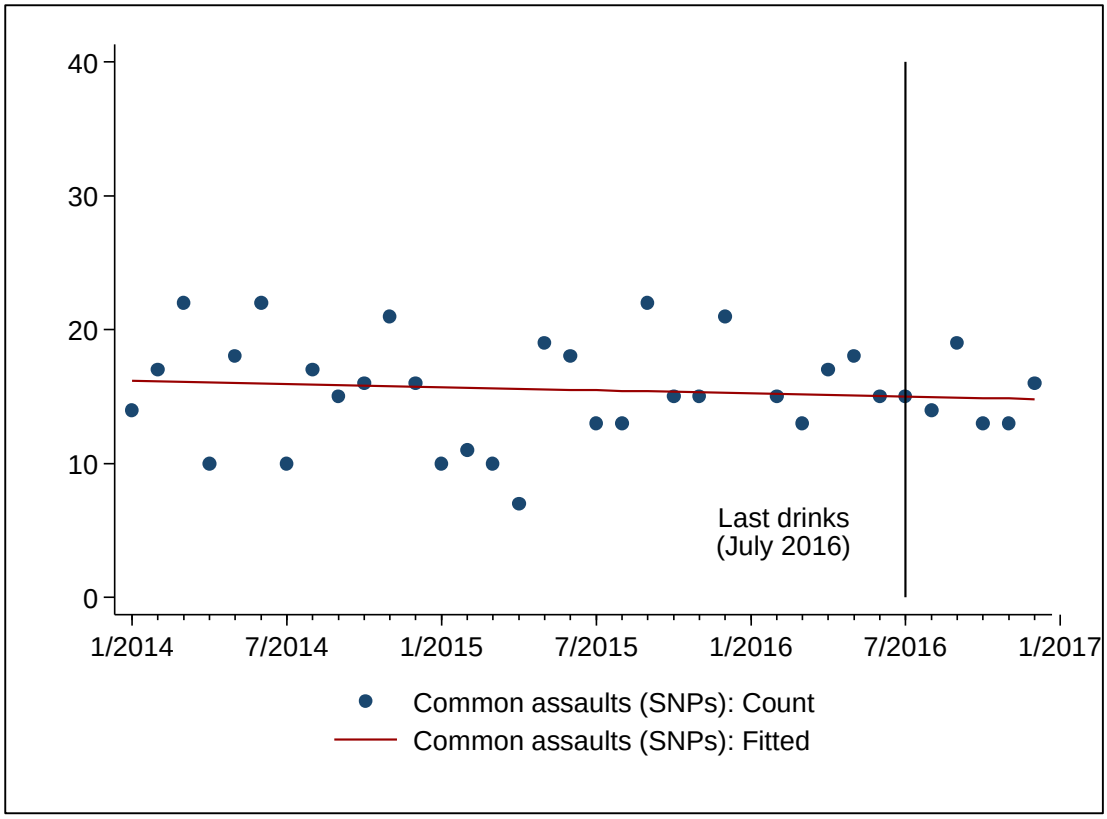
We define high alcohol hours (HAH) as (Coghlan, Sutherland & Millstead, 2016):

- Friday nights (Friday 20:00 to 23:59; Saturday 00:00 to 06:00)
- Saturday nights (Saturday 20:00 to 23:59; Sunday 00:00 to 06:00)

For the purposes of the analyses we delineate data by location (SNP/ rest of Queensland). We also present data for the Fortitude Valley SNP as a separate case study. The unit of analysis used for the series data are counts of assault by month. The study focuses on data ranging from January 2014 to December 2016.

6.1 NDV related assaults HAH

Figure 1: NDV Common assaults HAH (SNPs): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a stable flat trend in NDV, common assaults in SNPs during HAH. This trend reflects relative stability in events across the data series.
- Overall: the trend in monthly counts of NDV, common assaults during HAH in SNPs was flat and stable between January 2014 and December 2016.

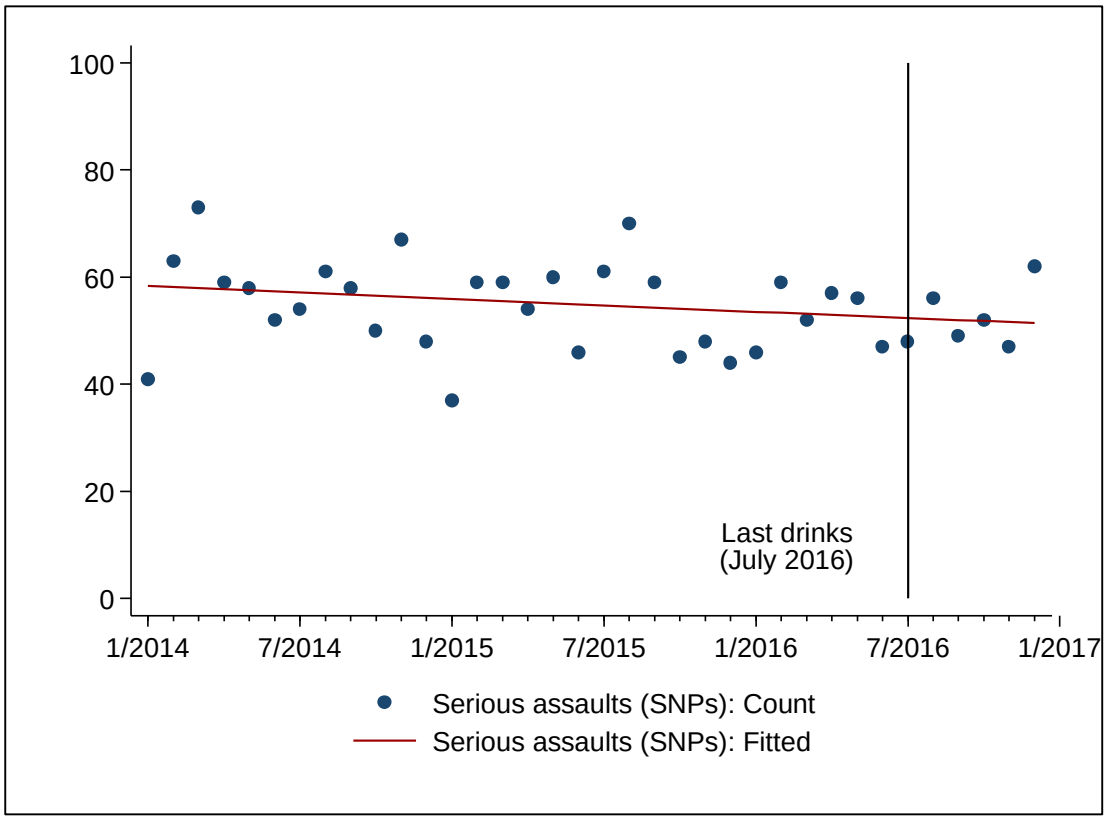
Figure 1 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, common assaults during HAH in Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, common assaults in SNPs during HAH over the three year period was 15.14 (SD 4.12). The monthly count of NDV, common assaults in SNPs during HAH ranged from 5 in January 2016 to 22 in March 2014; June 2014 and September 2015. As depicted in Figure 1, the trend in monthly counts of NDV, common assaults in SNPs during HAH remained relatively stable across the data series. Average monthly percentage change in NDV, common assaults in SNPs during HAH was -0.25% per month (-0.92% to 0.42%, p=0.45) between January 2014 and December

2016. Table 3 presents the results of the joinpoint analysis for NDV, common assaults in SNPs during HAH.

Table 3: Average monthly percentage change in NDV Common assaults in HAH (SNPs): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	-0.25%	(-0.92%, -0.42%)	0.45

Figure 2: NDV Serious assaults HAH (SNPs): January 2014-December 2016



Key Points:

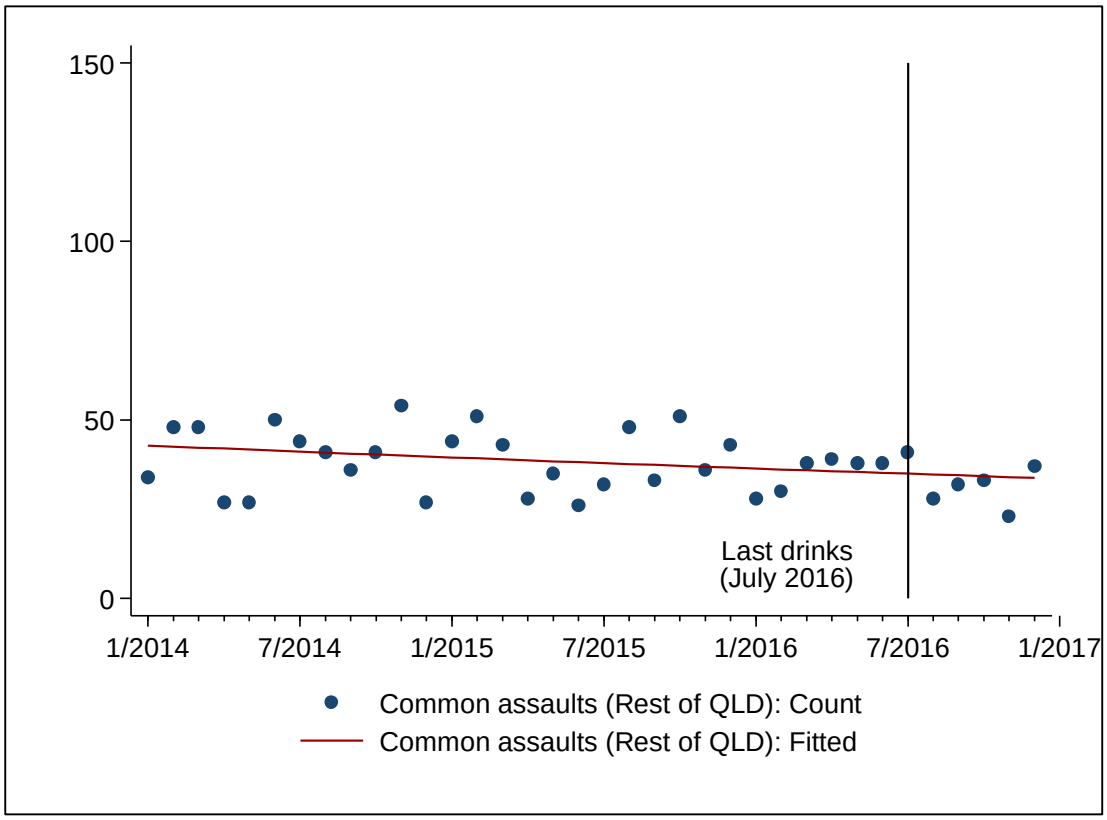
- Post- 1st July: continuation of a stable trend in NDV, serious assaults in SNPs during HAH. This trend reflects relative stability in events across the data series.
- Overall: the trend in monthly counts of NDV, serious assaults during HAH in SNPs was relatively stable between January 2014 and December 2016.

Figure 2 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, serious assaults during HAH in Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, serious assaults during HAH in SNPs over the three year period was 54.36 (SD 8.04). The monthly count of NDV, serious assaults during HAH in SNPs ranged from 37 in January 2015 to 73 in March 2014. As depicted in Figure 2, the trend in monthly counts of NDV, serious assaults in SNPs during HAH remained relatively stable across the data series. The average monthly percentage change in NDV serious assaults in HAH in SNPs between January 2014 and December 2016 was -0.36% (-0.79% to 0.07%, p=0.10). Table 4 presents the results of the joinpoint analysis for NDV, serious assaults during HAH inside SNPs.

Table 4: Average monthly percentage change in NDV Serious assaults in HAH (SNPs): January 2014-December 2016

	MPC	95% CI	P-value
January 2014-December 2016	-0.36%	(-0.79%, 0.07%)	0.10

Figure 3: NDV Common assaults HAH (Rest of QLD): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a downward trend in NDV, common assaults outside SNPs during HAH. This trend reflects a downward trend in events across the data series.
- Overall: monthly counts of NDV, common assaults during HAH outside SNPs were trending downwards between January 2014 and December 2016.

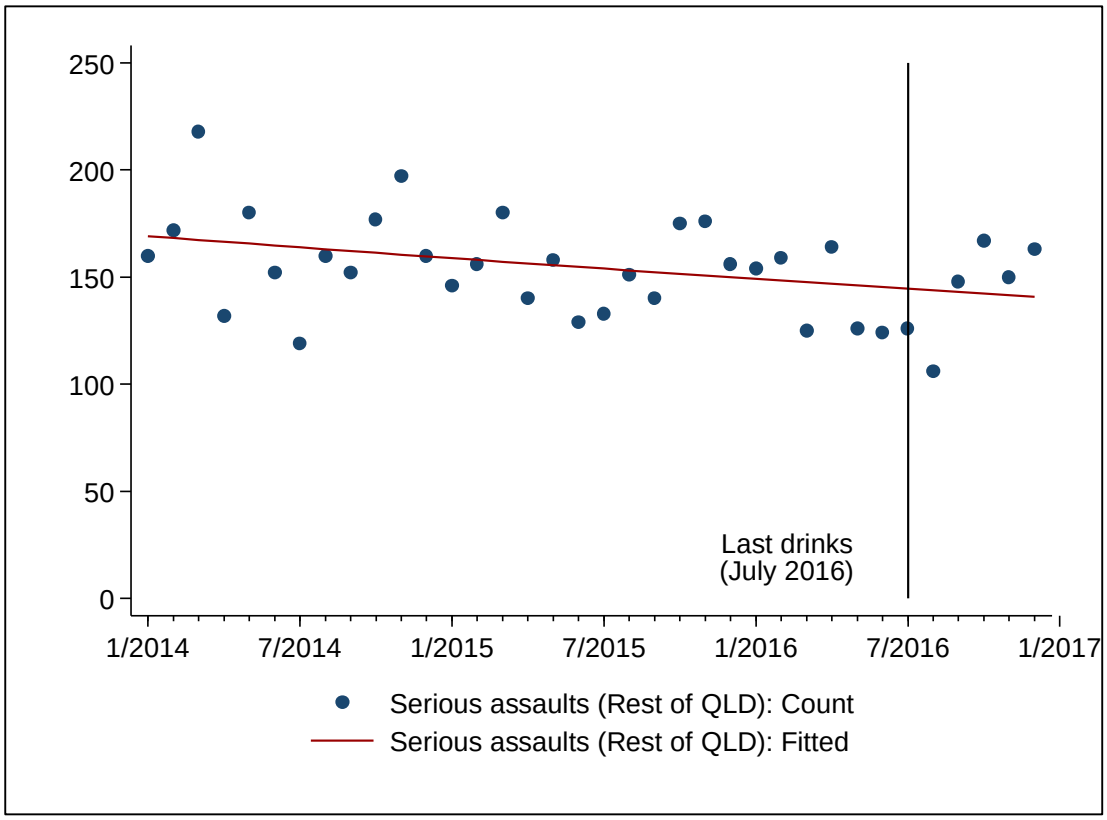
Figure 3 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, common assaults during HAH outside Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, common assaults outside SNPs during HAH over the three year period was 37.56 (SD 8.34). The monthly count of NDV, common assaults outside SNPs during HAH ranged from 23 in November 2016 to 54 in November 2014. As depicted in Figure 3, there was evidence of a downward trend in monthly counts of NDV, common assaults outside SNPs during HAH across the data series. Average monthly percentage change in NDV, common assaults outside SNPs during HAH was -0.68% per month (-1.26 % to -0.09%, $p<0.05$) between January 2014 and December 2016. This equates to an average annual decrease of 3.06 offences across the three

year period. Table 5 presents the results of the joinpoint analysis for NDV, common assaults outside SNPs during HAH.

Table 5: Average monthly percentage change in NDV Common assaults in HAH (Rest of Queensland): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	-0.68%	(-1.26%, -0.09%)	<0.05

Figure 4: NDV Serious assaults HAH (Rest of QLD): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a downward trend in NDV, serious assaults outside SNPs during HAH. This trend reflects a downward trend in events across the data series.
- Overall: monthly counts of NDV, serious assaults during HAH outside SNPs were trending downwards between January 2014 and December 2016.

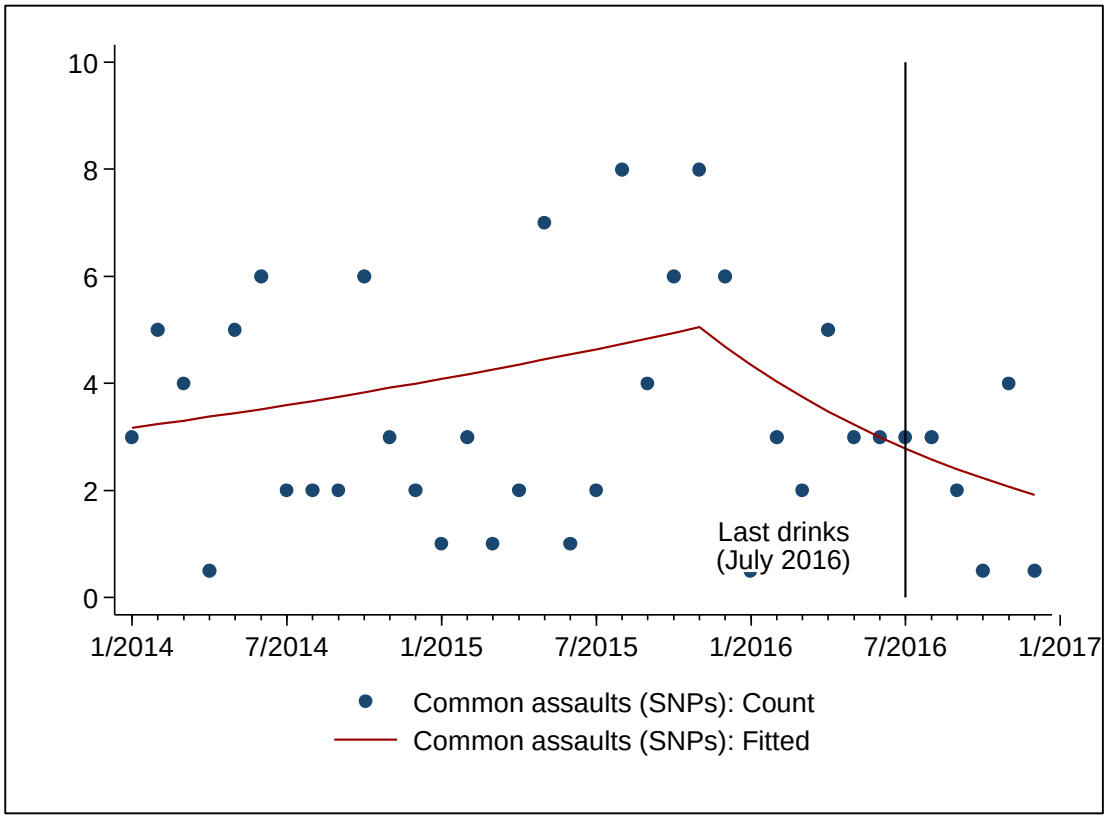
Figure 4 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, serious assaults during HAH outside Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, serious assaults outside SNPs during HAH over the three year period was 153.64 (SD 22.98). The monthly count of NDV serious assaults outside SNPs during HAH ranged from 106 in August 2016 to 218 in March 2014. As depicted in Figure 4, there was evidence of a downward trend in NDV, serious assaults outside SNPs during HAH across the data series. Average monthly percentage change in NDV, serious assaults outside SNPs during HAH was -0.52% per month (-0.91 % to -0.14%, $p<0.01$) between January 2014 and December 2016. This equates to an average annual decrease of 9.59 offences across the three year period. Table 6 presents the results of the joinpoint analysis for NDV, serious assaults outside SNPs during HAH.

Table 6: Average monthly percentage change in NDV Serious assaults in HAH (Rest of Queensland): January 2014-December 2016

	MPC	95% CI	P-value
January 2014-December 2016	-0.52%	(-0.91%, -0.14%)	<0.01

6.2 NDV related assaults Saturday and Sunday 03:00 and 06:00

Figure 5: NDV Common assaults 03:00 and 06:00 Saturday and Sunday (SNPs): January 2014-December 2016



Key Points:

- **Note: apparent trends are non-significant and reflect small counts in the data series**
- Post- 1st July: continuation of a stable trend in NDV, common assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday. This trend reflects relative stability in events across the data series.
- Overall: the trend in monthly counts of NDV, common assaults between 03:00 and 06:00 on Saturday and Sunday in SNPs was relatively stable between January 2014 and December 2016. There was a non-significant upwards trend in the data between January 2014 and November 2015 followed by a non-significant downwards trend until December 2016.

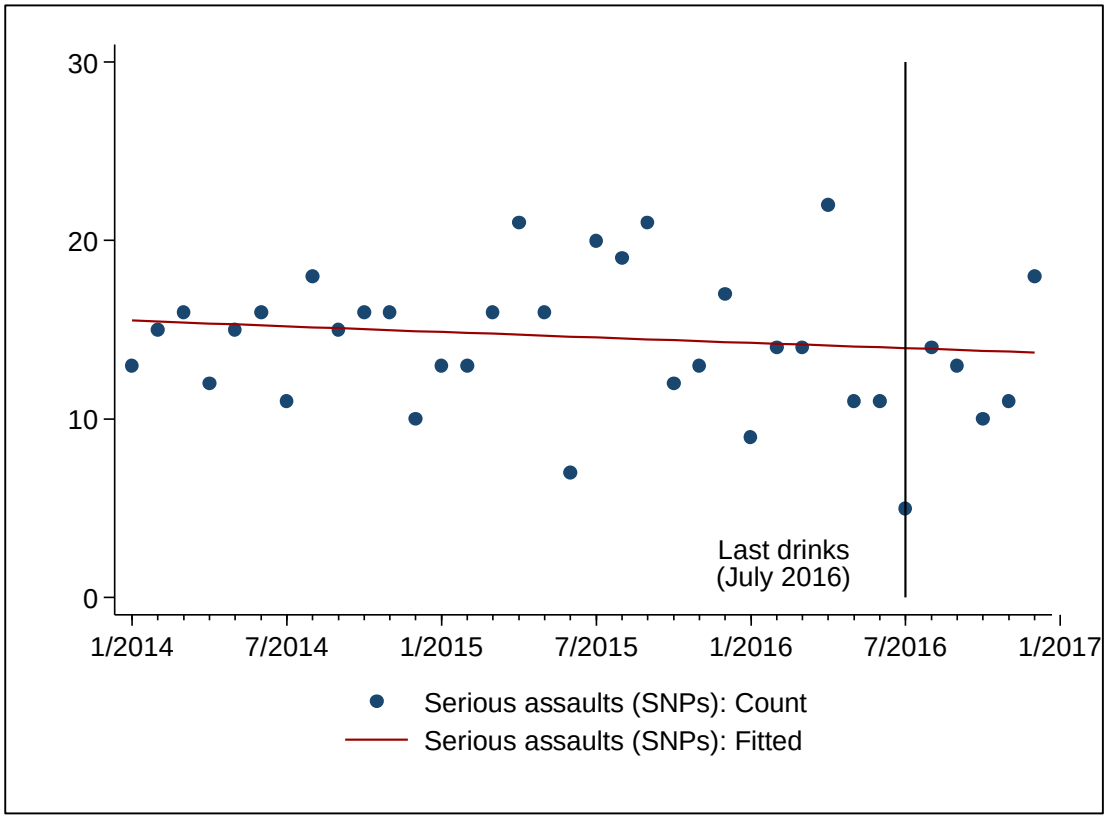
Figure 5 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, common assaults between 03:00 and 06:00 on Saturday and Sunday in Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, common assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday over

the three year period was 3.31 (SD 2.13). The monthly count of NDV, common assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday ranged from 0 in April 2014; January 2016; October 2016 and December 2016 to 8 in August 2015 and November 2015. As depicted in Figure 5, the trend in monthly counts of NDV, common assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday remained relatively stable across the data series. There was some evidence of a non-significant upward trend in events between January 2014 and November 2015. Average monthly percentage change in NDV, common assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday was 2.14% per month (-0.53% to 4.89%, p=0.11) during this period. Following November 2015 and continuing to December 2016, there was evidence of a non-significant downward trend in the data series. The average monthly percentage change in NDV, common assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday was -7.17% per month (-14.24% to 0.47%, p=0.06) during this period. Table 7 presents the results of the joinpoint analysis for NDV, common assaults in SNPs during HAH.

Table 7: Average monthly percentage change in NDV Common assaults 03:00 and 06:00 Sat/Sun (SNPs): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-November 2015	2.14%	(-0.53%, 4.89%)	0.11
November 2015-December 2016	-7.17	(-14.24%, 0.47%)	0.06

Figure 6: NDV Serious assaults 03:00 and 06:00 Saturday and Sunday (SNPs): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a stable flat trend in NDV, serious assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday. This trend reflects relative stability in events across the data series.
- Overall: the trend in monthly counts of NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday in SNPs was relatively stable between January 2014 and December 2016.

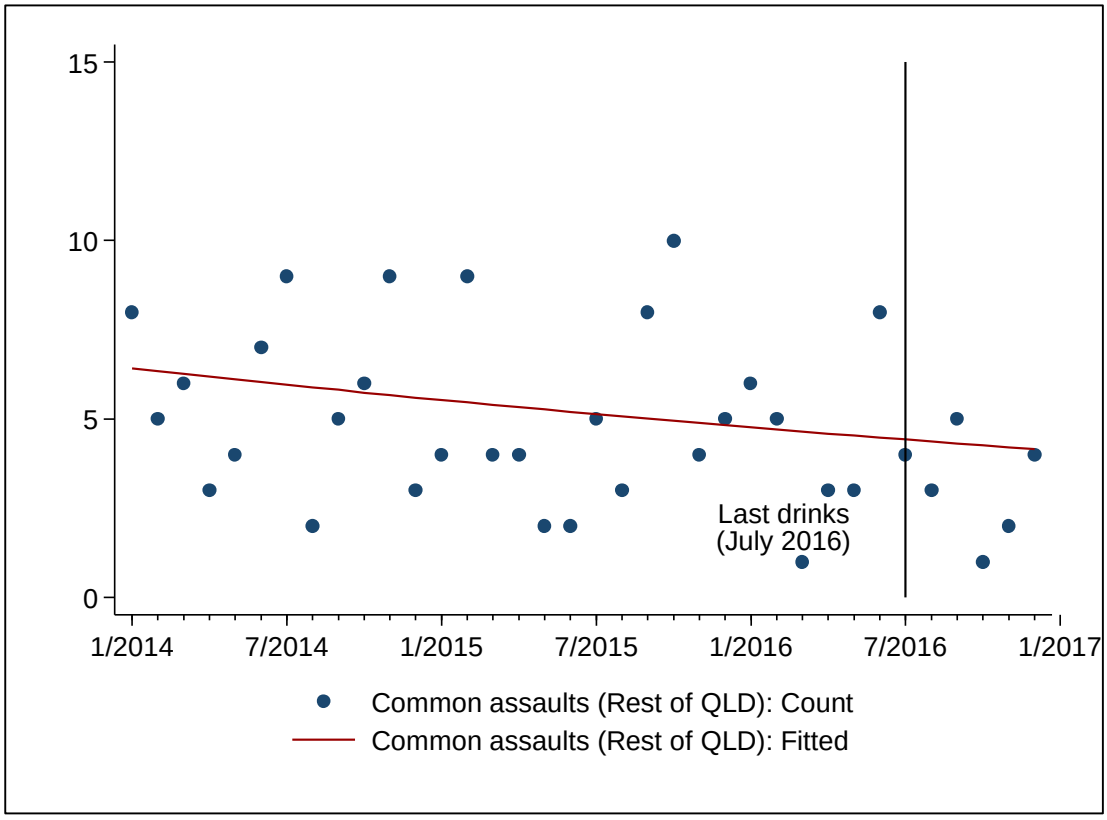
Figure 6 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, serious assaults between 03:00 and 06:00 on Saturday and Sunday in Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday in SNPs over the three year period was 14.25 (SD 3.87). The monthly count of NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday in SNPs ranged from 5 in July 2015 to 22 in April 2016. As depicted in Figure 6, the trend in monthly counts of NDV, serious assaults in SNPs between 03:00 and 06:00 on Saturday and Sunday remained relatively stable across the data series. The average monthly percentage change in NDV serious assaults between 03:00 and

06:00 on Saturday and Sunday in SNPs between January 2014 and December 2016 was -0.35% (-1.10 % to 0.041%, p=0.34). Table 8 presents the results of the joinpoint analysis for NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday inside SNPs.

Table 8: Average monthly percentage change in NDV Serious assaults 03:00 and 06:00 Sat/Sun (SNPs): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014- December 2016	-0.35%	(-1.10%, 0.41%)	0.34

Figure 7: NDV Common assaults 03:00 and 06:00 Saturday and Sunday (Rest of QLD): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a relatively stable trend in NDV, common assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday. This trend reflects a relatively stable trend in events across the data series.
- Overall: the trend in monthly counts of NDV, common assaults between 03:00 and 06:00 on Saturday and Sunday outside SNPs was relatively stable between January 2014 and December 2016. The apparent downward trend was not statistically significant.

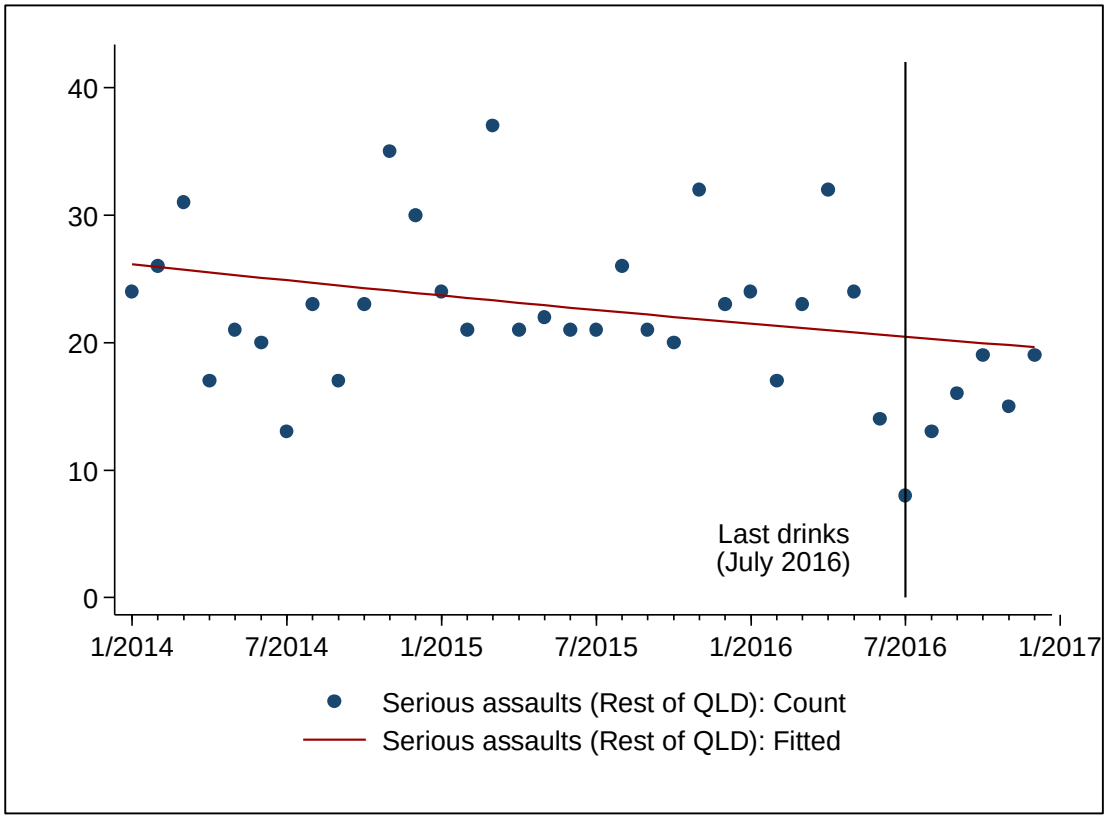
Figure 7 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, common assaults between 03:00 and 06:00 on Saturday and Sunday outside Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, common assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday over the three year period was 4.78 (SD 2.42). The monthly count of NDV, common assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday ranged from 1 in March 2016; October 2016 to 10 in October 2015. The downward trend in monthly counts of NDV, common assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday depicted in Figure 7 was not statistically significant. This suggests the trend in monthly

counts of NDV, common assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday remained relatively stable across the data series. Average monthly percentage change in NDV, common assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday was -1.24% per month (-2.61 % to 0.16%, p=0.08) between January 2014 and December 2016. Table 9 presents the results of the joinpoint analysis for NDV, common assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday.

Table 9: Average monthly percentage change in NDV Common assaults 03:00 and 06:00 Sat/Sun (Rest of QLD): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	-1.24%	(-2.61%, 0.16%)	0.08

Figure 8: NDV Serious assaults 03:00 and 06:00 Saturday and Sunday (Rest of QLD): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a relatively stable trend in NDV, serious assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday. This trend reflects a relatively stable trend in events across the data series.
- Overall: the trend in monthly counts of NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday outside SNPs was relatively stable between January 2014 and December 2016. The apparent downward trend was not statistically significant.

Figure 8 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, serious assaults between 03:00 and 06:00 on Saturday and Sunday outside Queensland SNPs between January 2014 and December 2016. The average monthly count of NDV, serious assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday over the three year period was 22.02 (SD 6.34). The monthly count of NDV, serious assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday ranged from 8 in July 2016 to 10 in March 2015. The downward trend in monthly counts of NDV, serious assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday depicted in Figure 8 was not statistically significant. This suggests the trend in monthly counts of NDV, serious

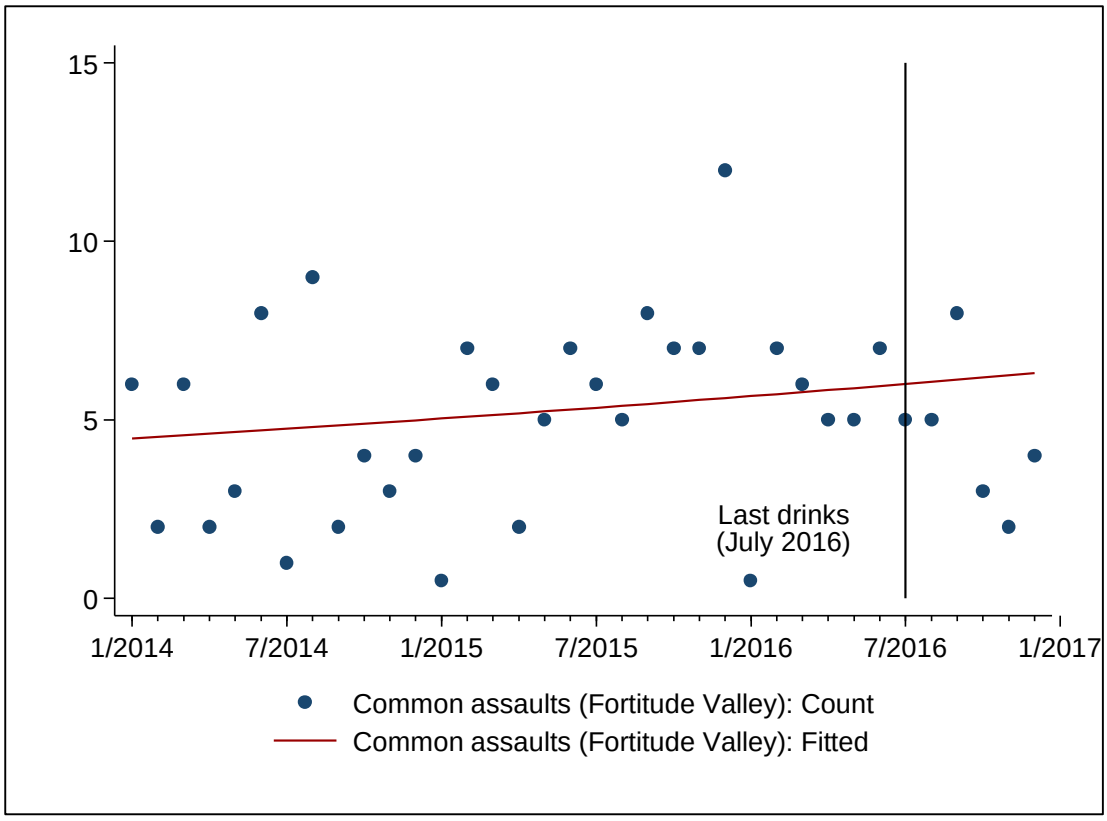
assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday remained relatively stable across the data series. Average monthly percentage change in NDV, serious assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday was -0.81% per month (-1.66 % to 0.04%, p=0.06) between January 2014 and December 2016. Table 10 presents the results of the joinpoint analysis for NDV, serious assaults outside SNPs between 03:00 and 06:00 on Saturday and Sunday.

Table 10: Average monthly percentage change in NDV Serious assaults 03:00 and 06:00 Sat/Sun (Rest of QLD): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	-0.81%	(-1.66%, 0.04%)	0.06

6.3 NDV assault Fortitude Valley

Figure 9: NDV Common assaults HAH (Fortitude Valley): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a relatively stable trend in NDV, common assaults in the Fortitude Valley SNP during HAH. This trend reflects relative stability in events across the data series.
- Overall: the trend in monthly counts of NDV, common assaults during HAH in the Fortitude Valley SNP was relatively stable between January 2014 and December 2016. The apparent upward trend across the data series was not statistically significant.

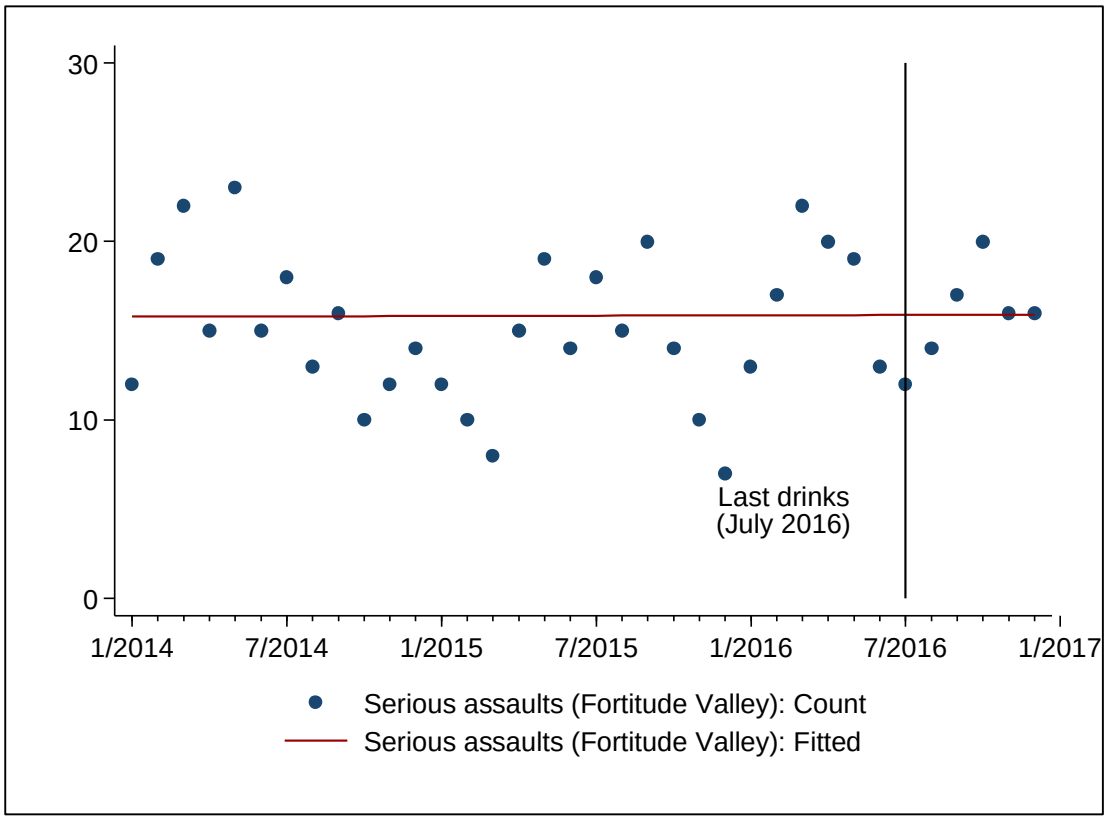
Figure 9 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, common assaults during HAH in the Fortitude Valley SNP between January 2014 and December 2016. The average monthly count of NDV, common assaults in the Fortitude Valley SNP during HAH over the three year period was 5 (SD 2.60). The monthly count of NDV, common assaults in the Fortitude Valley SNP during HAH ranged from 0 in January 2015 and January 2016 to 12 in December 2015. As depicted in Figure 9, the trend in monthly counts of NDV, common assaults in the Fortitude Valley SNP during HAH remained relatively stable across the data series (the upward trend in events across the

data series was not statistically significant). Average monthly percentage change in NDV, common assaults in the Fortitude Valley SNP during HAH was 0.98% per month (-0.16% to 2.14%, p=0.09) between January 2014 and December 2016. Table 11 presents the results of the joinpoint analysis for the NDV, common assaults in the Fortitude Valley SNP during HAH data series.

Table 11: Average monthly percentage change in NDV Serious assaults HAH Sat/Sun (Fortitude Valley): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	0.98%	(-0.16 %, 2.14%)	0.09

Figure 10: NDV Serious assaults HAH (Fortitude Valley): January 2014-December 2016



Key Points:

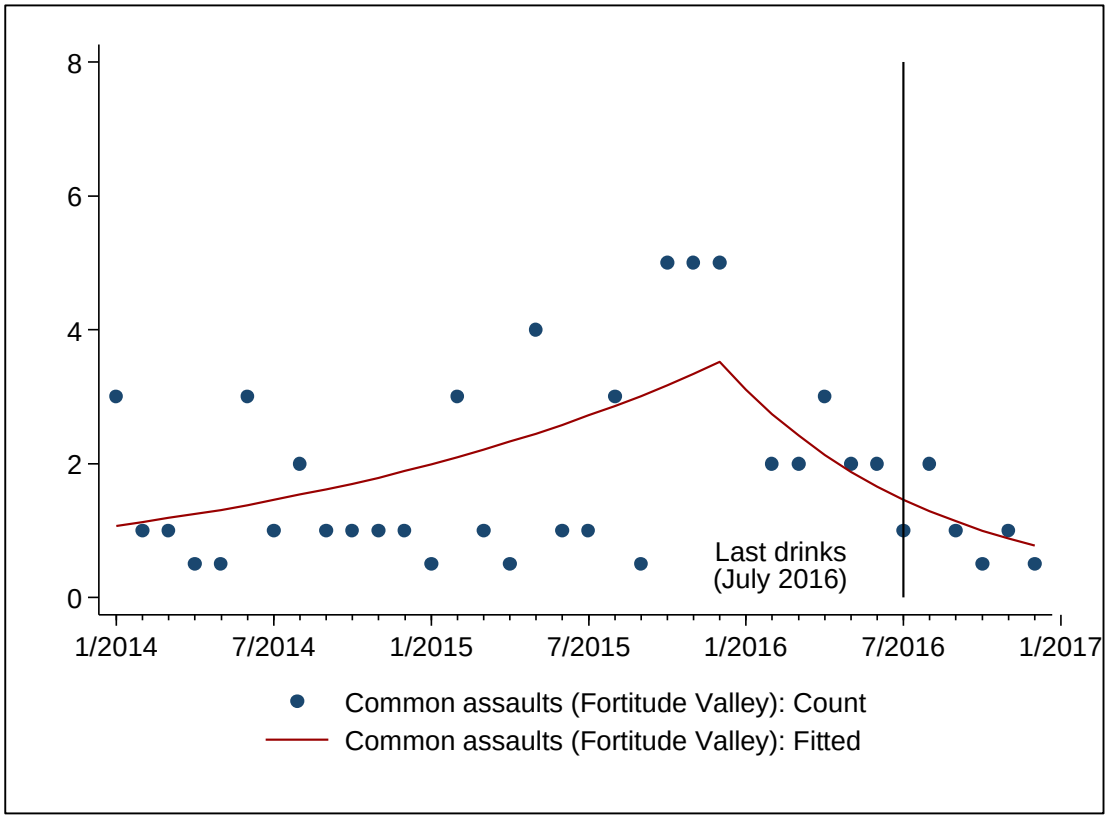
- Post- 1st July: continuation of a stable trend in NDV, serious assaults in the Fortitude Valley SNP during HAH. This trend reflects stability in events across the data series.
- Overall: the trend in monthly counts of NDV, serious assaults during HAH in the Fortitude Valley SNP remained stable between January 2014 and December 2016.

Figure 10 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, serious assaults during HAH in the Fortitude Valley SNP between January 2014 and December 2016. The average monthly count of NDV, serious assaults during HAH the Fortitude Valley SNP over the three year period was 15.28 (SD 3.96). The monthly count of NDV, serious assaults during HAH the Fortitude Valley SNP ranged from 7 in December 2015 to 23 in May 2014. As depicted in Figure 10, the trend in monthly counts of NDV, serious assaults in the Fortitude Valley SNP during HAH remained relatively stable across the data series. The average monthly percentage change in NDV serious assaults in HAH in the Fortitude Valley SNP between January 2014 and December 2016 was 0.02% (-0.83% to 0.87%, p=0.96). Table 12 presents the results of the joinpoint analysis for NDV, serious assaults during HAH in the Fortitude Valley SNP.

Table 12: Average monthly percentage change in NDV Serious assaults HAH Sat/Sun (Fortitude Valley): January 2014-December 2016

	MPC	95% CI	P-value
January 2014-December 2016	0.02%	(-0.83%, 0.87%)	0.96

Figure 11: NDV Common assaults 03:00 and 06:00 Saturday and Sunday (Fortitude Valley): January 2014-December 2016



Key Points:

- **Note: apparent trends reflect small counts in the data series and should be interpreted with caution**
- Post- 1st July: continuation of a downward trend in NDV, common assaults in the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday. This trend reflects a downward trend in the data series beginning around December 2015.
- Overall: monthly counts of NDV, common assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP followed an upward trend between January 2014 and December 2015. This was followed by a downward trend in the data between December 2015 and December 2016.

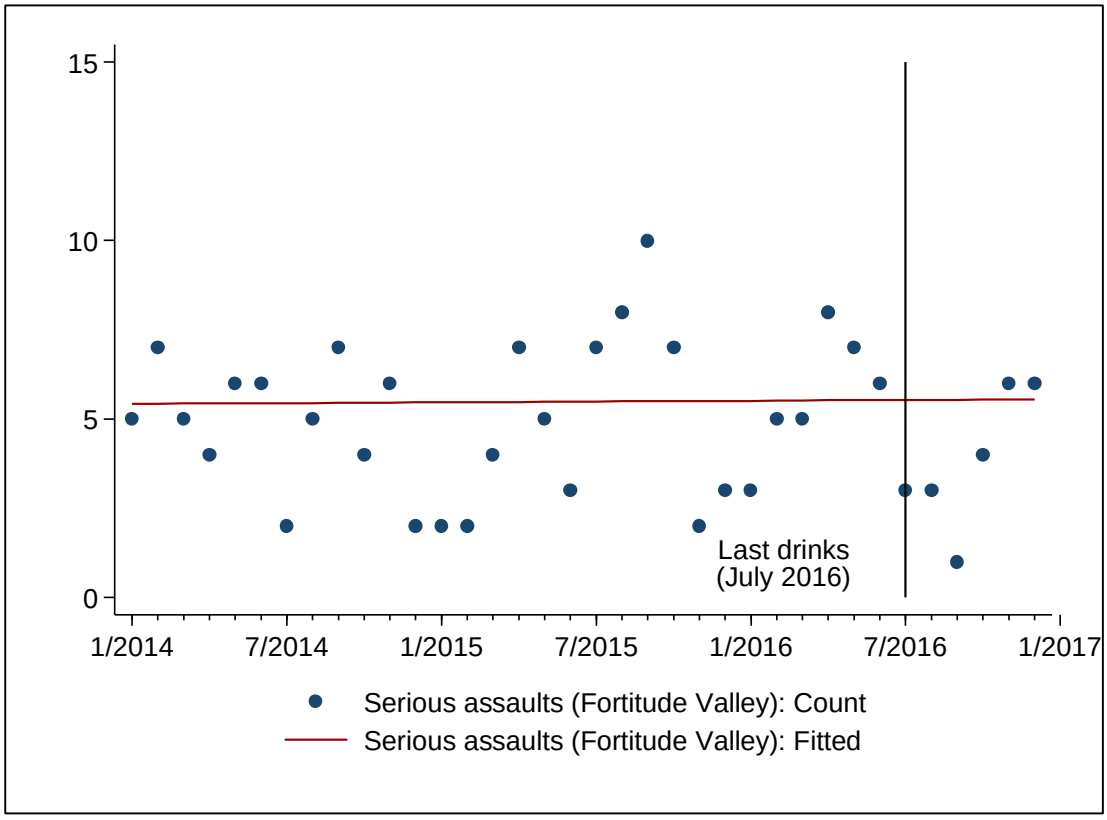
Figure 11 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, common assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP between January 2014 and December 2016. The average monthly count of NDV, common assaults in the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday over the three year period was 1.75 (SD 1.36). The monthly count of NDV, common assaults in the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday ranged from 0 in April 2014; May 2014; January 2015; April 2015;

September 2015; January 2016; October 2016 and December 2016 to 5 in October 2015; November 2015 and December 2015. As depicted in Figure 11, there was some evidence of an upward trend in monthly counts of NDV, common assaults in the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday between January 2014 and December 2015. Average monthly percentage change in NDV, common assaults the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday was 5.34% per month (2.39% to 8.34%, $p<0.001$) during this period. Following December 2015 and continuing to December 2016, there was evidence of a downward trend in the data series. The average monthly percentage change in NDV, common assaults in the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday was -11.81% per month (-20.68% to -1.98%, $p<0.05$) during this period. Table 13 presents the results of the joinpoint analysis for the NDV, common assaults in the Fortitude Valley SNP during HAH. Given the small monthly counts in the data series, trends should be interpreted with caution.

Table 13: Average monthly percentage change in NDV Common assaults 03:00 and 06:00 Sat/Sun (Fortitude Valley): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2015	5.32%	(2.39%, 8.34%)	<0.001
December 2015 – December 2016	-11.81%	(-20.68%, -1.98%)	<0.05

Figure 12: NDV Serious assaults 03:00 and 06:00 Saturday and Sunday (Fortitude Valley): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a stable trend in NDV, serious assaults in the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday. This trend reflects relative stability in events across the data series.
- Overall: the trend in monthly counts of NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP remained relatively stable between January 2014 and December 2016.

Figure 12 demonstrates the monthly percentage change (MPC) in counts of non-domestic violence (NDV) related, serious assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP between January 2014 and December 2016. The average monthly count of NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP over the three year period was 4.89 (SD 2.12). The monthly count of NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP ranged from 1 in September 2016 to 10 in September 2016. As depicted in Figure 12, the trend in monthly counts of NDV, serious assaults in the Fortitude Valley SNP between 03:00 and 06:00 on Saturday and Sunday remained relatively stable across the data

series. The average monthly percentage change in NDV serious assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP between January 2014 and December 2016 was 0.07% (-1.39 % to 1.55%, p=0.93). Table 14 presents the results of the joinpoint analysis for the NDV, serious assaults between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley SNP.

Table 14: Average monthly percentage change in NDV Serious assaults 03:00 and 06:00 Sat/Sun (Fortitude Valley): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	0.07%	(-1.39%, 1.55%)	0.93

6.4 ED Snapshot

We explored the Queensland Department of Health data for trends in estimated alcohol-related injuries using emergency department (ED) data from 28 facilities in Queensland.[1] The data was sourced from the Queensland Hospital Admitted Patient Data Collection.[3] The analytic sample was restricted to emergency presentations where the patient was aged 18-100 years. Patients arriving via a community service vehicle or 'other' were excluded from the sample leaving only those who arrived via ambulance, police/correctional services vehicle or public/private transport (walk-ins). The data cover a three year period from January 2014 to December 2016.

The Queensland Department of Health ED data include measures of primary diagnosis, time of day, day of the week, patient age, sex and visit type. The data do not include an indicator of patient intoxication or alcohol involvement in the incident preceding presentation. Instead we use primary diagnosis coupled with time of day and day of the week to identify ED presentations for which alcohol is highly likely to have been involved. Research demonstrates that the use of surrogate measures are reliable for assessing trends over time (Coghlan, Sutherland & Millstead, 2016; Lensvelt et al., 2015).

Data presented here are restricted to:

- Injury related primary diagnosis ICD-10 codes presentations occurring during high alcohol hours (this is based on research by Evans et al., 2011, full list of codes Appendix 3).
- Injury related primary diagnosis ICD-10 codes presentations occurring between 03:00 and 06:00 on Saturday and Sunday.

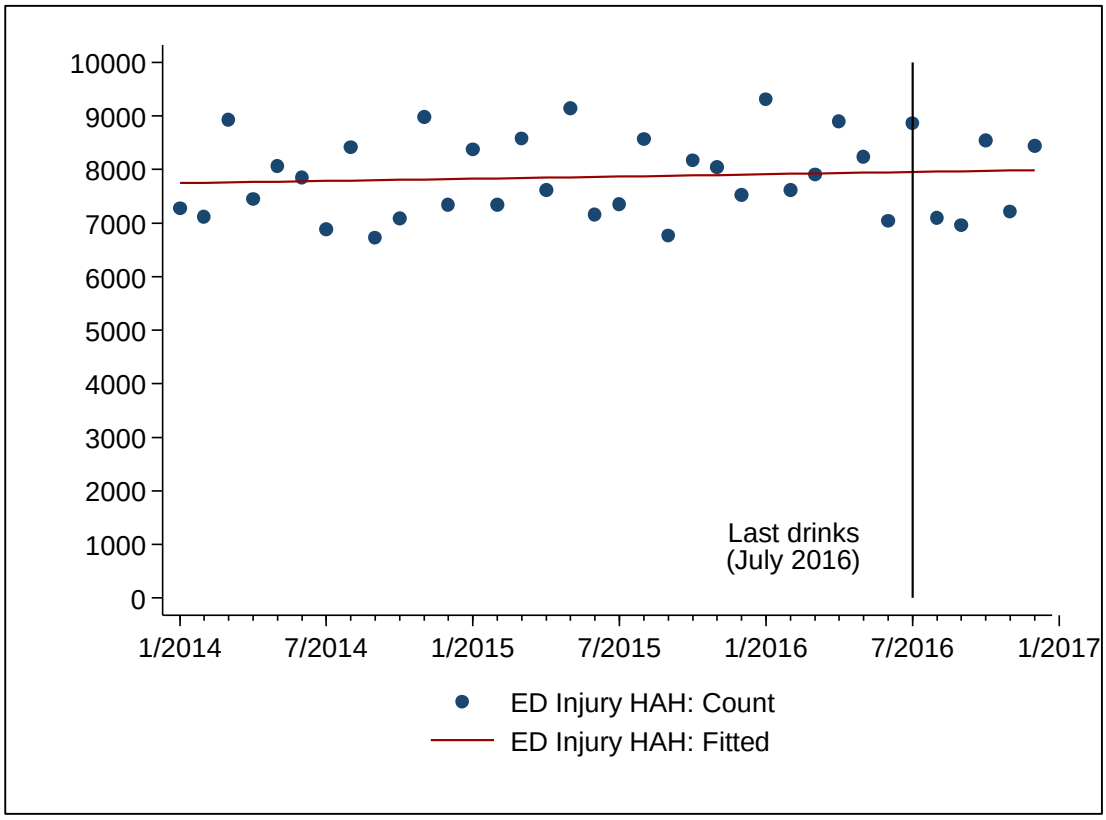
We define high alcohol hours (HAH) as (Lensvelt et al., 2015):

- Friday nights (Friday 20:00 to 23:59; Saturday 00:00 to 06:00)
- Saturday nights (Saturday 20:00 to 23:59; Sunday 00:00 to 06:00)

[1] The Gold Coast Hospital closed in October 2013 and the Gold Coast University Hospital opened late September 2013. The Mater Children's Public Hospital and the Royal Children's Hospital closed in December 2014 and the Lady Cilento Children's Hospital opened in November 2014.

These data are counts of ED presentations meeting the noted inclusion criteria and therefore do not control for increases in Queensland population during the time period of interest.

Figure 13: Queensland ED injury presentations during HAH (Friday and Saturday 20:00 and 06:00): January 2014-December 2016



Key Points:

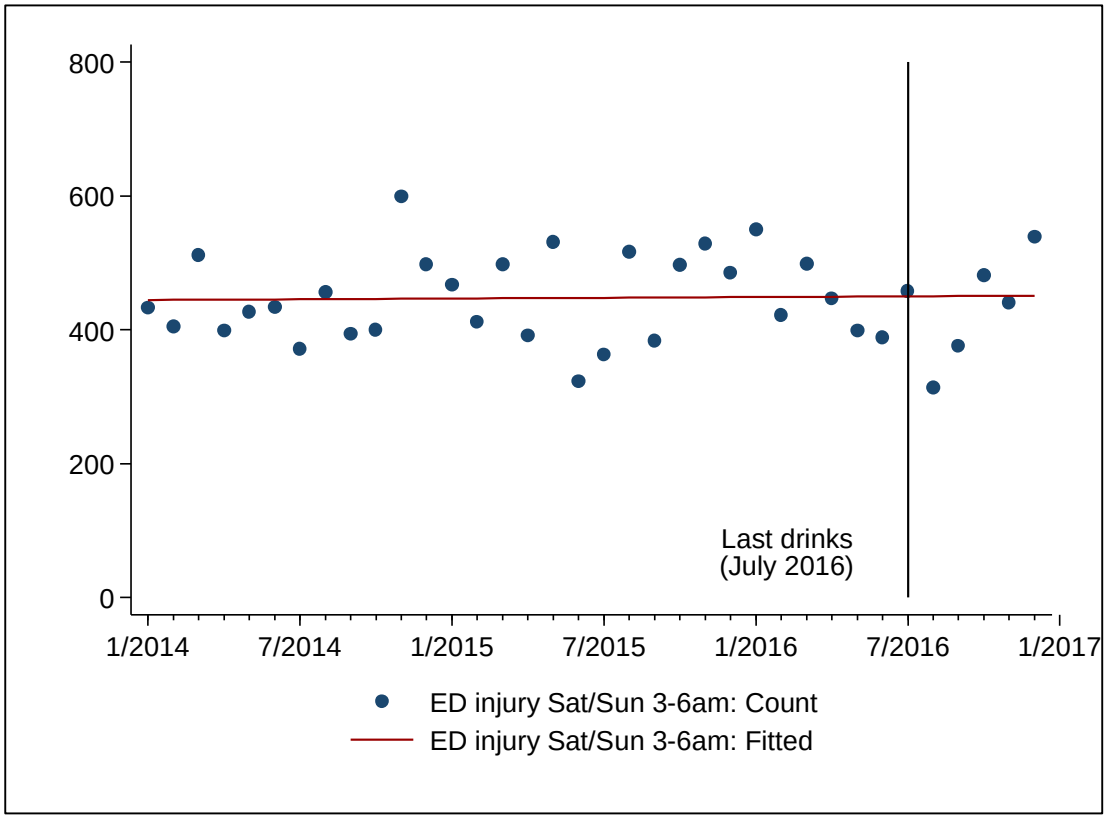
- Post- 1st July: continuation of stable trend in estimated alcohol-related ED injury presentations during HAH.
- Overall: the trend in monthly counts of estimated alcohol-related ED injury presentations remained stable between January 2014 and December 2016.

Figure 13 demonstrates the monthly percentage change (MPC) in counts of injury presentations during high alcohol hours (HAH) in 28 Queensland Health Emergency Departments (ED) between January 2014 and December 2016. The average monthly count of estimated alcohol-related injury presentations over the three year period was 7856.36 (SD 757.05). The monthly count of estimated alcohol-related injury presentations in Queensland EDs ranged from 6726 in September 2010 to 9312 in January 2016. As depicted in Figure 13, average monthly percentage change in HAH ED injury presentations was 0.09% per month (-0.10% to 0.27%, p=0.34) between January 2014 and December 2016. Table 15 presents the results of the joinpoint analysis for HAH ED injury presentations.

Table 15: Average monthly percentage change in Queensland ED injury presentations during HAH: January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	0.09%	(-0.10%, 0.27%)	0.34

Figure 14: Queensland ED injury presentations 03:00 and 06:00 Saturday and Sunday: January 2014-December 2016



Key Points:

- Post- 1st July: continuation of stable trend in estimated alcohol-related ED injury presentations between 03:00 and 06:00 Saturday and Sunday.
- Overall: the trend in monthly counts of estimated alcohol-related ED injury presentations between 03:00 and 06:00 on Saturday and Sunday remained stable between January 2014 and December 2016.

Figure 14 demonstrates the monthly percentage change (MPC) in counts of injury presentations between 03:00 and 06:00 on Saturday and Sunday in 28 Queensland Health Emergency Departments (ED) between January 2014 and December 2016. The average monthly count of estimated alcohol-related injury presentations over the three year period was 445.61 (SD 66.33). The monthly count of estimated alcohol-related injury presentations in Queensland EDs between 03:00 and 06:00 on Saturday and Sunday ranged from 314 in August 2016 to 599 in November 2014. As depicted in Figure 14, the average monthly percentage change in ED injury presentations between 03:00 and 06:00 on Saturday and Sunday was 0.09% per month (-0.10% to 0.27%, p=0.34) between January 2014 and

December 2016. Table 16 presents the results of the joinpoint analysis for the ED injury presentations between 03:00 and 06:00 on Saturday and Sunday.

Table 16: Average monthly percent change in Queensland ED injury presentations during Sat/Sun 03:00 and 06:00: January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	0.04%	(-0.34%, 0.42%)	0.83

7 Queensland Ambulance Service (QAS) Data

We explore Queensland Ambulance Service (QAS) data for trends in ambulance attendances occurring during high alcohol hours (HAH). The data are sourced from the Queensland Ambulance Electronic Ambulance Report Form (EARF) and Queensland Ambulance Case Information Reporting (QACIR) databases.

The QAS data contain unit level records of all ambulance attendances in Queensland. The data include: 1) time and date of patient contact; and 2) scene location. Data presented here are restricted to:

- Ambulance attendances occurring during HAH;
- Ambulance attendances occurring between 03:00 and 06:00 on Saturday and Sunday.

We define high alcohol hours (HAH) as (Coghlan, Sutherland & Millstead, 2016):

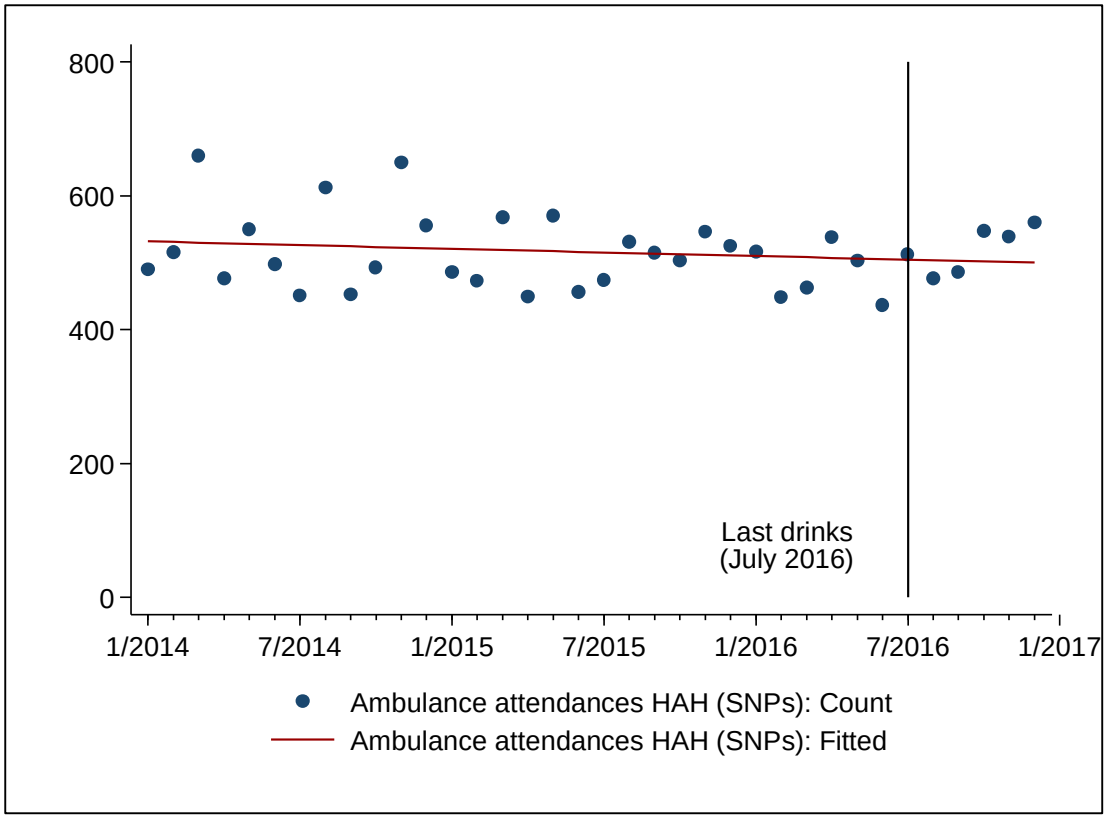
- Friday nights (Friday 20:00 to 23:59; Saturday 00:00 to 06:00)
- Saturday nights (Saturday 20:00 to 23:59; Sunday 00:00 to 06:00)

For the purposes of the analyses we delineate data by location (SNP/ rest of Queensland). We also present data for the Fortitude Valley as a separate case study.[2] We use patient suburb as a proxy measure for SNP. For a full list of suburbs included in the SNP classification see Appendix 4. The unit of analysis used for the series data are counts of attendances by month. The study focuses on data ranging from January 2014 to December 2016.

[2] Location is based on suburb and not SNP boundaries.

7.1 Ambulance attendances HAH

Figure 15: Ambulance attendances HAH (SNPs): January 2014-December 2016



Key Points:

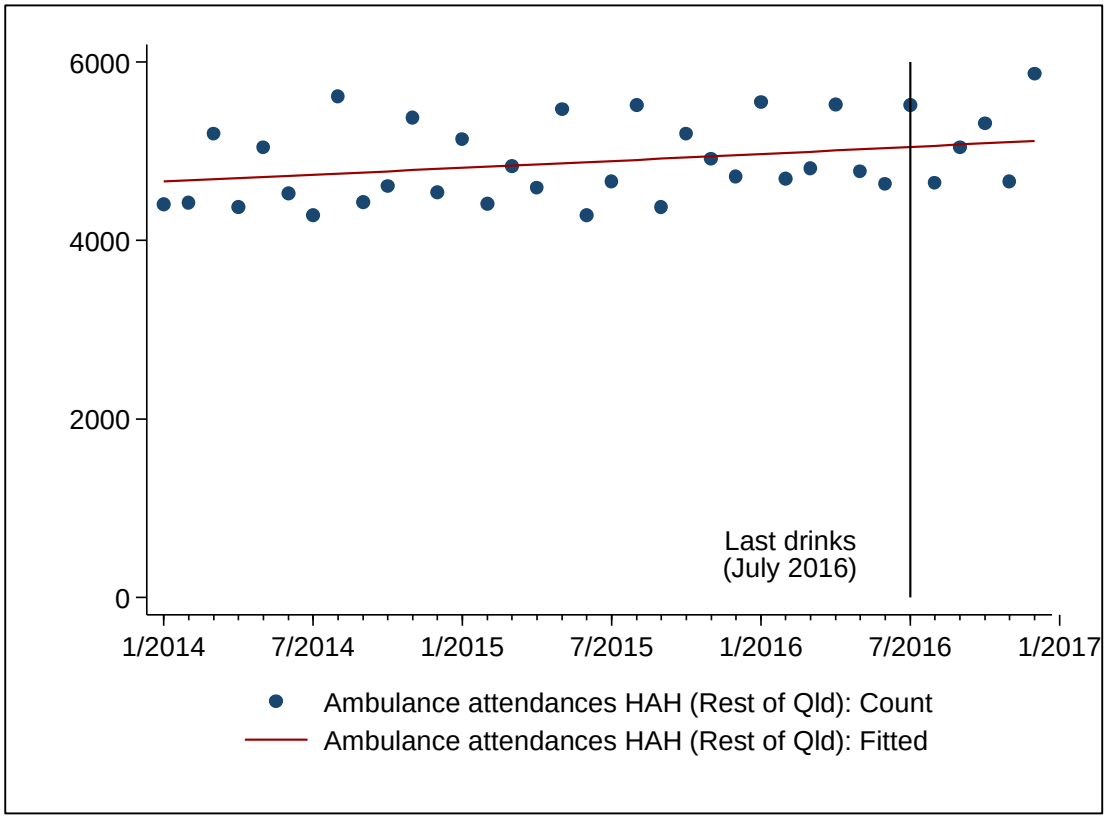
- Post- 1st July: continuation of a stable, flat trend in ambulances attendances in SNPs during HAH. This trend reflects relative stability in events across the data series.
- Overall: the trend in monthly counts of ambulance attendances in SNPs during HAH was stable and flat between January 2014 and December 2016.

Figure 15 demonstrates the monthly percentage change (MPC) in counts of ambulance attendances during HAH in Queensland SNPs between January 2014 and December 2016. The average monthly count of ambulance attendances in SNPs during HAH over the three year period was 514.69 (SD 53.87). The monthly count of ambulance attendances in SNPs during HAH ranged from 437 in June 2016 to 660 in March 2014. As depicted in Figure 15, the trend in monthly counts of ambulance attendances in SNPs during HAH remained flat and stable across the data series. Average monthly percentage change in ambulance attendances in SNPs during HAH was -0.18% per month (-0.41% to 0.07%, p=0.15) between January 2014 and December 2016. Table 17 presents the results of the joinpoint analysis for ambulance attendances in SNPs during HAH.

Table 17: Average monthly percentage change in ambulance attendances in HAH (SNPs): January 2014-December 2016

	MPC	95% CI	P-value
January 2014-December 2016	-0.18%	(-0.41%, 0.07%)	0.15

Figure 16: Ambulance attendances HAH (Rest of Queensland): January 2014-December 2016



Key Points:

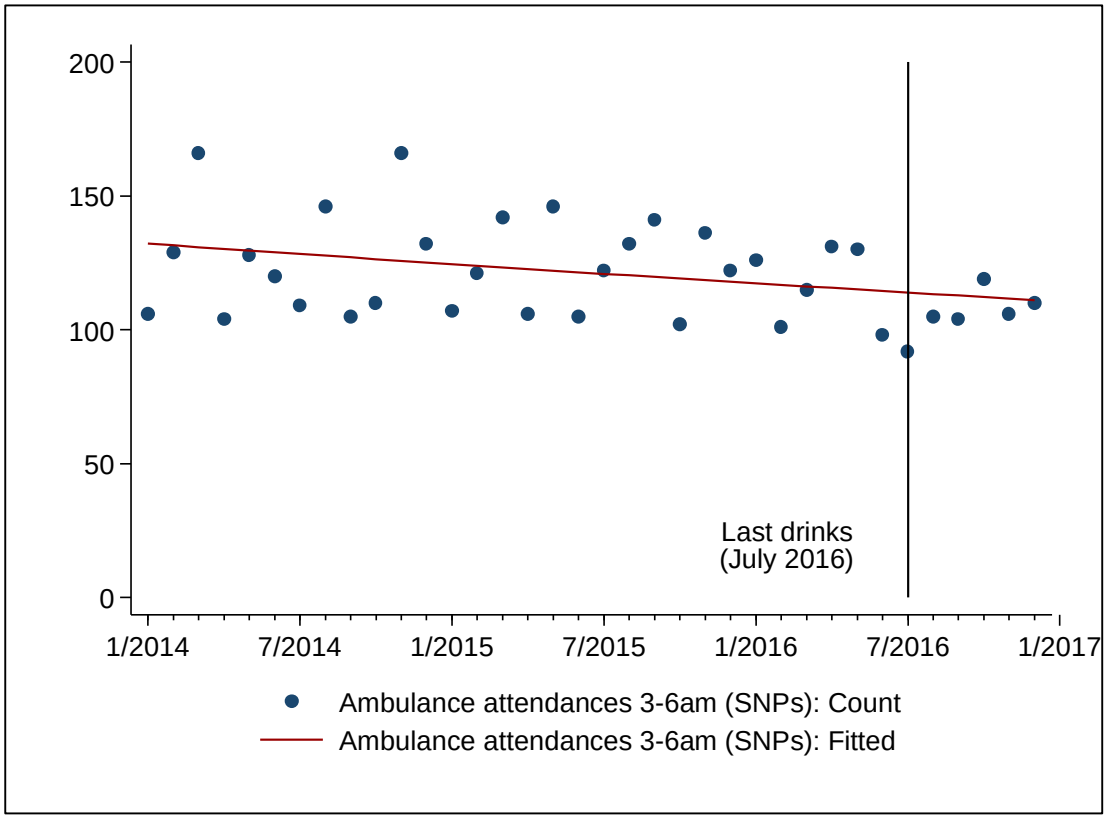
- Post- 1st July: continuation of an upward trend in ambulance attendances outside SNPs during HAH. This trend reflects an upward trend in events across the data series.
- Overall: monthly counts of ambulance attendances outside of SNPs during HAH were trending upward between January 2014 and December 2016.

Figure 16 demonstrates the monthly percentage change (MPC) in counts of ambulance attendances during HAH outside of SNPs in Queensland between January 2014 and December 2016. The average monthly count of ambulance attendances during HAH outside SNPs over the three year period was 4887.47 (SD 448.17). The monthly count of ambulance attendances during HAH outside SNPs ranged from 4283 in June 2015 to 1113 in December 2016. As depicted in Figure 16, there was an upward trend in monthly counts of ambulance attendances outside SNPs during HAH across the data series. The average monthly percentage change in ambulance attendances in HAH outside SNPs between January 2014 and December 2016 was 0.27% (0.12% to 0.41%, $p<0.001$). Table 18 presents the results of the joinpoint analysis for ambulance attendances during HAH outside SNPs.

Table 18: Average monthly percentage change in ambulance attendances in HAH (Rest of Queensland): January 2014-December 2016

	MPC	95% CI	P-value
January 2014-December 2016	0.27%	(0.12%, 0.41%)	<0.001

Figure 17: Ambulance attendances 03:00 and 06:00 Saturday and Sunday (SNPs): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a downward trend in ambulance attendances between 03:00 and 06:00 on Saturday and Sunday in SNPs. This trend reflects a downward trend in events across the data series.
- Overall: monthly counts of ambulance attendances in SNPs between 03:00 and 06:00 on Saturday and Sunday were trending downward between January 2014 and December 2016.

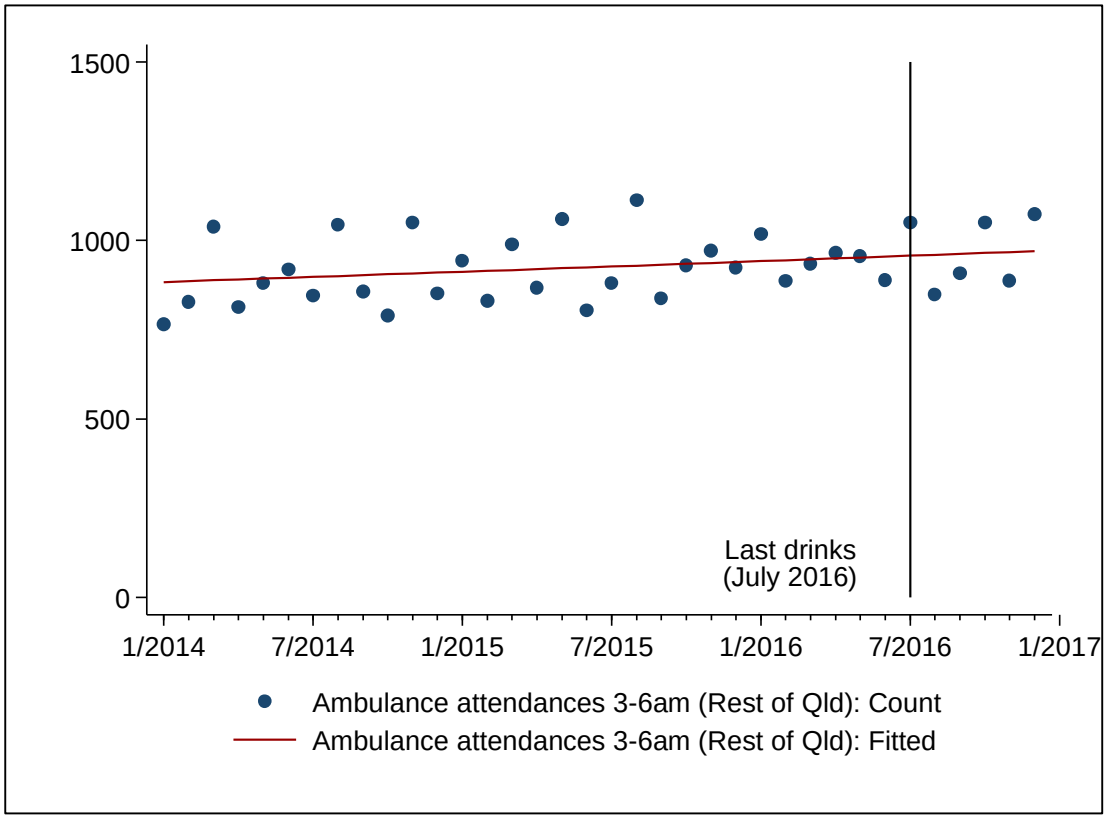
Figure 17 demonstrates the monthly percentage change (MPC) in counts of ambulance attendances between 03:00 and 06:00 on Saturday and Sunday in Queensland SNPs between January 2014 and December 2016. The average monthly count of ambulance attendances in SNPs between 03:00 and 06:00 on Saturday and Sunday over the three year period was 120.56 (SD 18.28). The monthly count of ambulance attendances in SNPs between 03:00 and 06:00 on Saturday and Sunday ranged from 92 in July 2016 to 166 in March 2014 and November 2014. As depicted in Figure 17, there was evidence of a downward trend in monthly counts of ambulance attendances in SNPs between 03:00 and 06:00 on Saturday and Sunday across the data series. Average monthly percentage change in ambulance attendances

between 03:00 and 06:00 on Saturday and Sunday in SNPs was -0.49% per month (-0.84 % to -0.14%, p<0.01) between January 2014 and December 2016. Table 19 presents the results of the joinpoint analysis for ambulance attendances in SNPs between 03:00 and 06:00 on Saturday and Sunday.

Table 19: Average monthly percentage change in ambulance attendances 03:00 and 06:00 Sat/Sun (SNPs): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	-0.49%	(-0.84%, -0.14%)	<0.01

Figure 18: Ambulance attendances 03:00 and 06:00 Saturday and Sunday (Rest of Queensland): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of an upward trend in ambulance attendances outside SNPs between 03:00 and 06:00 on Saturday and Sunday. This trend reflects an upward trend in events across the data series.
- Overall: monthly counts of ambulance attendances outside SNPs between 03:00 and 06:00 on Saturday and Sunday were trending upward between January 2014 and December 2016.

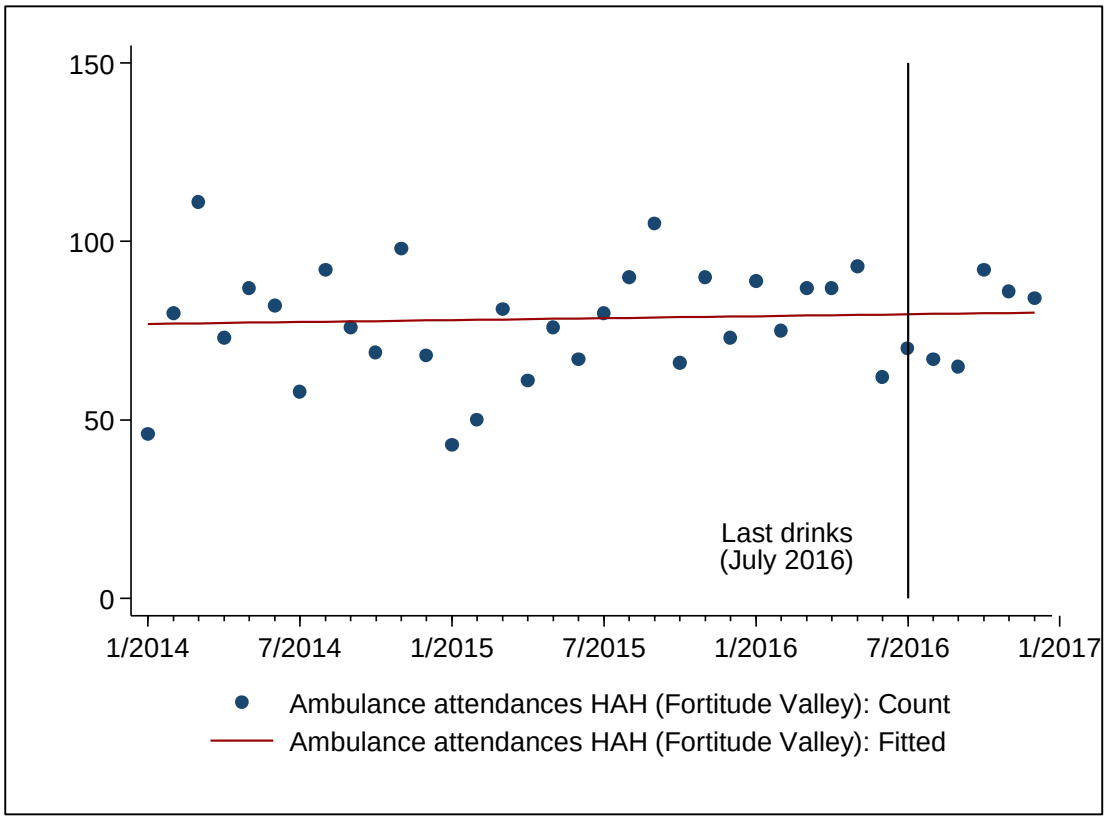
Figure 18 demonstrates the monthly percentage change (MPC) in counts of ambulance attendances between 03:00 and 06:00 on Saturday and Sunday outside Queensland SNPs between January 2014 and December 2016. The average monthly count of ambulance attendances outside SNPs between 03:00 and 06:00 on Saturday and Sunday over the three year period was 925.22 (SD 92.28). The monthly count of ambulance attendances outside SNPs between 03:00 and 06:00 on Saturday and Sunday ranged from 766 in January 2014 to 1113 in August 2015. As depicted in Figure 18, there was evidence of an upward trend in monthly counts of ambulance attendances outside SNPs between 03:00 and 06:00 on Saturday and Sunday across the data series. Average monthly percentage change in

ambulance attendances outside SNPs between 03:00 and 06:00 on Saturday and Sunday was 0.27% per month (0.10 % to 0.44%, p<0.01) between January 2014 and December 2016. Table 20 presents the results of the joinpoint analysis for ambulance attendances outside SNPs between 03:00 and 06:00 on Saturday and Sunday.

Table 20: Average monthly percentage change in ambulance attendances 03:00 and 06:00 Sat/Sun (Rest of Queensland): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	0.27%	(0.10%, 0.44%)	<0.01

Figure 19: Ambulance attendances HAH (Fortitude Valley): January 2014-December 2016



Key Points:

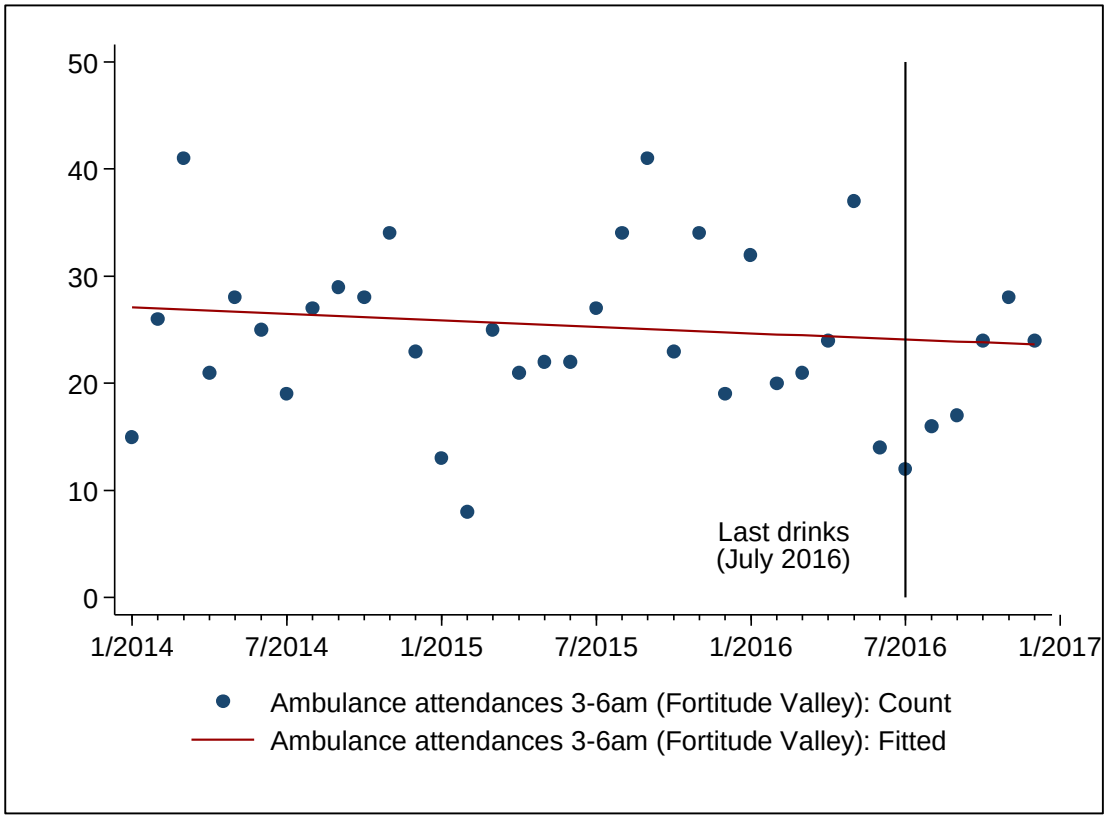
- Post- 1st July: continuation of a stable, flat trend in ambulance attendances in the Fortitude Valley in HAH. This trend reflects a stable trend in events across the data series.
- Overall: the trend in monthly counts of ambulance attendances in the Fortitude Valley in HAH remained stable and flat between January 2014 and December 2016.

Figure 19 demonstrates the monthly percentage change (MPC) in counts of ambulance attendances during HAH in the Fortitude Valley between January 2014 and December 2016. The average monthly count of ambulance attendances during HAH in the Fortitude Valley over the three year period was 77.19 (SD 15.53). The monthly count of ambulance attendances in the Fortitude Valley during HAH ranged from 43 in January 2015 to 111 in March 2014. As depicted in Figure 19, the trend in monthly counts of ambulance attendances in the Fortitude Valley in HAH remained stable and flat across the data series. Average monthly percentage change in ambulance attendances in the Fortitude Valley during HAH was 0.12% per month (-0.45 % to 0.68%, p=0.68) between January 2014 and December 2016. Table 21 presents the results of the joinpoint analysis for ambulance attendances in the Fortitude Valley during HAH.

Table 21: Average monthly percentage change in ambulance attendances HAH (Fortitude Valley): January 2014-December 2016

	MPC	95% CI	P-value
January 2014-December 2016	0.12%	(-0.45%, 0.68%)	0.68

Figure 20: Ambulance attendances 03:00 and 06:00 Saturday and Sunday (Fortitude Valley): January 2014-December 2016



Key Points:

- Post- 1st July: continuation of a stable, flat trend in ambulance attendances in the Fortitude Valley between 03:00 and 06:00 Saturday and Sunday. This trend reflects a stable trend in events across the data series.
- Overall: the trend in monthly counts of ambulance attendances in the Fortitude Valley between 03:00 and 06:00 Saturday and Sunday remained stable and flat between January 2014 and December 2016.

Figure 20 demonstrates the monthly percentage change (MPC) in counts of ambulance attendances between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley between January 2014 and December 2016. The average monthly count of ambulance attendances during between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley over the three year period was 24.28 (SD 7.79). The monthly count of ambulance attendances in the Fortitude Valley between 03:00 and 06:00 on Saturday and Sunday ranged from 2 in January 2015 to 41 in March 2014 and September 2015. As depicted in Figure 20, the trend in monthly counts of ambulance attendances between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley remained stable across the data series. Average monthly

percentage change in ambulance attendances between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley was -0.39% per month (-1.32% to 0.54%, p=0.40) between January 2014 and December 2016. Table 22 presents the results of the joinpoint analysis for ambulance attendances between 03:00 and 06:00 on Saturday and Sunday in the Fortitude Valley.

Table 22: Average monthly percentage change in ambulance attendances 03:00 and 06:00 Saturday and Sunday (Fortitude Valley): January 2014-December 2016

	MPC	**95% CI**	**P-value**
January 2014-December 2016	-0.39%	(-1.32 %, 0.54%)	0.40

8 OLGR Data

Table 23: Approved extended trading permits July 2016-December 2016 5am close

	Fortitude Valley SNP	All QLD SNPs	All QLD
July 2/3	9	24	24
Jul 9/10	5	21	22
Jul 16/17	7	9	11
Jul 23/24	5	15	16
Jul 30/31	11	20	20
Aug 6/7	10	19	22
Aug 13/14	8	21	29
Aug 20/21	9	22	25
Aug 27/28	11	25	28
Sep 3/4	5	10	13
Sep 10/11	8	29	30
Sep 17/18	6	17	21
Sep 24/25	14	32	33
Oct 1/2	15	45	49
Oct 8/9	5	15	17
Oct 15/16	9	20	22
Oct 22/23	10	31	33
Oct 29/30	16	44	49
Nov 5/6	3	17	19
Nov 12/13	11	23	26
Nov 19/20	11	33	37
Nov 26/27	13	40	43

Dec 3/4	13	52	55
Dec 10/11	17	57	60
Dec 17/18	23	70	76
Dec 24/25	9	63	69
Jan 3/4	17	70	82

9 Lock Out Laws Summary

The lockout (or one-way door) refers to an intervention that requires licenced venues to refuse entry or re-entry to patrons after a designated time, prior to the end of trading hours. The aim of the intervention is to reduce alcohol-related violence by impeding late-night movement between venues (de Andrade et al., 2016). Lockouts have been implemented in Australia, Scotland and New Zealand. In Australia, variants of lockouts are currently in effect in all jurisdictions except Tasmania (Trifonoff et al., 2011). Core differences which are important to consider are the time of night the lockout is in place (i.e. 1.30am or 3am), whether the lockout is stand-alone or part of wider restrictions (especially last drinks regulations) and whether the lockouts are precinct-wide or whether they are targeted at specific venues (such as the NSW violent venues scheme).

9.1 History of the lockout in Queensland

In Queensland, the first trial of the lockout occurred in 2004 when a mandatory 3am lockout was introduced in Surfers Paradise. The 3am lockout was rolled out across Queensland starting in 2005.

9.2 Evidence

As lockouts tend to be implemented simultaneously with other strategies, as part of multi-pronged approaches to curbing alcohol-related violence, evaluating their effectiveness as a stand-alone measure can be difficult. Three evaluations of lockouts as stand-alone strategies to curb alcohol-related violence come from Surfers Paradise (de Andrade et al., 2016), Ballarat (Miller et al., 2012) and Newcastle (Kypri et al., 2014).

A comprehensive evaluation of the 2004 trial of the lockout in Surfers Paradise, Queensland found no evidence to suggest that the lockout introduction had a significant effect on crime, violence, injury or levels of intoxication (de Andrade et al., 2016). This study examined both police and ambulance data and followed a rigorous design to examine both temporal and spatial patterns of alcohol related events (de Andrade et al., 2016). The research findings, that lockouts had no effect on crime or alcohol-related injuries, resonate with those of two other studies that examined the effectiveness of the lockout as a stand-alone intervention. Evaluations of the lockout in Ballarat and Newcastle found that the

intervention had no effect on emergency department attendances for alcohol-related injuries and alcohol-related assaults respectively (Miller et al., 2012; Kypri et al., 2014).

Other studies have reported positive outcomes related to lockouts. An evaluation of the Surfers Paradise lockouts in 2004 by Palk and colleagues (2010) found post-lockout reductions in sexual assaults and street disturbances, however, there was no changes in assaults, property damages or stealing. Further, as this evaluation focused on a very short time period of 5 weeks post-lockout, conclusions are speculative at best. In another example, evaluation of a temporary 2am lockout in Melbourne in 2008 indicated decreases in assaults following the introduction of the lockouts (KPMG, 2008). Again, these results must be considered with caution given that 25% of licensed venues in the lockout zone were exempt from the lockouts and the evaluation relied on emergency department presentations of all alcohol-related incidents (not just injuries) at an aggregate level including areas outside the lockout zone (Miller et al., 2015).

The most recent and relevant evaluations of lockouts have both come from Newcastle in New South Wales. Using qualitative data, Miller et al (Miller et al., 2015) found that lockouts can impact negatively on smaller bars and those that trade earlier, because patrons chose to go to venues offering the most options for entertainment and socialising.

The most important finding regarding the impact of one-way doors comes from the comparison between Newcastle city centre and the neighbouring nightlife precinct of Hamilton conducted by Kypri, McElduff and Miller (2016). The Newcastle strategy was a multipronged approach. While Newcastle had mandatory restrictions that included a lockout, it also had a 3am cessation of alcohol service. On the other hand, Hamilton district had adopted all of the Newcastle conditions except 3am cessation of alcohol service, but it did have the lockout. While there was substantial reduction in assaults in Newcastle, there was no discernible change in assault levels in Hamilton, suggesting the 3am cessation of alcohol service was the active element of the Newcastle measures, rather than the lockout. However, it was also noted that the lockout in Newcastle may have impacted on pre-drinking levels (Miller et al., 2016) although further evidence is required.

Despite its popularity in entertainment districts across Australia, current empirical evidence surrounding stand-alone lockouts (i.e, no entry or re-entry into a premise after a particular time) is weak or non-existent with regards to reducing alcohol fuelled violence. Only a few studies have looked at the impact of the lockout as a part of a multi-pronged approach, as

in Newcastle and Sydney and have shown little discernible impact on assaults; but have been found to at least stop pre-drinking at the prescribed hour. However, it is unclear whether this has benefits in its own right and other negative consequences (such as impacting small venues and earlier traders) have been noted (Miller et al., 2015).

Alternatively, restricting (opening) hours for venues demonstrates compelling empirical support for reducing alcohol-related harm (Chikritzhs et al., 2002; Chikritzhs et al., 2005; Chikritzhs et al., 2006; Chikritzhs et al., 2007; Nelson et al., 2010). Australian research has demonstrated overwhelmingly that last drinks at 3am or earlier is by far the most effective measure implemented. In the case of multi-pronged approaches, research has shown that it is trading hours restrictions that are impactful, not the lockout or other measures (Miller et al., 2015).

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11 Appendices

Appendix 1

Joinpoint Regression (Statistical Research and Applications Branch, 2013) is used to evaluate and quantify any significant deviations in trends over time. When using time series data the assumptions of linear regression are typically violated. For example, it is often the case that the assumption of homoscedasticity is invalid as the variance of the outcome changes with time and potentially other variables in the model (i.e., heteroscedastic). As such we have modelled the data using weighted least squares to account for any heteroscedasticity. Finally, as it is well known that data in a time series are often correlated (or dependent) with each other from one or more time points to the next we account for serial auto-correlation in the error terms associated with the outcome variable.

Using Joinpoint Regression avoids the need to arbitrarily select a base for estimating the direction and magnitude of slopes within a data series. The software uses statistical criteria to determine when and how often a change in the count of events (or slope) occurs across a series by fitting counts using joined log-linear segments. Commencing January 2014, monthly aggregate data is used which consists of 36 data points. All zero values are replaced with 0.05 as non-zero values are required. The model is specified to test with a maximum number of four joinpoints. Based on the number of estimated line segments drawn from the analysis, each segment of the series is characterised by an average monthly percentage change (Kim et al., 2000) and the associated 95 per cent confidence interval is indicative of the adequacy of the final model and the degree of random variation inherent in the underlying count data. P-values are presented to indicate if the monthly percentage change in each segment is significantly different from zero (e.g., $p<0.05$). Furthermore, when comparing the slope of the alcohol and non-alcohol related offences within and outside SNPs, having an alpha level for significance at $\alpha=0.05$ may be misleading due to multiple testing. Rather than performing Bonferroni statistical correction to account for family-wise error, we have retained an $\alpha=0.05$ to test for statistical difference between the slopes but have also presented the p-values for readers to have a more refined interpretation. The model uses a Monte Carlo Permutation method to test if an apparent change in trend is statistically significant. A re-sampling method of 5,000 iterations is

specified. For further information the reader is encouraged to visit www.surveillance.cancer.gov/joinpoint.

Appendix 2: Assault Classifications

QPRIME contains items to indicate the nature of assault. There are 10 assault classifications:

- Assault occasioning grievous bodily harm
- Assault occasioning wounding
- Assault occasioning bodily harm
- Assault; serious (other)
- Assault; police (PPRA)
- Assault; minor (not elsewhere classified)
- Assault; Common
- Assault; aggravated (Non-sexual)
- Assault (Comm By-Law)
- Driving causing grievous bodily harm (0212) data not included in 'Assaults by Substance'.

For the purpose of this report the first nine classifications are combined to reflect all assaults.

Appendix 3: EDI ICD Injury Diagnosis Codes

Table 24: EDI ICD Diagnosis Codes: Injuries

S00-S09	Injuries to the head
S10-S19	Injuries to the neck
S20-S29	Injuries to the thorax
S30-S39	Injuries to the abdomen, lower back, lumbar spine and pelvis
S40-S49	Injuries to the shoulder and upper arm
S50-S59	Injuries to the elbow and forearm
S60-S69	Injuries to the wrist and hand
S70-S79	Injuries to the hip and thigh
S80-S89	Injuries to the knee and lower leg
S90-S99	Injuries to the ankle and foot
T00-T07	Injuries involving multiple body regions
T08-T14	Injuries to unspecified part of trunk, limb or body region
T15-T19	Effects of foreign body entering through natural orifice
T20-T32	Burns and corrosions
T33-T35	Frostbite
T36-T50	Poisoning by drugs, medicaments and biological substances Toxic
T51-T65	Effects of substances chiefly nonmedicinal as to source
T66-T75	Other and unspecified effects of external causes (T78 Excluded)
T79-T79	Certain Early complications of trauma

Queensland Health. (2013). Queensland Alcohol related presentation to the Emergency Department. Statistics provided to FARE by QLD Health.

Appendix 4. Suburbs included in SNP classification in QAS Data

SNP	Suburb inclusions
Airlie Beach	Airlie Beach
Brisbane City	Brisbane Brisbane City
Broadbeach	Broadbeach
Bundaberg	Bundaberg Bundaberg Central
Cairns	Cairns Cairns City Cairns Central
Fortitude Valley	Fortitude Valley
Gladstone	Gladstone Gladstone Central Gladstone City
Inner West Brisbane	NB. This SNP is encapsulated in Brisbane City
Ipswich CBD	Ipswich
Mackay CBD	Mackay
Sunshine Coast	Caloundra Maroochydore Mooloolaba
Rockhampton	Rockhampton

	Rockhampton City
Surfers Paradise	Surfers Paradise
Toowoomba	Toowoomba Toowoomba City
Townsville	Townsville Townsville City

International Journal of Drug Policy 63 (2019) 39–46

Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research Paper

Off the rails—Evaluating the nightlife impact of Melbourne, Australia's 24-h public transport trial

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ARTICLE INFO

Keywords:
Alcohol
Illicit drugs
Face-to-face interviews
Night-time entertainment precincts
Public transport

ABSTRACT

Background: This paper evaluates the impact of the AU$83 million introduction of 24-h public transport (PT) in Melbourne, Australia on Friday and Saturday nights on a sample of nightlife venues and venue patrons. This sample was selected because a primary reason for the introduction of 24 h PT was to provide a safe means of travel home for nightlife attendees.

Methods: Covert venue observations (pre-post) and a convenience sample of nightlife patron interviews (post-only) were conducted to measure the impact of 24-h PT on venues and venue patrons. Specifically, the impact of 24-h PT on the proportion of people observed within venues (as rated on a 0–100% scale of venue capacity), patrons in venues showing any sign of intoxication, those who were observed to be too intoxicated to remain in the venue, patron drinking or drug taking behavior, train use, and the time and money spent in the night time economy were assessed.

Results: After 24-h PT was introduced there were no significant differences overall in the proportion of people observed within venues, or significant associations with the proportion of patrons showing any sign of intoxication or proportions who were observed to be too intoxicated to remain in the venue. However, when accounting for seasonality (matching-months), observed patron intoxication increased significantly after the introduction of 24-h PT. The majority of nightlife patrons did not report a change in their pre-drinking or drug taking behavior after 24-public transport, but 44% indicated spending more time in the night time economy, 27% reported spending more money, and 56% reported increasing their train use.

Conclusion: Patron reports suggest that 24-h public transport has increased the amount of time people spend in nightlife settings without obviously impacting on drinking behavior. However, supplying 24-h public transport has resulted in greater self-reported use of public transport.

Introduction

On January 1 2016 the State Government in Victoria, Australia, introduced "Homesafe", a trial of 24-h public transport (PT) in the state capital of Melbourne. Prior to Homesafe, trains and trams ran until approximately 1am on Friday and Saturday nights, and a night bus serviced the remainder of the night. The Homesafe trial involved an increase in PT availability on Friday and Saturday nights after 1am: trains running every hour from Flinders street station (the major metropolitan railway station in Melbourne), and selected trams running every 30 min for the entire night; a 2am regional bus service (previously 1am); and an expanded night bus service on 20 metropolitan routes. The trial was initially costed by the government at AU$50 million and was later revised to AU$83 million to cover the costs of additional protective service officers required to patrol the major transport hubs. In August 2016, the trial was extended to June 2017, at additional cost of AU$38.7 million, and in April 2017 the Victorian Government announced that 24-h PT in Melbourne would run for a further four years at an additional cost of AU$193 million.

As noted by Public Transport Victoria, running accessible PT to over 70% of Melbourne residents on weekends "provides late night public transport options for the thousands of people who go out at night on weekends, as well as shift workers who may currently have limited means of getting to and from work on public transport" (Public Transport Victoria, 2017). Benefits to nightlife patrons include cheap, accessible options for travelling home, and relatively frequent opportunities to leave the city. Further, licensed venues may benefit from increased business as patrons may opt to stay out for longer. Indeed,

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https://doi.org/10.1016/j.drugpo.2018.10.006

research has suggested that providing late night transport options for nightlife attendees would reduce harm in night time entertainment precincts (NEPs) through the efficient dispersal of patrons from NEPs, and reducing opportunities for assaults and injuries to occur (Graham & Homel, 2008; Graham, Bernards, Osgood, & Wells, 2006; Homel & Clark, 1994; Homel, Carvolth, Hauritz, Mcillwain, & Teague, 2004). However, providing patrons with the option to spend longer in the night time economy (NTE) may also increase rates of alcohol-related harm, given they may spend longer in licensed venues consuming more alcohol (or other drugs), which may in turn may increase their risk of intoxication-related harms, such as assault and injury. For example, Miller et al. (2014) found that risk of harm associated with alcohol use increases after 12am. Additionally, when trading hours are reduced for licensed venues, and people are forced to go home earlier, there is a reduction in alcohol-related harm (Chikritzhs & Stockwell, 2002; Wilkinson, Livingston, & Room, 2016). In addition to providing patrons with an opportunity to spend additional time in the NTE, there is also the risks associated with violence occurring on public transport, which may be increased if there are greater levels of intoxication (Hughes, Anderson, Morleo, & Bellis, 2008). As such, it is important to ensure that there is a balance between providing accessible and cheap PT and ensuring the safety of persons attending the NTE.

This mixed method paper evaluates the impact of the introduction of weekend 24-h PT in January 2016 in Melbourne, Victoria, upon a sample of nightlife venues and among venue patrons, with the aim of determining any changes to the number of people attending late-night NEPs, the proportion of people within licensed venues consuming alcohol or drugs, and changes in patron behavior as a result of 24-h PT availability. This is explored through the use of i) a program of covert venue observations, and ii) a convenience sample of nightlife patrons using brief field interviews.

Method

Ethics approval for the project was obtained from the Deakin University Human Research Ethics Committee to conduct the project. Two methods are utlised for this study; covert venue observations, and patron interviews.

Study 1 – covert venue observations

Setting

Observations were conducted monthly on Saturday evenings pre 24-h PT (October 2015-December 2015), and post 24-h PT (January 2016–November 2016) from 12am–4am. A total of 505 independent observation checklists were conducted by pairs of observers in four nightclubs in Melbourne. The venues were chosen because of their late-trading hours (all were open until at least 3am) that these were the types of venues that would be impacted by additional PT availability, and that all venues had close access to 24-h PT. All venues either had live DJs or recorded DJ entertainment throughout the night, did not serve food, had cover charges, and had indoor and outdoor areas. All venues had a dance-focus with clear dance floor areas. None of the venues appeared to change practices after the introduction of 24-h PT.

Procedure

All observations and patron interviews were recorded using iPhones and iPods with the app TapForms™. The methodology utilized in the current study has been successfully used elsewhere (Coomber et al., 2016; Droste, Miller, Pennay, Zinkiewicz, & Lubman, 2016; Miller, Pennay, Jenkinson et al., 2013). All observers and interviewers received training on how to conduct covert observations and patron interviews, including how to identify signs of intoxication, which were based on the criteria shown in Table 1 (Liquor & Gaming, 2015).

Observers and interviewers also received training on how to identify signs of drug use, including common physiological signs for each class of drug (e.g., stimulants, depressants), recognizing drug paraphernalia (e.g., pipes, baggies, needles), and drug taking behavior (e.g., smoking or ingestion of drugs) (Coomber et al., 2017; Miller, Pennay, Droste et al., 2013; Miller et al., 2012).

Each hour, observers were required to complete an observation form recorded electronically using the TapForms™ app. In the hour prior to the observations, observers were instructed to move throughout the venue ensuring they had observed all areas. Observers were then instructed to focus on different areas of the venue to that of their observation partner to ensure data were independent and to ensure an accurate representation of the entire venue, rather than any one specific area (Droste et al., 2016).

As per similar studies using this methodology, male/female pairs were utilized wherever possible to maximize safety of observers (Droste et al., 2016; Miller, Pennay, Jenkinson et al., 2013). To ensure observations remained covert, observers wore clothes consistent with those of usual patrons of the particular venue they were at, and were encouraged to behave as a normal customer of that venue would. At times, this may have involved interacting casually with other patrons, dancing, or purchasing a beverage.

Measures

Patron characteristics

Observers were required to estimate the maximum number of patrons in the venue at each hourly time point, and to estimate how full the venue was (proportion of total venue capacity, 0–100%). Further, observers estimated the proportion of patrons who were male, and of patrons who were below the age of 25 years.

Patron alcohol use

Observers reported whether they saw patrons stockpiling alcoholic drinks in the past hour, defined as having more than two unconsumed drinks. Observers also noted whether any one patron purchased more than four alcoholic drinks at one time, or more than one bottle of wine (regardless of who consumed these), in the past hour.

At each observation point, observers were required to estimate the proportion of all patrons who were showing any signs of intoxication in the past hour. They were also asked to note the proportion of patrons who seemed too intoxicated to be in the venue at the current observation point, based on the existence of three or more signs of intoxication (Table 1). In addition, observers reported whether they had seen an intoxicated person attempt to purchase an alcoholic drink, and noted the actions taken by staff in response.

Patron drug use

Observers recorded any sign of drug use witnessed in the venue in the past hour (e.g., explicit drug possession or use, possession of drug paraphernalia). They then recorded the proportion of patrons who were showing any signs of illicit drug use in the past hour, and whether staff took any action regarding the drug use.

Police activity

Prior to entering the venue and when leaving the venue, observers recorded whether they saw any police officers on the streets of the NTE area, the number of police seen, and whether police were conducting a routine patrol or responding to an incident. Observers also recorded whether any police entered the venue, and if so how many and what they were doing.

Table 1
Signs of intoxication used by observers.

Speech	Balance	Coordination	Behavior
Slurring words	Unsteady on feet	Lack of coordination	Rude
Rambling or unintelligible conversation	Swaying uncontrollably	Spilling of drinks	Aggressive
Incoherent or muddled speech	Bumping into or knocking over furniture or people	Inability to find ones mouth with a glass	Belligerent
Loss of train of thought	Difficulty walking straight	Fumbling change	Argumentative
Not understanding normal conversation	Cannot stand or falling down	Difficulty counting money or paying	Offensive
Difficulty in paying attention	Stumbling	Difficulty opening or closing doors	Drowsiness or sleeping at a bar or table
	Staggering	Dropping drinks	Physically violent
			Loud/boisterous
			Disorderly
			Confused
			Exuberant
			Using offensive language
			Annoying/pestering others
			Overly friendly
			Loss of inhibition
			Inappropriate sexual advances
			Bad tempered
			Vomiting
			Drinking rapidly

Study 2 – patron interviews

Setting

Flinders Street Train Station was chosen as the site for nightlife patron interviews because it is the only station in the Melbourne central business district where 24-h PT was made available during the Homesafe trial.

Participant eligibility

Participants were interviewed if they were over the age of 18. However, the research is focused on understanding changes to participant behavior in the nightlife over the past year, therefore, participants who reported their age as 18 were excluded from analyses. This is because the legal age of licensed venue entry in Australia is 18, and as such, persons who were 18 at the time of the interview would have only been 17 years at the time of the introduction of 24 h PT.

Procedure

Interviews were conducted by two teams comprising between four and six members. Interview sessions occurred once per month on a Saturday night from August-November 2016, between the hours of 11 pm and 6am. Interviewers systematically approached every third person to ask if they would be interested in participating in the interview.

Measures

Demographics

Participants were asked their age and postcode. Date and time of interview were automatically entered by the TapForms™ app.

Current night out

Participants were asked how many standard drinks they had consumed before attending the city that evening (pre-drinking), and how many they had consumed prior to the interview (including pre-drinking). They were also asked whether they had consumed any illicit or pharmaceutical drugs not prescribed to them, and if so, the type of drug, during the night prior to the interview. Participants were asked whether they usually take the train home, and if yes, the time that they usually travel home.

Experience of aggression in past three months

Participants were asked how many times they had experienced (i.e. witnessed or were involved in) physical or verbal aggression, unwanted sexual attention, or alcohol-related injuries, in and around licensed venues in the past three months.

Behavioral changes

Participants were asked specific behavior change questions since the introduction of 24-h PT, for which they could respond 'more', 'less' or 'no change'. These included: hours spent consuming alcohol prior to going out (and if so, how many hours); drug use; use of PT; time in the NTE (if so, how many more/less hours); and money spent on a night out (if so, how much more/less money). They were also asked whether they use trains more regularly now that they are available over a 24-h period, whether they have experienced more aggressive incidents, unwanted sexual attention, or alcohol-related injury, in or around licensed venues since the introduction of 24 h PT.

Blood alcohol concentration (BAC)

All participants were asked to provide a breathalyzer sample to determine BAC at the end of their interview. BAC was recorded using a calibrated Andatech Alcosense Prodigy breathalyzer.

Analysis plan

All data were analyzed using SPSS v23 (IBM Corp, 2014).

Study 1 – covert venue observations

Pearson's chi square tests were utilized to determine whether there was an association between the introduction of 24-h PT (2015, pre 24-h PT and 2016, post 24-h PT) and the proportion of observations during which the observer had to wait in line, the proportion of patrons stockpiling drinks, buying more than four drinks at once, or showing signs of drug use, and the proportion of observations where police were observed. All proportions recorded from 0 to 100% by observers were coded categorically in intervals of 10.

A series of independent sample t-tests were conducted to determine average differences between observational variables before versus after the introduction of the 24-h PT. Comparisons pre/post 24-h PT included: the proportion of males; the proportion of persons estimated to be under 25 years of age; venue entry time; the proportion of observations reporting police activity inside and outside of venues; hourly

differences in the proportion of total capacity of the venue; proportion of intoxicated patrons; proportion of patrons who were too intoxicated; and proportion of patrons showing signs of drug use. All t-tests used a Bonferroni adjusted alpha level of 0.003 (i.e., $\alpha = 0.05/16$ analyses).

Study 2 – patron interviews

Given the type and nature of the data, medians, proportions, and mean changes are reported. Pearson's chi square tests were conducted to determine whether there were significant differences between proportions.

Findings

Study 1 – covert venue observations

Patrons

Independent sample t-tests showed there was no significant difference between the proportion of patrons observed as being male before or after 24-h PT (59% vs. 60%). Further, there was no significant difference between the proportion of patrons observed to be under 25 years of age before or after 24-h PT (80% vs. 79%).

Venue entry

Prior to 24-h PT, on 10% of observations, observers had to wait in line for entry, with an average wait time of 6.17 min ($SD = 4.73$). After 24-h PT, observers had to wait in line on 13% of observations, with an average wait time of 9.75 min ($SD = 7.99$). Independent t-tests indicated these differences were not statistically significant.

Alcohol and drug use

Independent t-tests also indicated there were no significant differences in the observed proportion of patrons stockpiling drinks (26% vs 27%), buying more than four drinks at one time (8% vs 8%), or showing signs of drug use (73% vs 81%) after the introduction of 24-h PT. Signs of drug use were observed during 390 (77%) observations. The most common of these included people appearing intoxicated, but obviously not from alcohol (n = 363), observers witnessing an exchange of money for small items (n = 79), observers witnessing drugs being ingested by patrons (n = 45), and observers seeing drug paraphernalia (n = 9).

Observation of police

Independent t-tests also showed there was no significant difference in the observation of police before or after the introduction of 24-h PT (13% of observations vs. 11% of observations, respectively).

Pre versus post introduction of 24-h public transport

To determine the impact that the introduction of 24-h PT had on a number of NTE indicators, four chi square tests of association were conducted to determine whether 24-h PT (before and after 24-h PT) was associated with the proportion of total capacity of the venue, the proportion of patrons showing any sign of intoxication, the proportion of patrons who were too intoxicated to remain in the venue, and the proportion of patrons showing any signs of drug use for each hour that observations were conducted.

There was no significant association between the introduction of 24-h PT and the observed proportion of patrons in venues (Fig. 1a), the observed proportion of patrons showing any signs of intoxication (Fig. 1b), or the proportion of patrons being observed as too intoxicated to be currently in the venue (Fig. 1c). As shown in Fig. 1d, there was also no significant association between the introduction of 24-h PT and the proportion of patrons showing any signs of drug use throughout the night. A Bonferroni correction ($\alpha = .003$) was applied to all analyses. All chi-squares were re-run to account for potential seasonality by matching months (i.e. October and November before and after 24 h PT); the percentage of those who were showing any sign of intoxication was significantly higher after the introduction of 24 h PT ($\chi^2 = 51.51$, $p < 0.001$). No other significant differences were observed.

Study 2 – patron interviews

A total of 432 persons were approached to participate, with an agreement rate of 60%. After participants with missing data on key variables, or who were 18 years of age were removed, the final sample comprised 207 participants (see Table 2 for sample characteristics). Males were significantly more likely to agree to participate than females (63% agreed vs. 47% agreed; $\chi^2 = 7.55$, $p < 0.01$).

Participants reported that they had consumed six drinks on average prior to the interview, and at the time of interview the average BAC reading was 0.041% (see Table 3), which is below the legal driving limit for fully licensed drivers in Australia.

Behavior change since 24-h public transport

On average, participants reported spending 3.27 ($SD = 1.89$) more hours drinking after the introduction of 24-h PT. One in 10 people (10%) reported that they pre-drink more now that 24-h PT is available; reporting an average increase of 3.32 more standard drinks ($SD = 2.61$). Less than 5% of participants reported that they pre-drink less ($M = 4.28$ fewer drinks, $SD = 2.98$), and the remainder (85%) said they had not changed their pre-drinking behavior. Fig. 3 shows the distribution of BAC, amount of money spent, number of drinks consumed, and time spent out after the introduction of 24 h PT.

Six people (5% of those who responded) reported that they take more drugs now that 24-h PT is available. Two participants (2%) reported taking less drugs, and an overwhelming majority of the sample (93%) reported that they have not changed their drug use.

Seven participants (3%) reported experiencing more aggressive, unwanted sexual attention, or alcohol-related injury incidents since the introduction of 24-h PT. Five of these incidents were physical, one was verbal, and one was unwanted sexual attention. There were no reports of additional alcohol-related injuries since the introduction of 24-h PT.

Public transport use

One hundred and twenty nine (62%) participants reported that they planned to take the train home on their current night out. As shown in Fig. 2, 73% of the 106 participants who responded to the question, reported usually getting the train home between 1am and 6am- the new 24-h PT time.

Ninety four participants (56%) said they use trains more regularly since the introduction of 24-h PT. Eight participants (5%) said they use trains less regularly, and 65 (39%) said they have not changed the regularity of train use, despite 22% reporting now using trains after 1am.

Time and money spent in night time economy

Eighty six participants (44%) said they stay out for longer since the availability of 24-h PT. On average, participants reported staying out 3.27 ($SD = 1.89$) more hours. Seven people (4%) said they spent less time out since the introduction of 24-h PT ($M = 2.66$, $SD = 1.21$), and 101 (52%) said they have not changed the amount of time they spend out in the NTE.

Over a quarter of the sample (27%) reported spending more money on a night out since the introduction of 24-h PT, an average of $60 ($SD = \$71.50$) more. Thirty participants (17%) reported spending less money ($M = \$38.2$, $SD = \$25.94$), and 97 (56%) said they spend the same amount of money as they did prior to 24-h PT.

Discussion

The current study used a mixed-method approach to determine whether the introduction of 24-h public transport in Melbourne has impacted on nightlife venues and nightlife patron behaviors. Given the

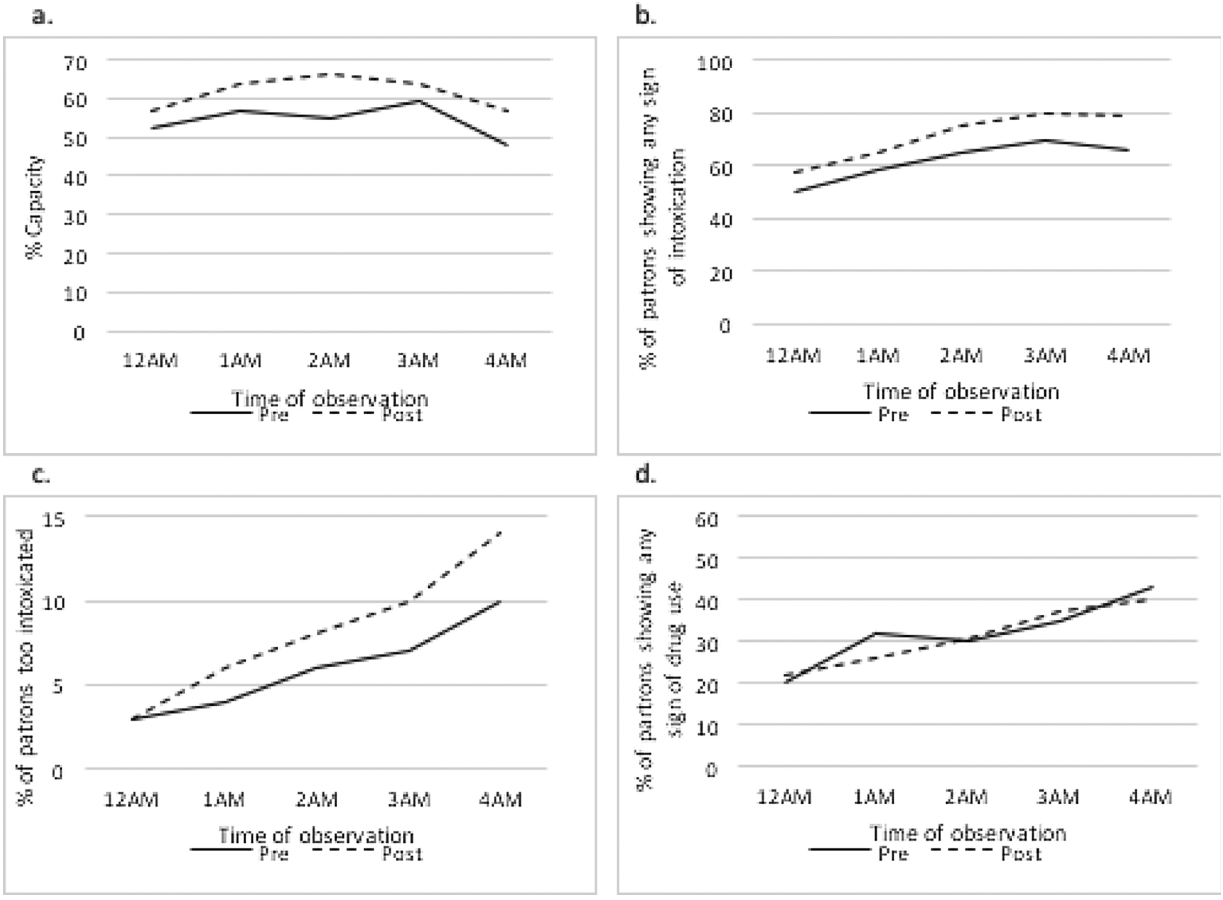

Fig. 1. Proportion of patrons (a), showing intoxication signs (b), too intoxicated (c), and signs of drug use (d) by time of observation.

Table 2
Sample Characteristics.

	N	%
Gender		
Male	120	62.2%
Female	73	37.8%
Age		
18-20	55	26.7%
21-25	92	44.7%
> 25	59	28.6%
Time Interviewed		
11pm-12am	26	12.6%
12am-1am	41	19.8%
1am-2am	51	24.6%
2am-3am	43	20.8%
3am-4am	14	6.8%
4am-5m	22	10.6%
5am-6am	10	4.8%
Drug use that evening prior to interview	25	12.1%
Type of drug used among those who had consumed drugs[a]		
Ecstasy	11	44.0%
Cannabis	7	28.0%
Cocaine	2	8.0%
Methamphetamine	1	4.0%
Prescription Drugs	2	8.0%
Ketamine	1	4.0%
Experienced physical aggression past 3 months	38	18.4%
Experienced verbal aggression past 3 months	54	26.1%
Experienced unwanted sexual attention past 3 months	38	18.4%
Experienced alcohol-related injuries past 3 months	25	12.1%

* Some variables do not sum to the total *N* due to missing data.

[a] Drug use percentages refer to those who reported consuming illicit substances.

cumulative cost of implementing this 24-h PT trial is approaching AU $200 million, it is important to understand its impact on the nightlife community members and nightlife stakeholders it is targeting.

After the introduction of 24-h public transport there were no significant differences in venue characteristics such as the observed proportion of people within venues, or significant associations with the proportion of patrons showing any sign of intoxication or of being too intoxicated (i.e., showing more than three signs of intoxication). When the same months were compared before and after 24 h PT, however, there was a significant increase in the proportion of those who were observed to be showing any sign of intoxication in the venue. These observed higher levels of intoxication may be a result of some patrons feeling comfortable about consuming higher levels of alcohol given they do not need to stay below the Australian legal blood alcohol content limit to drive (0.05 g/100 mL). Alternately, they may have more money available due to a cost-effective means of travelling home, or the change may reflect longer periods of pre-drinking. The lack of overall change from before to after 24 h PT may indicate that there is not an increase in the number of people attending the nightlife, instead the nightlife patrons may have changed their mode of transportation from a taxi/Uber, for example, to a 24-h PT option, such as trains. This is particularly relevant for those who live some distance from the NEP for whom a taxi/Uber would have been expensive compared to the small cost of public transport (a metro train trip is approximately AUD $4.00). Most participants who were interviewed also reported that they had not changed their pre-drinking behavior or drug use after the introduction of 24-h PT. For those who did pre-drink, 24-h PT may provide a cost effective means of travel into the city later in the evening and allow patrons to pre-drink at home for an extended period of time, far beyond the last available evening train prior to 24 h PT (usually 11 pm-12am). Importantly, almost half the sample were spending more

Table 3
Alcohol Consumption behavior of patrons who were interviewed.

	M (SD)	Median
Number of standard drinks consumed that evening prior to interview	6.51 (5.79)	6.00
If standard drinks were consumed prior to attending city, how many were consumed (pre-drinking)	2.44 (4.18)	0.00
BAC at time of interview	0.041% (0.05)	0.028%

time in the NTE, and over a quarter reported spending more money, which is of great economic benefit to licensees. Further, a large majority of participants reported that they now usually take the train home between 1am and 6am- an option that was not available to them previously.

The average BAC of participants in study 2 was lower than other studies in which nightlife interviews have been conducted. For example, in the POINTED study, the average BAC of participants was 0.054% (Miller, Pennay, Jenkinson et al., 2013), indicating that the current sample may be different to other nightlife samples. This may be due to participants being interviewed when they are leaving the city, at which point their intoxication levels are likely to be decreasing, particularly if they have been waiting at the station for their hourly train prior to being interviewed. This is consistent with findings from Miller et al. (2014) who identified that the peak BAC in Melbourne was 2am, after which point BAC decreased. As such, it is likely these patrons were on the descending arm of the BAC curve, whereby fatigue sets in, prompting patrons to go home (Holdstock & Wit, 1998).

Only a very small proportion of participants reported experiencing more incidents of aggression, unwanted sexual attention, or alcohol-related injuries in and around licensed venues since the introduction of 24-h PT. The limited number of additional incidents may be associated with the increased number of protective service officers in and around train stations, potentially deterring anti-social behavior. Alternatively, the sample recruited for the current study may be biased toward under-reporting of negative incidents due to their personal belief that the 24-h PT system is useful. Further, self-report of aggressive incidents, unwanted sexual attention or alcohol-related injuries may be an under-representation of actual incidents as a result of recall bias (Hughes et al., 2008; Schnitzer et al., 2010), particularly as participants were asked to recall incidents that had occurred during the last 8–12 months. It would have been useful to also ask participants about whether they had experienced less incidents, to determine whether such a change was as small as those experiencing more incidents, and potentially a result of chance. As such, investigation of the number of people using 24-h PT and alcohol-related harms in the nightlife, including injuries and assaults, requires further investigation.

There were limitations to the current study that should be considered when interpreting the findings. In regard to Study 1, data were collected for the three Spring/Summer months leading in to the introduction of 24-h PT as this was when the trial was announced. The remainder of observations were conducted throughout the following year, including in Winter. This is likely to have reduced the possibility of finding significant results, given crowd numbers are likely to be smaller in the winter months. Ongoing monitoring of these trends will be important to enable exploration of seasonal effects, or long term impact on crowd numbers. In regard to Study 2, recruitment was targeted; patron interviews were conducted at a train station, where the sample would most likely be train users, enabling data to be collected around PT use at night. As such, participants are likely to have been positively biased toward using PT. Further investigation of 24-h PT should attempt to capture a broader sample of nightlife patrons from a variety of different areas, such as outside of licensed venues. Recruiting participants outside a train station also meant that participants may not have been able to complete the interview given they had a train to catch, potentially reflected in the participant agreement rate being lower than previous in-situ nightlife studies (e.g. Miller, Pennay, Droste et al., 2013). Third, we did not ask participants what their purpose for being in the city was, and as such we could not clearly distinguish between those who had been in the city on a night out, or who were travelling for work. Fourth, the interviews required participants to recall behaviors over the past year, which may have resulted in some recall bias. Finally, participants were not asked to distinguish between the cost of transport and the cost of their night out, therefore any changes in spending may be attributable to alcohol consumption, entertainment costs, or changes in travel practices.

Conclusions

The implementation and ongoing availability of 24-h PT has come at a substantial economic cost to Victorians. However, it appears that a substantial proportion of nightlife patrons are staying out longer, and are spending more money in the night time economy since it became available. Given the small sample size and targeted recruitment method for interviewing participants, it is important to explore further whether 24-h PT has impacted on wider trends of alcohol-related harms, such as

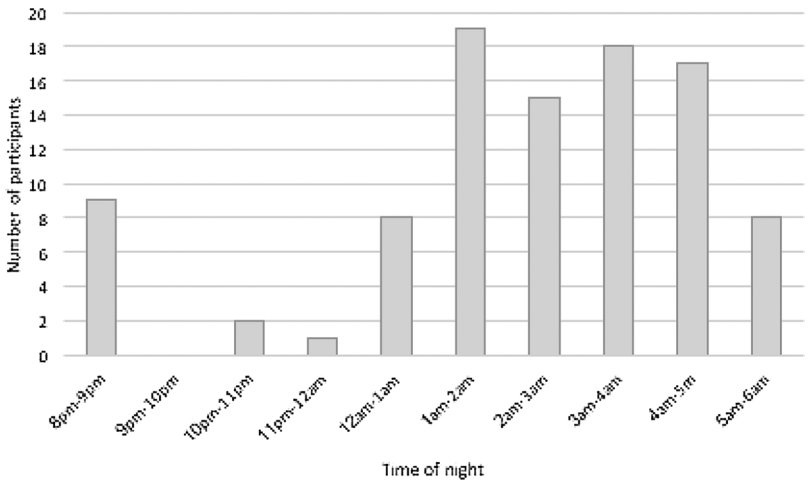

Fig. 2. Time participants reported they usually get the train home.

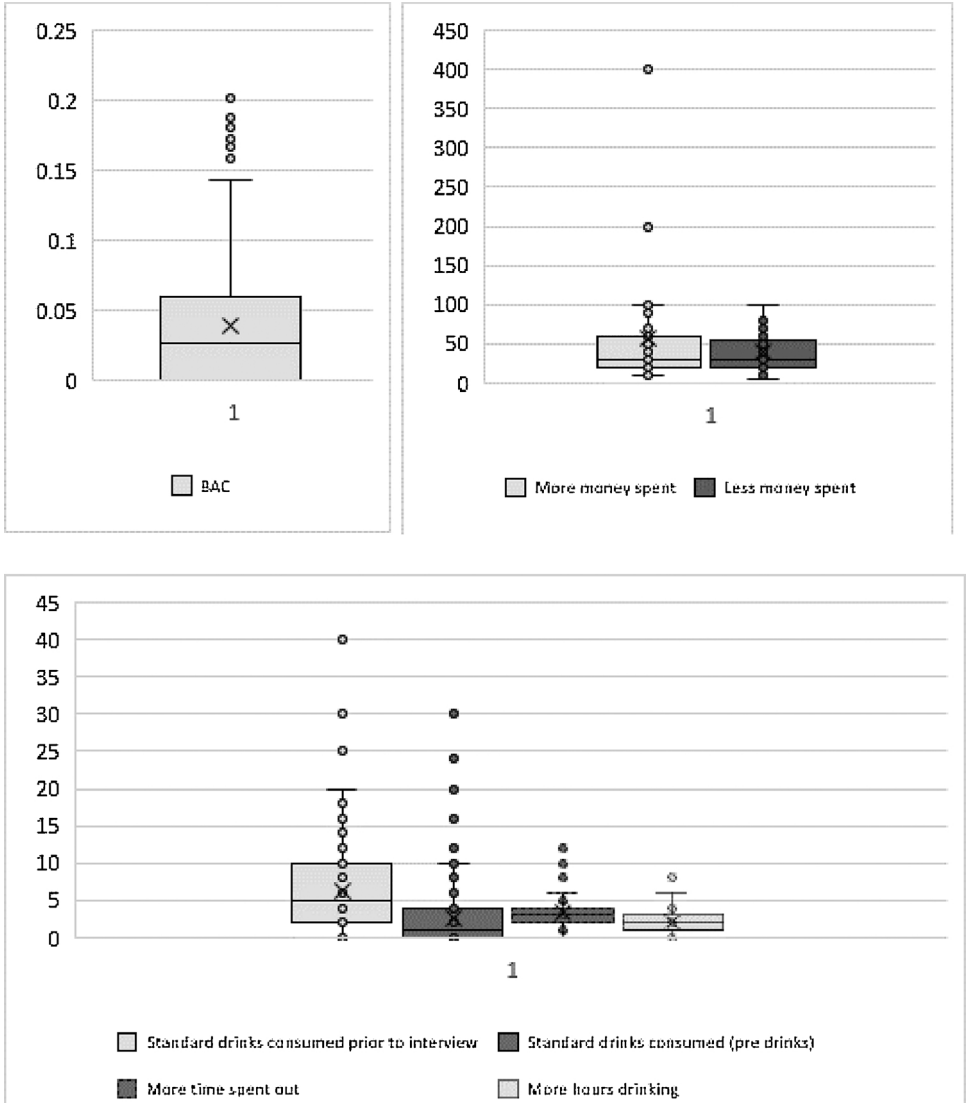

Fig. 3. Box and Whisker Plots highlighting changes in BAC, money spent, drinks consumed, and time spent out after 24 h PT.

alcohol-related ambulance attendances and assaults.

Declarations of competing interest

Peter Miller receives funding from Australian Research Council and Australian National Health and Medical Research Council, grants from NSW Government, National Drug Law Enforcement Research Fund, Foundation for Alcohol Research and Education, Cancer Council Victoria, Queensland government and Australian Drug Foundation, travel and related costs from Australasian Drug Strategy Conference. He has acted as a paid expert witness on behalf of a licensed venue and a security firm.

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Coomber et al. BMC Public Health (2018) 18:1185
https://doi.org/10.1186/s12889-018-6098-x

BMC Public Health

RESEARCH ARTICLE Open Access

Short-term changes in nightlife attendance and patron intoxication following alcohol restrictions in Queensland, Australia

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Abstract

Background: This study aims to explore short-term changes following the introduction of alcohol restrictions (most notably 2 am to 3 am last drinks). We examined patterns of nightlife attendance, intoxication, and alcohol use among patrons shortly before and after restrictions were introduced in Fortitude Valley, Brisbane: the largest night-time entertainment precinct of Queensland.

Methods: Street-intercept patron interviews were conducted in Fortitude Valley in June ($n = 497$) and July ($n = 562$) 2016. A pre-post design was used to assess changes in time spent out drinking/partying prior to the interview, time of arrival in the precinct, pre-drinking, and blood alcohol concentration (BAC).

Results: Regression models indicated that after the policy introduction, the proportion of people arriving at Fortitude Valley before 10:00 pm increased (OR = 1.38; 95% CI = 1.04, 1.82). Participants reported going out, on average, one hour earlier after the intervention (β = − 0.17; 95% CI = 0.11, 0.22). There was a decrease (RRR = 0.58; 95% CI = 0.43, 0.79) in the proportion of participants who had a high level of intoxication (BAC ≥0.10 g/dL) post-intervention. No other significant differences were found.

Conclusions: Earlier cessation of alcohol sales and stopping the sale of rapid intoxication drinks after midnight was associated with people arriving in Fortitude Valley earlier. Though legislative loopholes allowed some venues to continue trading to 5 am, the proportion of people in the precinct who were highly intoxicated decreased after the restriction. Further measurement will be required to determine whether the reduction has persisted.

Keywords: Alcohol, Policy, Patron interviews, Nightlife, Intoxication

Background

Restricting the hours alcohol can be sold is an effective and inexpensive way of reducing alcohol-related assaults and unintentional injury [1, 2]. In 2008, a multi-component strategy including the restriction of trading hours from 5 am to 3:30 am in Newcastle, New South Wales, was followed by a 37% decrease in assaults compared to a control site, and an average reduction of 344 emergency department attendances per year [3, 4]. When last analysed [3, 5], this downward trend in assaults had been sustained for eight years. Conversely, increased venue trading hours in Perth, Western Australia, was associated with a 70% and 47% increase in the incidence of assault and drink-driving, respectively [6, 7]. International research also demonstrates an increased rate of alcohol-related assault and unintentional injury after extending venue trading hours [8, 9].

In February 2016, the Queensland state government passed legislation based on the Newcastle model. Coming into effect on 1 July 2016 (see http://www.webcitation.org/6rXxbYEe8 for full details), the multi-faceted Queensland Tackling Alcohol-Fuelled Violence Policy required the cessation of alcohol service ('last drinks') by

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3 am within defined entertainment areas (Safe Night Precincts) and by 2 am in the rest of the state. However, venues could apply for an extended trading permit allowing sales of alcohol until 5 am; venues could apply for up to 12 single night permits within a 12-month period. A state-wide ban on the service of 'rapid intoxication drinks' (e.g., shots) after midnight was also introduced.

In this study we undertook patron interviews in the entertainment precinct of Fortitude Valley, Brisbane, in the month before and after the introduction of the policy, to test for short-term changes in drinking behaviour.

Methods

Sample

Interviews were conducted from 11:00 pm-5:59 am on three Saturday night/Sunday mornings before the change (11/12 June, 18/19 June, and 25/26 June 2016) and four Saturday night/Sunday mornings after the change (2/3 July, 8/9 July, 23/24 July, and 30/31 July 2016). Following established protocols [10, 11], every third person passing the research teams (who were wearing easily identifiable institutional clothing) was invited to participate. Participants who provided verbal consent were given a business card with study and contact details.

Measures

Demographics and current night

Participants' gender and age were recorded in the following categories (18–20 years; 21–25 years; and > 25 years) [12]. Participants were asked how long they had been out and what time they arrived in the precinct. Based on the distribution of responses, a cut-point of arrival up to 10:00 pm versus after 10:00 pm was used.

Alcohol use

Participants were asked how many standard drinks they consumed prior to entering a licensed venue (pre-drinking). Participant alcohol status at the time of interview was measured, after confirming that at least 10 min had elapsed since eating or drinking, using a breathalyser (Andatech Prodigy S, calibrated six-monthly) that converted breath alcohol level into an estimate of blood alcohol concentration (BAC). BAC was examined as both a continuous measure and an ordinal categorical measure in g/dL. The BAC categories used were: 'sober' (0.0); 'slightly intoxicated' (> 0.0 to < 0.05); 'moderately intoxicated' (≥0.05 to < 0.10); and 'highly intoxicated' (≥0.10). Our research indicates that observers of licensed venue patrons are able to reliably estimate level of intoxication based on physical signs, with interviewer-rated intoxication moderately correlated with BAC [13]. Therefore, we use the terms BAC and intoxication interchangeably throughout the paper.

Procedure

Ethical approval was obtained from Deakin University (2011–095) and The University of Queensland (20160010121). Five-minute interviews were conducted with patrons in Brunswick Street Mall, the main thoroughfare of Fortitude Valley (see Fig. 1), using a mobile survey application (TapForms™) on an iPod Touch.

Analysis

Linear, logistic, and negative binomial regression models examined differences in participant responses by month of interview, with hour of interview as a covariate. For the ordinal BAC variable, ordered logistic regression was planned. However, the assumption of parallelism was not met (Brant test for month = 13.18, $p = 0.001$). Therefore, three multinomial logistic regression models were conducted to explore potential BAC change among those who had a BAC greater than zero; the BAC categories of slight, moderate, and, high intoxication were each used as the reference category. This approach was used to provide insight into how patrons shifted in their levels of intoxication. All analyses were conducted using Stata 14.0.

Results

Demographics

Research teams approached 1267 people, of whom 1059 completed the interview (June $n = 497$; July $n = 562$), with an overall response rate of 84% (June 83%; July 85%). For the June sample, participant mean age was 23 years (standard deviation (SD) = 5.9), and 65% were male. In the July sample, the mean age was 24 years (SD = 6.6), and 62% were male. There were no significant differences in age and gender distribution by month. Seventy-three participants (7%) refused the breath-test (June $n = 50$, 10%; July $n = 23$, 4%).

Hours spent out and time of arrival at precinct

Participants interviewed in July started their night earlier, relative to their interview time, than those interviewed in June (see Table 1). Further, a significantly smaller proportion of participants arrived in Fortitude Valley after 10:00 pm in July, compared to June.

Pre-drinking and blood alcohol concentration (BAC)

There was no significant difference in the proportion of participants pre-drinking, or the number of standard drinks consumed while pre-drinking, in July versus June (Table 1).

There was no significant difference in the overall mean BAC of participants interviewed in July compared to June. Compared to slight intoxication, there were no significant shifts in the proportions of patrons in the higher

Fig. 1 Boundary of Fortitude Valley entertainment precinct and location of interviewing (Brunswick Street Mall). Map data: Google, DigitalGlobe

BAC categories. However, compared to moderate intoxication, there was a decrease in the proportion of participants who were highly intoxicated in July compared to June and a small, but significant, decrease in those with a zero BAC (see Table 1). There was a corresponding increase in the proportion of participants who recorded a moderate intoxication in July versus June (reference category of ≥0.10 g/dL; RRR = 1.73, 95% confidence interval = 1.27, 2.35). No other significant differences were found.

Discussion

In the month following the introduction of new legislation on alcohol restrictions in Queensland, a smaller proportion of patrons in the Fortitude Valley precinct had a BAC ≥0.10 g/dL than in the pre-change period. A corresponding shift in the proportion of patrons to lower BACs (from a BAC of ≥0.10 g/dL to a BAC of ≥0.05 to < 0.10 g/dL) was also observed in the post-change period. While it appears the majority of patrons still consume alcohol to moderate intoxication, the finding of a reduction in the number of highly intoxicated patrons is encouraging. This change in patterns of intoxication coincided with a larger proportion of patrons arriving before 10:00 pm and patrons commencing their evenings out an hour earlier.

The finding that people went out earlier after the restriction on last drinks aligns with previous cross-sectional research into the trading hours restrictions implemented in Newcastle [14]. Our findings suggest that patrons responded to the policy changes by starting to socialise, and arriving in the precinct earlier [14]. Despite patrons having spent more time out and more time within the Fortitude Valley precinct after the policy introduction, there was a decline in the proportion of highly intoxicated patrons. This reduction in percentage of highly intoxicated patrons may be partially driven by

Table 1 Regression models testing change in outcome variables pre- and post-intervention

Variable	June M (SE) or %	July M (SE) or %	Test statistic	95% CI
Hours out ($n = 1058$)	4.6 (0.14)	5.7 (0.13)	β = 0.17	0.11, 0.22
Arrival at precinct ≤10:00 pm ($n = 900$)	43%	50%	OR = 1.38	1.04, 1.82
Pre-drinking (yes) ($n = 1035$)	85%	85%	OR = 1.05	0.75, 1.48
Number of pre-drinks ($n = 879$)	8.1 (0.28)	7.5 (0.25)	IRR = 0.93	0.84, 1.02
Mean BAC (g/dL) ($n = 986$)	0.081 (0.033)	0.079 (0.002)	β = −0.003	−0.010, 0.005
BAC categories (g/dL) (n = 986)				
0.0 (sober)	15%	12%	RRR = 0.60	0.40, 0.90
> 0.0 to < 0.05 (slight)	17%	17%	RRR = 0.73	0.50, 1.06
≥ 0.05 to < 0.10 (moderate)	30%	41%	RRR = 1.00	
≥ 0.10 (high)[a]	38%	30%	RRR = 0.58	0.43, 0.79

Note. All models adjust for hour of interview. June is the reference category for all models
[a]Within the BAC category of ≥0.10 g/dL, 74% of participants in both June and July recorded a BAC of ≥0.12 g/dL and 28% (June) to 32% (July) had a BAC of ≥0.15 g/dL
M = Mean
SE = Standard error
95% CI = 95% confidence interval
β = Beta-weight
OR = Odds ratio
IRR = Incidence rate ratio
RRR = Relative risk ratio

the ban on rapid intoxication drinks after midnight. Further research is needed to explore both the drivers of these changes in consumption patterns and whether the changes were sustained over time. Encouragingly, there was no significant increase in the prevalence of pre-drinking.

While the findings indicate some changes in patterns of drinking and intoxication immediately after the introduction of the alcohol restrictions, the use of extended trading permits allowing venues to continue serving alcohol until 5 am may have reduced the impact of earlier last drinks [15, 16]. While the earlier last drinks had the potential to reduce alcohol service across 34 venues in Fortitude Valley by 68 h each night, there was no weekend in July 2016 (after the restriction) in which all venues stopped serving alcohol at 3 am [15, 16]. The objective of the new legislation was undermined by the continued provision of these extended trading permits.

Limitations

This preliminary study compared patterns of drinking and intoxication before and after new alcohol restrictions in a major entertainment precinct in Queensland. The inclusion of control sites was impracticable given the short lead-time between funding of the research and the legislation coming into effect. Accordingly, the shortcomings of pre-post designs limit what can be inferred from the observed changes.

The primary threat to validity is competing interventions or conditions that exert downward pressure on socialising behaviour and drinking, for instance, changes in economic or climatic conditions. Neither seems likely given the short timeframe of the pre- and post-measurement periods -- a total period of less than two winter months. A secondary limitation is that the university semester ended in late June. This may have resulted in differences between the pre- and post-intervention populations, because fewer students were going out in June because of examinations, or because students from outside of Brisbane returned home during the between-semester break. Our interview did not capture information that would allow us to identify students and adjust for differences in the distributions. However, we found no significant difference in age (June M = 23 years; July M = 24 years) or gender (June = 65% male; July = 62% male) distribution between the June and July samples. As far as we are aware, there were no other legislative or policy changes at the national, state, or local levels that could account for the observed changes in this period.

Such considerations will come into play in the evaluation of longer-term changes. We are currently collecting patron interview data in additional precincts of Queensland. This will allow us to examine longer term trends in drinking and intoxication in Safe Night Precincts and other areas, including asking patrons if, and how, they have changed their behaviour on their nights out since the introduction of the policy [see [17]]. Based on observations in Newcastle, we expect to see reductions in intoxication and harm as licensees modify their business practices in response to the new conditions [14]. A strength of this preliminary evaluation and the ongoing work is the objective measurement of BAC

afforded by the use of breathalysers and the sampling protocol we employed.

Despite the high response rate of 84%, it is possible the participants in this study may not be fully representative of all people who attend night-time entertainment precincts; however, we suggest the findings would generalise to a large proportion of the population exposed to these areas.

Conclusions

The restrictions implemented in Queensland were followed by an immediate reduction in the prevalence of highly intoxicated patrons in Fortitude Valley, although average BAC levels did not change. This happened despite the widespread use of extended trading permits, which undermined the objective of the legislation. Further research is necessary to determine how drinking patterns change in the longer term and what occurs in other parts of the state.

Abbreviations

BAC: Blood alcohol concentration; CI: Confidence interval; IRR: Incidence rate ratio; M: Mean; OR: Odds ratio; RRR: Relative risk ratio; SD: Standard deviation; SE: Standard error

Availability of data and material

The datasets generated and/or analysed during the current study are not publicly available due to contractual obligations but are available from the corresponding author on reasonable request.

Funding

This study is funded by an ARC Linkage grant (LP160100067), Foundation for Alcohol Research and Education, Australian Rechabites Foundation, and Lives Lived Well. The funding body has no input on the design of the study, data collection, analysis, interpretation of data or writing of the manuscript.

Authors' contributions

KC, RZ, JF, ND, and PM developed the study design. KC analysed the data and drafted the manuscript. KC, RZ, JF, ND, RM, AC, KK, DD, KG, TC, RR, HJ, NT, JN, and PM all advised on analyses and data collection, contributed to the written manuscript, and read and approved the final manuscript.

Ethics approval and consent to participate

Ethics approval was received from the Deakin University Human Ethics Committee (2011–095) and The University of Queensland Human Research Ethics Committees (2017000012). All participants provided informed verbal consent prior to completing the interview. Verbal consent was obtained, rather than written, as it is impractical to obtain written consent in a night-life environment and written consent would have resulted in a reduced response, therefore, potentially less representative sample.

Consent for publication

Not applicable.

Competing interests

Heng Jiang is a member of the BMC Public Health Editorial Board. The authors declare that they have no competing interests.

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Received: 22 May 2018 Accepted: 5 October 2018
Published online: 12 November 2018

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International Journal of Drug Policy 66 (2019) 23–29

Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research Paper

Investigating and validating methods of monitoring foot-traffic in night-time entertainment precincts in Australia

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ARTICLE INFO

Keywords:
Foot-traffic
Pedestrian
Methodology
Validation
Night-time economy

ABSTRACT

Background: Assaults occur frequently in night-time entertainment precincts (NEPs), with rates typically reported using estimated resident population. However, this form of reporting does not accurately represent the number of people within the NEP at the time of an assault or potential fluctuations in density throughout the course of the night. As such, the aim of this study was to assess multiple methods of obtaining an accurate estimate of hourly foot-traffic within NEPs.

Methods: The validity and reliability of three types of foot traffic counters were assessed. A passive-infrared sensor and two different types of smartphone sensor were installed at two sites in Australia from 2016 to 2018, ongoing (pilot phase: 2016–2017; validation phase: 2018). Researchers also manually counted the number of people walking past through the range of two of these sensors across the course of Friday, Saturday and Sunday nights between 8 pm to 2am.

Results: Results show a similar trend between the smartphone counts, the sensor counts, and the manual counts; however there was notable variability (43%–267% compared with manual counts). Analysis showed that all measures were significantly positively correlated.

Conclusion: Reliable counting of the number of people attending nightlife precincts is an important element of ongoing studies into nightlife settings and associated rates of harm. There are multiple methods of estimating fluctuations in foot traffic within a NEP, however, determining the most appropriate method to use requires consideration of the proximity of pathways in the area, budget constraints, and project aims. Of the methods tested, laptop WiFi traffic monitoring programs functioned the least consistently. Specifically designed smartphone sensors overcame this issue; however, they required dedicated power sources. The current study found infrared scanners appeared to be the most accurate across sites; additionally they functioned consistently, and were the simplest method to setup and maintain.

Introduction

Alcohol-related harm is a widespread problem across Australia, that has significant economic impact (Manning et al., 2013). Much of this harm occurs in high-risk areas inside and around licensed venues (McIlwain & Homel, 2009) within night-time entertainment precincts (NEPs). One difficulty in conducting research in NEPs is determining an accurate rate of alcohol-related harm for those visiting the area on a given night. Currently, research in NEPs typically uses population-based injury and assault rates, with estimated residential population (ERP) as the denominator (Kypri et al., 2016; Miller et al., 2013, 2017). However, this is unlikely to accurately represent the number of persons attending NEPs, given unpublished data shows that only 11% of nightlife patrons report their postcode of residence as within the nightlife district they are attending (Miller et al., 2013). Additionally, ERP does not take into account the dynamic influence crowding has on alcohol-related harm in NEPs, which has been associated with increased aggression (Hughes et al., 2011). Crowding is a particularly important factor, as it has been shown to independently predict police recorded assaults in and around bars, while controlling for multiple other environmental conditions (Morrison et al., 2015). The ability to consistently determine the crowdedness of a NEP over the night would overcome these measurement issues, allowing more accurate rates of assaults or injuries to be calculated, enabling exposure levels to be

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https://doi.org/10.1016/j.drugpo.2019.01.009

appropriately reflected, and to examine the associations between exposures of interest, and the incidence of alcohol-related harm.

One alternate method to the use of ERP is to count foot traffic in a given area through manual counting of pedestrians, however this is resource intensive, and can be difficult in busy thoroughfares. For instance, the local council in Sydney, Australia, conduct manual counts twice a year for 10 min and multiply by six to get an hourly count (City of Sydney, 2017). Another study estimated the number of people inside bars and clubs in Toronto, Canada using observers to manually count patrons (inter-rater correlation of 0.94 at peak; (Graham et al., 2006)), however this did not require them to count continuously over long periods of time as would be required to accurately determine pedestrian traffic. The use of a manual count approach only provides a snapshot of pedestrian traffic and is unlikely to provide a representative account of foot traffic on different days of the week and hour of the day. The use of sensors to count foot traffic has also been used in an attempt to address the limitations of manual counts. For example, in the city of Melbourne, Australia, laser line and infra-red technology is utilised, which counts each time a person 'breaks' a laser line (City of Melbourne, 2018). Counting the number of WiFi beacon requests from devices with unique MAC addresses in a fixed area has also been used (Li, 2016).

Foot traffic counts are used to inform policy and determine pedestrian traffic management, and if not conducted accurately have the potential to negatively impact policy choices, including the allocation and distribution of resources. A technology-based approach to people counting is recommended to overcome the limitations of manual counts. Therefore, as a part of an ongoing research programme, the current study sought to pilot and critically evaluate multiple technology-based methods of people counting within three NEPs in Australia. The study aimed to determine which counting method would be the most suitable for future research, in terms of accuracy in relation to manual counts, functionality, and ease of implementation.

Methods

A series of methods were piloted to count the number of people in three Australian NEPs between 2016 and 2018. Approaches that functioned consistently through a pilot stage were compared to manual counts for validation. This project was granted ethics approval by a University Ethics Committee.

Study sites

Three cities in Australia were used for the evaluation. The NEP in Geelong, Victoria was used in both the pilot and validation stages of the study. Two NEPs in Queensland were used: Fortitude Valley and Cairns. These latter two sites were selected in response to a large policy change that occurred state-wide (Queensland Government, 2016). Given Fortitude Valley has a large amount of foot-traffic in the area, it enabled the technology to be stress tested. Cairns was used in the validation stage. It was believed that this area would have less foot traffic due to the cities lower population (Australian Bureau of Statistics, 2018), therefore enabling manual counts to be undertaken. Fig. 1 shows a representation of the sites used in the validation stage, the radius examined by the smartphone sensor, and the dotted line representing the path of the infrared sensor.

People counting technologies

Laptop WiFi traffic monitoring programs

The first method piloted to count the number of people in an area used mobile phone wireless signals through a WiFi traffic monitoring program, specifically the Tshark function within Wireshark (Wireshark, 2015). The program could be downloaded onto a laptop or other small device (e.g. a tablet) and placed in shopfronts in key areas within NEPs.

The program involves a network protocol analyser scanning a network, browsing and capturing any 'traffic' or devices accessing the network, while a companion program is used to filter and export traffic captures. Devices with WiFi activated constantly send out a signal, or probe request, looking for a suitable access point to a network. These probe requests are recorded in a database, along with the time of the probe, the device type (mobile, laptop, tablet), and the MAC address (the unique identifier) of the device.

Although the program identifies all devices eliciting a WiFi signal, only mobile phone counts were utilised in the current study. Given most (95%) persons in public spaces have WiFi enabled on their phones (Abedi et al., 2013), it was expected that the counts of unique mobile phones using WiFi signals would provide an accurate representation of pedestrian traffic. In order to ensure no personal information could be obtained, only datasets using counts of the number of unique MAC addresses were analysed by the research team.

Smartphone sensor

Many companies have developed their own technology to count foot traffic in and around stores; the one used in this study was developed by Kepler Analytics (2016). The counts are conducted using a sensor that is plugged into a power point within a shop or venue.

While the sensor chosen for the current study has the capacity to count the number of WiFi signals within a 150 square metre radius, a 20 m radius was used, given this range ensures that only people using a single walkway/street are counted. The sensor identifies the WiFi signal requests in the same way as a WiFi traffic monitoring program, whereby it identifies MAC addresses of phones. The MAC addresses are used to remove instances where the same phone is being counted multiple times over a short period of time, providing a more accurate count of people within an area; this same method was used when analysing WiFi signals identified by the laptop WiFi traffic monitoring program.

The data collected by the counting sensor is uploaded to an online database in real time, this interface only provides access to the number of unique MAC addresses and not the addresses themselves. At the time of purchase, there was an initial installation fee for the sensor of AU $100, AU$80 for calibration of the sensor, and a monthly data access fee through an online dashboard of AU$100.

Infrared sensor

The infrared sensor is a portable person counting system that can count pedestrians in urban environments; the specific model used was the PYRO-Box (Eco Counter, 2016). The sensor uses a passive infrared pyroelectric technology and a high-precision lens to count people within the passing range of the sensor by detecting the person's body temperature. A person is counted when the sensor identifies a differentiation of body temperature from outside, or 'background' temperature. The sensor can simultaneously detect two people walking in a slightly staggered formation, by detecting daylight between the heat signatures of the people, however it is less accurate when there are crowds of people.

The sensor can have either a 15-metre range or 30-metre range (15 m each way from the box). The 15-metre option was selected, as the sensor was set up on the side of a foot path/road.

The data collected by the sensor is obtained by visiting the sensor in person, using Bluetooth and a mobile phone application to download the data, and then becomes available through an online database.

The cost of the sensor at the time of purchase was AU$4856.05. There is an optional cost for installation (AU$950), though self-installation is available. The cost of the license to run the software was AU $495 (covers 1–5 sensors).

Data validation

In January 2018, the infrared and smartphone sensors were used in the validation process. An infrared sensor was installed in the NEPs of Geelong and Cairns. In Cairns, a smartphone sensor was positioned in a

Fig. 1. Representations of validation site locations.

building along the same walkway as the infrared sensor. In Geelong a smartphone sensor (Cisco Meraki MR84; Cisco Meraki, 2018) had already been put in place, and this data was used for convenience. In addition, two observers manually counted how many people walked through each thoroughfare at each site, in four hour shifts across an eight hour night for three nights (inter-rater reliability for manual counts > .99 at both sites). This method was chosen as previous research comparing a single manual counter to video footage has demonstrated that the method has a low error rate (-0.9% to 1.4%) (Greene-Roesel et al., 2008). Manual counts took place from 6 pm to 2am on the 12th, 13th, and 14th of January 2018.

Analysis

In order to determine the accuracy of technological counting methods in the data validation stage, Pearson correlations were utilised to examine how closely each method is related to manual counts at each site. All analysis was conducted in IBM SPSS Statistics 25.0 (IBM Corp, 2017). The functionality and ease of implementation of each method will be discussed qualitatively.

Results

Stage one: pilot period

Data collected from the three pilot periods are shown in Fig. 2 below. The graphs show the average count of pedestrians per hour during high alcohol hours (8 pm Friday-6am Saturday; 8 pm Saturday-6am Sunday (Coghlan et al., 2016)). Fig. 2A shows the data collected in Geelong over a 10-week period (19/02/2016-22/04/2016) using the WiFi monitoring program. The average number of people counted varied from between approximately 15 people per hour, to 130 people per hour. The WiFi monitoring program was not able to consistently collect and record the number of people attending NEPs; the program would often cease working. Fig. 2B shows 54 weeks (12/08/2016-28/08/2017) of data collected in Fortitude Valley using the smartphone sensor. The average number of people counted per hour ranged from approximately 100 to 3500. Count data from the third method piloted, the infrared sensor, was tested in Geelong over a 6-week period (09/06/2017-14/07/2017; see Fig. 2C). The average hourly count ranged from approximately 10 people per hour to 200 people per hour.

Stage 2: data validation

Fig. 3A-C compare the manual counts to the two technology-based count methods at the Geelong sites. The infrared sensors accuracy ranged between 69% and 267% of pedestrians manually counted by observers (*SD* = 38%). The smartphone sensor ranged from 82% to 195% of manual pedestrians counts (*SD* = 30%). The two technology-based methods of counting did not vary consistently from manual counts, suggesting error was unique to each method used. When the two methods were averaged, accuracy ranged between 80% and 215% of manual counts (*SD* = 28%).

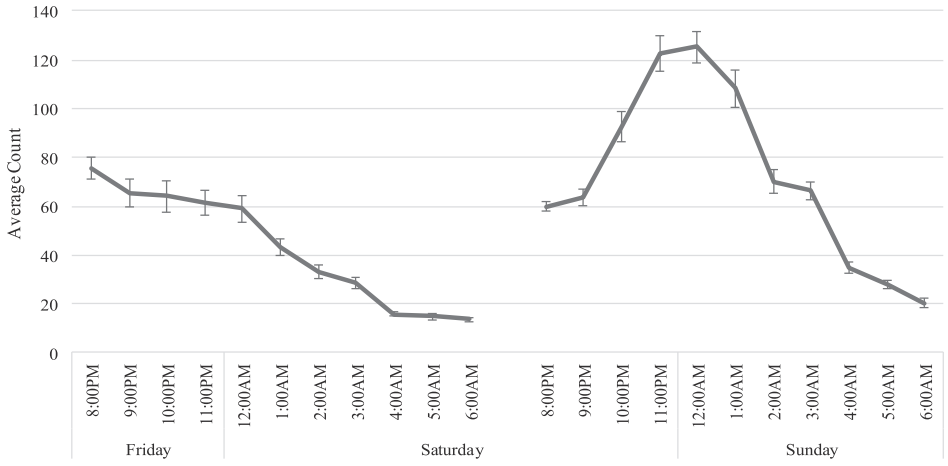
Fig. 4A-C compares the manual counts to the two technology-based count methods at the Cairns site. The infrared sensor's accuracy ranged between 43% and 69% of pedestrians manually counted by observers or smartphone sensors (*SD* = 6%). The smartphone sensor's accuracy ranged between 87% and 288% of pedestrians manually counted (*SD* = 50%). The infrared sensors variability remained relatively stable throughout the course of the night when compared to the manual counts, while the smartphone sensor was more variable over the night. When the two methods were averaged, accuracy ranged between 71% and 175% (*SD* = 26%).

Pearson correlations were run in order to examine the relationship between the different counting methods. Table 1 shows strength of the relationships between the different methods used.

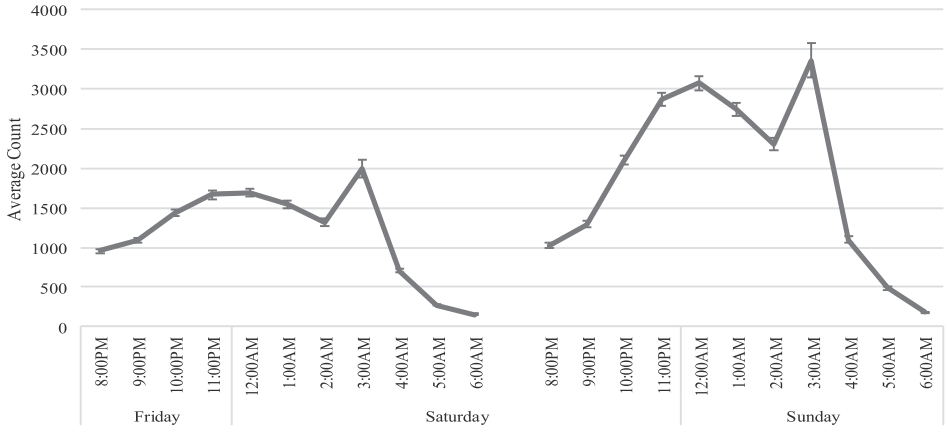
Discussion

The ability to easily and effectively count the number of persons who attend NEPs is essential to provide accurate rates of alcohol-related harm, which has implications for evaluations of harm reduction measures in NEPs and policy decisions. Research has previously been forced to rely on population estimates (Miller et al., 2012, 2014; Miller, Tindall et al., 2012), which have inherent limitations. The technology-based counting methods employed in the current study were significantly related to manual counts of pedestrians over the course of a night during high-alcohol hours, in a way that could not be accounted for by an ERP. As such, they have the ability to demonstrate fluctuations in crowd trends in NEPs, and to provide insight into key times at which there are large crowds of people on the streets, without being nearly as resource intensive as requiring individuals the manually count pedestrians throughout the night. This type of information is useful for emergency services and city council resource planning, as well as the evaluation of alcohol policy changes.

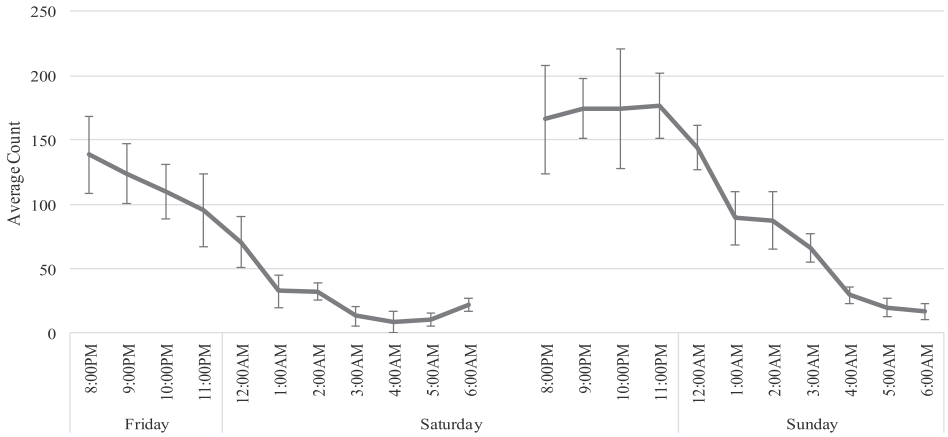
The infrared sensor was the most accurate when compared to



A. WiFi monitoring program (Geelong 10 weeks)



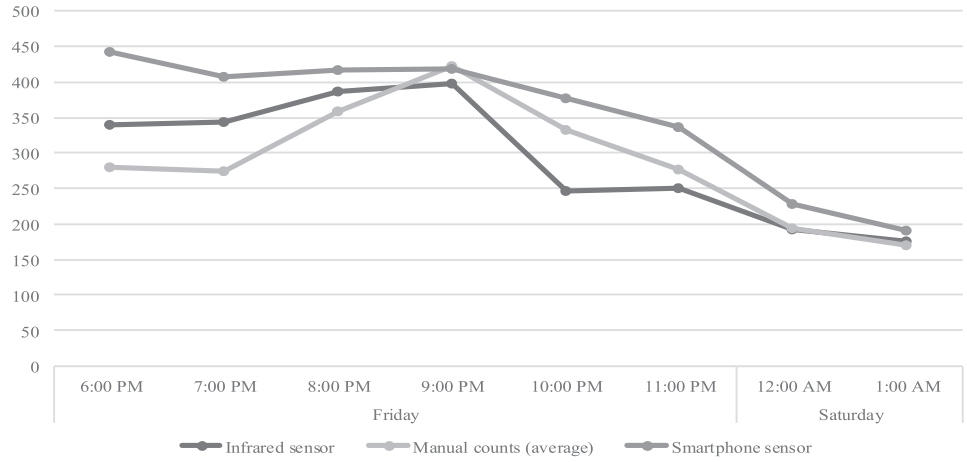
B. Smartphone sensor (Fortitude Valley 54 weeks)



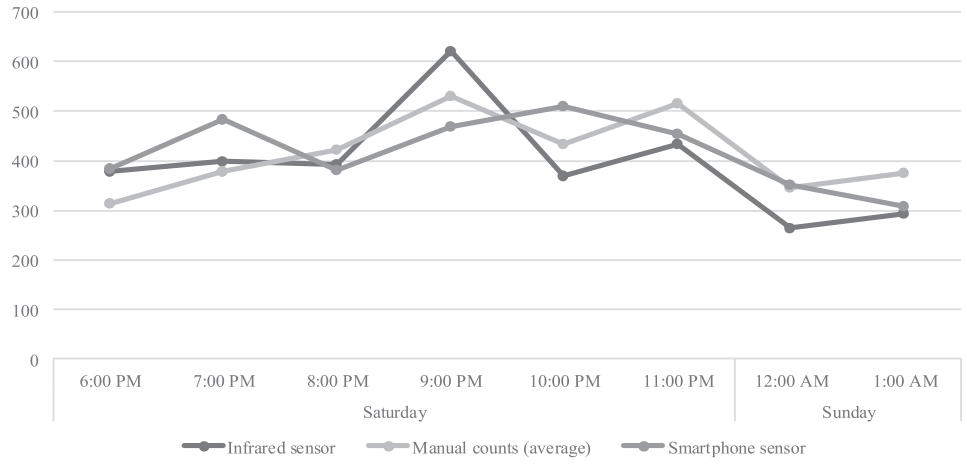
C. Infrared sensor (Geelong 6 weeks)

Fig. 2. Pilot results for the WiFi monitoring program, smartphone sensor, and infrared sensor.

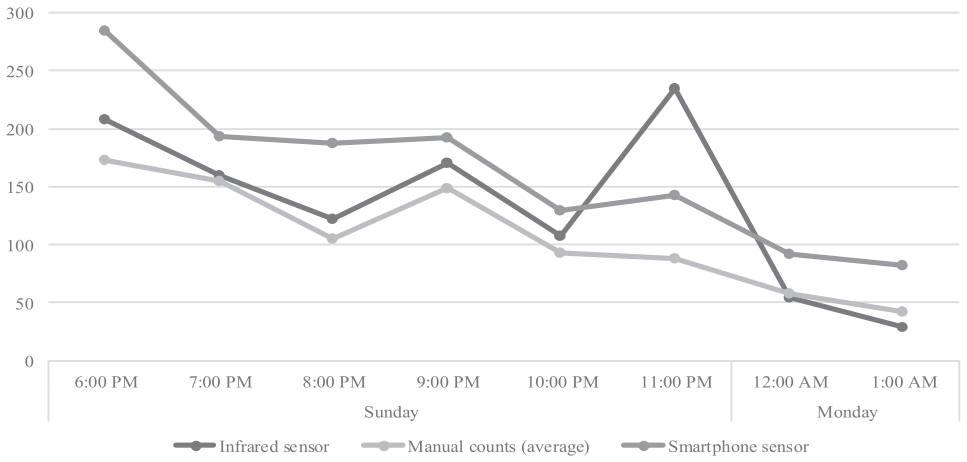
manual counts across both sites where it was installed. This relationship was particularly pronounced in Cairns, where the infrared sensor had the narrowest range of variation when compared to the manual counts. The main limitation of this device was the increased possibility of an anomaly creating error in the counts, as demonstrated between 11 pm and 12am on the 14th of January in Geelong (see Fig. 3C), and may explain the variance observed during peak hours during the pilot stage (see Fig. 2C). Due to the nature of this device, such errors may occur because of something blocking the device or something passing by the sensor rapidly within a short period of time (e.g. movements in a crowd lingering in front of the sensor). The smartphone sensor was the most internally consistent of the measures tested, reporting the most reliable fluctuations in foot-traffic across different nights. The smartphone sensors had strong relationships with the manual counts across sites, however this was notably lower in Cairns. Validation of the smartphone sensor was difficult as it counted individuals in a 20 square metre radius, rather than a straight line. This may have resulted in the sensor detecting persons outside the area of interest, consistent with the trends



A. Geelong Validation - 12/01/2018



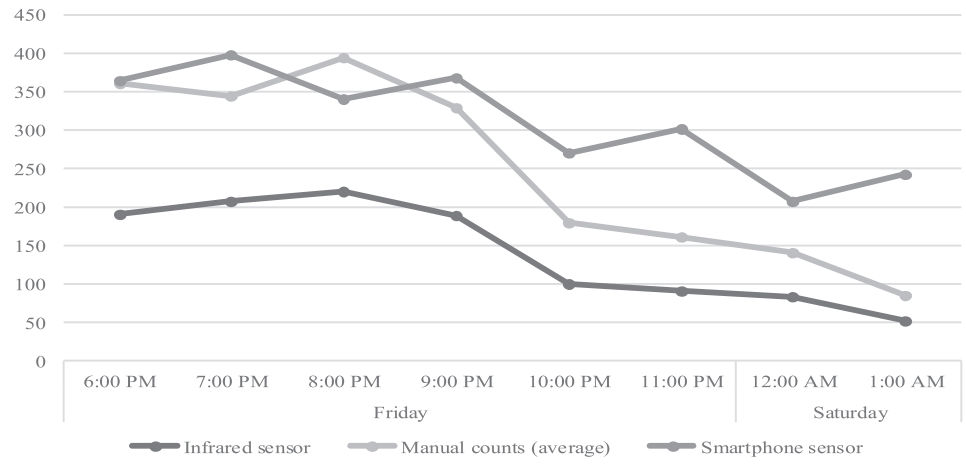
B. Geelong Validation – 13/01/2018



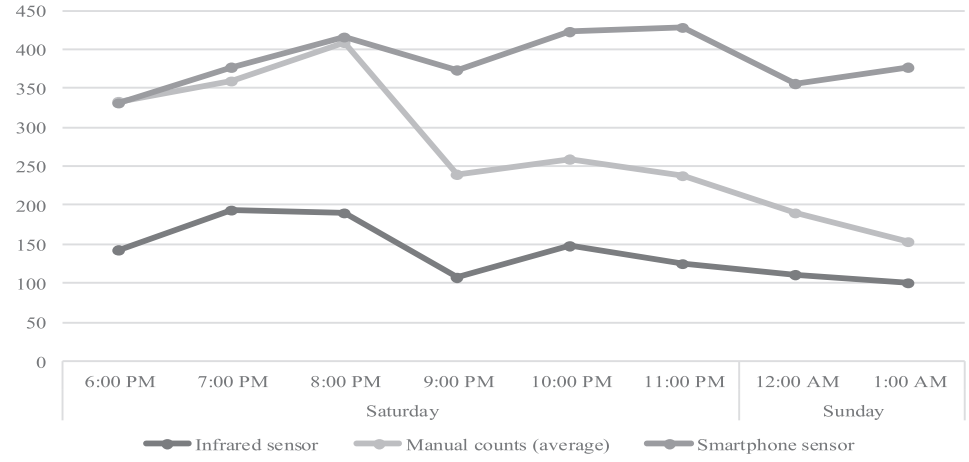
C. Geelong Validation – 14/01/2018

Fig. 3. Validation of smartphone and infrared sensors - Geelong.

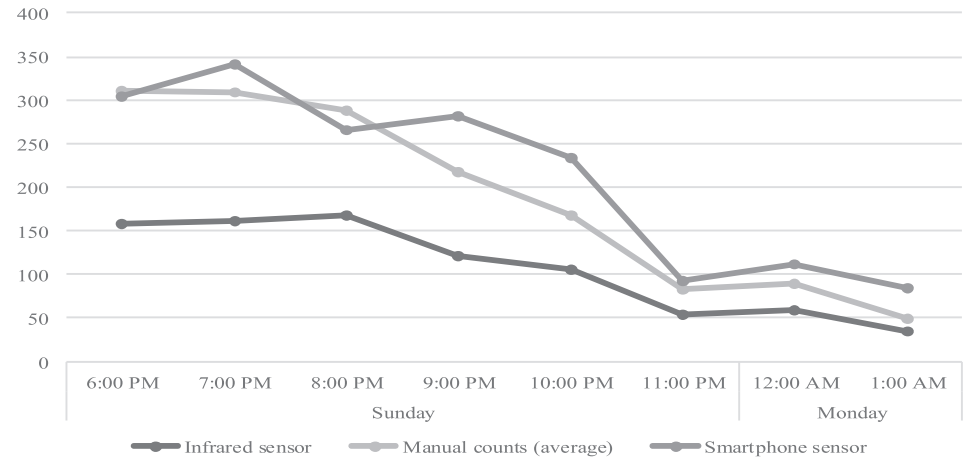
evident in Cairns. In Geelong, neither of the measures used in the validation stage were consistently above or below manual counts, therefore, the application of a consistent correction to technology based counts is limited. Additionally, while smartphone WiFi use in public spaces is quite high (Abedi et al., 2013), no research has determined if this is consistent in night-time spaces, where individuals may be more motivated to preserve phone battery. As such, it may be difficult to infer exact estimates of foot traffic. During the pilot stage of the project the smartphone counting device reflected expected trends in foot traffic: the 3am peak observed in Fig. 2B reflects the trading hours restriction in Queensland (Miller et al., 2017). Smartphone sensors, and other methods that rely on identifying unique MAC addresses often raise privacy concerns, as they allow organisations to track the movements of individuals, even when security measures are enabled on these devices (Vanhoef et al., 2016). Because of this, their use in research should be subject to strict ethical guidelines. Aggregate data, as used in this study,



A. Cairns Validation - 12/01/2018



B. Cairns Validation - 13/01/2018



C. Cairns Validation - 14/01/2018

Fig. 4. Validation of smartphone and infrared sensors – Cairns.

is all that is required in order to monitor foot-traffic.

Previous work examining infrared scanners outside of NEPs found that infrared scanners systematically undercounted pedestrians across sites (Greene-Roesel et al., 2008). While this was found at the Cairns site in the current study this wasn't reflected in the results from Geelong. This study also experienced an anomalous over count on one occasion, similar to that seen in Geelong (Fig. 3C), this was also attributed to lingering in front of the sensor (Greene-Roesel et al., 2008). The inter-rater reliability in this study was higher than that of previous manual counts in NEPs (Graham et al., 2006), this could be because the task given to manual counters was quite simplistic compared to that of previous research in the area. Greene-Roesel et al. (2008) found that manual counters given simple instructions, along walkways similar to those in the current study, had almost no error unlike studies where manual counters were required to count large groups in more complex environments. This in combination with the high level of consistency

Table 1
Correlations between different counting methods.

	Manual counts	Infrared sensor	Smartphone sensor
Geelong			
Manual counts	1	–	–
Infrared sensor	.92*	1	–
Smartphone sensor	.91*	.89*	1
Cairns			
Manual counts	1	–	–
Infrared sensor	.97*	1	–
Smartphone sensor	.74*	.73*	1

Note.
* $p < .001$.

between counters indicates the results obtained were reliable estimates of pedestrian traffic.

Limitations

The foot traffic counting methods trailed do have limitations, which restrict the conclusions that can be drawn. The WiFi-traffic monitoring program was not able to consistently collect and record the number of people attending NEPs throughout the night at all sites. The program would often stop working mid-way through the night, most likely due to the program being unable to manage the sheer volume of people attending the NEP. Limiting the smartphone sensors radius by using signal strength may have been influenced by other factors that influence signal strength other than proximity to the sensor. There was also substantial variation between smartphone sensor and infrared sensor when compared to manual counts. Further validation may be required to investigate these issues in more detail. While manual counts were used to measure the validity of the other methods, they are also a proxy measure of the total number of pedestrians.

Conclusion

Accurately describing the denominator for harm in nightlife studies is crucial for ongoing research; simply relying on population estimates fails to acknowledge the distances people travel to NEPs. The findings of this study suggest that dedicated people counting devices (e.g. infrared sensor or smartphone sensor) are more reliable than Laptop WiFi Traffic Monitoring Programs at consistently detecting the number of people in NEPs. Both types of such devices that were validated showed strong, significant relationships with manual counts. The infrared sensor was the most strongly related to manual counts, and required the least in order to set up and use. For this reason it is the most highly recommended method for future research in the area. Further research is needed to identify the environmental conditions within NEPs that aid and limit the functioning of each sensor. Additionally, further research should investigate the relationships between alcohol-related harm and various characteristics of NEPs using denominators related to the actual population of the NEP, rather than ERPs.

Declaration of interests

Kerri Coomber receives funding from Australian Research Council, Foundation for Alcohol Research and Education, Lives Lived Well, Australian Rechabites Foundation, and the Queensland government.

Tanya Chikritzhs has received most of her research funding from national and international competitive grant agencies and the Commonwealth Government. She has never received alcoholic beverage industry funding. She has received economy travel class airfare from IOGT-NTO to attend meetings jointly convened by the Swedish Society of Medicine and the IOGT-NTO. Chikritzhs has also received travel funds from Systembolaget, the Swedish retail government-owned alcohol monopoly which operates with a public health and safety mandate.

Peter Miller receives funding from Australian Research Council and Australian National Health and Medical Research Council, grants from NSW Government, National Drug Law Enforcement Research Fund, Foundation for Alcohol Research and Education, Cancer Council Victoria, Queensland government and Australian Drug Foundation, travel and related costs from Australasian Drug Strategy Conference. He has acted as a paid expert witness on behalf of a licensed venue and a security firm.

Acknowledgements

This study was funded by Australian Research Council Discovery ProjectDP150100441.

Nicholas Taylor is receiving funding through an Australian Government Research Training Program Scholarship.

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Commentary

Serving Evidence Warrants Caution: A Commentary on Woodall et al. (2018)

In their report, Woodall and colleagues (2018—this issue) present data on an intervention program they have been developing for almost a decade. Their investment and effort in the size of the study is very substantial, and their achievement of recruiting every licensed venue they approached is truly astounding. Unfortunately, after reading the report, I am left questioning most elements of the study and especially its relevance to the rest of the world.

Something else happened

The most scientifically valid conclusion to make about this trial is that something else happened in New Mexico regarding responsible beverage service (RBS) training. The control sites showed almost identical change. Although the authors used one-tail *t* tests to demonstrate impact at the 1-year level, it is clear that there was huge improvement in serving across all sites that was the same at the 6 months stage. The 1-year difference in control versus intervention may well be explained by the fact that double the number of venues in the WayToServe (WTS) closed during the trial; this is an unfortunate reality of research, but it is likely to have influenced their results, and the authors make no mention of controlling for it in their analyses. Put simply, venues in trouble will be more focused on maintaining profit than worrying about the relatively slim chance that they will be prosecuted for serving an intoxicated person. It is also worth questioning the potential for a "refresher" effect because venues allocated to the WTS training condition took on this additional training as a part of the design, whereas servers in the control sites were only doing their renewal at 5 years. To clarify, the comparison is not of the WTS program versus a refresh of incumbent training programs; rather, it is WTS versus no additional training conducted at control sites where staff may not have updated RBS training for 5 years. Or was it the effect of incentivizing venues allocated to the WTS condition is unknown? Maybe control sites would have had sustained improvement in their service behavior if given a laptop by a RBS training company?

It is a more plausible conclusion that something very significant occurred in the liquor scene in New Mexico to explain the simultaneous trend in changes in control venues and intervention venues alike. The small, debatably significant, differences between WTS and the control sites could be explained by a number of plausible confounders, not least of which is the number of venues who ceased trading, thus breaching Bradford Hill's requirement for specificity.

Design negates generalizability

The aim of RBS is to reduce demonstrable harm, like violence and injury. This rarely happens in restaurants at 7 P.M. By choosing the hours of 6:30 P.M.–8:30 P.M. for their pseudo-patron tests, the authors have missed the vast majority of likely intoxication and created test results that have little relevance to reducing harm. A staff member in a hotel at 8 P.M. faces almost none of the contextual challenges of a person serving in a nightclub at 3 A.M. Indeed, most people attending nightlife, which is where most harm occurs, do not head out until 10 P.M. (Hughes et al., 2011; Miller et al., 2012).

Thus, unfortunately, this study and its findings have little relevance for liquor licensing and training in most cities around the world that wish to reduce alcohol-related harm. We need a study to be conducted that addresses late-night issues. Preferably, it would be conducted by a team independent of the intervention development, as this has often been shown to be associated with a number of substantial issues (Gorman, 2015).

Is responsible beverage service really that effective anyway?

We have known for a long time that RBS should be a part of any civilized alcohol market, although the effects are not as great as often thought because original studies went from baseline situations (where people were served after having passed out at the bar), which are not commonly accepted in most countries today. This low baseline also explains why follow-up studies have almost always failed to find similar effects (Hallgren & Andréasson, 2013).

High staff turnover, low motivation and investment in a casual workforce, and the reality of the priority of profit

motive over RBS have all shown over decades that RBS training is no panacea. Indeed, it is clear that RBS must be strongly monitored and enforced to have any ongoing impact (Chikritzhs et al., 2007). Certainly, other well-designed studies have shown that RBS has continued to fail to deliver on simple measures such as preventing underage sales (Toomey et al., 1996, 2007).

In conclusion, the current study fails to support the claim that "WTS RBS training improved refusal rates of alcohol service to apparently-intoxicated patrons immediately after training and at 1 year." Whatever happened in New Mexico during the study period, the very small difference between control and WTS, and the huge change in both, means that this study has not been able to explain the potential confounders. Further, the study holds little relevance for most cities around the world and the prevention of harm related to alcohol. Although there is surely a market for doing cheap online RBS training, governments and local communities would be well advised to wait for better evidence and consider interventions with far more reliable effects, such as restricted trading hours (Kypri et al., 2014) and minimum price regulations (Stockwell et al., 2015). From a local perspective, it is important to ensure adequate regulation and monitoring of the online training and accreditation to avoid the situation recently documented in Australia, in which Mickey Mouse and two of Donald Duck's nephews are all licensed to pull beers in Queensland pubs and clubs (AAP, 2012).

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NDLERF

Interventions for reducing alcohol supply, alcohol demand and alcohol-related harm

Final Report

A/Prof Peter Miller, Ashlee Curtis,
Prof Tanya Chikritzhs and Prof John Toumbourou

Monograph Series No. 57

Funded by the National Drug Law Enforcement Research Fund
An Initiative of the National Drug Strategy

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Funded by the National Drug Law Enforcement Research Fund, an initiative of the National Drug Strategy

Produced by the National Drug Law Enforcement Research Fund (NDLERF)
GPO Box 2944, Canberra, Australian Capital Territory 2601

ISSN: 1449-7476

The research on which this report is based was funded by the National Drug Law Enforcement Research Fund, an initiative of the National Drug Strategy.

Contents

Tables

Figure

Boxes

Acknowledgements

We are grateful to co-investigator, Professor Steve Allsop, for his comments on final drafts and overall guidance on the project.

Special thanks to Detective Superintendent James Migro, Dr Maria Borzycki, Debra Salter, Inspector Steve Munro, Inspector William Graham, Sergeant Wayne Buck, Leading Senior Constable Bob Pupavac, Mr Barry Newell, Mr Pat Doyle, Mr Michael Sarquis, Superintendent Pat Paroz, Sergeant Jo Cameron, Senior Sergeant Tim Pfitzner, Mrs Pat Ward and Ms Katalina Bradley.

Thank you to Elise Cox for proofreading the report.

Particular thanks go to Superintendent Anthony Cooke (NSW Police Force) and Dan Keating (QLD Police Service, superintendent retired) for their continued support and advice.

We are grateful to Prof Kate Graham and Prof Ross Homel for their guidance in many areas.

Intervention index

1. Introduction

Alcohol accounts for about four percent of deaths worldwide and 4.65 percent of the global burden of injury and disease. This places it alongside tobacco as one of the leading preventable causes of death and disability (Rehm et al., 2009). Four out of five Australians aged over 14 years report being recent drinkers and one in five report drinking seven or more drinks on a single occasion at least monthly (Australian Institute of Health and Welfare, 2008). Two-thirds (61%) of 18 29-year olds report consuming alcohol to get drunk (Laslett et al., 2010). The annual cost of alcohol-related harm in Australia is estimated to be between $15.6 (Collins & Lapsley, 2008) and $36 billion (Laslett et al., 2010) depending on the model used and whether harm to others is included in the model. The personal cost of alcohol-related trauma to many individuals is overwhelming (Laslett et al., 2010). Virtually every type of alcohol-related harm is on the rise in Australia (Livingston et al., 2010).

Many interventions currently exist which attempt to reduce the supply, demand and harm associated with alcohol. In Australia, alcohol is related to around 3,000 deaths and 65,000 hospitalisations every year (Collins & Lapsley, 2008). During an average week, four people under the age of 25 die as a direct result of alcohol-related harm, and 70 Australians under 25 are hospitalised due to injury associated with alcohol consumption (Chikritzhs et al., 2003). A substantial proportion of the problems associated with alcohol and interpersonal violence appears to arise in or around licensed premises in the night-time economy.

While many interventions have been implemented to curb alcohol-related violence and injury, few local community level responses are based on evidence. This is due to several factors, including the widespread acceptance of alcohol consumption and related violence as a part of Western culture, as well as the difficulty in trialling many of the interventions in a scientifically rigorous fashion (Graham, 2008). Many initiatives are thus created, based on little empirical evidence, and are seldom implemented with an integrated evaluation strategy (Saffer, 1991).

The most authoritative review of alcohol-related harm and the measures to reduce it is *Alcohol: No ordinary commodity* (Babor et al., 2010). The book uses an expert consensus model with the author panel representing a collection of the leading international researchers in the field. The author group then meets over the course of the project and produces a consensus version of each chapter. The main problem with this method is that it relies on the final version reflecting a consensus opinion and there is no formal documentation of the process or feedback behind the final document. Despite this, the book is authored by the leading researchers in the field, and it accurately reflects the major issues in alcohol supply and demand.

Other smaller reviews examine more specific issues or locations. For example, Anderson and Baumberg (2006) produced a comprehensive description of alcohol-related harm and the measures required to address it for the European Union. Alternatively, a substantial number of topic-specific reviews focus on strategies to reduce supply or demand. Recent stand-out examples in supply reduction are the book *Raising the bar* (Graham & Homel, 2008) providing a comprehensive review of strategies around licensed venues and the National Drug Research Institute report *Restrictions on the sale and supply of alcohol: Evidence and outcomes* (Chikritzhs et al., 2007b) looking at restricting supply more broadly. Specific reviews around demand reduction strategies include the review article *Interventions to reduce harm associated with adolescent substance use* (Toumbourou et al., 2007) and *The prevention of substance use, risk and harm in Australia: A review of the evidence* (Loxley et al., 2004).

Babor et al. (2010) identifies seven different ways in which alcohol-related harm can be addressed:

- applying alcohol taxes and other price controls;
- regulating physical availability through restrictions on time and place of sales and density of alcohol outlets;
- altering the drinking context;
- using drink-driving countermeasures;
- providing information to adults and young people especially through mass media and school-based alcohol

education programs;

- regulating alcohol advertising and other marketing; and
- conducting screening and brief interventions in health care settings; increasing availability of treatment programs.

These strategies have been widely researched globally. They reflect the evidence and are reliable when applied in the real world. Many of the interventions discussed have not been tested in Australia, and some that have been tested (particularly increasing the price of alcohol) have not been popular with politicians, policymakers nor the public. This was also noted in a major Australian review by the National Preventative Taskforce Alcohol Working Group (2008). These major reviews have tended to focus on categories based on response type, rather than their intended effect (ie reducing supply, demand or harm). The UN has conceptualised strategies under such categories since the late 1990s.

1.1 Reducing supply

In this project, we define reducing supply or supply reduction as any measures associated with the supply of alcohol. Measures can include serving practices in licensed venues or the number of outlets in a specific geographic area. They can also include restricting access such as minimum purchase age or restricting trading hours. Some strategies for reducing supply have a strong empirical basis in relation to reducing alcohol-related harm. While major measures are well researched, many practices that are generally considered best practice have little or no evidence. For example, the recent case study of trading restrictions imposed on venues in Newcastle in New South Wales incorporated restricted trading hours (which have a strong evidence base) along with restricting the types and quantities of drinks that could be sold (Miller et al., 2011a).

1.2. Reducing demand

A vast array of strategies can be included under the banner of reducing demand. Major areas include: restricting advertising/marketing, prevention programs, early intervention programs for people exhibiting alcohol problems, education measures, and treatment and policy-level measures such as pricing controls – though some may see this as reducing supply.

As with reducing supply, there are many targeted reviews and more general reviews for specific locations and intervention types. For example, conceptual frameworks for thinking around reducing the demand for substance use have been identified (Loxley et al., 2004; Toumbourou et al., 2007). Toumbourou et al. (2007) found that prevention is a central demand reduction strategy. Traditional classification of prevention approaches includes primary, secondary, and tertiary strategies. Primary prevention aims to reduce risks and prevent new cases, secondary prevention seeks to limit harm in the early stages of a disorder, and tertiary prevention treats the long-term sequelae and consequences of a disorder.

An alternative conceptualisation categorises approaches based on level of risk of a disorder in various targeted groups. Universal interventions are directed at whole populations at average risk; selective interventions target groups at increased average risk, and indicated interventions target individuals with early emerging problems. Reductions in pre-birth maternal use of drugs, environmental tobacco smoke, and substance-impaired parenting have been associated with reduced risk of adolescent alcohol misuse and mental health problems. Unsurprisingly, developmental perspectives have been widely incorporated in attempts to understand and reduce adolescent substance use. Social developmental risk and protective factors originate not only during the early years but also in a range of environments, such as education systems and local communities, and are affected by cultural factors.

In general, prevention programs seem more successful when they maintain intervention activities over several years and incorporate more than one strategy. Developmental prevention programs are unlikely to be adequate as a stand-alone policy to reduce population harm related to substance use, particularly for substances such as tobacco where the burden of harm falls late in life.

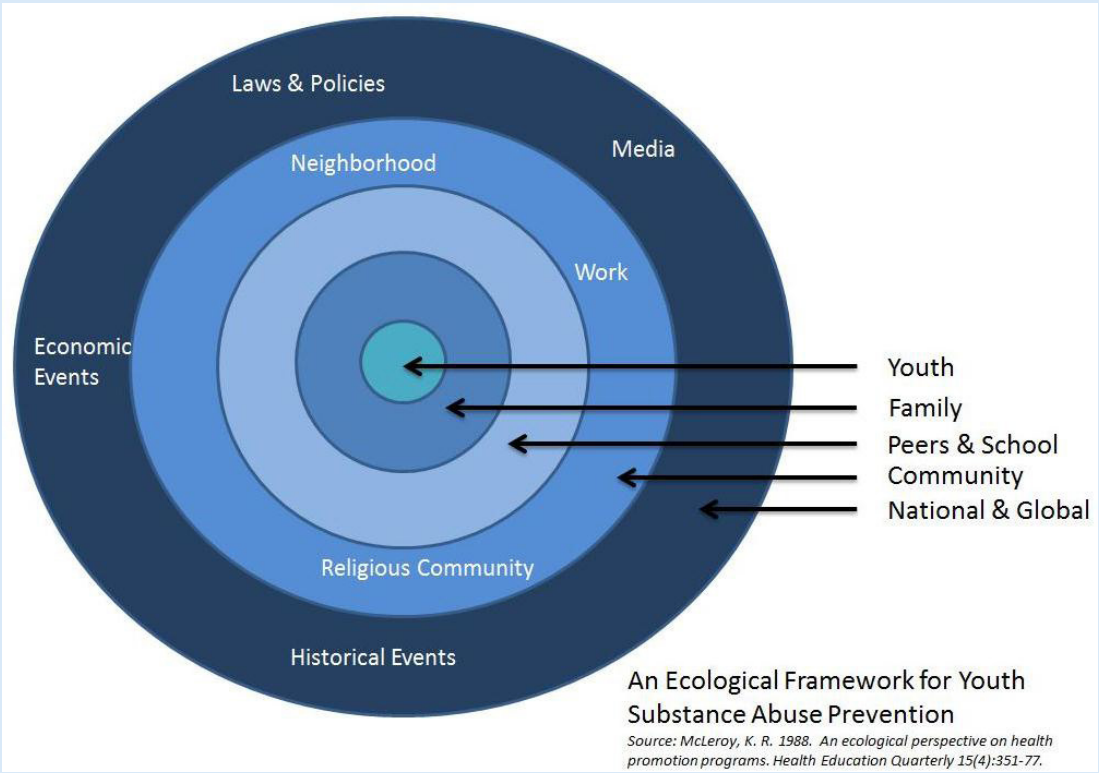
1.3. Harm reduction strategies

Many strategies have elements of reducing both supply and demand. In keeping with UN categories, this report includes these under the banner of harm reduction strategies. Major elements of harm reduction approaches include Responsible Service of Alcohol (RSA) programs, community intervention programs, security and management strategies around licensed venues and newer technological innovations such as closed-circuit television (CCTV) in venues, radio networks and ID scanners. The RSA interventions typically involve education about the minimum legal purchase age (MLPA) and public drunkenness, the physiological effects of alcohol, identifying overt signs of patron intoxication, legal issues of alcohol service, management training and policy development (Graham & Homel, 2008). While positive effects have been found in some studies, effect sizes have generally been small and often short-lived (Johnsson & Berglund, 2003; Wagenaar et al., 2005a). Many harm reduction strategies for which there is literature, are not mentioned in this brief summary. Many practices also remain which deserve further consideration, such as models of providing security (ie staff/patron ratios), high visibility clothing for staff in venues, CCTV, ID scanners and radio networks, etc. This information needs to be collated and independently assessed.

1.4. A theoretical framework

The report will use the ecological framework (McLeroy et al., 1988) when describing interventions to allow for further understanding of the types of interventions being used from a broader perspective, as well as to acknowledge any gaps in existing interventions.

Figure 1: The ecological framework



1.4.4 Societal

Societal interventions influence whether alcohol consumption is encouraged or inhibited. They include economic (eg tax) and social policies and the advertising and availability of alcohol.

1.4.2. Community

Community factors include an individual's neighbourhood, any religious communities within the community, and factors such as those unique to the situation in which the alcohol is being consumed. For example, the policies put in place by venues around alcohol consumption. Situational interventions are therefore those that focus on managing alcohol consumption of an individual while they are in the community.

1.4.3. Social

Social interventions focus on peer groups and social norms and their influence on alcohol. These interventions approach alcohol consumption acknowledging the importance of an individual's group of friends, and well as known social norms.

1.4.4. Family

Family can have considerable influence over an individual's alcohol use, and can provide an environment that encourages or discourages alcohol consumption. Family interventions focus on incorporating an individual's family within the intervention to provide the individual with the support they require.

1.4.5. Individual

Individual interventions focus on helping the individual to make changes in their alcohol consumption and behaviour while consuming alcohol. This may include placing the individual on medication or helping them to change their behaviours towards alcohol.

1.5. Summary and conclusion

Use of alcohol contributes substantially to the burden of disease and harm in society. Some evidence suggests it can be reduced through applying a combination of regulatory, early-intervention, and harm-reduction approaches. The diversity of research knowledge and practical experience often leads to confusing messages for practitioners wishing to reduce alcohol-related harm in their community. Much of the evidence remains of poor quality and is often of limited relevance to multiple settings. Further, a plethora of interventions have not yet been evaluated. Although great progress has been made over the past three decades, many interventions still only have evidence of efficacy, and need to be evaluated in real-world settings to establish effectiveness.

2. Studies

2.1. Systematic literature review

A systematic computer database search of all EBSCO databases, ProQuest, EMBASE and Sociological Abstracts used the following search terms: 'supply reduction' or 'demand reduction' or 'harm reduction' AND 'alcohol' or intox* AND intervention* or treatment* or program*. A Google Scholar search was also used as it searched all databases, ensuring all relevant papers were captured. Reference lists of previous reviews and articles in the area were also read to ensure all relevant studies were included.

2.2. Delphi

The Delphi method provides a reliable consensus of opinion from a panel of experts. It involves conducting a series of structured surveys, the responses from which are summarised and returned to the panellists in the next survey (Hasson et al., 2000). This iterative process continues until consensus is reached, that is responses are stable through a series of rounds (Crisp et al., 1997). In round one, panel members were asked to rate the importance of the supply and demand reduction strategies as well as harm reduction strategies identified from the systematic literature review and environmental scan. The participants were asked to rate interventions on its effectiveness for reducing alcohol-related assaults, reducing intoxication, solving crime, preventing crime, reducing alcohol-related harm, and reducing alcohol consumption.

Round two involved presenting interventions back to the panellists to rate. Firstly, they were asked to re-rate any interventions that received low mean effectiveness scores on each of the domains. After this, they were asked to rate any new interventions that were suggested from round one of the Delphi process. Participants were given the opportunity to comment on any of the interventions from both round one and two so that any qualitative feedback could be analysed. This qualitative feedback assisted in understanding why some interventions rated more highly on the different domains than others.

2.3. Delphi round one

The first round was labelled as the environmental scan. The environmental scan round was conducted to gather information on any interventions for alcohol supply, demand and harm reduction that might be being used around Australia. The survey contained questions regarding the person's suburb, state, occupation, as well as asking participants to describe any interventions that they were aware of, or that they may be involved in applying. Recruitment was via a snowball email method, first contacting those who were known to the researchers or who held relevant institutional roles, and then asking them to pass on to others who may have been interested in participating. A link to the survey was sent to existing alcohol and drug email lists and via police newsletter. Any person with information about interventions to reduce alcohol supply, demand and harm was eligible to participate.

The first round of the Delphi received 83 responses. Respondents came from across Australia (43.9% NSW; 11% Vic; 9.8% Qld; 8.5% NT; 4.9% SA; 8.5% Tas and 4.9% ACT). Most respondents were members of the police force (51.8%). In total, eight responses were received for supply reduction, five for demand reduction and 44 for harm reduction.

Participants mentioned several interventions that had already been incorporated into the literature review. These included, but were not limited to, ID scanners, reducing trading hour, increasing alcohol taxes, and alcohol free zones. Measures are listed in Section 3.

2.4. Delphi round two

A panel of 20 people specialising in alcohol-related harm responded in round two of the Delphi study. Participants were able to select whether they thought the intervention would have any impact at all, and if they chose 'yes' they then rated the interventions effectiveness on six domains: reducing alcohol-related assaults, reducing intoxication, solving crime, preventing crime, reducing alcohol-related harm, and reducing alcohol consumption. The data presented in the tables below are based on responses of those participants who believed the intervention would have some impact. The interventions were rated on a scale of 0 (not effective) to 10 (very effective). For the purposes of this report, a mean rating of 0–3.9 is considered to have low effectiveness, 4–6.9 to be moderately effective, and 7–10 to be very effective.

Two interventions consistently scored poorly across each of the domains, namely alcohol warning labels, and the liquor advisory board. These were included in round three of the Delphi study, and participants were asked to re-rate them and provide reasons for why they were rating the interventions in that particular way. Participants were also given the opportunity to suggest any interventions to include that had not yet been incorporated. This prompted seven new suggestions:

- preparing youth and their parents for night-life;
- manipulating the environment to reduce crowding by pedestrianising areas around premises;
- manipulating the environment to reduce crowding by placing food outlets on the outskirts of drinking areas;
- involving health and safety officials in licensing;
- restricting secondary supply;
- controlling the availability of energy drinks; and
- using drug detection dogs.

These interventions were included in the survey for round two of the Delphi study, and participants were able to rate and comment.

Each intervention discussed in this report will be given a specific code number for future reference.

2.4.1. Reducing supply

The intervention that consistently scored the highest for supply reduction was Western Australia's liquor licensing restriction, s 64 (see 10). The violent venues register (81) also scored highly enough to be considered likely to be effective.

Table 1: Delphi responses on supply reduction measures

	Yes, has an impact (N)	Reducing alcohol related assaults	Reducing intoxication	Solving crime	Preventing crime	Reducing alcohol related harm	Reducing alcohol consumption
Liquor licensing restriction s 64 (10)	20	6.10	5.90	n.a.	5.55	6.30	5.55
Liquor licence planning involving health & safety officials in licensing, 40)	18	4.11	3.50	n.a.	n.a.	4.17	3.44
Schedule 4 (violent venues register) NSW (81)	17	6.35	5.06	n.a.	5.53	6.18	4.76

2.4.2. Reducing demand

Only three interventions were suggested for reducing demand for alcohol. The intervention that received the highest mean ratings for demand reduction was the Early Intervention Pilot Program (24).

Table 2: Delphi responses on demand reduction measures

	Yes, has an impact (N)	Reducing alcohol related assaults	Reducing intoxication	Solving crime	Preventing crime	Reducing alcohol related harm	Reducing alcohol consumption
Advertisement of harms (2)	18	n.a.	3.72	n.a.	2.39	4.5	4.5
Early Intervention Pilot Program (24)	17	3.94	4.06	2.18	4.24	4.35	4.76
Alcohol warning labels (9)	14	n.a.	2.71	n.a.	n.a.	3	3.57

2.4.3.Reducing harm

The interventions that received the highest mean ratings for effectiveness were: 175(1a) Western Australia's Liquor Control Act (41), reducing alcohol content (4) and designating venues as high risk (34).

Effectiveness

This section summarises the findings of the Delphi survey regarding the effectiveness ratings supplied by the expert panel.

Reducing Alcohol-Related Assaults

The top three scoring interventions for reducing alcohol-related assaults were: sch 4 violent venues register (81; M=6.53), liquor licence restriction, s 64 (10; M=6.10), and 175(1a) Liquor Control Act (41; M=6.06). The interventions receiving the lowest mean ratings for effectiveness in reducing alcohol-related assaults were: liquor advisory board (39; M=3.25), Multi Agency Liquor Taskforce (45; M=3.50), and banning volume discounts (12; M=3.81).

Reducing Intoxication

The top three rated interventions for reducing intoxication were: 175(1a) Liquor Control Act (41; M=6.67), reducing alcohol content (4; M=6.45) and no sale of shots etc (46; M=6.00). The three lowest scoring interventions for reducing intoxication were: alcohol warning labels (9; M=2.71), drunk tanks (22; M=3.29), and venue instigated sanctions (11; M=3.32).

Solving Crime

The three interventions rated as most effective for solving crimes were: user pays policing (72; M=3.84), development application process (40; M=3.83), and consequence policing (18; M=3.78), although all of the interventions rated below four out of 10.

Preventing Crime

The three most highly rated interventions for preventing crime were: 175(1a) Liquor Control Act (41; M=6.06), liquor licensing restriction, s 64 (10; M=5.55), and sch 4 NSW violent venues register (81; M=5.53). The three

interventions that received the lowest mean effectiveness ratings were: advertisement of harms (2; M=2.39), Holyoake drug and alcohol treatment (35; M=3.42), and alcohol diversion programs (5; M=3.47).

Reducing Alcohol-related Harm

The three interventions that received the highest mean effectiveness rating for reducing alcohol-related harm were: 175(1a) Western Australia's Liquor Control Act (41; M=6.67), liquor licensing restriction s 64 (10; M=6.30), and sch 4 of the New South Wales violent venues register (81; M=6.18).

The three interventions that scored the lowest for reducing alcohol-related harm were: alcohol warning labels (9; M=3), liquor advisory board (39; M= 3.13), and Multi Agency Liquor Taskforce (45; M=3.43).

Reducing Alcohol Consumption

The three most effective interventions for reducing alcohol consumption were: reducing alcohol content (4; M=6.15), liquor licensing restriction s 64 (10; M= 5.55), and no sale of shots etc (46; M=5.61). The three lowest scoring interventions were: drunk tanks (22; M=3.06), operations targeting alcohol-related violence (47; M=3.50), and risk-based licensing (59; M=3.73).

2.5. Delphi round three

The third round of the Delphi had two major components. Firstly, participants were asked to re-rate two interventions in round two with very low scores in effectiveness on many outcome measures—alcohol warning labels and liquor advisory board. Further clarification was given for these interventions to ensure panel members were clear about what the intervention involved. The panel was given an opportunity to comment on these. The second aspect of round three involved the panel rating new interventions suggested from round two on each of the outcome measures. The results are shown in the following table.

Table 3: Delphi round three responses on measures

	Reducing alcohol related assaults	Reducing intoxication	Solving crime	Preventing crime	Reducing alcohol related harm	Reducing alcohol consumption
Preparing youth and parents (53)	4.46	4.38	–	3.77	4.77	4.15
People management via pedestrianising (50)	5.77	–	–	5.23	4.77	–
Energy drink restrictions (26)	4.75	4.75	–	3.5	4.67	4.42
Secondary supply restrictions (65)	3.75	4.08	–	3.75	4.25	4.5
Involving health and safety officials in licensing (40)	3.83	3.18	–	3.67	4.25	3
Alcohol warning labels (9)	–	3.93	–	–	3.93	4.14
Liquor advisory board (39)	3.92	–	–	–	3.92	3.31
People management by food outlet placement (50)	3.36	–	–	3	3.09	–
Drug dogs (21)	2.08	2.33	5.33	5.17	2.83	2

The two interventions that were re-rated received consistently higher mean effectiveness ratings for each of the outcome variables than in the previous round. However, ratings remained low (below 4) for the liquor advisory board. On the other hand, alcohol warning labels received a mean effectiveness rating of 4.14 for reducing alcohol consumption, which is the most likely dimension of alcohol-related harm on which it would act.

2.5.1. Reducing Alcohol-related Assaults

In round three, the three interventions with the highest mean effectiveness ratings for reducing alcohol-related assaults were: people management by pedestrianising (50; M=5.77), energy drink restrictions (26; M=4.75), and preparing youth and parents for night-life (53; M=4.46). These three very different interventions may be seen as complimentary (dealing with different predictors of harm, from different angles). Pedestrianising selected roads at night is also the easiest of the interventions to implement, whereas industry will strongly resist placing restrictions on the use of energy drinks.

2.5.2. Reducing Intoxication

Only three interventions were rated in the moderate range for reducing intoxication: energy drink restrictions (26; M=4.75), preparing youth and parents for night-life (53; M=4.38), and secondary supply restrictions (65; M=4.08).

2.5.3. Solving Crime

The panel reported that only drug detection dogs were moderately effective for solving crime (21; M=5.33).

2.5.4. Preventing Crime

Two interventions received moderate ratings for effectiveness in preventing crime. These were: people management by pedestrianising (50; M=5.23), and drug detection dogs (21; M=5.17).

2.5.5. Reducing Alcohol-related Harm

The three interventions that scored the highest mean effectiveness ratings for reducing alcohol-related harm were: preparing youth and parents for night-life (53; M=4.77), people management by pedestrianising (50; M=4.77), and energy drink restrictions (26; M=4.67).

2.5.6. Reducing Alcohol Consumption

The three interventions receiving the highest mean effectiveness ratings for reducing alcohol consumption were: secondary supply restrictions (65; M=4.50), energy drink restrictions (26; M=4.42), and preparing parents and youth for night-life (53; M=4.15).

Table 4 Delphi responses on harm reduction measures

	Yes, has an impact (N)	Reducing alcohol related assaults	Reducing intoxication	Solving crime	Preventing crime	Reducing alcohol related harm	Reducing alcohol consumption
Reducing alcohol content (4)	20	5.15	6.45	n.a.	4.75	5.8	6.15
Restrictions based approach (81)	19	5.74	5.16	2	5.16	5.63	5
ACT *Liquor Act 2010* (27)	19	4.63	4.95	n.a.	4	5.39	4.78
Consequence policing (18)	19	5.57	4.21	3.78	5.47	5.37	4.21
Controlling alcohol at public events	19	5.11	5.63	n.a.	5.11	5.32	5.53
Holyoake (35)	19	4.21	4.26		3.42	5.05	4.79
User pays (72)	19	4.79	3.68	3.84	4.74	4.84	n.a.
Venue instigated sanctions (11)	19	4.74	3.32	2.53	4.58	4.79	n.a.
Alcohol diversion programs (5)	19	3.84	4.42	n.a.	3.47	4.74	4.79
Security plans (67)	19	4.16	n.a.	3.37	3.84	4.16	n.a.
s 175(1a) *Liquor Control Act 1988* (WA) (41)	18	6.06	6.67	n.a.	6.06	6.67	7.17
Liquor licence interventions/ objections (40)	18	5.61	5	3	4.94	5.67	4.67
No sale of shots etc (46)	18	4.89	6	n.a.	4.89	5.56	5.61
No shots	18	5.22	5.89	n.a.	4.67	5.44	5.44
QLD Drink Safe Precincts (20)	18	5.11	4.61	2.39	4.67	5.06	4.28
Development application process (7)	18	4.78	4.59	3.83	4.5	4.94	4.11
Operations alcohol-related violence (47)	18	5.44	3.61	3.11	5.44	4.89	3.5
RSA marshals (62)	17	4.94	5.53	n.a.	4.94	5.41	5.18
Drunk tanks (22)	17	4.12	3.29	n.a.	4	4.71	3.06
s 152(P) *Liquor Control Act 1988* (WA) (42)	17	4.65	4.24	n.a.	4.29	4.41	4.18
Radio communications precincts (58)	17	4.35	n.a.	4.29	4.59	4.18	n.a.
Long-term precinct-wide banning (11)	16	5.75	4.69	2.31	5.5	5.88	4.87
Test purchasing (70)	16	–	5.44	–	5.5	5.33	5.37
Banning volume discounts (12)	16	3.81	5.19	–	–	5.12	5.37
Banning multi buys (12)	16	4.19	4.81	–	–	4.75	4.81
High visibility clothing (33)	16	5.25	–	–	5.63	4.62	–

Table 4 Delphi responses on harm reduction measures cont.

	Yes, has an impact (N)	Reducing alcohol related assaults	Reducing intoxication	Solving crime	Preventing crime	Reducing alcohol related harm	Reducing alcohol consumption
Risk-based licensing (60)	16	4.69	4.75	–	4.19	4.5	3.73
Temporary banning orders (11)	15	5.2	4.47	2.27	4.87	4.93	4.33
Alcohol to finish 30 minutes before closing (8)	15	4.13	4.33	–	4.07	4.53	4.13
NT mandatory treatment (44)	15	4	4.67	–	3.67	4.4	4.47
Supervisor (62)	15	4	5.2	2.53	4.33	4.4	4
Radio communication inside (58)	15	4.33	–	3.67	4.67	3.87	
No RTD beverages more than 6% (4)	14	4.86	5.23	–	4.29	5.14	4.71
Refusal of entry (67)	14	4.5	5.07	–	4.36	4.64	4.71
Random breath testing in venues (59)	14	4.5	4.79	–	4.43	4.57	4.86
Liquor accords—Indigenous (38)	14	4.21	4.29	–	3.79	4.57	4.07
Multi Agency Liquor Taskforce (45)	14	3.5	–	–	–	3.43	–
Precinct ambassadors (56)	13	4.08	–	3.54	4.45	4.62	–
Designate venues as high risk—NSW (34)	12	6	5.08		5.33	5.5	4.83
Availability of free water (29)	12	–	5.31	–	4.23	4.54	5.15
Liquor advisory board (39)	8	3.25	–	–	–	3.13	–

3. Interventions

This report covers a very large number of interventions, many of which are similar. To make it easier to cross-reference different information, this section lists the interventions alphabetically. Each intervention is given a specific code number for future reference. As well as a description of each intervention, this section also provides information about the aspect of alcohol consumption it addresses (supply, demand or harm reduction), the societal level at which it acts (ie social or family), the type of evidence available on the intervention and its how its effectiveness rates.

The Australian National Preventive Health Agency (ANPHA) has funded research associated with community level health promotion and risk reduction strategies around harmful alcohol consumption, among other things. Though it has funded many research projects focused on education and prevention concerning binge drinking, no evaluation data could be obtained from these projects and therefore effectiveness could not be included in this report. A list of these projects is in Appendix A.

Further, a list of projects funded by the National Binge Drinking Strategy are at: http://www.alcohol.gov.au/internet/alcohol/publishing.nsf/Content/cli#cli

Once again, very few final reports were available through the website. As a result, this review includes only those projects from which effectiveness could be gauged. What this list makes clear, is that a substantial number of projects into alcohol use is being funded, but that none of the findings regarding effectiveness or usefulness of such interventions are readily available to community members.

1. Accords (Voluntary Liquor Licensing Forums)

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **with enforcement ?**
without enforcement x

In the current regulatory environment, most voluntary alcohol programs for licensed premises centre on RSA training—an approach with varying levels of success. Such interventions typically involve education about minimum legal purchase age and public drunkenness, the physiological effects of alcohol, identifying overt signs of patron intoxication, and general management of problem customers (Graham & Homel, 2008). While effects have been significant, its size has generally been small and often short-lived (Johnsson & Berglund, 2003; Wagenaar et al., 2005b). For example, Lang and Rumbold (1997b) demonstrated a decrease in patrons rated as 'extremely drunk' ($p<0.017$), a decline in blood alcohol content (BAC) levels ($p<0.03$), and a small but statistically significant increase in staff knowledge of RSA laws ($p<0.05$). Similarly, Johnson and Berglund (2003) reported reductions in average BAC-levels of bar patrons (-0.011, 95% CI =0.022-0) as well as in 'rowdy' atmospheres (-6pts, 95% CI = -11 to -1). A third study, which focused on alcohol sales to minors (Wagenaar et al., 2005) generated a post-intervention 17 percent decline in underage alcohol purchases. Thus, RSA programs have demonstrated positive, albeit moderate, effects on variables such as BAC-levels, extreme intoxication, and raucous on-premise behaviour.

Community alcohol accords are voluntary initiatives based on active cooperation between licensees and various government groups, including the police and local councils (Graham & Homel, 2008). Participating licensees agree to uphold certain guidelines and rules—for example, RSA, informing partners of potentially troublesome patrons, minimum alcohol pricing, lockouts, etc—to maintain a level of order and security in the night-time economy (NTE), and are, in return, accredited with a label of approval indicating an acceptable standard of operation. The police role centres on enforcing these regulations (Graham & Homel, 2008). Many

such approaches are currently active targeting alcohol-related violence in the NTE, and many specifically aim to reduce bar-hopping as well as disorder inside licensed venues (City of Greater Geelong, 2007). Strategies focusing on voluntary participation have been attempted in Geelong, Victoria (City of Greater Geelong, 2007); Fremantle, Western Australia (Hawks, 1999); Queensland (Queensland Government, 2011); Sydney, New South Wales (Graham & Homel, 2008) as well as in the UK with Pubwatch (Pratten, 2005a) and Best Bar None schemes (Burrell & Erol, 2009).

The Geelong Local Industry Accord

The Geelong Local Industry Accord in Victoria was the first of this type of intervention, and focused on reducing excessive alcohol consumption and alcohol-related problems in and around licensed premises in the city centre (Graham & Homel, 2008). Central to the intervention was the cooperation between police and licensees in ensuring RSA and responsible management of licensed venues, including cover charges after 11 pm (ie charging patrons an entrance fee after a designated time), lockout policies, limitations on alcohol promotions and happy hours, as well as a minimum pricing on drinks (Lang & Rumbold, 1997a). Further, city bylaws targeting public drinking and fake identification use were enforced to full extent (Felson et al., 1997).

Although, the evaluation of the project initially revealed a 52 percent reduction in assaults (Felson et al., 1997), several serious caveats complicated how the results were interpreted. For example, no comparison site was examined to help eliminate extraneous variables. The assault data used for the evaluation was not detailed enough to determine the location or time of an offence. Specifically, as the data covered Geelong as well as the suburbs within a 90 km radius of Geelong, it was virtually impossible to determine how much of the observed decline in assault occurred in Geelong, let alone the Geelong NTE (Felson et al., 1997; Graham & Homel, 2008). Thus, while generating promising initial results, the findings in Geelong are difficult, if not impossible, to properly interpret, as the evaluation design was generally inadequate.

The Fremantle Police-Licensee Accord

The Fremantle Police-Licensee Accord in Western Australia is similar to Victoria's Geelong accord in terms of the policies included such as cover charges, RSA, and prohibition of drink discounts and promotions (Hawks, 1999). Apart from these strategies the Fremantle accord also incorporates a Better Practices Committee where an RSA training program is tailored to participating managers and bar staff (Graham & Homel, 2008). A control site was included, and extensive data collected in the year before and after the intervention to measure impacts on a wide range of variables (Hawks, 1999). The Fremantle accord evaluation was more rigorous in terms of design and method.

The Freemantle accord evaluation used a range of outcome measures, including: patron, resident, business and taxi driver surveys regarding perceived changes; risk assessment; and the use of pseudo-patrons for measuring service to intoxicated and under-aged persons. Officially recorded data that identified road crashes, drink-driving charges and assaults specifically associated with individual premises were used to evaluate server practices. Indicators of pre- and post-intervention levels of harm were examined among a selection of 10 particularly high-risk premises. The indicators were also matched to control premises in a similar entertainment area (Northbridge in the city of Perth) that did not have an accord at the time (Chikritzhs et al., 2007b). The evaluations concluded no significant improvement in outcomes on any of the measured variables. They showed a near-significant increase in assaults, but this was likely due to the augmented police presence dictated by the accord during the intervention period (Hawks, 1999). The fact that the control site implemented their own alcohol accord nearly simultaneously with the start of the Fremantle accord represents another confounding variable crippling the empirical reliability of the study (Hawks, 1999). Nonetheless, considering that none of the outcome variables were affected in any meaningful way by the intervention indicates either a lack of effectiveness of the measures adopted, inadequate experimental design and evaluation strategy, or a deficiency in motivated and genuine participation of the stakeholders.

The Kings Cross Accord

Kings Cross in Sydney, New South Wales, is renowned for its high density of pubs, skid-row bars, gambling establishments, brothels and strip clubs operating 24 hours a day. The Kings Cross Accord focused on alcohol-related incidents within this entertainment area, using both police and local emergency department data (Graham & Homel, 2008). Accord stakeholders included police, liquor licensing, local and state governments, as well as industry and business associations. The main objective of the initiative centred on safety and security in the night-life focusing particularly on police enforcing licensee legal obligations. Evaluation found that the project generated no significant improvement on any of the outcome variables (Graham & Homel, 2008). Similar to the results obtained for the Fremantle intervention, the lack of meaningful effects of the Kings Cross Accord appear to indicate problems with either the actions implemented or the vigilance with which they were carried out. Also, being a city neighbourhood, it would conceivably be difficult to avoid any spillover effects from other areas of Sydney into Kings Cross. In a study investigating the attitudes of key informants towards the Kings Cross Accord, police informants had mixed opinions. None were overly optimistic, stating 'They're just feel-good things that formalise the Liquor Act' (Spooner & McPherson, 2001). Unfortunately, no comprehensive evaluation of outcomes has been published.

Norseman Voluntary Liquor Agreement

In 2005 the members of the Norseman Aboriginal community in Western Australia noted that alcohol was a primary contributing factor to causing chronic disease. The community developed strategies to try to change drinking behaviour such as male and female drying out houses, a resolution to eat before drinking and supporting members to seek early medical assistance. In collaboration with Population Health (Goldfields) and local police, the community negotiated with the local licensee to voluntarily restrict the sale of packaged liquor products to the general public. The voluntary agreement reads:

> Between 12 midday and 6pm, Monday to Sunday, red and white Lambrusco wine was limited to one 5 litre cask per person per day, port wine was limited to one 2 litre cask per person per day and non-fortified wine was limited to one 4 litre cask per person per day. No sales of the above mentioned products were permitted at any other time.

An evaluation of the effectiveness of this agreement found a 10.3 percent reduction in total police task attendance in the 12 months after restrictions, a 17.5 percent reduction in assaults, a 15.3 percent decrease in domestic violence incidents, a 60.5 percent decrease in the number of alcohol-related hospital admissions and a 9.84 percent decrease in per capita consumption of alcohol (Schineanu et al., 2010).

Other accords—Pubwatch & Best Bar None

Other community alcohol accords include the British 'Pubwatch' scheme and 'Best Bar None' (BBN) accreditation strategy. Pubwatch relies on local police cooperation and licensee endorsement. It focuses on banning troublesome patrons from all venues participating in the scheme (Metropolitan Police, 2011; Pratten, 2005b). Licensees work together with police to create a linking system by which problem patrons in one venue can be reported to police and other participating licensees immediately after their offence. Subsequently, police will give the individual a banning notice and if necessary a fine (Metropolitan Police, 2011). Targeted offences typically include any form of violence, assault, drug-dealing or consumption, as well as damaging venue property (Pratten, 2005a). Awareness of Pubwatch is created through the local media as well as venue advertisements and window-stickers outlining what the scheme entails and how it works (Metropolitan Police, 2011). While at face value it has strong objectives and strategies as well as community organisation and mobilisation, empirical evaluations of Pubwatch are lacking. This is due mainly to its failure to include an assessment strategy in the overall intervention plan. It is virtually impossible to tell if Pubwatch schemes have any effect at all (Pratten, 2005a). Nonetheless, Metropolitan Police statements do indicate decreases in alcohol-related violence in areas operating Pubwatch schemes (Metropolitan Police, 2011; Pratten, 2005a).

The BBN strategy focuses on promoting good practice among licensees rather than on punitive enforcement of regulation. It is presented as an inclusive community initiative and accreditation strategy designed to encourage improved conditions in the NTE (Ackerman & Rogers, 2007; Graham & Homel, 2008; UK Home Office, 2011). Best practice is promoted when licensees cooperate by upholding a certain standard of operation. Participating establishments receive an official stamp of approval, or plaque to display inside the bar. The strategy guiding BBN, however, is largely arbitrary, as it does not provide any concrete advice to licensees on best practice. Nor does the project allow for any form of evaluation other than anecdotal impressions (UK Home Office, 2011).

While Pubwatch and BBN type initiatives may have some face value, there is a dearth of research assessing their effectiveness in reducing alcohol-related violence and disorder. Those evaluations that do exist show only short-term minimal effects at best. More empirical assessment is needed before any conclusive statements can be made regarding their effectiveness.

A recent approach in the United Kingdom uses Alcohol Disorder Zones (ADZs) to levy extra fees for venues within specific NTE areas. Section 16 of the country's *Violent Crime Reduction Act 2006* permits local authorities (with the consent of the police) to designate areas as ADZs if they have problems with alcohol-related nuisance, crime and disorder. In order to pay for additional policing and other enforcement activities they can then impose charges on premises and clubs within the ADZ that sell or supply alcohol (National Archives, 2008). Under the *Licensing Act 2003*, licensing authorities can modify, suspend or revoke individual licenses.

Alcohol banning orders are another approach taken in the UK. Licensees can apply for a banning order to be applied to troublesome patrons so that they cannot enter the premises by law for a designated period of time. This approach is hampered by the time it takes to apply, process, and serve such an order, as well as by other factors such as identifying the given patron, and effectively enforcing the banning order (Home Office, 2006). At present, there are no evaluations of these type of interventions in terms of alcohol-related crime, or crime in the NTE.

Liquor accords are operationally distinct from the evidence-based community programs used in the United States, Queensland and Scandinavia. Apart from the differences in relation to scope, magnitude, level of community involvement and evaluation between the two approaches, accords attempt to encourage discourse between police and licensees. As a part of their de-emphasis on legal obligations, accords typically have limited, or no focus on enforcement and usually allow significant latitude for addressing the concerns and wishes of licensees. Despite the growing popularity of accords and other types of voluntary 'codes of conduct', few have been formally evaluated and, among those that have, most evaluations have been unable to demonstrate effectiveness in reducing alcohol-related harms in either the short- or (particularly) long-term. In addition, a fundamental weakness of accords is their reliance on voluntary commitments from individuals who operate in a highly competitive profit-orientated industry. Such a conflict of interest is likely to undermine any genuine attempt to bring about effective and lasting change (Hawks, 1999). Evaluations have shown an inability for any reductions in alcohol-related harm to be sustained for more than a few months (Homel, 2001). Similarly, other reviewers have concluded that in the absence of adequate enforcement, accords can be a 'look good' only measure (Stockwell, 2006). It appears that overall, the value of accords rests more on developing local communication networks, enabling local input or a sense of local 'control', and improving public relations through open negotiations, than in actually reducing harm. Nonetheless, improved communication and participation may also be seen as desirable and worthwhile outcomes.

2. Advertisement of Alcohol-related harms

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

For every alcohol advertisement, a government-produced public health advertisement should immediately follow (funded via a levy on all sales by alcohol producers) informing the public of the harms associated with drinking and addressing social norms around intoxication. On television and in cinemas these health

messages can be shown on a thin horizontal band (its height corresponding to 7% of the height of the screen), or as a screened notice displayed just after the advertisement. On radio, the message can be broadcast immediately after the advertisement. Printed materials include a horizontal message strip also corresponding to seven percent of the total height of the advertisement. Companies that do not add public health warnings to all television advertisements can be required to pay a government levy of 1.5 percent of their advertising budget, which can then be used to help the government to reduce alcohol-related harm.

3. Advertising and Promotion Restrictions

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: ✓

Alcohol beverages are typically marketed through nearly uninhibited advertisements in the media, films and television shows, as well as through brand merchandise and a variety of sponsored events (Babor & Caetano, 2005; McClure et al., 2009). Online marketing has added further dimensions, the impact of which is poorly understood. Exposure to such alcohol promotion has been associated with the development of positive and care-free attitudes to drinking in the general public (Ellickson et al., 2005; Smith & Foxcroft, 2009), as well as increased consumption (Engels et al., 2009), earlier initiation to alcohol use (McClure et al., 2009), increased under aged drinking (Anderson et al., 2009; Hastings et al., 2005; Snyder, 2006) and alcohol-related violence (Casswell & Zhang, 1998). In spite of these findings alcohol advertising is self-regulated by the liquor industry in many countries, including Australia. This clear conflict of interest juxtaposed with the empirical evidence of the harmful effects of alcohol promotion, has led to much debate about the detrimental nature of the alcohol industry's advertising programs, and in particular about their sponsorship of sport clubs, teams, and events. Given that recent evidence indicates higher levels of alcohol consumption among athletes connected to industry subsidised sport clubs or teams, Kypri et al. (2009) argues for a ban on this type of funding and advertising, and instead suggests channelling revenue accrued from increased taxation on alcohol products into community initiatives, such as sport clubs.

Apart from total bans, restrictions and regulations on advertising have shown significant, but limited effects on consumption with weak to average effect sizes at best (Saffer, 1991; Young, 1993). Saffer and Dave (2002) found that total and sustained prohibition of alcohol-advertising decreased overall alcohol use by up to eight percent, while Agostinelli and Grube (2002) concluded that counter-advertising and warning labels had the potential to dilute the effect of alcohol promotion at a statistically significant level. The evidence base for the latter approach is qualified by intricate interactions between audience cognitive/affective processes and message factors, such as design, content, and source (Agostinelli & Grube, 2002; Austin, 2000). Anderson and colleagues (2009) conducted a systematic review on longitudinal studies of the impact of alcohol advertising and media exposure on future adolescent alcohol use. They discovered that the studies consistently suggested that exposing alcohol advertising to adolescents is associated with the likelihood that they will start to drink alcohol, with increased drinking among baseline drinkers. Overall, the literature on the effects of alcohol counter-advertising and regulated advertising, rests on a small evidence base which is plagued by a vast number of confounding factors (eg Donovan et al., 2002; Hastings et al., 2005; Jones & Lynch, 2007). One such example includes consumption and promotional clothing and paraphernalia (McClure et al., 2009) as well as the alcohol industry's sponsorship of sport. A further concern with the current evidence base around alcohol advertising is that the impacts are measured at a population level, and do not distinguish between those who may be particularly sensitive to this advertising. For example, young adolescents may be more likely to respond to alcohol advertising, as it may be a new and exciting experience for them. Adults, who have been consuming alcohol for years, may be unmoved by the advertisements. Future research should distinguish between the impacts on differing populations, such as adults versus children.

4. Alcohol content of drinks—limits after midnight

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners/stakeholders of this intervention are the Gunnedah Council liquor accord in New South Wales. In 2011 the Gunnedah liquor accord entered an agreement to reduce the alcohol content of drinks sold by the licensed premises to 3.3 percent after midnight. This intervention addresses the intoxication level of patrons remaining in the licensed premises after midnight. An evaluation by Oxley Local Area Command found that assaults for the period reduced by 35 percent from the previous year. It also found that the level of intoxication of patrons leaving at closing time was reduced to a level where they were aware of what they were doing. Council and police wished to continue with this intervention, but the Australian Hotels Association advised the liquor accord not to continue. Gunnedah Council has said it would like to try this intervention again.

5. Alcohol Diversion Programs

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

These programs provide adult defendants with a history of problematic alcohol use with case management and treatment during their bail period. Willing clients who meet eligibility criteria are treated to address their problematic alcohol use, including residential detoxification and rehabilitation services, pharmacotherapy, case management, as well as counselling and community outpatient services as necessary. When a defendant completes the program a report is submitted to the presiding magistrate who may consider the defendant's treatment progress at sentencing.

6. Alcohol Management Plans

Intervention type: **Reduce harm**
Societal level: **Societal/Community**
Available evidence: **Literature/Delphi**
Effectiveness rating: **Literature: ✓**
Delphi: ***

Alcohol management plans were developed in 2004 as part of the Northern Territory Alcohol Framework. These plans are located and implemented within the local community. They are driven by the community and are a negotiation between the local community, community organisations, local governments, government agencies, licensees and other key stakeholders. They are not a set of rules imposed on the community; rather they are locally appropriate and consider resources within the community that are already available to them to help reduce alcohol supply. Although this intervention addresses supply, demand and harm reduction, thus far it has mainly focused on reducing supply through a set of alcohol restrictions (Senior et al., 2009).

Margolis et al. (2008) evaluated Alcohol Management Plans in four remote communities in the Northern Territory. They found these plans were effective in reducing serious injury in the assessed communities. The authors concluded that alcohol management plans are preferable when they are strategically planned and include formal regulator enforcement and evaluation for outcomes.

7. Alcohol-Related Harm/Risk Reduction via the Development Application Process

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners/stakeholders of this intervention are the Wagga Wagga police local area command (LAC) and the Wagga Wagga City Council. This intervention takes a proactive 'prevention is better than cure' approach to alcohol-related harm and anti-social violence. When new alcohol-related development applications are lodged with Wagga Wagga City Council, the Licensed Premises Reference Group meets to discuss the potential impact of the development on the surrounding area. The group identifies the risks associated with the development and discusses conditions that can be included in the development consent to reduce the risk of any associated alcohol-related harms. Approval of these types of developments can potentially increase the risk of alcohol-related violence and anti-social behaviour due to increased patronage, sales, and persons remaining after closing time in locations that are historically linked to alcohol-related violence and anti-social behaviour.

The process has been used to develop venue and security management plans that are negotiated with consent holders as an imposed condition on their development consent. These have been used for development applications including licensed premises and late night food outlets in the Wagga Wagga CBD and outlying suburbs. Many of the requirements placed into these plans are already being implemented in some premises. This process seeks to formalise those procedures to ensure that they are actually being carried out.

This intervention, particularly the venue and security management plans, aims to ensure that consent holders are monitoring the behaviour of patrons in their premises before problems arise. It also encourages early intervention, ensuring that appropriate deterrents are in place such as CCTV, security, and possibly restrictions in relation to the sale and supply of alcohol. It includes more functional reporting measures for incidents in all licensed premises, not just late night trading venues. It places crime scene preservation requirements on consent holders associated with licensed premises and late night food outlets, as well as providing relevant training for staff.

The aim of the strategy/intervention is to work harmoniously with other relevant strategies to address alcohol-related issues, reduce the risk of same and provide a safe environment for all persons including staff of premises, patrons, police and emergency service staff. The plans are also designed to assist police in investigating any incidents of violence that occur in and around these developments. This initiative is still very much in its infancy, however consent conditions have been successfully imposed by council in respect to all alcohol-related development applications, and several venue and/or security management plans have been negotiated with consent holders. Although the initiative has not been formally assessed at jurisdictional or departmental level, it has recently been reported that the Wagga Wagga CBD area has had a 26 percent reduction in violence over the past 12 months. In addition, since July 2010 the Wagga Wagga LAC has experienced reductions in alcohol-related assaults across 31 of the 35 reporting periods during that time.

8. Alcohol service to finish 30 minutes before closing

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

This intervention involves venues being required to stop serving patrons at least 30 minutes before closing time to ensure that patrons finish their drinks.

9. Alcohol Warning Labels

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

In Australia, mandatory labelling requirements for alcoholic beverages and food containing alcohol are specified under Standard 2.7.1 of the Australia New Zealand Food Standards Code.

The code requires beverages, or foods capable of being consumed as beverages, which contain more than 0.5 percent alcohol by volume, measured at 20 °C, to be labelled with a statement of the approximate number of standard drinks in the package.

10. Application liquor restriction s 64 Liquor Control Act 1988

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners/stakeholders are the Western Australia Police and the community where the application is made. Under the provisions of s 64 of the *Liquor Control Act 1988*, police apply to the Director of Liquor Licensing to obtain liquor restrictions for a town, adjoining towns, or even a region. The restrictions relate to reduced trading hours in particular for packaged liquor and reducing the types and size of liquor that can be sold. It can also be for a particular licensed venue requesting conditions to be placed on the licence. It addresses both harm and supply reduction. Restrictions for Halls Creek were assessed by Notre University Fremantle and found to be successful.

11. Banning (Venue-instigated sanctions imposed on repeat offenders)

Intervention type: **Reduce harm**
Societal level: **Societal/ Community**
Available evidence: **Delphi**
Effectiveness rating: ******

Sanctions excluding patrons for bad behaviour ('banning notices' or Drinking Banning Orders; DBOs) work under several different models and are intended to tackle alcohol-related criminal or disorderly behaviour and to protect others from such behaviour. The DBOs can be instigated by licensee, police or liquor accord instigated or imposed by a court. Some precincts (such as Victoria, Australia) can have all three systems operating at once. The orders are not seen as suitable for criminal or disorderly behaviour that is not alcohol-related.

These civil orders can last from months through to being lifetime bans, depending on the jurisdiction. They have been available on application throughout England and Wales since 31 August 2009, but have operated less formally for many years. From February 2008, Victoria Police have powers to ban people from licensed premises and designated areas for up to 24 hours for offences such as:

- drunkenness;
- physical assault;
- threats to kill;
- destroying or damaging property;
- offensive or obscene behaviour;

- sexual offences;
- weapons offences; and
- failure to leave licensed premises.

The maximum penalty for re-entering the area after a notice has been given is more than $2,000. Court ordered notices are used for longer periods, but take time to put in place. Normally, licensee or accord-based bans are used in the interim.

DBOs are enforced through several different mechanisms, depending on the technology available. Most commonly in the past, police or the licensee association or accord would circulate the photos and names of banned patrons. More recently, the use of ID scanners, particularly those that are networked with police and other licensees, has meant that the banned patrons list can be uploaded onto the scanner and that a banned individual would be identified immediately upon presenting their ID at the venue. This has obvious benefits in terms of not relying on human memory, although it is worth considering that all technologies can be circumvented if the offender is motivated enough. In addition, police patrols can also identify banned patrons and remove them from the area.

Another notable difference between systems is the ability to restrict alcohol consumption. For example, in the United Kingdom, a DBO may impose any prohibition on a person that the court considers necessary to protect others from alcohol-related crime or disorderly conduct committed while they were under the influence of alcohol. The prohibitions must include whatever the court thinks is necessary with regard to that person entering premises that sell alcohol. This could include exclusion from:

- purchasing alcohol;
- consuming alcohol or being in possession of alcohol in public;
- individual or sets of licensed premises; and
- all licensed premises in a geographically defined area.

Current Australian systems do not allow for this degree of intervention, however the ability to restrict an individual from purchasing alcohol may serve as a powerful behaviour change agent and possibly a deterrent.

The banning notice/DBO intervention has the potential to remove some troublesome individuals from specific venues or areas. They are a technological and legislative extension of what has been common practice for many years (Graham & Chandler-Coutts, 2000). Such a system undoubtedly works in favour of those venues that have a system in place. The orders also most likely assist law enforcement personnel in managing problematic individuals. However, it is unclear whether such systems will realistically prevent alcohol-related violence and harm or simply shift them to other entertainment districts or to domestic settings (Miller et al., 2011b).

An especially promising application of the banning order is in relation to family violence in South Australia. The ability to stop an offender drinking or purchasing alcohol has very substantial potential for reducing some of the family violence that affects women and children in our community. However, evidence of its impact needs to be developed.

Other elements that should be included or considered:

- appeal mechanisms need to be codified and equitable;
- patron privacy should be assured;
- systems are unlikely to be effective unless all entrances and exits are monitored; and
- best used in a mandatory regulatory environment where all alcohol outlets were obliged to conform.

Issues needing careful consideration when implementing such a project include:

- Could the system end up discriminating against certain individuals or groups in society?
- Could these systems move troublemakers to other settings?
- How widely do bans apply (anecdotal evidence suggests that some ID scanner companies have Australia-wide banning notices)?
- Who should be responsible for managing the overall process?

Banning notices are popular with licensees and police, allowing them to target individuals who have already demonstrated themselves as problem patrons. No evidence suggests that banning notices either prevent crime or help in solving crime. Banning notices essentially act as punishment for bad behaviour and are often reliant on little evidentiary proof, depending on whether they are licensee, police or court ordered. It may be that over time a preventative effect becomes apparent as more problem patrons are banned. It may also be that the possibility of being banned would act as a deterrent to some people, although this runs counter to the evidence around the behaviour of intoxicated people and their ability to think through the consequences of their behaviour. In light of this, banning orders cannot be considered best practice until substantially more is known about how they are used, the effect they have on people and possible abuses of the system.

12. Banning Volume Discounts

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

This involves placing a ban on packaged liquor outlets that means they cannot place discounts on bulk purchases of alcohol. For example, packaged liquor outlets would no longer be able to provide discounts such as saving 10 percent when you buy six bottles of wine, 15 percent when you buy 12 bottles etc.

13. Beat da Binge

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: **?**

Beat da Binge is a community-initiated binge drinking awareness campaign in Indigenous communities. The intervention began in 2011, and focuses on preventing and raising awareness of binge drinking in the North Queensland Indigenous community of Yarrabah. An evaluation in 2013 found 16 percent fewer young binge drinkers in Yarrabah, a 27 percent increase in awareness of binge drinking, and a 16 percent increase in awareness of what constitutes a standard drink. The evaluation is still being peer reviewed.

14. Beverage Types Sales Restriction

Intervention type: **Reduce supply**
Societal level: **Societal**
Available evidence: **Literature/Delphi**
Effectiveness rating: **Literature:** ✓
Delphi: **

The consumption of cask wine and full-strength beer has been linked to various social harms. Caldeira and Woodin (2012) notes a strong link between consumption of beer and drink driving. Stockwell et al. (1998) found that the consumption of cask wine and full strength beer was associated with higher rates of assaults in the NTE, and reported that sale of low strength beer was associated with lower assault rates. In Western Australia full-strength beer sales were the most important single predictor of police reported assaults, positive drink driving tests, alcohol-attributable hospitalisations and alcohol-attributable deaths (Chikritzhs et al., 2007a). Nicholas (2008) notes that those interventions focusing on reducing sales, and therefore consumption, of full-strength beer and cask wine may reduce the associated social harms. Unfortunately, this has not been implemented as a policy response and it is not known what impact restricting type of alcohol sold might have on subsequent harms in the community.

15. Closed-circuit television

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature/Delphi**
Effectiveness rating: **Literature: ?**
Delphi: **

Closed-circuit television (CCTV) cameras are commonly employed in the NTE in some countries. While no research has specifically assessed the impact of CCTV on alcohol-related violence, relatively robust evidence demonstrates significant associations between overall crime deterrence and CCTV (Welsh et al., 2002). However, these results are nearly exclusive to vehicle theft and car park settings (41% decline: Welsh et al., 2002). Crime rates, including violent crime, in city centres, public housing communities, and on public transport were largely unaffected by CCTV At best the results were ambiguous with small effect sizes (Welsh & Farrington, 2004a; Welsh et al., 2002; Welsh & Farrington, 2008). Similarly, a systematic review of 32 international (UK, US, Canada) studies examining the effects of CCTV and street lighting on crime, demonstrated that both CCTV and street lighting were effective in decreasing total crime (CCTV: 21% decrease, weighted mean OR=1.27, CI 95% = 1.11–1.46, p=0.0004; street lighting: 22% decrease, weighted mean OR=1.28, CI 95% = 1.11–1.48, p=0.0008) (Welsh & Farrington, 2004a). However, CCTV was only significantly effective in car parks, while not making any difference on city centre crime rates. While both street lighting and CCTV were significant predictors of reductions in property crime (CCTV: OR=1.54, p=0.0001; street lighting: OR=1.27, p=0.019), neither had any impact on violent crime (robbery, assaults) (Welsh & Farrington, 2004b). Finally, research has also established significant displacement effects of CCTV rather than deterrence or prevention—that is, rather than ceasing criminal activity due to CCTV, crime will simply move elsewhere (Sutton & Wilson, 2002; Welsh & Farrington, 2009; Wilson & Sutton, 2003).

In contrast, other studies conclude that CCTV *does* have a significant positive impact on interpersonal violence (Armitage et al., 1999; Squires, 1998). In a study on the relationship between CCTV and assault injury and detection, for example, emergency department assault presentations decreased by three percent (ratio 0.96; 95% confidence interval (CI) 0.93–0.99) in CCTV areas while they increased by 11 percent (ratio 1.11; 95% CI 1.08–1.14) at control sites (t-test, p<0.05) (Sivarajasingam et al., 2003). Similarly, police recorded that violence increased by 11 percent (ratio 1.16; 95% CI 1.08–1.24) at the CCTV-site compared to five percent (ratio 1.06; 95% CI 0.99–1.13) in the control area. While this finding was non-significant (t-test, p>0.05), the increase possibly indicates higher level of detection using CCTV (Sivarajasingam et al., 2003). It seems that while there may be no discernible effect of CCTV on deterring violent crime, there does seem to be an effect for crime severity, perhaps mostly due to the increased surveillance of crime and resulting possibility for early intervention afforded by CCTV (Sivarajasingam et al., 2003).

Thus, given the evidence, it may be concluded that while CCTV does have a clear displacement effect and a possibly minor deterrence effect on premeditated crime such as car and property theft, the evidence indicates overwhelmingly that crimes of a more spontaneous nature, including violence and assault (and probably alcohol), are unaffected in terms of frequency. Some evidence indicates that the detection of violent crime by CCTV may result in early police intervention and in turn decreased injury severity (Sivarajasingam et al., 2003). More research is required to draw firm conclusions about the role that these common strategies may have in reducing violent crime in the NTE. What is needed in particular, are studies looking at the specific relationship between CCTV and alcohol-related crime.

CCTV can play a valuable role in monitoring and solving crime within licensed venues. Its role in preventing crime remains doubtful. Areas should be adequately covered, including all entrances and bar areas in nightclubs and major hotels, and the minimum technical requirements should be identified.

16. Community action projects

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **with enforcement ✓✓**
without enforcement x

Community action projects are comprehensive approaches to tackling alcohol-related violence on several levels and at the same time. This typically includes community mobilisation in terms of publicity campaigns, local task force activities, and community forums and discussion groups. Further emphasis is usually placed on RSA practice, security staff capabilities, environmental safety factors, and police enforcement of liquor laws (Graham & Homel, 2008). The most often cited community action initiative to date is probably the Swedish 'Stockholm Prevents Alcohol and Drug Problems' (STAD) project (see Box 1).

The Finnish Local Alcohol Policy project (PAKKA; Warpenius et al., 2010) is very similar to STAD in terms of goals and methods. Its main objectives are to reduce the number of heavy drinking occasions and related problems; counter under-aged alcohol consumption; and to create a community model of sustained prevention. The methodology employed entails community mobilisation and policy change; a focus on youth alcohol access and consumption; and RSA training. Supervision and implementation of the project was overseen by a central coordinator working closely with community and local government (police, educators, schools, licensees, liquor commission, etc.).

The Surfers Paradise Safety Action Project was a community-based initiative in 1993, designed to reduce violence in and around licensed venues in the central business district of the main tourist area on Queensland's Gold Coast (Homel et al., 1997). Key features of the project included:

- channelling funding through local government;
- creating a representative steering committee and community forum;
- forming task groups to address safety of public spaces, management of venues, and security and policing;
- encouraging nightclub managers to introduce a Code of Practice that regulates serving and security staff, advertising, alcohol use and entertainment; and
- regulating managers through 'risk assessments' and a community-based monitoring committee.

The evaluation of the project (Homel et al., 1997) initially showed reductions in irresponsible drinks promotions and improvements in security practices, entertainment, handling of patrons, and transport policies. Physical and verbal aggression inside and outside venues declined substantially, based on structured observations pre- and post-implementation and on police and security data. Male and female drinking rates and drunkenness also declined markedly, even though there was no change in drinks prices or admission charges (Homel et al., 1997).

Another community project, the 'Queensland Safety Action Projects' (Hauritz & Homel, 1998) involved licensees, police, the liquor licensing authority, and local and state government. It focused on enforcement of RSA laws, improved crowd controller capabilities, better night-time community transport, and the creation of a general drinking environment less conducive to aggression and violence. The Queensland Safety Action Projects was trialled in four towns and the evaluation reported a decline in verbal abuse (82%), arguments (68%), and assault (82.1%) (Homel et al., 2004). However, there was almost a complete lack of effect-sustainability post-intervention; some of which might be attributed to a lack of dedicated resources and mediocre police intervention.

These and other community intervention projects such as the Sacramento Neighbourhood Alcohol Prevention Project (SNAPP) in the United States (Treno et al., 2007) and the Preventing Alcohol Trauma: A Community Trial project also in the United States (Holder et al., 1997) have consistently produced positive results. The evidence suggests future efforts should focus on adapting the best parts of these programs to other communities and countries. These best practice elements include:

- ensuring a long-term focus on interventions and results;
- having a coordinated approach, with dedicated resources and personnel;
- including monitoring and, where appropriate, enforcing measures such as responsible serving;
- ensuring blanket written responsible service of alcohol serving policies, preferably mandatory, which include staff training;
- having a model for community/scientist/government involvement; and
- devising an evaluative framework at the outset.

Box 1: Stockholm prevents alcohol and drug use (Wallin et al., 2005b).

The STAD project was launched by the Stockholm county council in 1995, and consists of a multi-component approach to reducing alcohol-related violence and intoxication in the night-time economy and the community as a whole. The project centres on RSA-training and, importantly, enforcement of RSA-practice, as well as community mobilisation and engagement with these preventive measures (Wallin et al., 2005a). The RSA-training included servers, security staff and owners, and covered Swedish alcohol law, the physiological and psychological effects of alcohol, and conflict management. At the end of 2000, more than 570 servers, doormen, and managers had completed the training program (Graham & Homel, 2008). Enforcing RSA practice involved giving official warnings to venues demonstrating problematic serving practices. The alcohol licensing board and police conducted joint audits of licensed premises. This fostered communication and cooperation between the two authorities as well as produced more effective venue assessments (Wallin et al., 2005a). The project measures were institutionalised in 2001, with its various components added to national legislation, and responsibilities of the project allocated to stakeholders. Results included a 29 percent reduction in violent crimes occurring between 10 pm and 6 am, compared to a slight increase in the control area. The refusal of service rates increased from five percent in 1996 to 70 percent in 2001 (Wallin et al., 2003).

Recently released data from a subsequent six city expansion of the STAD program has shown that while uptake was good in all cities with very high levels of fidelity in implementation, the serving practice or alcohol-related harm did not change (Andreasson, 2011). What might have been different about the original STAD trial? It started from an extremely low baseline where police only ever went to licensed venues when they were called, normally to break up fights that could not be handled by security. The concept of responsible service of alcohol was almost non-existent, with pseudo-patron studies showing that in the initial round of observations, 95 percent of bars would serve an actor portraying heavily intoxicated behaviour who had staggered to the bar, had problems sitting down or standing at the bar and had fallen asleep briefly before attempting to order the beer. The improvement to only 47 percent (Wallin et al., 2002) of bars still serving these intoxicated individuals still represents a basic failure of RSA (Wallin et al., 2002). Starting from such a baseline, virtually any intervention would be likely to see an improvement. This means that while the measures outlined in the STAD project may be highly effective given the low baseline RSA practice, they are unlikely to have as much impact on an environment where RSA, enforcement of alcohol laws, and decreased alcohol-related problems due to community pressure have been in place for some time.

17. Community-led sales restrictions

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓

In a very different version of a community led measure, community leaders in Western Australia's Fitzroy Valley identified in 2007 problems with violence and dysfunction in their communities, particularly relating to alcohol abuse and suicide. They decided to take action. The senior women in the community held a meeting to discuss the alcohol issue, and launched a campaign to restrict the sale of alcohol from the takeaway outlet in the Fitzroy Valley (Australian Human Rights Commission, 2007). By the end of 2007, the Director of Liquor Licensing released his decision, which involved restrictions on the sale of packaged liquor. The restriction read:

> The sale of packaged liquor, exceeding a concentration of ethanol in liquor of 2.7 percent at 20 degrees Celsius, is prohibited to any person, other than a lodger (as defined in s 3 of the Liquor Control Act).

The effectiveness of the restriction was evaluated with police identifying a 23 percent increase in reports of domestic violence after the first 12 months of restriction although the level of harm had decreased (Kinnane

et al., 2009). The women's refuge reported a 25 percent decrease in the number of women seeking support. Police reported a 28 percent reduction in the average number of monthly alcohol-related tasks attended to by police. The average number of alcohol-related emergency department presentations decreased by 36 percent and the number of unconscious persons being brought in for treatment decreased substantially.

Further, in 2009 the Director of Liquor Licensing announced that the same alcohol restrictions would be applied to Halls Creek. In addition to the restriction on alcohol-strength, the licensee of the Kimberly Hotel in Halls Creek was prohibited from selling and supplying liquor for consumption on the premises before midday on any day except when it is sold with a meal or to a lodger. Following the restrictions, it was found that there was a significantly lower number of alcohol-related incidents between June 2009 and May 2010 reported to police (Kinnane et al., 2010). The number of drink driving charges significantly dropped, and reports of violence to police fell by 16.5 percent in the 12 months after the restriction was imposed. Since the introduction of the restriction, the total number of reported assaults in the town has decreased by 32 percent and the number of alcohol-related assaults fell by 36 percent. Domestic violence reports decreased by 25.9 percent and alcohol-related sexual assault reports fell by 46 percent. Alcohol-related presentations to the Halls Creek hospital dropped by 40 percent after the restriction.

Comprehensive community-led interventions addressing alcohol have shown some promise, although those resulting in mandatory restrictions appear to have more meaningful effects. While those projects exhibited impressive achievements they were often motivated by a very poor situation and had a bottom line of no interventions. This makes it difficult to extrapolate those findings to the current situation where all Australian states have substantial measures in place governing alcohol consumption and licensing. Finally, it is important to note the role of enforcement within all of these models and the priority given to ensuring appropriate statutory and law enforcement support.

18. Consequence Policing

Intervention type:	**Reduce harm**
Societal level:	**Societal**
Available evidence:	**Literature/Delphi**
Effectiveness rating:	**Literature: ✓✓**
	Delphi: **

The owner/stakeholder of this intervention is the New South Wales Police Force (Newcastle City LAC). The consequence policing strategy is all about changing police behaviour to change offender behaviour. It uses legislative options to provide consequence for poor behaviour. The intervention involves taking immediate action for anti-social offences. It suggests that rather than using cautions when a person engages in behaviour that requires police attention, the person has already committed the offence for which they need to receive their consequence. The intervention aims to make the message clear that if you play up in Newcastle City, you will face consequences. It addresses alcohol-related harm, alcohol-related violence and damage.

Consequence policing in Newcastle is similar to the policing methods adopted in Geelong, Victoria and recently evaluated (Miller et al., in press; Miller et al., 2012b; Miller et al., 2012c). Although not a part of the original *Dealing with alcohol-related harm and the night-time economy* (DANTE) study, towards the end of the data collection period, local Geelong police officers undertook a new campaign (Nightlife 2) which focused on intense policing, and more importantly, using existing fine structures to aggressively hand out fines to individuals who were intoxicated, fighting or engaging in other forms of antisocial behaviour on the street. The increased use of these fines by police, and a subsequent increase in their monetary value, has been associated with a decrease in emergency-department attendances and assaults recorded by police. Although the intervention focuses on a small part of the sources of alcohol-related harm, this intervention has impact. Further, no stakeholders objected to the measure, compared to other interventions, suggesting they may be easier to implement.

19. Developmental prevention interventions

Intervention type: **Reduce demand**
Societal level: **Individual**
Available evidence: **Literature**
Effectiveness rating: ✓

Developmental prevention interventions aim to reduce pathways to alcohol and other drug (AOD) related harm by improving conditions for healthy development in a person's earliest years through to adolescence. The interventions, beginning before birth, aim to reduce drug use motivated by escape from distress, by reducing risk factors such as use of tobacco, alcohol, or other drugs in pregnancy and exposure of children to environmental tobacco smoke. Evidence from small, well-controlled trials indicates that visiting family homes is a feasible approach with disadvantaged families and can reduce risk factors for early developmental deficits, thereby improving childhood development outcomes.

In the United States, savings and returns to government have been estimated across a range of areas at around US$5 for every $1 spent on the program over the first 15 years of the child's life. Many interventions targeting the high school age period focus on reducing motivations for drug use related to conformity, becoming an individual, and self-management. Universal interventions, such as the Communities That Care (CTC) prevention program, have shown reduced adolescent alcohol, tobacco and other drug use and delinquent behaviour in the community (Hawkins et al., 2009). More recent schemes have incorporated harm-reduction information. Evidence from an Australian trial shows reductions in alcohol use and misuse after two years (McBride et al., 2004).

In general, prevention programs seem more successful when they maintain intervention activities over several years and incorporate more than one strategy. Developmental prevention programs are unlikely to be adequate as a stand-alone policy to reduce population harm related to substance use, particularly for substances such as tobacco where the burden of harm falls late in life.

20. Drink Safe Precincts

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Literature/Delphi**
Effectiveness rating: **Literature: x**
Delphi: **

Drink safe precincts combine local, state, industry and community resources to reduce alcohol-related violence. Their approach is to deliver coordinated plans that have been adapted to local contexts. A trial of this was undertaken across three Queensland sites from 2010–12. The key components were:

- increased and high-visibility policing;
- enforcement of liquor licensing laws;
- providing support, rest and recovery services; and
- coordinating venues, police, ambulance, community support services and transport providers.

Some additional strategies in some trial sites and not others were:

- improved taxi zones and supervision;
- improved transport information;
- improved lighting and other crime prevention initiatives, such as measures to reduce crowding and footpath queuing; and
- efforts to increase access to public toilets.

The Queensland trial was evaluated after 14 months and again at 18 months. Both evaluations concluded that there were some aspects of improved community safety and reduced alcohol-related violence. This was not evident in the data. In other words, positive conclusions were not based on the data supplied. Further, as noted by the Queensland Audit Office (Queensland Audit Office, 2013) in their report on Drink Safe Precincts, the evaluation of the trial was designed in a way that did not allow for changes in alcohol-related violence and community safety to be attributed to the trial itself. Specifically, the report concluded that the trial was poorly planned, implemented and evaluated, rendering the efficacy of this intervention unknown.

21. Drug Detection Dogs

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

Drug detection dogs are trained to actively seek out drugs in all environments. The dogs are trained to indicate the presence of drugs no matter the quantity. The dog's proficiency is maintained through continued regular training in workplace environments.

22. Drunk Tanks

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

This intervention is owned by the police. Individuals who are intoxicated and unruly are sent to a sobering up centre for the night and are fined. Implementing this intervention has been ad hoc in many cities, and it has not been systematically or independently evaluated.

23. Dry or Alcohol free zones

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓

Several different models exist of 'alcohol-free zones'. This report refers to those surrounding entertainment districts, rather than 'dry area alcohol bans' used in communities with more endemic social problems. Alcohol-free zones have been in place in most cities in Australia around entertainment districts. They allow greater control of the streets by law enforcement personnel and venue security. In particular, they allow security personnel to move-on anyone drinking in front of establishments and allow police to identify and (in some cases) fine those who break the law. They have also resulted in less glass on the streets, most probably decreasing the amount of available weaponry in the case of altercations. Alcohol free zones, or 'dry' zones, are designated public areas within which it is illegal to consume or carry alcohol (Babor et al., 2010). Such bans are typically installed in areas with high rates of alcohol-related antisocial behaviour, such as city parks (Babor et al., 2010) or sports stadiums (Bormann & Stone, 2001). Although this type of intervention is relatively widespread, little empirical research assesses the effectiveness of alcohol free zones. Bormann and Stone (2001) studied the effect of banning beer at a college football stadium in Colorado in the United States, and recorded reductions in stadium ejections (50%) and arrests (45%). Similarly, Gliksman et al. (1995) found significant reductions in underage drinking, violence, and vandalism following the implementation of dry zones in public facilities such as stadiums, malls, parks and beaches. This study, however, also found that dry-zone

policies take time to yield an effect, and that a minimum period of six months is typically required before any meaningful reductions are observed (Gliksman et al., 1995).

Dry zones are also used in New Zealand, where most of the country's 72 districts or city councils either have permanent alcohol-free zones, or time-restricted alcohol bans (Webb et al., 2004). Results from Auckland, for example, indicate a 12 percent decline in assaults and a 21 percent decline in disorderly conduct over two years (Webb et al., 2004). The free alcohol zone approach was implemented in conjunction with other interventions targeting alcohol-related violence and disorder, and a direct effect is therefore difficult to establish. Finally, other studies have found no effect associated with implementing alcohol free zones. For example, Spaite et al. (1990) reviewed four years (1983–86) of medical incident reports from a major collegiate football stadium in the US. At no time had alcoholic beverages been sold inside the stadium, but before 1985, fans were allowed to bring alcohol into the venue. In 1985, this practice was banned. They found no significant decrease in injury following the implementation of an alcohol ban within a college football stadium during games (Spaite et al., 1990). While some evidence suggests the effectiveness of alcohol dry zones, more research is needed to establish conclusively the usefulness of this type of intervention.

24. Early Intervention Pilot Program

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

ACT Policing owns this program in collaboration with ACT Health. It targets the Australian Capital Territory's youth (under 18 years) involved in alcohol possession/consumption. The Early Intervention Pilot Program, launched on 1 July 2010, was developed to raise awareness of the short and long-term impacts of 'risky' drinking among young people, specifically targeting those young people who are apprehended for consuming, supplying or possessing alcohol. These young people are diverted away from the criminal justice system and offered education on the effects and consequences of underage drinking. Young people who are detected as being significantly intoxicated or where an offence has a significant alcohol-related factor are also offered the diversion service. This is provided by health clinicians from the ACT Health Directorate.

When a case officer identifies a young person who is consuming, supplying, or possessing alcohol or showing signs of intoxication or where an offence that has a significant alcohol-related factor has been committed, the case officer takes appropriate duty of care actions and contacts the parents and/or guardians of the young person. The officer informs the ACT Policing Drug and Alcohol Diversion Team (DADT) and the ACT Health Directorate clinicians of the offence or interaction using the Supportlink Referral Management System. The DADT and the clinicians will notify the child/young person and their parents and/or guardians, in writing, of the:

- details of the offence or interaction the young person had with ACT Policing;
- options provided to the young person on how to deal with the offence or interaction (a choice between a diversion and a caution); and the
- process of diversion and how to comply with the program.

ACT Health clinicians make an initial assessment of the young person at the diversion session to determine if assistance from other services may be indicated, such as counselling, housing, schooling etc. The initial assessment is followed by an education session on the adverse effects of alcohol abuse on a developing body and brain. The clinicians notify the DADT and the case officer of the compliance of the young person with the program. If the young person does not comply with the diversion, the case officer will clear the offence by issuing a caution or proceeding with a relevant charge. Despite the end of funding for the pilot program in 2012, the pilot program was extended by agreement between ACT Policing and the ACT Health Directorate. Police officers will still be able to clear underage drinking offences by alcohol diversion, and ACT Health clinicians will provide the education and information to those young people who are apprehended for underage drinking.

25. Education

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: ✓

Educational programs aim to prevent and/or reduce problematic alcohol-related behaviour by increasing knowledge and understanding of the risks associated with alcohol consumption, and to help develop sensible attitudes regarding alcohol consumption.

One educational program, known as the School Health and Alcohol Harm Reduction Project, was evaluated by McBride et al. (2004) using more than 2,300 students from metropolitan government secondary schools in Perth, Western Australia. The program aimed to reduce alcohol-related harm in secondary school students, and was conducted in two phases over two years. At the end of the program (Lang & Rumbold, 1997b) the intervention students were more likely to be non-drinkers or only drink under supervision than the comparison students. Seventeen months after the program, the students from the intervention group were far less likely to drink risky amounts of alcohol than were the comparison group.

Many reviews have been conducted to determine the effectiveness of education initiatives, with each noting a lack of positive outcomes (e.g. Foxcroft et al., 2003). However, the systematic review by the authors indicates that some educational programs show promise including the Strengthening Families Program (Spoth et al., 2001a; Spoth et al., 2001b). They note that culturally focused programs, require further investigation to establish their effectiveness on a larger scale. Within the same review (Foxcroft et al., 2003), the authors note that much of the research into educational programs uses poor methodology, and this needs to be improved by using large-scale randomised control trials or comparative interrupted time series designs.

DrinkWise is an organisation that implements national information and educational programs. Although it implements these programs, adequate descriptions of what is being done and any evaluation of these could not be located, even after communicating with the organisation. Some initial evaluation results were located for some of the programs, however these were only presented in a summarised form, and no methodology or link to a final evaluation report were located. As a result it is difficult to determine whether findings were significant, or the extent of their effects. In addition, the evaluations were conducted by a marketing research company, which is not a peer-reviewed form of evaluation. As a result, the effectiveness of such programs could not be evaluated in this report, however a list of those able to be located is provided in Appendix B. Any intention to evaluate these interventions could not be found.

The goal of education is to inform the public, which means it may not result in behaviour change but may help to build support for policy initiatives that do work. Future evaluations of education programs should keep this in mind when discussing behaviour change of participants.

School Based Prevention—Computer or Internet Based

Many prevention programs for alcohol and drug use have been developed for delivery in schools. Resource limitations as well as the adaptation necessary to deliver in particular school/classroom environments means these programs are often not delivered as intended (Tobler, 2000). Delivery of these programs by computer, or via the internet overcomes these problems, and ensures consistent delivery of programs. A systematic review of the effectiveness of programs delivered in this way discovered that all four of the programs targeting alcohol consumption and delivered in a computer or internet-based format, were associated with reduced alcohol use after intervention (Champion et al., 2013). They also reduced the frequency of binge drinking. However, effect sizes were small to moderate (0.09–0.38). One intervention was found to reduce alcohol-related harms, but only for females at a one-year follow up. Research into education programs delivered in this way is still in its infancy, with only four studies identified in the Champion et al. (2013) systematic review.

Social norms Campaigns

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: **?**

The Social Norms approach is an American model of health promotion that focuses on the way that peer attitudes and behaviour influence young people's own drinking behaviours. The idea is that misperceptions among the social group can be corrected, in turn making the peer environment supportive and safe for the consumption of, or lack of consumption of alcohol (Cook, 2005). In 1999, 20 percent of colleges in the United States reported using Social Norm marketing campaigns. This increased to 50 percent just two years later (Weschler et al., 2004).

The Social Norms approach has recently been evaluated in Australia. The program, known as the Social Norms Analysis Project, was trialled and evaluated in Tasmania, and was funded by the Alcohol Education and Rehabilitation Foundation. Hughes (2008) assesses some initial data from the evaluation. Participants were students from years seven to 10 at four of Tasmania's rural high schools. The students were asked to complete a 51-item survey, which asked about their own alcohol-related behaviours, experience of alcohol-related harms, parental rules, perception of others' alcohol-related behaviours and attitudes, and question about the last time they consumed alcohol. The data collected from this survey is then used to create key messages that are positive and reaffirming. Hughes et al. (2008) reports that misperceptions were present at all four trial sites. Firstly, students significantly overestimated how many people drink alcohol to excess, and secondly, there was a strong positive relationship between students' self-reported rates of alcohol consumption and drunkenness, and their perception of their friends' level of alcohol consumption and drunkenness.

Hughes et al. (2008) reports on the final results of the trial project. Data was collected at three points: time one (mid–2006), time two (first term in 2007) and time three (third term in 2007). Hughes et al. states that at the conclusion of the trial (time two), there were significant decreases in perceived peer drinking rates. This was followed by an increase in perceived peer drinking rates when tested at time three. There were also significant reductions in perceived peer drunkenness at time two, but again this increased at time three. Self-reported drunkenness initially declined from time one to time two, but at time three the proportions reported were similar to baseline. None of the changes were observed at the control school. Thus, although there were many changes observed, particularly from time one to time two, these tended to be short lived and returned to baseline levels at time three.

Alcohol Prevention based on Social Marketing

The principles of social marketing can be applied to alcohol prevention in order to influence alcohol-related attitudes and behaviour. These principles include: customer orientation, insight, segmentation, behavioural goals, exchange, competition, and methods mix. As education has demonstrated little behavioural change, the question arose as to whether using social marketing principles might assist in creating long-term attitudinal and behavioural change (Janssen et al., 2013). A systematic review found six studies that assessed the effect of using principles of social marketing in alcohol prevention programs (Janssen et al., 2013). The authors found that there was a relationship between these interventions and changes in attitudes and behaviours related to alcohol. Due to methodological limitations and variations among the studies, the authors could not assess the overall effectiveness of these programs. Further research is needed to determine whether the effect of programs is due to the incorporation of social marketing principles, or whether the program was having an effect before their inclusion.

26. Energy Drink restrictions

Intervention type: Reduce harm

Societal level: Societal

Available evidence: Delphi

Effectiveness rating: **

This involves reducing the availability of energy drinks at venues, for example through sales, reducing the hours available, or through negative advertising.

27. Enforcement of Liquor Act 2010

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: **

ACT Policing and the ACT Office of Regulatory Services own this intervention in the Australian Capital Territory. The stakeholders are licensees, community, ACT Government regulatory bodies, the Australian Hotels Association (AHA) and Clubs ACT. On 1 December 2010 the *Liquor Act 2010* came into effect, introducing offences for patrons, licensees and employees in relation to children/young people. New criminal offences against licensees and employees included offences for supplying liquor to intoxicated people; promoting liquor which encourages excessive and rapid consumption of alcohol; failing to keep an incident register, and supplying alcohol without an RSA certificate. The Liquor Act also introduced new public order offences to protect employees who refuse service under RSA principles, namely: offences for abusing or threatening staff; failing to leave premises when directed, and consuming liquor in certain public places. Other significant changes from the old Act include:

- introducing a new risk-based liquor licensing framework;
- mandatory RSA training for licensees and their employees;
- crowd controllers working at a licensed premise;
- a new licensee risk assessment management plan to be approved by the Commissioner for Fair Trading which will inform the government about how risks associated with the supply of liquor will be mitigated;
- power for the Commissioner for Fair Trading to impose and vary conditions on a licence at any time;
- emergency power for ACT Policing to close a premises for up to 24 hours; and
- power for the Minister to declare a lockout by regulation.

A review of the *Liquor Act 2010* found non-significant declines in offending patterns in the first year of implementation. Further assessment is required (Mathews & Legrand, 2013).

28. Family-Based Alcohol use Prevention

Intervention type: **Reduce demand**
Societal level: **Family**
Available evidence: **Literature**
Effectiveness rating: ✓

Recently, a Cochrane review (http://www.cochrane.org/) found that alcohol misuse prevention for young people, which is universal and family-based, is effective (Foxcroft & Tsertsvadze, 2011). Such prevention typically takes the form of supporting the development of parenting skills including parental support, nurturing behaviours, establishing clear boundaries or rules, and parental monitoring. Social and peer resistance skills,

and the development of behavioural norms and positive peer affiliations can also be addressed within a family-based preventive program. Most of the studies included in the review reported positive effects of family-based prevention programs on alcohol misuse. However, the evaluations generally had small sample sizes with more than 30 studies failing to find significant effects (Foxcroft & Tsertsvadze, 2011). The authors concluded that the current evidence suggests certain generic psychosocial and developmental prevention programs (the Life Skills Training Program, the Unplugged program, and the Good Behaviour Game) can be effective and could be considered as policy and practice options.

Box 2: The Strengthening Families Program for young adolescents (Bowes et al., 2012)

In the United States, the Strengthening Families Program for Parents and Youth 10–14 was created by Project Family. It consists of a series of research investigations focused on youth and family intervention needs assessments. It is based on the bio-psychosocial vulnerability model (Kumpfer et al., 1990) which proposes that there are key psychosocial risk factors associated with the family, including attitudes and values, that interact with stressors such as financial stress. These family factors are viewed as influencing adolescent adjustment outcomes such as substance abuse.

Several studies have supported the program for its effectiveness (Bowes et al., 2012; Havard et al., 2012). Issues have been noted with the large amount of time and resources required to implement this program, along with its suitability for families 'at risk' rather than 'mainstream families' (Babor et al., 2010). This program was adapted for families in the United Kingdom and has produced some positive initial results (Navarro et al., 2011).

29. Free Water

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: **

This involves venues having free water available to all patrons, ideally on separate stations on the bar. This avoids the need for people to queue with those ordering other drinks and reduces any disincentive to patrons such as feeling that they are asking bar staff for something 'free'. This encourages patrons to drink more water, which has been found beneficial in terms of reducing intoxication and ensuring adequate hydration.

30. Glassware and violence

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓

The presence of glassware in licensed venues has been associated with the severity of assaults, but not with the frequency of violence (Cassematis & Mazerolle, 2009; Forsyth et al., 2010). Past research has also shown that 'glassings' (use of a glass as a weapon) are relatively common in alcohol-related assault cases, with frequency rates of victim injuries due to on-premise attacks with bottles or glasses ranging between 10 percent and 19 percent (Luke et al., 2002; Shepherd et al., 1990). Beer glasses have also been identified as the most frequently used weapon in alcohol-related assaults (Shepherd, 1994) and appear to be the weapon causing the most severe injuries, with glass bottles a close second (Coomaraswamy & Shepherd, 2003; Shepherd, 1998). The evidence relating glassware to alcohol-violence severity is relatively strong and clear.

Forsyth (2008) assessed the impact of banning glassware using observational methods in nightclubs in Glasgow, Scotland. Forsyth found that there was less risk of injury in venues, and that patrons also felt safer.

Specifically, 59 glassings occurred in the year before the ban compared to only five in the six months following the ban. Findings such as Forsyth's have led to some venues replacing glassware with 'toughened' glass (which is harder to break and mostly shatters into thumb-sized pieces when it does) in a bid to counter the severity of glassing and bottle assaults. Research has shown that while glass with higher impact resistance decreased the frequency of unintentional injury (eg bar staff cutting themselves on broken glass), there was no difference in terms of unintentional injury severity between toughened and ordinary glassware (Warburton & Shepherd, 2000). Although these findings only relate to unintentional injury, they still provide an indication of similar effects of toughened glass on the severity of intentional injuries.

In a qualitative study on glassing behaviour and prevention conducted in Queensland, key-informant interviews revealed an emphasis on the efficiency of buss boys ('glassies') in removing empty glasses as a counter-measure to glassing incidents (Cassematis & Mazerolle, 2009). Other suggestions were a changeover from glass to plastic drinking vessels after a designated time (eg 9 pm), using toughened glass, proactive security, or a combination of the four (Cassematis & Mazerolle, 2009).

Some have argued that all glass should be replaced with plastic containers as these do not break as easily, are lighter, and ultimately comprise a less likely weapon to be used in a fight (BBC News, 2003; Cassematis & Mazerolle, 2009), a measure supported by Forsyth's (2008) findings.

Using polycarbonate glassware is a pragmatic and easily-adopted strategy that has been shown to prevent a number of serious injuries in licensed venues. It can be adopted by replacing glassware over time, for example, relevant licensed venues could be required to replace glass within two years of legislation being introduced. New venues could be required to adopt the measure prior to start of business.

31. Good sports

Intervention type: **Reduce demand**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **?**

The Good Sports program was developed in Australian community sport clubs and is free. It aims to reduce alcohol-related harm by encouraging a culture of responsible drinking among players, members and spectators. It is a three-stage accreditation program for the clubs. Stage one focuses on ensuring the club follows liquor licensing laws and that its bar staff are RSA trained, as well as providing smoke-free facilities. Stage two focuses on the availability of alternative food and drink, safe transport and a lack of discounted drink promotions. Stage three involves policy development, review and enforcement. Clubs commit to progressing through the stages in a set time, increasing their commitment to changing practices and policies as they advance (Duff & Munro, 2007).

An evaluation of the program by Rowland and colleagues found that although community sports club patrons are drinking at riskier levels than the general Australian population, less alcohol was consumed in stage two clubs than in stage one clubs (Rowland et al., 2012b). The longer the club has been in the Good Sports program, the less likely that short-term risky alcohol consumption will occur. A further evaluation conducted by the same authors discovered that the level of Good Sports accreditation is strongly associated with lower levels of long and short-term risky alcohol consumption (Rowland et al., 2012a). However, while effects appear positive, it has proved difficult to get widespread uptake across sporting clubs. Without statutory backup, the intervention relies on voluntary uptake and reporting, which presents necessary problems for intervention fidelity and real world impact. Further evaluation of this program is required, especially comparing it to the adequate enforcement of liquor licensing laws.

32. Healthy Sporting Environments Demonstration Project

Intervention type: **Reduce harm**
Societal Level: **Community**
Available evidence: **Literature**
Effectiveness rating: **?**

In 2010 VicHealth funded the Healthy Sporting Environments Demonstration Project. One of its key objectives was for sporting clubs to achieve some minimum standards regarding the responsible use of alcohol, together with other health related behaviours.

The project was implemented over two years across 73 sporting clubs from the Barwon region in Victoria. The minimum standards that the intervention aimed to meet in regard to alcohol were:

- Good Sports stage two accreditation;
- not selling or providing alcohol before midday on match days;
- displaying health promotion messaging of equal weighting or branding as messaging provided by alcohol industry sponsors; and
- offering a choice of:
  - spirits to be sold at an additional 20 percent premium on 2010 prices and full-strength beer to be sold at an additional 10 percent premium on 2010 prices; or
  - only serving beer and spirits with alcohol content of not more than 3.5 percent, and wine in 100ml glasses.

The evaluation of the project (Nicholson et al., 2013) found that the price increase of alcohol did not tend to reduce alcohol consumption or attitudes to consumption, and acted as more of a revenue raising intervention than one to reduce alcohol consumption. The evaluation also found that reaching the minimum standards did not produce any statistically significant change in health and social impacts.

33. High Visibility Security Clothing

Intervention type: **Reduce harm**
Societal level: **Societal/ Community**
Available evidence: **Delphi**
Effectiveness rating: ******

Very little information is available on the use of high visibility clothing for security personnel. However, a substantive literature does document problems associated with wearing black in different situations (Frank & Gilovich, 1988). People usually associate the colour black with evil, aggression and badness. For example, Vrij (1997) found that people expected that offenders and suspects who wore black clothes were more aggressive than those who wore light-coloured clothes. Most licensed venues are dimly lit and if security personnel are to play a preventative role, or patrons are to be able to find them in a time of need, they must be identifiable within a crowd. Furthermore, there is no reason why security personnel should wear dark clothing. This clothing should be worn with identity badges so that patrons can identify security officers in the case of an incident. Australian best practice systems use a numbered badge, where the incident register records which individual is wearing the badge each night.

Other elements that should be included or considered:

- Clothing need not be entirely high visibility and standards can be built into either security plans or set at minimum levels. For example, it could be stipulated that no less than 30 percent of a staff uniform meets Australian AS/NZS 4602 High Visibility Safety Garments Standards.
- Different personnel (eg door staff, RSA marshals and internal security) could wear different coloured high visibility clothing. Ideally, this colour scheme would be regulated to ensure it did not clash with police high visibility clothing.

Issues needing careful consideration when implementing such a project include:

- Employers should provide any high visibility clothing needed for the job free to employees.
- Who is responsible for keeping high visibility clothing clean and in good working order?
- How will these standards be enforced?
- Is there adequate provision for evaluating and reviewing the program at appropriate intervals?

While there is no clear evidence specifically regarding the implementation of mandatory high visibility clothing for security personnel, strong evidence does exist from other areas of policing and social research to suggest this would represent best practice.

34. High Risk Venue designation

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The Director General with the agreement of the Police Commissioner can designate venues in New South Wales as high-risk if satisfied that significant alcohol-related violence or antisocial behaviour exists at the premises. Designated high-risk venues have a series of restrictions placed on them including: no glass; no shots; no ready-to-drinks with more than five percent alcohol; no doubles; only four drinks per customer; 10-minute alcohol time-outs every hour; and no alcohol service 30 minutes before closing time.

35. Holyoake family Alcohol and Drug Programs

Intervention type: **Reduce harm**
Societal level: **Family**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners are Holyoake/Catholic Care in Tasmania and the stakeholders are parents, partners, children all families effected by alcohol and other drug (AOD) problems. Holyoake offers help to all family members, regardless of whether or not the person with the dependency problem seeks help. It recognises the huge impact of alcohol, drugs, gambling and related problems on individual family members and the family as a system. Consequently Holyoake offers a range of programs targeted at all family members. By working with children aged from five years Holyoake aim to reduce the intergenerational transmission of patterns of addiction in families. Parents of adolescents learn skills that help reduce their children's AOD use and potential anti-social behaviour. Internal and external research has been conducted on Holyoake programs. Holyoake's own research shows that in more than 50 percent of cases the user has either stopped using, reduced their use or sought help within the 12 weeks of the family member attending Holyoake group therapy.

36. ID-scanner technology

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **with enforcement ?**
without enforcement x

Using ID-scanners as a security measure at licensed venues is relatively new and untested. Scanner technology can vary from simply recording an image of a patron's ID, through to sophisticated systems. Some can analyse images for their properties and how they compare to legitimate forms of ID, as well as comparing

the image on the ID to a photograph taken of the patron at the same time. The most commonly proposed model is where the scanner records the IDs of all patrons entering a venue and compiles the information in a database that can then be linked to other venues and police using ID-scanners. If a patron presents a fake ID, or is ejected from a venue for disruptive behaviour, his or her name will be flagged in the common database, preventing subsequent access to other venues using ID-scanners (Palmer et al., 2010). Banning orders can be instigated through regulatory frameworks, such as by mutual agreement between venue operators through a liquor accord for example, or can be mandated by a magistrate. Such 'banning orders' are increasingly popular and have become strongly linked to the ID scanner technology. No sites have yet fully implemented the complete system with similar levels of technology across all venues.

Also almost no research exists on the effectiveness of this initiative. In the single study known to the authors on this topic, Palmer, Warren and Miller (2010) examined emergency department records for instances of alcohol-related injuries sustained in the night-life to assess the impact of ID-scanners being implemented in Geelong, Victoria. The article concluded that while many embrace ID-scanners as a powerful countermeasure to alcohol-related violence in the NTE, no evidence could be found in emergency department frequencies to back up this claim. In fact, instances of alcohol-related injuries have steadily increased in the timeframe studied. While it could reasonably be expected that ID-scanners might deter potential offenders inside licensed venues, it is unlikely—due to the spontaneous nature of alcohol-related interpersonal violence—that the frequency of altercations involving intoxicated patrons would be affected. More research is required to make any firm conclusions. Specifically, other data-sources—such as police data and ambulance data indicating location of offence and whether alcohol was involved—should be examined to properly assess the impact, if any, of ID-scanners on violence in the NTE.

Securely storing and protecting patron information is also a serious issue in terms of privacy and confidentiality and should rank among the highest priorities to consider in ID-scanner implementation (Palmer et al., 2010). While many widely believe in the effectiveness of this tool as a security measure, currently no empirical data underpins this belief, and further research and consideration of ID-scanner implementation is needed.

A major positive associated with ID scanners is the increased ability to solve crime in and around licensed venues. Substantial anecdotal evidence shows that ID scanners have been useful in solving criminal acts on the street (in combination with CCTV) and inside licensed venues. It may be that the identification and incarceration of violent criminals will lead to longer-term reductions in offences committed, although this is dependent on effective follow-up mechanisms that remove offenders from the street. It is likely different law enforcement regimes and resourcing levels will impact heavily on the effectiveness of ID scanners. In this context, however, the benefit of using ID scanners to solve crime is worth considering in any policy frameworks.

Without proper regulations in place to protect consumers, there is a very real chance that ID scanners can be used inappropriately. Until that regulation is in place, they do not constitute best practice. Given appropriate controls around privacy and assuring informed consent of patrons, ID scanners have the potential to help with solving alcohol-related crime and reducing underage people entering licensed venues. The potential to prevent alcohol-related harm remains unclear, although there is clear benefit for licensed venues in being able to accurately identify known troublemakers.

37. Individualised Control of Drinkers

Intervention type: **Reduce harm**
Societal level: **Individual**
Available evidence: **Literature**
Effectiveness rating: **?**

Placing bans on specific individuals to prevent them from purchasing alcohol or drinking in specific places is known as individualised control of drinkers (Laslett et al., 2011). Such bans can be imposed by the courts, police or by alcohol sellers. This strategy to reduce harm has a long history with minimal evaluations to

determine its effectiveness. Sweden, Finland and Ontario all had individual controls in place from the early to mid 1990s. In each case, specific controls were included, such as requiring a type of tracking book or permit to monitor the purchase of alcohol. Although no specific evaluation of this particular measure was undertaken, Norström (1999) notes that after the abolition of the Swedish controls, total alcohol consumption rose, and indicators of heavy drinking, such as number of liver cirrhosis cases, also increased. In recent times, individualised control systems have started gaining strength, particularly in Australia and the United Kingdom (Laslett et al., 2011). In 2011, Western Australia developed a 'barring notice' which allowed senior police officers to ban disorderly drinkers from particular pubs and nightclubs for up to one year. Alice Springs and Katherine in the Northern Territory, require that anyone who purchases takeaway alcohol show their electronic photo identification so the seller can check whether the person is on a prohibition notice or has had restrictions placed on their purchase of alcohol as part of criminal proceedings (Shakeshaft et al., 2012).

It is not known whether the re-introduction of individualised control of drinkers would result in a reduction of alcohol-related harm, as minimal evidence exists for the effectiveness of such controls. As Room (2012) points out, introducing these controls may result in people feeling as though their privacy is being invaded, and that they are being stigmatised and marginalised for their alcohol purchases.

38. Liquor accords in indigenous communities

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners/stakeholders of this intervention are the licensees. Liquor accords are developed in catchment areas of discrete Indigenous communities to help avoid undermining alcohol management plans. Strategies are voluntary and include licensees making individual decisions to ban patrons from geographical areas for various reasons including sly grogging in discrete Indigenous communities; notifying police in those communities of large sales suspected to be intended for sly grogging; bulk sales; and restricted area sales registers. Within a catchment licensees also contribute to harm minimisation strategies and cooperate with the Queensland Police Service, the Office of Liquor and Gaming Regulation (OLGR) and other stakeholders.

39. Liquor Advisory Board

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: *****

Owners/stakeholders are the Australian Capital Territory's Commissioner for Fair Trading, ACT Policing, the Australian Hotels Association (AHA), business and community sectors and Aboriginal and Torres Strait Islander representatives.

Established under part 15 of the *Liquor Act 2010*, the liquor advisory board advises government about matters associated with the Act's operation. One board member is appointed to represent each of the following groups: the Australian Federal Police; liquor consumers; small business; Clubs ACT; Aboriginal and Torres Strait Islander people; and the AHA (ACT Branch). The Commissioner for Fair Trading chairs the board.

40. Liquor licence application Interventions/Objections

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners/stakeholders of this intervention are the Western Australia Police Liquor Enforcement Unit (LEU)/ general public of Western Australia. The unit has responsibility from the police commissioner to assess all liquor licensing applications under the provisions of the *Liquor Control Act 1988*. On assessing the application it may either intervene or object to the application. With an intervention only, the LEU will request that conditions are placed on the licence to reduce harm. These can relate, but are not limited to, drink restrictions, serving practices, security including CCTV, and trading hours. In an intervention/objection, the unit will claim that the licence should not be granted but that if it is, then conditions should apply. These would be similar to what is asked for in interventions only, but could include more specific conditions tailored to that particular application. This intervention aims to reduce harm caused by alcohol. No evaluations of effectiveness have taken place, but the intervention process is very successful in having conditions placed on licences.

41. Liquor restricted area s 175(1a) Liquor Control Act 1988

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners/stakeholders are the Indigenous group that owns the community as well as government agencies including the Western Australian Drug and Alcohol Office and Department of Racing Gaming and Liquor. An Indigenous community can apply to the Minister for Racing Gaming and Liquor for their community to be declared a restricted area. Once declared, it is unlawful to take liquor into the community and or to consume it in the community.

42. Liquor restricted premises s 152P Liquor Control Act 1988

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The owners of the intervention are the owner/occupier of the specific premises, as well as local police and other government agencies in Western Australia. Under the provisions of s 152P, the owner/occupier of premises may apply to the Director of Liquor Licensing to have the premises declared as liquor restricted. Once declared, it is unlawful for anyone to take liquor onto the premises until the declaration expires or is revoked. Local police and/or government agencies usually support applicants with submitting their application.

43. Lockouts

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **x?**

Lockouts, curfews or 'one-way doors' involve venues having a designated time of night after which no more patrons can enter licensed venues. The venue may still operate until close, and serve drinks to those patrons already in the establishment, but no new customers are allowed in after the lockout time (eg 2 am or 3 am). This approach is based on the rationale that much of the alcohol-related violence in the night-life is due to the movement of people between venues during early morning hours (Graham & Homel, 2008). Lockouts are mostly aimed at reducing the number of people engaging in the relatively popular practices of 'pub-crawls' and 'club-hopping' (Graham & Homel, 2008), although recent justifications have also focused on simply reducing foot traffic late at night. Lockouts have traditionally been applied to whole cities or entertainment districts, but they may be applied to single venues. This has been found effective as a part of a suite of measures particularly relating to venues with consistently high rates of alcohol-related harm in New South Wales (See intervention 81).

Lockouts have mostly been used within Australia (Palk et al., 2010), but the initiative has also been implemented in New Zealand and Scotland (Bleetman et al., 1997). Research examining this type of intervention is limited, generating ambiguous results at best. Trials have been conducted without evaluation, and data is normally extremely limited.

The most recent evaluations of lockouts have both come from Newcastle in New South Wales. Kypri et al. (2014) compares Newcastle and the neighbouring suburb of Hamilton. Both entertainment districts had lockouts, but only Newcastle had restricted trading hours. No evidence indicated that lockouts had any impact on alcohol-related assaults. Using qualitative data, Miller et al. (2014b) found that lockouts can impact negatively on smaller bars and those that trade earlier, because patrons chose to go to venues offering the most options for entertainment and socialising. While both studies were part of a multi-pronged intervention, they each reported potential negative consequences associated with lockouts and found no evidence of them having any positive impact.

Another study on lockout interventions within Queensland in 2004 (Palk et al., 2010) examined the effectiveness of a five-week trial lockout at 3 am using first response (general police) data. During the lockout trial period, the number of street disturbances reduced significantly (12.3% reduction) as well as sexual assaults (33.7% reduction). No significant declines were found for general assaults, property damages, or stealing. While these results initially seem promising, a major limitation is the extremely short evaluation period of only five weeks, making conclusions speculative at best. A particular problem of this study, and most studies published thus far, is the inability to control for levels of police activity. It has been demonstrated several times that high levels of street policing, especially when it adopts a zero-tolerance approach to anti-social behaviour, is effective in reducing alcohol-related assaults and injuries (Miller et al., 2014a; Miller et al., 2012c).

In another example, a temporary 2 am lockout was set in Melbourne for three months during 2008, affecting 487 licensed venues (KPMG, 2008). The main aim was to reduce alcohol-related violence and disorder. Results indicated decreases in assaults in the affected areas ranging from five percent to 36 percent when compared to the three months immediately preceding implementation. Within these results, however, increases in assaults were noted between 12 and 2 am, and 2 and 4 am (KPMG, 2008). Limitations to this study largely revolve around data specificity and research design. For example, a major concern involves the fact that a large part of the data used for evaluation (emergency department data) comprised all alcohol-related incidents (assault, DUI, intoxication, etc) across all metropolitan areas in Melbourne without specifying which cases were assaults, and which cases were linked to venues included in the lockout intervention. Adding further complication, a third of the venues within the entertainment district were excluded from the study and allowed to maintain their original mode of operation with patron re-entry permitted throughout business hours. This compromised the ability of the trial to assess the impact of the intervention. A clear

picture of intervention effects on the main outcome variable (alcohol-related violence in the NTE) is extremely difficult, if not impossible to ascertain (KPMG, 2008).

An evaluation of the lockout in Ballarat (Victoria) used police data for the 12 months before and 12 months after the lockout (Molloy et al., 2004). It found that the number of assaults within licensed premises decreased (47.5%) as did those in public places (33.3%). Overall property damage outside of licensed premises also decreased (17.3%) but property damage to licensed premises increased (25%). Again, these results seem promising, but the decreases in assault and property damage actually began six months before the implementation of the lockout. At the same time, Ballarat police increased its presence in the CBD on weekend nights as well as liaising regularly with venue operators, security personnel, and patrols in both marked and unmarked police vehicles (Molloy et al., 2004). Lastly, using police data is problematic as only 34 percent of alcohol-related assaults are typically reported (Laslett et al., 2010). In an attempt to counter these issues, Miller, Coomber, Sonderlund and McKenzie (2012a) evaluated the long-term effect of lockouts on alcohol-related attendances at Ballarat's emergency department using the frequency of alcohol-related injuries. They discovered there was no long-term impact as a result of the intervention, apart from shifting injury attendances at the emergency department to later at night.

Bleetman et al. (1997) evaluated Operation Blade in Glasgow, Scotland, which aimed at reducing knife crime. The intervention included a midnight lockout policy as well as a reduction in licensed venue trading hours from 3 to 2 am. The evaluation measured emergency department assault presentations. Results indicated a 19 percent reduction in assaults for 10-months following implementation, but this apparent success was ultimately attributed to the increased police presence in the NTE following implementation of Operation Blade. Further, the ten-month decrease precipitated an eventual increase in assaults which then surpassed pre-intervention rates, indicating a decay of intervention effects (Bleetman et al., 1997).

Based on the findings reported above, the balance of the evidence suggests that precinct-wide lockouts are ineffective in reducing alcohol-related harm in night-life districts, and are associated with some negative consequences. However, a more general need remains to evaluate the use of lockouts. For example, different lockouts have not been compared to each other and no work has been done on what time of night would be most effective. Based on the most recent evidence regarding intoxication levels in Australia across the night (Miller et al., 2014c), the strongest logic would be for lockouts which started at midnight. Further research is needed which focuses particularly on venue-level lockouts.

44. Mandatory Treatment

Intervention type: **Reduce harm**
Societal level: **Individual**
Available evidence: **Delphi**
Effectiveness rating: ******

The Northern Territory government owns this intervention. The client group is predominately Indigenous. The police are stakeholders, as repeated episodes of protective custody are a trigger. Refer to NT Department of Health website and the territory's *Alcohol Mandatory Treatment Act 2013.*

45. Multi Agency Liquor Taskforce (MALT)

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: *****

Owners/stakeholders in the Australian Capital Territory are ACT Policing, ACT Office of Regulatory Services (Liquor, Transport, Worksafe), ACT Fire Brigade, ACT Ambulance, ACT Health, ACT Gambling and Racing Commission, AHA, Clubs ACT and Canberra CBD Limited. ACT Policing established the monthly MALT

meetings in 2011 to bring together government agencies and internal portfolios with either a regulatory responsibility in the operation of licenced premises, or a vested interest in reducing the impact of alcohol-related harm to society. The goal is to provide a platform between government organisations that promotes information-sharing, stimulates problem-solving and drives the development of multiple strategies that will positively impact on the complex issue of alcohol-related harm within the community. As an extension to the original intent of the MALT, industry stakeholders now also attend every third meeting of the taskforce to inform and provide advice on issues and to help develop effective strategies.

46. No sale of shots or strong mixed drinks

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: **

No sale of shots, mixed drinks with more than 30 ml of alcohol, ready mixed drinks stronger than five percent alcohol, and more than four drinks to any patron at one time from 10 pm.

47. Operations alcohol-related violence

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: **

The owners are the NSW Police Force and the stakeholders are the New South Wales public. Police crews are rostered to proactively target, address and deter alcohol-fuelled violence. Police are also walking from licensed premises to licensed premises interacting with staff and patrons to stop the problems before they occur. To ensure RSA compliance police also enforce licence restrictions.

48. Outlet Density

Intervention type: **Reduce supply**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: ✓✓

The third major way to reduce alcohol availability in the community and its associated harms is by reducing the density of licensed premises where alcohol can be bought. Previous research has demonstrated positive correlations between alcohol outlet density and aggravated assault (Livingston, 2008), domestic violence (McKinney et al., 2009), and rape and homicide (Britt et al., 2005). Britt et al. (2005) reports that an addition of one alcohol establishment to a neighbourhood which has the average observed density of alcohol outlets, would result in an increase in the number of violent crimes in that neighbourhood by 5 per 1,000 capita per year. Despite the apparent robustness and clarity of these relationships, it is qualified by factors such as a community's socioeconomic status, as well as the particular prevalence of different types of alcohol outlets. For example, while Gruenewald et al. (2006) found a positive general relationship between alcohol outlet density and violence rates, this association was shown to be conditional on other factors such as high population density, low socioeconomic status, and type of alcohol business. The quantity of off-premise alcohol stores, for instance, was significantly and positively correlated with assault rates, whereas bars were not.

In a similar study of outlet quantity and violence rates across 581 area codes in California, positive correlations were established between violence and density of bars and off-premise alcohol retail shops. At the same time a negative association was found in relation to restaurants (Gruenewald & Remer, 2006). This association

between type of outlet and rates of violence, was uncovered in greater detail by Livingston (2008) who established a consistent positive correlation between the density of off-licences (off-premises) and violence in suburban areas, and on-premise licences and violence in inner-city and inner-suburban areas. Liang and Chikritzhs (2011) investigated the relationship between the number of on-site and off-site licensed outlets and number of assaults at both residential and licensed settings in Western Australia. On-site outlets referred to those outlets with set trading hours, or a requirement to sell alcohol as an accompaniment to food. Off-site referred to liquor stores that were restricted to selling packaged liquor. They found that, after accounting for the average amount of alcohol sold by those premises, the amount of alcohol sold per off-site outlet was associated with increased interpersonal violence in residential settings and on-site outlets. Numbers of on-site outlets was a significant predictor of assaults.

Other research again, adds further nuances to the relationship between violence and the density of alcohol outlets. It has been found that alcohol-fuelled domestic violence sometimes occurs at a higher rate in an area with fewer alcohol outlets, than in a district with more such businesses (Block & Block, 1995). In the latter case, it was discovered that certain licensed premises were hot-spots for violence—a conclusion that supports the idea that factors (clientele, establishment type and community characteristics) other than outlet density also have a potentially significant effect on violence related to alcohol outlets (Block & Block, 1995). This study is comparatively old and its methodologically lacking.

A review of studies investigating the relationship between the density of alcohol outlets and excessive alcohol consumption and alcohol-related harms, discovered that seven of nine studies found positive relationships between changes in alcohol outlet density and consumption and related harms, particularly interpersonal violence (Bellis & Hughes, 2011).

The type of alcohol outlet and various community features, including resident density and socioeconomic status, appears to interact to either facilitate or moderate the link between alcohol outlet density and violence. This reveals the complexity of the association between these factors, and shows that special attention should be given to specific environmental details when interpreting results related to this particular topic.

There appears to be no evidence on the impact of actually reducing the number of licensed venues selling alcohol, primarily because there have been few, if any, instances of this happening. A program of buying back liquor licences in the community, for example, might be one way to reduce outlet density. Such a program is currently under way in Alice Springs, but it is early in its implementation and the impacts are unlikely to be evident in the immediate future.

49. Patron dispersal

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **?**

Past research has found that the number of people lingering on premises at closing time was associated with increased risk of aggression. Very little research exists specifically on patron dispersal. Graham et al. (2006a) observed in Canada that people were more likely to leave peacefully if they had nothing left to drink. This would indicate the importance of bar closing guidelines, such as last calls at a designated time (eg 45 minutes) before closing, allowing patrons to finish beverages bought prior to a venue closing.

50. People Management by Pedestrianising

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

This involves manipulating the environment to reduce crowding. For example, pedestrianising areas around premises, placing food outlets on the outskirts of drinking areas, and encouraging a mixed night-time economy.

51. Pharmaceutical treatments

Intervention type: **Reduce demand**
Societal level: **Individual**
Available evidence: **Literature**
Effectiveness rating: **Naltrexone: ?**
Acamprosate: ✓

Naltrexone

Naltrexone is a pharmacological product that acts to reduce alcohol consumption and craving, and is used for those with alcohol dependence. It can be taken orally, or inserted via an implant due to problems with those with alcohol dependence taking the medication orally.

A systematic review of the efficacy and safety of naltrexone found that short-term administration significantly reduced the relapse rate, however there was not enough data to determine its efficacy over longer periods (Carmen et al., 2004).

A systematic review of the effectiveness of Naltrexone implants for reducing alcohol dependence located two studies which investigated the use of Naltrexone in double-blind, placebo-controlled trials (Lobmaier et al., 2011). Both studies found that participants reported reductions in alcohol consumption. However, the review's authors note that in both these studies the participants in the experimental and control groups both received psychosocial counselling which may have confounded the results (World Health Organization, 2010).

Acamprosate

Acamprosate is a pharmacological product that also acts to reduce alcohol cravings.

A systematic review conducted by Carmen et al. (2004) on its efficacy and safety found that it was associated with significant improvement in abstinence rates and days of cumulative abstinence. The review concluded that it would be useful to use in conjunction with a therapeutic approach targeted at abstinence.

52. Planning assessment process Changes to liquor licences

Intervention type: **Reduce supply**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

The City of Greater Geelong in Victoria owns this intervention. Its stakeholders include Victoria Police, Department of Justice (local Geelong office) and internal City of Greater Geelong departments. The intervention changed the way in which the council assesses liquor licence applications. Firstly, applications

for new or revised licences are assessed by the Community Development Department, which then runs the internal referral process. Secondly, statutory planning refers all liquor-related planning permits to the Community Development Department. This department has developed close relationships with internal stakeholders, Victoria Police and licensing enforcement officers. The intervention attempts to provide a more rigorous assessment of liquor licence applications, in particular, impacts on amenity. It ultimately limits outlet density.

53. Preparing Youth and Parents for Night-life

Intervention type: **Reduce harm**
Societal level: **Societal/Family**
Available evidence: **Delphi**
Effectiveness rating: **

This involves providing youth and their parents with information about the harms associated with night-life.

54. Purchase Age restrictions

Intervention type: **Reduce supply**
Societal level: **Societal**
Available evidence: **International peer reviewed**
Effectiveness rating: ✓✓✓

Alcoholic beverages are easy to obtain in most of Australia. One avenue for reducing alcohol availability in the community, particularly for young people, is to establish or increase the Minimum Legal Purchase Age (MLPA). In a review and analysis of the effects of changes to the MLPA from 1960 to 2000, Wagenaar and Toomey (2002) examined 241 empirical studies on the subject. Of those with high methodological quality (56%), 33 investigated the effect of the MLPA on alcohol consumption, 79 looked at the MLPA and traffic crashes, and 23 related to miscellaneous social and health problems including violence. The studies found an inverse relationship between the particular outcome variable ie car crashes, and an increase in the MLPA (33%, 58 %, and 34 % respectively). All of the remaining studies bar one, found no effect. Thus, with the exception of a single piece of research, all of the statistically significant results obtained in the comprehensive range of literature reviewed supported a negative correlation between the MLPA and the particular outcome variables. Although, many of the results demonstrated small statistical effect sizes, the practical outcome of, for example, increasing the MLPA to 21 years, involved preventing an estimated 846 deaths on highways in the United States in 1997 (Wagenaar & Toomey, 2002). While most of the studies reviewed by Wagenaar and Toomey were North American, the negative correlation between MLPA and alcohol consumption and related harm, has also been found in other countries, such as New Zealand (Kypri et al., 2006) and Denmark (Møller, 2002).

Plunk, Cavazaos-Rehg, Bierut and Grucza (2009) investigated the persistent effects of MLPA laws on drinking patterns later in life and found that the ability to buy alcohol before the age of 21 did not tend to increase overall drinking frequency, however it was associated with more frequent binge episodes, and less frequent non-heavy drinking. A change in MLPA from 21 to 18 years has been estimated to be associated with a 20–33 percent increase in alcohol consumption and a 10 percent increase in fatal traffic accidents for adult males (Kaestner & Yarnoff, 2011). In Australia, Smith and Burvill (1987) compared both South Australia and Western Australia to Queensland after they reduced their minimum legal purchase age from 20 and 21, respectively to 18. They found that reducing the legal drinking age resulted in an increase in male juvenile crime by 20–25 percent compared with state-control groups of the same age. Strict enforcement of a given legal drinking age is also required to obtain and preserve the desired result (Forster et al., 1995; Grube, 1997). For maximum effect, age limits must be enforced by police and bar staff. Although, some groups such as college students have been shown to resist age restrictions (Martinez et al., 2009), such adverse consequences are typically greatly outweighed by the benefits identified elsewhere (Wagenaar & Toomey, 2002).

Box 3: Reducing access to alcohol for young people under age 18 program

A research partnership between Victoria's Deakin University and Communities That Care Ltd is developing and testing an intervention to check the compliance of retailers with minimum age laws for alcohol sales. Purchase attempts are monitored for a young person who looks to be under the legal age for alcohol purchase. Retailers receive information about the purchase attempt and the law.
This strategy is supported through media stories and public information. In subsequent years the strategy may be expanded to discourage other community practices that increase the availability to minors, including secondary supply (adults buying and providing alcohol to minors), and the promotion of child-friendly alcohol products such as the discounting of alcopops (premixed sweetened alcohol products).

Evaluation Evidence
Evidence shows that enforcing liquor laws can increase compliance with minimum age laws. In the United States, an intervention to increase retailer compliance with underage sales laws used a strategy of compliance checks coupled with media advocacy to deter retailers from selling alcohol to minors (Scribner & Cohen, 2001). The evaluation found substantial gains in compliance (51%) among retailers who were issued with citations for failing compliance checks. Gains were also made in compliance for those who had not been cited (35%).

55. Police interventions

Targeted

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓

See below.

Random

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓

Most police interventions are based on highly visible enforcement of drinking laws in and around licensed premises, and are either targeted at certain problematic establishments or at random in the community. This approach falls into the main strategies of 'randomised' and 'targeted' enforcement interventions (Graham & Homel, 2008).

Randomised enforcement interventions are exemplified by studies such as the Torquay (UK) experiment (Jeffs & Saunders, 1983), the Brighton (NZ) (Stewart & Casswell, 1993) and Sydney (Burns & Coumarelos, 1993) replications, and the Wellington (NZ) enforcement experiment (Sim, 2005). The central approach of these interventions emphasised random and visible police visits to licensed premises. The Brighton and Wellington initiatives also included police cooperation with other community bodies such as the liquor industry, licensing authorities, and public health. Although the Sydney and Wellington replications had no measurable impact, the Torquay and Brighton projects had positive effects on alcohol-related arrests as well as on the relationship between hospitality staff and police. In Brighton, a 14 percent decrease in alcohol-related assault was detected, while in Torquay alcohol-related arrests decreased significantly ($p<0.005$). Improved RSA practice was also observed. While these findings were promising, the effect sizes were generally small and the overall impact decayed rapidly after the intervention (Jeffs & Saunders, 1983; Sim, 2005; Stewart & Casswell, 1993). Compared with randomised policing, targeted police enforcement has yielded better results. Two particularly promising strategies deserve special attention—the Australian Alcohol Linking Program (Wiggers et al., 2004) and the Welsh Tackling Alcohol-related Street Crime Project (TASC) (Maguire et al., 2003).

The Alcohol Linking Program ran in New South Wales over nine years. It focused mainly on assessing licensed premises for alcohol-related crime rates linked with specific venues. The project identified the last place of drinking of any intoxicated offenders apprehended by the authorities, allowing police to locate potential problem venues. Importantly, significant effort went into ensuring that police filled in the relevant forms. Once a drinking establishment had been linked to a certain number of alcohol-related crime incidents, the licensee was informed of their 'performance' compared with other venues. Police then audited the premises to determine whether it delivered an appropriate level of RSA. The licensees were invited to a police workshop to discuss proper alcohol service and management (Wiggers et al., 2004). Over three months, this course of action was associated with a 36 percent drop in alcohol-related criminal incidents in the experimental community compared to a decrease of 21 percent in the control area ($p<0.08$). Further, assault-rates declined by 32 percent in the experimental community compared to a 25 percent reduction in the control region (Graham & Homel, 2008; Wiggers et al., 2004).

The TASC project was a multi-component enterprise. It included targeted policing of confirmed problem venues, local council lobbying to influence alcohol policy as well as an extensive media focus on alcohol-violence, RSA training for hospitality staff, and rehabilitation therapy for repeat offenders (Maguire et al., 2003). The project also included establishing a licensee forum to foster organised dialogue between licensees as a group and regulatory authorities (Maguire et al., 2003).

The evaluation of TASC found an eight percent decrease in the rate of violent incidents, although these results were qualified by several assumptions related to crime rates in other parts of New South Wales. Overall, most of the TASC project results were inconclusive and limited by flaws in the research methodology such as the lack of a comparison site as well as a relatively short project timeframe. The reportedly sceptical reception of the program by the local council greatly impeded hope for progress and results. Some elements of the program did seem to decrease violence. These included a combination of targeted police enforcement, graphic presentations of alcohol-violence injuries to managers of problematic establishments, and a police warning that an audit of the given venue would be published in six months (Graham & Homel, 2008; Maguire et al., 2003).

Considering the small body of literature available, the overall efficacy of police interventions ranges from the generally modest and unsustainable effects obtained in randomised interventions, to the more extensively researched and comprehensive targeted approach. The Alcohol Linking Program is far and away the most promising evidence-based police method of curbing alcohol-related harm in and around licensed premises. It has been permanently adopted by some other Australian states and territories as well as by New Zealand police (Graham & Homel, 2008). The TASC project also provides extra support for the potential of a targeted police enforcement approach.

56. Precinct Ambassadors

Intervention type: **Reduce harm**
Societal level: **Societal/ Community**
Available evidence: **Delphi**
Effectiveness rating: *****

Precinct Ambassadors are non-police personnel tasked with the governance of streetscapes around licensed venues. Their level of training and statutory authority varies. At one end of the spectrum, off-duty police can be paid to patrol areas. This option is discussed below. Police are an expensive option and although employing off-duty police has many benefits, a range of alternative options may be considered. These include employing licensed security guards or council laws officers, through to employing purpose-specific trained government officers such as the Victorian 'Protective Services Officers', who carry some statutory authority, without being fully trained police officers. Ambassadors fulfil a public support role such as helping people

to access transport, calling for medical attention and summoning reinforcements where necessary. With a helping brief, they are also able to intervene in potentially negative events very early on without becoming physically involved. Just the presence of ambassadors may deter antisocial behaviour, but ensuring good contact with local police services will enable early intervention in potentially escalating incidents.

These programs are based on the rationale of ensuring that public spaces are obviously governed and people in these spaces will be held accountable for their actions. This approach fits well with criminological and governance literature in that people are more likely to observe rules when being observed. While trials have been conducted in several cities (eg Auckland, New Zealand, including one currently under way in Sydney), no evaluation of these projects has been published.

57. Price including Excise and Taxation

Intervention type: **Reduce demand**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: ✓✓✓

Studies have demonstrated that increasing the price of alcohol is directly associated with a reduction in acute and chronic health concerns, accidents, crime and violent incidents (Brennan et al., 2009). With a broad and international body of supporting research, excise taxation appears to be the most successful alcohol policy in terms of cost-effectiveness, reductions in level of consumption, and overall social benefit (Babor et al., 2003). Numerous studies have firmly established a negative correlation between alcohol price and general use (Babor et al., 2003), violence (Cook & Moore, 1993; Matthews et al., 2006), injury (Gray et al., 1999), and traffic accidents (Adrian et al., 2001). This applies across gender and age, socioeconomic status and geographical location.

For example, in a British study on how the real price of beer influences violence-sustained injuries across economic regions, it was found that a one percent increase in the price of alcohol would result in an economy-wide reduction of 5,000 alcohol-related assaults a year (Matthews et al., 2006). Such a decrease in injury would impact significantly on not only the most at-risk segment of the population, but also on the disbursement of health resources. The central message emanating from this study—ie that alcohol price and violence are inversely related—has further support in previous studies which found similar relationships between the price of beer and youth violence (Cook & Moore, 1993), and cask wine levies and general harm in the population (Gray et al., 1999).

One of the most recent and perhaps most conclusive examinations of the relationship between alcohol taxation and consumption, is the meta-analysis conducted by Wagenaar, Salois, and Komro (2009) in which they assessed the relative effects of various alcohol taxes on consumption. They found 112 relevant studies from which they derived 1,003 estimates of the effect of alcohol levies on alcohol use. After adjusting for various study characteristics, such as methodology, statistical models employed, level of analysis, and multiple outcome measures, the meta-analysis produced a highly significant negative relationship between alcohol price and use ($p<0.001$; $r = -0.44$). It was further established in this study, that the tax approach to reduce alcohol consumption generally yielded considerably larger effect sizes than any other prevention policies or programs.

Apart from the clear and significant public health advantages noted above, other benefits of increasing excise and tax include its ease of introduction (equating to a simply changing legislation) and the added benefit of raising revenue—profits which can either be channelled for general purposes, or, more attractively, put towards prevention, treatment and community causes (such as sporting clubs). A few minor limitations associated with increased taxation include potential small rises in alcohol smuggling and home-production when alcohol levies are introduced on a loosely controlled market (Babor et al., 2003).

Minimum Price per unit of alcohol

Another promising way of reducing consumption through the price of alcohol is by increasing its minimum cost. In a United Kingdom review of the effects of alcohol cost, Meier et al. (2008) found a continually decreasing drop in consumption accompanying increasing levels of minimum pricing by 5p increments spanning from 20p to 70p. For instance, a 50p, 60p, and 70p increase in price per unit would decrease overall consumption by 6.9 percent, 12.8 percent, and 18.6 percent, respectively. As such, higher price consistently equated to disproportionately lower consumption. The review found that this strategy was most successful when applied to all alcohol products rather than targeted at certain types. More recently, definitive evidence from Canada has shown that, following adjustments to minimum alcohol prices in British Columbia over the past 20 years, consumption has reduced significantly across beverage types (Stockwell et al., 2012). Stockwell and colleagues (2012) report that time-series estimates indicate that a 10 percent increase in minimum prices reduced consumption of spirits and liqueurs by 6.8 percent (P = 0.004), wine by 8.9 percent (P = 0.033), alcoholic sodas and ciders by 13.9 percent (P = 0.067), beer by 1.5 percent (P = 0.043) and all alcoholic drinks by 3.4 percent (P = 0.007). Thus, similar to studies on excise taxation, these findings again attest to the firmly established negative correlation between price of alcohol and alcohol consumption.

With virtually no implementation cost, a wide array of empirical support, and very few limitations of any type, excise taxation and minimum pricing of alcohol can certainly be regarded as a highly (if not the most) efficient, cost-effective, and encompassing approach to reducing overall alcohol consumption and, in effect, alcohol-related harm and social costs.

Box 4: The Living With Alcohol Program

The Northern Territory's Living With Alcohol program imposes a small levy on alcoholic beverages that were greater than three percent alcohol by volume (Babor et al., 2010). The money made from this tax was then used to fund alcohol harm reduction programs. An evaluation by Chikritzhs et al. (2005) found that the combination of price increase and program implementation significantly reduced acute alcohol-related mortality. When the tax was removed the effect failed to exist. Chikritzhs et al. also noted a reduction in chronic mortality, however this did not appear until six years after the start of the program, and therefore it is hard to assign causality.

58. Radio communication networks

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Delphi**
Effectiveness rating: **Internal: ****
External **

Radio communication networks are rapidly being deployed in many night-time entertainment districts (NEDs) around the world (Miller et al., 2011b). These networks cover both inside venues and within entertainment districts. How radio communication networks operate as best practice has not been evaluated, although there is a strong logic behind improving communication within and between venues and other stakeholders.

Inside venues

Good communication between both security and general staff has often been identified as best practice, although this is impossible to test scientifically. Communication between staff has some benefits. Specifically, communication between security staff allows for quicker response time to incidents and a better ability to allocate resources appropriately ensuring that areas are not left unattended. In some venues, incidents can result in all security staff rushing to a particular event, leaving other areas unattended. Conversely, security staff can be unaware of incidents occurring out of sight. Radio networks provide quick and easy communication to allow venue management to be aware of the movements of staff and potential issues that are emerging. Including key general staff, such as bar managers and RSA marshals, in the network allows

for greater staff sense of security, a better team approach to managing problem patrons and easier early intervention with intoxicated people or potentially aggressive situations.

Other elements that should be included or considered:

- setting minimum standards for the type of technology used;
- making radio network considerations a mandatory part of any security plan; and
- employers providing communication equipment free of charge to employees.

Issues needing careful consideration when implementing such a project include:

- What size venue should be considered a minimum size for such systems? In the absence of such a formula, any venue where there are not clear lines of sight between all bar areas and/or security posts should be required to implement a radio system.
- Who is responsible for maintaining radios in good working order?

Programs where security guards carry radios linking them to other colleagues within the venue provide greater flexibility and responsiveness within the security team. They also allow for better communication between security and other staff (such as bar staff, managers and RSA marshals). Improved communication should logically lead to early intervention and better resolution of problems. Important points to consider are: adequate training of staff in communication protocols, ensuring staff adopts the technology, and guaranteeing proper maintenance.

Precinct-wide

Radio networks between venues and other stakeholders are now being set up in many NEDs around the world, but there have been no intervention-specific evaluations to date. Radio networks within precincts involve each venue owning a headset that feeds back to a base station. Often, others in the NED (such as street cleaners and police) will also operate headsets. One of the first documented networks was established in Geelong, Australia (Armstrong-Rowe, 2008; Miller et al., 2011b). This radio program supports third party policing, which seeks to make best use of existing resources in improving community safety. Third party policing is based on the idea that a community does not necessarily need to create a new level of policing by employing private security, when trained people are already on the ground to support existing resources. Given the number of late-night licensed venues in central Geelong, an excellent opportunity exists to use the 'eyes and ears' of the trained security personal employed by venues to support the work of the police and the existing camera network (Armstrong-Rowe, 2008). The network involves: venues operating after 1 am, street cleaners, fast-food venue operators and police. Each stakeholder bought a handheld radio. A base station was set up in the local police station where it was monitored by the safety camera officer, who watches over CCTV across the city. The program was officially launched in April 2007 and is still operating. So far it has:

- enabled early identification of groups of people who have been causing difficulty in or around venues;
- provided police access to more information to identify and deal with people who previously may have spent long periods on the streets in an intoxicated state;
- helped the camera operator to better track issues of concern;
- given 'real time' information to police and camera operator;
- established genuine goodwill of venues to support safety measures for the community;
- built a foundation to develop other creative strategies with venues and operators;
- provided the initial step leading to the redevelopment of the region's liquor accord; and
- helped to build positive relationships between all players as a result of early success.

While generally considered a success, the implementation of the radio network alone was not associated with any reductions in people attending the Geelong Hospital Emergency Department (Miller et al., 2011b).

Other elements that should be included or considered:

- clarifying the expectations of police attendance at incidents;
- making radio network cooperation a mandatory part of any security plan;
- ensuring minimum technical standards are outlined and adhered to; and
- ensuring mandatory check in/sign off each evening.

Issues needing careful consideration when implementing such a project include:

- Who calls emergency services? Experiences from Geelong suggest problems with communication between security and radio base station about calling 000 in an emergency.
- Are venues close enough for the system to work without needing expensive repeater technology?
- Who is responsible for maintaining radios in good working order?
- How long is it permissible for a venue to have a non-functioning radio?
- Who should be responsible for the overall management of the network?

Programs where security guards carry radios linking them to other venues, police and other stakeholders within the venue allows for greater flexibility and responsiveness across NEDs. A best practice model would incorporate a radio network with CCTV monitoring and eventually ID scanner technology. It is important that protocols be agreed around calling for an emergency response. Improved communication should lead logically to early intervention and better resolution of problems. Important points to consider are: adequate training of staff in communication protocols, ensuring stakeholders adopt the technology, and guaranteeing proper maintenance. This practice would mandate sign-on/sign off protocols during operating times, including penalties for not complying. Ideally, this would be built into a security plan as a part of the licence conditions.

59. Random breath testing in venues

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Delphi**
Effectiveness rating: ******

Random breath testing in venues involved police being able to enter venues and breathalyse patrons, to ensure levels of intoxication are not excessive (Graham et al., 2014). Patrons are chosen at random, and if a person is above a particular level of intoxication the police can take an action they deem appropriate for both the individual and the venue.

60. Risk-based licensing

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Literature/Delphi**
Effectiveness rating: **Literature: ✓**
Delphi: **

Risk based licensing (RBL) frameworks exist in the Australian Capital Territory, Queensland and Victoria as well as New Zealand and Ontario, Canada. They vary substantially, but have similar components, especially a cost-recovery element and a system which charges higher fees for venues with higher risk. The Victorian government introduced the new schedule of licensing fees on 1 January 2011. The fee structure differentiates between licensed categories, such as restaurants versus general licences, late-night licences and packaged liquor outlets. The fee structure also includes 'multipliers', which account for venue size, hours of operation and compliance history. A late night (general) licence with a maximum capacity of 550 patrons would multiply the base fee plus risk fee by 2.5 to calculate its total annual licence renewal fee. Risk fees will apply for all licensees with a poor compliance history. The proposed risk fees for compliance history would be determined by the number of paid infringements or successful prosecutions for the following offences:

- supplying alcohol to an intoxicated person;
- permitting a drunk or disorderly person on the premises;
- supplying alcohol to a minor; and
- permitting a minor on licensed premises.

A licensee's compliance history between 1 January and 30 September 2010 will determine the relevant compliance history risk fee payable for 1 January 2011. Licensees with one to two infringements are charged an additional $2,840 per infringement. Licensees with three or more infringements are charged $5,860 per infringement. Although the regulatory changes provide a framework that rewards better service of alcohol practice, the effects of the changes are yet to be documented. The system relies on consistent and equitable law enforcement, as do others.

Although there is no peer-reviewed research on risk-based licensing (RBL), the Foundation for Alcohol Research and Education, produced a report evaluating RBL in the Australian Capital Territory (Mathews & Legrand, 2013). Mathews and Legrand (2013) report that since December 2010, the territory has calculated fees for on-trade licensed premises according to venue type, occupancy, and trading hours. One year after the introduction of RBL, alcohol-related offences had declined. The extent of reductions at licensed premises in entertainment precincts after midnight was unclear. Although the report provides useful information regarding RBL, the territory's night-life is too small to draw reliable conclusions for larger jurisdictions. The key points from the report are that RBL is politically acceptable and was associated with modest reductions in alcohol-related harm.

Introducing RBL fees holds some promise in terms of acknowledging the costs associated with different types of venues to the community, and passing some of that cost back to the licensee. Clear evidence exists regarding the contribution of different types of licensed venues to alcohol-related harm in the community. The rollout of RBL in Victoria has demonstrated a small number of problems, mostly centred around the effects it has on small licensed venues and particularly those with live music. If the reasoning behind the intervention is to use economic penalties as an incentive to change behaviour, the Victorian system requires some adjustment. In particular, penalties of $5,000 (for example) can be a major fine to one business and a very minor fine to another. Several people interviewed for this report suggested that a more equitable and effective approach would be to implement penalties on the basis of trading hours. This could be a reduction in hours permitted to trade, or as days of trading lost. This system has a stronger rationale for engendering behaviour change, particularly in large venues.

61. Responsible service of alcohol (RSA)—effectiveness

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: **x**

Responsible service of alcohol interventions typically involve education about the MLPA. In particular they focus on public drunkenness, the physiological effects of alcohol, identifying overt signs of patron intoxication, legal issues of alcohol service, management training, and policy development (Graham & Homel, 2008). While positive effects have been found in some studies, effect sizes have generally been small and studies often short-lived (Johnsson & Berglund, 2003; Wagenaar et al., 2005a). For example, in a study on the association between RSA and patron intoxication, Lang et al. (1997a) demonstrated an 8.9 percent ($p<0.017$) decrease in patrons rated by researchers as 'extremely drunk', and a small but statistically significant improvement in staff scores on an RSA questionnaire ($p<0.05$). Similarly, Johnson and Berglund (2009) breathalysed bar patrons and questioned them on the social atmosphere of that bar. They reported reductions in average BAC-levels of bar patrons (-0.011, 95%CI =0.022–0) as well as in 'rowdy' atmospheres (-6pts, 95%CI = -11 to -1) following bar-staff training in RSA practice. However, this result decayed within five months (Johnsson & Berglund,

2009). A third study which focused on the association between RSA-training and RSA enforcement and alcohol sales to minors (Toomey et al., 2004) observed a 17 percent decline in alcohol purchases attempted by pseudo-customers without identification. Other studies have found that training has had no effect on service to intoxicated patrons or intoxication levels of patrons (Krass & Flaherty, 1994).

Within Australian, two recent studies into night-life have found that RSA is generally poorly upheld (Miller et al., 2013; Miller et al., 2012c). Miller et al. (2013) compares Geelong and Newcastle across a wide range of alcohol-related harms and intoxication measures. The observational arm of the study found that 83 percent of patrons who showed three or more signs of intoxication subsequently bought another drink. In a follow-up study spanning three cities, Miller et al. (2013) found that 86 percent of patrons who showed three or more signs of intoxication subsequently bought another drink. The combined findings of these two large studies suggest that the RSA conditions in Australia are failing.

Enforcement of server practice

While RSA programs have generated small, but positive outcomes as standalone initiatives, the best results have come from wider community projects with RSA as a central measure, such as STAD (see Box 1). This is likely due to the fact that most of these community projects include an enforcement component (Homel, 2006; Wallin & Andreasson, 2005). Using STAD as an example, responsible service training was coupled with, and almost entirely dependent on, police and municipal enforcement practice in the NTE (Wallin & Andreasson, 2005). Similar conditions were reflected in the Queensland Community Action Projects (Hauritz & Homel, 1998), and the link between RSA and enforcement were further highlighted in the Torquay experiment (Jeffs & Saunders, 1983), the Brighton replication (Stewart, 1993), and the Wellington enforcement experiment in New Zealand. All of these interventions emphasised random and visible police visits to licensed premises as their central approach. The Brighton and Wellington initiatives also included police cooperation with other community bodies such as the liquor industry, licensing authorities, and public health. Although the Sydney and Wellington replications had no measurable impact, the Torquay and Brighton projects had positive effects on alcohol-related arrests as well as on the relationship between hospitality staff and police. In Brighton, a 14 percent decrease in alcohol-related assault was detected, while in Torquay alcohol-related arrests decreased significantly ($p<0.005$) and notable indications of improving RSA practice were observed. However, while these findings were promising, the effect sizes were generally small and the overall impact decayed rapidly post-intervention (Jeffs & Saunders, 1983; Sim, 2005; Stewart, 1993). Thus, while RSA-training is important in its own right, it would appear that it is also highly dependent on proper enforcement methods, such as regular visits to venues by police and licensing officials to identify compliance issues, and following up issues with prosecution and/or licensing action, for maximum effect.

Several key elements make the current RSA conditions difficult for licensees to implement and for police to enforce. Many states have poorly defined conditions of ‘intoxication’ or ‘drunkenness’. Further, many enforcement agencies are constrained substantially by judicial interpretation and rules of evidence, making the enforcement of RSA extremely difficult, especially around service of intoxicated people. In at least one state in Australia, there have been no successful prosecutions of licensees who have served intoxicated patrons in the past year. Such a situation impacts negatively on the effectiveness of this intervention and the morale of enforcement personnel. A review of relevant liquor Acts across Australia is indicated, especially investigating success rates of prosecutions and subsequent penalties.

Mandatory versus voluntary RSA training

One major difference between different RSA interventions which has not been adequately described in its own right is the difference between projects in which RSA training is mandatory, versus those in which it is

voluntary. One study (Dresser & Gliksman, 1998) compared two states with mandatory training, two states with incentives for training, and two states with no formal statewide system. It found that significantly more servers are trained and fewer patrons are visibly intoxicated in states with mandatory training versus those with incentives or free market systems. This is consistent with a previous study using a time series analysis of single-vehicle, night-time, injury-producing crashes (Holder & Wagenaar, 1994) that showed a reduction in crashes associated with mandatory server training (Graham & Chandler-Coutts, 2000).

Implementing a regime to provide training for mandatory RSA will ensure consistency in training and may improve practice. The available evidence shows that having a comprehensive program of monitoring and enforcement is a stronger predictor of improved RSA practice. In line with this, a range of enforcement practices, such as test purchasing is recommended.

62. RSA marshals

Intervention type: **Reduce harm**
Societal level: **Societal/Community**
Available evidence: **Delphi**
Effectiveness rating: **

Some precincts in Australia have started introducing RSA marshals. These are venue staff whose sole duty is to monitor intoxication levels, identify people who are showing signs of heavy intoxication and either intervene early to slow drinking (typically by offering free water) or identify the individual for security to remove from the premises. These marshals are a relatively recent phenomenon, and their role is aimed at picking up an area of security that has become less clear, or is more difficult to conduct in larger venues by regular security staff. Previously, and in smaller venues, security personnel are able to monitor the crowd comparatively closely, creating relationships with patrons and identifying earlier signs of intoxication (such as escalating noise or slurring of words). Such early intervention is clearly ideal, preventing higher intoxication levels, while allowing patrons to remain in the premises.

In larger venues, security personnel are seldom able to undertake this role. It is better suited to someone dedicated to the task, who is specially trained to identify earlier signs of intoxication and who has excellent communication skills. With no evidence of when such a role is needed, providing marshals should be either a part of an overall security plan, or set at a minimum one RSA marshal per number of security staff for large venues. No evidence exists concerning the effectiveness of such positions.

Other elements that should be included or considered:

- This role might suit some ex-crowd controllers or bar staff; experienced staff who can identify intoxicated patrons easily and have excellent communication skills.
- The security plan should include whether or not RSA marshal/s are required.
- RSA marshal numbers should be tailored to each venue, but should work from the minimum formula: one for every 10 security personnel.
- All staff induction should include briefing on the role of the RSA marshal.

Issues needing careful consideration when implementing such a project include:

- Is there adequate quality assurance of practice and staff training?
- How do you ensure security staff members continue to monitor intoxication where possible?
- Is there adequate provision for evaluation and review of the program at appropriate intervals?

The deployment of RSA marshals holds some promise, particularly in larger venues, where security is seldom able to undertake such a role. In-depth evaluation of such roles to determine best practice is strongly recommended.

63. Sales restrictions

Intervention type: **Reduce supply**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: ✓

Local agencies have a range of powers to control access to alcohol through the United Kingdom's *Licensing Act 2003* and related legislation. For example, the *Police Reform and Social Responsibility Act 2011*, Early Morning Restriction Orders allow local authorities to restrict late night alcohol sales in areas where they are causing problems. Local health bodies are responsible authorities under the *Licensing Act 2003*, meaning they are automatically notified when a licence application or review is instigated. The United Kingdom Alcohol Strategy (2012) committed to consult on introducing a health-related licensing objective specifically related to cumulative impact (enabling local authorities to limit the growth of alcohol outlets in an area).

64. Safer Bars

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓

The Safer Bars intervention is a training program designed to reduce aggression and violence on licensed premises (Graham et al., 2004). It focuses on the contribution of alcohol intoxication to bar room aggression (Graham et al., 2006b) and the importance of avoiding over-serving patrons. Primarily it focuses on training staff in pragmatic and applied methods for dealing with and reacting to the problem behaviour and aggression of patrons (Graham et al., 2004). Staff training has six themes in interpersonal skills and handling (see Box 4). The Safer Bars program also includes a risk assessment workbook (Graham, 2009) which helps a venue's owner or manager to rate their premises in terms of known risk factors. This highlights particular components of the licensed operation that might be improved, as well as suggestions for making these improvements.

The value of Safer Bars has been documented in past studies. Graham et al. (2006a) assesses the effectiveness of the program in terms of staff knowledge and attitude to reducing bar room aggression, finding that the training sessions significantly improved staff-knowledge as evident in pre- to post-intervention test-scores ($t(514)=33.6$, $p<0.001$). Knowledge/attitude scores also improved significantly ($t(461)=20.1$, $p<0.001$), as did interpretation of body language ($t(451)=22.1$, $p<0.001$) (Graham et al., 2005b).

Graham et al. (2004) found that the program resulted in lower counts of aggression and violence recorded in intervention establishments after training compared to slight increases recorded in control venues. Moderate/severe physical aggression by patrons decreased from 11.5 percent pre-intervention to 8.3 percent post-intervention compared to a 5.1 percent increase in control bars ($t(28)=2.28$, $p<0.031$) (Graham et al., 2004). While the effect sizes were small, these results might in part have been 'diluted' by factors such as high-staff turnover (Graham et al., 2004). The relatively consistent significant findings across aggression categories for patrons, as well as staff, indicate the real effect of the *Safer Bars* training program.

Box 5: Main themes of the Safer Bars training program (Graham et al., 2004)

The central themes of the Safer Bars training program revolve around staff working as team, intervening early in incidents to prevent escalation, and dealing with patrons in a calm and respectful manner. Specifically the program involves:

- recognising dynamics of aggression and how it escalates;
- gauging an explosive situation effectively in terms of appropriate reaction and intervention;
- staying rational when confronted with aggression; not losing one's temper;
- using proactive non-verbal techniques to defuse a situation, for example by maintaining a calm, collected and respectful demeanour;
- reacting to aggressive patrons effectively with respect and consideration, and with the aim of resolving the situation; and
- being aware of the laws of liability in on-premises aggression and violence.

65. Secondary Supply Restrictions

Intervention type: **Reduce harm**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: ******

Secondary supply restrictions state that an adult must not supply alcohol to a minor at a private place unless the adult is a parent or legal guardian of the minor, or has specific permission of the parent or guardian; and that any alcohol consumption by minors should be controlled by their parent, or equivalent.

66. Security personnel

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓

Despite research connecting security personnel with increases in violence, past studies have also demonstrated the significance and value of well-trained and professional security personnel on licensed premises. Most of this research shows that effective security personnel typically display a firm, rather than aggressive, demeanour; act as patron guardians rather than antagonists (Graham et al., 2005a), and aim to defuse and resolve an explosive situation in an orderly and peaceful fashion (Fox & Sobol, 2000). Patron guardianship involves protecting patrons from violence and disorder through conflict resolution and prevention. In a study on patron guardianship and regulation in the NTE, Fox and Sobol (2000) observe the management of two bars in an unspecified town in the northeast of the United States. The authors found that greater levels of guardianship, through effective security personnel, were associated generally with a lower frequency of predatory sexual offending and disorder within the bar. Security staff who operated in a consistent and professional manner (rigorous in ID-checking and a firm, but friendly demeanour) were associated with lower patron interpersonal hostility and sexual aggression, as well as reduced violence in general on licensed premises (Fox & Sobol, 2000).

Education and training of security personnel appears to be crucial to the quality and effectiveness of their work. The relatively large body of research connecting security staff with increases in violence may therefore indicate that not enough security staff receive adequate training or apply their training. It might be that security personnel do not increase violence—but those who are poorly trained, do. This conclusion is supported in other studies linking specifically poorly skilled security personnel with aggression and violence (Graham

et al., 2005a; Graham et al., 2004; Hauritz & Homel, 1998; Hobbs, 2003; Homel et al., 1992; Wells et al., 1998). The variation in security personnel capability is likely a product of the difference between the variety of security firms that have different training programs and qualification requirements (Hobbs et al., 2002; Hobbs et al., 2000). This perhaps represents a need for a more rigorous, standardised security personnel screening, training and licensing program. More research is required before conclusive statements can be made.

67. Security plans

Intervention type: **Reduce harm**
Societal level: **Societal/Community**
Available evidence: **Delphi**
Effectiveness rating: ******

A security plan is a document drawn up by a licensed venue that covers all security-related issues and explains the rationale for each measure. Staff should be aware of their venue's security plan. Every venue is different in its layout, capacity and customers, and so each plan is unique. Plans should cover issues such as strategies for dealing with different types of incidents in different areas (eg aggressive patrons being refused entry versus altercations in female toilets), normal operating procedures, and staffing solutions for each area that include details of the number of staff and their required level of experience. Licensees, consultants or security companies can develop these plans. They should also include the use of current and emerging technologies (such as CCTV coverage and ID scanners). Such plans have been recommended at least as far back as 2000 (Graham & Chandler-Coutts, 2000), but remain unproven in terms of direct effects on the prevention of problems.

Other elements that should be included or considered:

- mandatory and comprehensive use of incident registers with penalties for failure to complete;
- identification of all security personnel through a registered number system documented in the security register, as is commonly practised in many precincts in Australia;
- individualised security staff numbers for each venue, using the minimum formula: two security staff for every 100, plus one staff member for every subsequent hundred customers ;
- numbers of security staff that are built into the security plan and are an enforceable element of the licence;
- numbers of security staff renewed upon changes to venue/licensee or bi-annually;
- briefings on the plan included in all staff inductions with security staff being fully conversant with its contents; and
- approval of the final plan by senior police responsible for licensing as a condition of purchasing or renewing a licence.

Issues needing careful consideration when implementing such a project include:

- Should the scheme be mandatory?
- Is there adequate quality assurance of practice and staff training?
- Is there adequate quality assurance within police training to ensure responsible officers are qualified to evaluate security plans?
- Is appropriate legislation current to ensure anti-corruption practices are in place?
- Is there adequate provision for evaluation and review of plans at appropriate intervals?

Licensed venues vary substantially in size, trading hours, patron type and location. Linking an approved security plan with licence conditions, which are renewed, provides a flexible and tailored mechanism for ensuring best practice.

68. Service (opening) hours for venues

Intervention type: **Supply**
Societal level: **Societal**
Available evidence: **Literature**
Effectiveness rating: ✓✓✓

Another way that the availability of alcohol can be limited is by restricting the hours it can be sold, most commonly by reducing licensed venue trading hours. A consistent and robust relationship between alcohol-related violence and outlet opening hours has received strong empirical support (Chikritzhs & Stockwell, 2002, 2006; Chikritzhs & Stockwell, 2007; Chikritzhs et al., 2005; Nelson et al., 2010). Perhaps most prominently, a Brazilian longitudinal study of the effects of a ban on alcohol trade between 11 pm and 6 am, found a large statistically significant reduction in homicides of nearly nine per month, or 30 per 100,000 population (Nelson et al., 2010). Similarly, Chikritzhs and Stockwell (2002) found that a one-hour extension of trading hours in the Perth NTE was related to a mean 70 percent rise in assaults in and around licensed venues. This effect was mainly attributed to an increase in alcohol consumption and patron numbers, which in turn was credited to longer trading hours of night-time businesses. In England, studies examining the impact of the *Licensing Act 2003* have found no evidence that violence increased following the introduction of extended licensing hours (possibly due to strong night-life policing) although the timing of violence was seen to have shifted further forward into the early hours of the morning.

Longer alcohol service hours have been introduced in some countries to prevent peaks in alcohol-related violence associated with fixed bar-closing times. In Australia, increased assaults were seen in venues that extended their opening hours (Chikritzhs et al., 2007b). Restrictions can also be placed on the days of the week on which alcohol can be sold. In 1981, for example, the government of Sweden implemented a trial that closed liquor stores on Saturdays. During the study period, both indoor and outdoor assaults declined as well as domestic and public disturbances. In 2000, the reopening of liquor stores on Saturdays was trialled and in 2001, reinstated across the country. Alcohol sales increased following Saturday reopening, but the number of assaults did not change significantly. In addition Rossow and Norstrom (2007) conducted a study in which they investigated the effect on violence of small changes in closing hours for on-premise alcohol sales across 18 cities in Norway. They discovered that on weekend nights in city centres a one-hour change in closing hours for on-premise sales was associated with a 16 percent increase in violent crime rates per extra trading hour.

The most recent and compelling evidence regarding trading hours has come from Newcastle in Australia, where trading hours were restricted to closing at 3:30 am, with a lockout (one-way door or curfew) and other minor conditions (Miller et al., 2012c). Research has documented a wide range of benefits, including a 37 percent reduction in assaults (Kypri et al., 2011; Miller et al., 2012c), significant reductions in property crime (Miller et al., 2012c) and a reduction of more than 340 emergency department attendances a year (Miller et al., in press; Miller et al., 2012c). Ongoing evidence of culture change is reflected by people going out earlier in Newcastle than Geelong and spending more money as well as an increase in the number of liquor licenses in Newcastle, compared to a reduction in the number of licensed venues in Geelong (Miller et al., 2012c). Subsequent research has also demonstrated that five-year trends in Newcastle have continued compared to nearby suburbs which had similar conditions but without the trading hours restrictions (Kypri et al., 2014). These findings are particularly important as they show that the active ingredient of the conditions implemented in Newcastle was the restriction on when alcohol was sold, not the lockouts or other restrictions.

Most the research supports the effectiveness of restricting opening hours to prevent alcohol-related violence, particularly in Australia. Distinguishing between on-licensed and off-licensed premises will be an important consideration for future interventions for outlet opening hours, as there appear to be differences between those who drink alcohol in on- and off-licensed premises.

69. Sunshine Coast Drink Safe Coalition Project

Intervention type: **Reduce harm**
Societal level: **Societal/Community**
Available evidence: **Literature**
Effectiveness rating: **?**

The aim of the project was to create a coalition to coordinate and facilitate multi-component strategies to promote safe drinking and reduce binge drinking particularly in young people aged 12–24 years. During 2009–11, the Drink Safe Coalition delivered more than 40 Drink Safe events and activities, partnered and supported a further 25, and provided events and activities for an estimated 2,000 young people. No evaluation has been produced and descriptions provided were not sufficient to include in the Delphi study.

70. Test Purchasing

Intervention type: **Reduce harm**
Societal level: **Societal/Community**
Available evidence: **Literature/Delphi**
Effectiveness rating: **Literature:** ✓
Delphi: **

In the United Kingdom, test purchasing is a procedure in which trained underage volunteers attempt to buy alcohol from retailers, to enable authorities to identify and prosecute those who break the law. It can be random or targeted towards high-risk premises and a successful sale can result in sanctions or licence suspensions (Hibell et al., 2009). An initial evaluation by the Home Office found that across three months, the test purchase failure rate was reduced from 25 to 15 percent (Hughes et al., 2010). While this measure might be considered to be primarily a state government responsibility, local communities can also engage in test purchasing.

71. Transport availability

Supervised taxi ranks

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓

Night-time buses and trains

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓

As well as factors related to entrance queues, other variables contributing to aggression and violence outside licensed venues mainly pertain to the number of people lingering on or around the premises after they have closed. Robust positive correlations have been demonstrated between the number of lingerers and the frequency of patron and staff aggression. Significant relationships have been found between the number of patrons hanging around the premises after closing time and: overall aggression ($p<0.01$); frequency of aggression ($p<0.001$); severity of patron aggression ($p<0.01$); and, severity of staff aggression ($p<0.01$) (Graham et al., 2006a). The outpouring of patrons onto the streets after venue closing times typically

overwhelms available local amenities such as fast food stands, taxi ranks and buses, and increases the risk of interpersonal conflict and aggression (Marsh & Kibby, 1992). This highlights a need for effective methods of dispersing patrons. Research in this area typically, if not exclusively, focuses on availability of transport after venue closing time.

Evidence relating to the effectiveness of increased transport availability in dispersing patrons and reducing violence is scarce and mixed. Homel et al. (2004a) did find that in the Queensland Community Safety Action Projects the ready availability of public transport, as observed by field researchers, leaped from there being available transport on 1.4 percent of observations in 1994 to 21.7 percent in 1996. They reported that this increase was a key factor in significant reductions in aggression and violence. Specifically, the number of observed patron arguments declined by 28.2 percent, verbal abuse declined by 60.4 percent, and threats decreased by 40.5 percent. Most significantly, violence declined by 81.2 percent (Homel et al., 2004a). This relationship was only present in multivariate analyses, and not in bivariate analyses, indicating that increasing transport availability alone may not be enough to significantly impact levels of aggression and violence. In addition, a community NTE initiative in Seattle, Washington, had a strong focus on improved late-night transportation options. Almost 90 percent of community respondents believed that increasing transport availability in entertainment precincts would be likely to decrease drink-driving and other alcohol-related crimes (McGinn, 2010). Improving late-night transit options was the most commonly mentioned measure to improve the Seattle NTE (McGinn, 2010).

Other approaches include the Australian NightRider buses that operate in most of the larger cities across the country. These services typically operate between 1 am and 6 am on weekends, and offer relatively inexpensive (approximately $5) transportation between the city centre and outer suburbs. The buses are fitted with CCTV cameras and have security guards on board. Phones are also available for travellers to make further transport arrangements beyond their drop-off (Metlink, 2011; Transperth, 2011). Similarly, the Vibrant and Safe Geelong Nightlife Project focused on creating a safer community overall, with a specific focus on the NTE. The project committee included key individuals from industry, local government, and police, who made recommendations based on their expertise. These included not only NightRider buses, but also supervised taxi ranks organising travellers by destination in order to fill every cab leaving the rank (Leaders for Geelong, 2011). Currently in Geelong, a taxi rank operates on weekends and NightRider buses operate between Geelong and surrounding suburbs.

While the initiatives mentioned above address some elements of the problematic issue of a lack of transport availability in the NTE, no empirical evaluations of such interventions have been conducted. This means there is no way of assessing their impact on alcohol-related violence. More research into the effectiveness of these measures is needed before any robust conclusions can be drawn about their value in countering crime.

Other elements of transport availability plans that should be included or considered:

- The quantity of available transport (the most commonly identified issue).
- Different formulations of transport solutions will be required for different geographical layouts.
- Security staff at taxi ranks will only be viable in larger cities.
- Alternative models for providing taxis could be required in some jurisdictions.

Issues needing careful consideration when implementing such a project include:

- Is there adequate transport infrastructure?
- Are there alternatives when transport infrastructure is inadequate?
- Is appropriate legislation in place to ensure adequate transport?
- Is transport available at the right times?

Other research suggests that staggered venue closing times within an NTE precinct to curb alcohol-related injury and assault has shown some promise with a 34 percent reduction in emergency department assault presentations (El-Maaytah et al., 2008). However, while variable venue closing times may avoid a simultaneous influx of patrons onto the streets, inadequate transport facilities still cause frustration and conflict in the NTE.

Staggered closing times can mean that high-risk times are more drawn out for police and other emergency services. Any changes in closing times should not result in a later closing time as the evidence is extremely clear that extending trading hours results in greater levels of alcohol-related harm (Chikritzhs & Stockwell, 2002, 2007; Chikritzhs, Stockwell & Masters, 1997). Most of the research to date indicates that often there are simply not enough available transport options.

Providing late-night public transport systems can constitute best practice in appropriate communities. Certainly, in entertainment districts with a lack of available transport, providing well researched and targeted transport solutions is best practice. In the absence of available information, trial programs should be run during peak times. Even where an adequate public transport system does exist, many people will choose the convenience of catching a taxi home late at night. Providing supervised ranks where patrons can safely catch a taxi appears to be a sensible addition to most entertainment districts and represents a good business decision on the part of local communities and businesses, if not best practice.

72. User pays policing alternatives

Intervention type: **Reduce harm**
Societal level: **Societal/ Community**
Available evidence: **Delphi**
Effectiveness rating: **

An alternative to the 'ambassador' approach (see intervention 56) is employing off-duty police for extra shifts. This model involves councils or licensee groups paying the local police department for an identified number of police to patrol defined areas. The individual officers will have volunteered for additional duties, normally at overtime rates. This solution has many positives, including having uniformed police with full powers. It also has the added benefit of running more money through the police force.

Issues needing careful consideration when implementing such a project include:

- Price and sustainability: is the cost of operation prohibitive to the extent that it may ultimately be viewed as too expensive to maintain once problem levels decline?
- Police numbers and sustainability: can enough police be employed on a regular, continuing basis?
- Competition with other duties: will enough police be able to cover this duty when more attractive alternative events (such as sporting or community events) are using the same system?
- Is there adequate provision for evaluation and review of this intervention at appropriate intervals?

The model has been trialled in regions such as New South Wales and Calgary, Canada, although no formal evaluation exists. This model has many clear benefits. However, when applying it to NEDs, real concerns could be raised over the long extended hours police would be required to work and the effects this would have on their performance of normal duties and to the overall availability of police officers.

73. Venue Capacity, crowding and aggression

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓✓

In a study on violence in large-capacity bars and clubs (>300 patrons) in Toronto, Canada, Graham et al. (2006a) found that the capacity of the venue was associated with the frequency of on-premises aggression. Higher rates were typically found in establishments with more patrons. This relationship became non-significant in multivariate analyses, suggesting that the relationship is likely mediated by other factors such as the increased likelihood of patrons bumping into each other or spilling drinks in high density venues (Graham, 2008; Macintyre & Homel, 1997). The authors suggest that these results most likely occurred because such

venues typically have more people on a given night, increasing the overall number of aggressive exchanges, but perhaps not the proportionate per patron frequency of these incidents. Other studies support this conclusion finding that crowdedness within a venue (eg at the bar) to be a better predictor of aggression and violence than overall venue capacity (Homel & Clark, 1994). The correlation between crowdedness and aggression has also been established in other studies (see Table 5) and reviews (Hughes et al., 2011). However, a significant relationship was not found in some studies (Forsyth et al.; Graham et al., 1980) and may depend on the type of venues included in the sample.

Studies have also noted positive correlations between crowdedness and patron injury (Roche, 2001), and between venue size and patron intoxication (Graham, 1985; Roche, 2001). The latter relationship may be due to the presence of larger crowds which complicate RSA, crowd control and general management (Graham, 2008). It would appear that it is not so much the capacity, but the crowdedness of licensed premises, which predicts patron aggression, and this may in turn be related to venue design and layout as well as size.

Table 5: Associations between number of patrons/crowdedness and patron aggression

Study	Location	Sample	Predictor variable	Outcome variable	Sig. and/or effect size
Homel & Clark, 1994	Sydney, Australia	36 licensed premises	No. of patrons	Patron aggression	r^2=0.19 *
Macintyre & Homel, 1997	Surfers Paradise, Australia	22 licensed premises	Crowdedness	Patron aggression	$F(2, 25)$ =48.89 ***
Homel et al., 2004a	Queensland, Australia	75 licensed premises	Bar crowding	Patron aggression	Γ=0.09**
Graham et al., 2006a	Toronto, Canada	118 licensed premises	No. of patrons	Patron aggression	HLM=0.0001**
Roberts, 2007	Hoboken, NJ, United States	25 licensed premises	Crowdedness	Patron aggression	χ^2= 29.62**
Forsyth, 2006	Glasgow, Scotland	8 licensed premises	No. of patrons	Patron aggression	t=2.425*
Quigley et al., 2003	Erie Country, NY, United States	327 18–30 year olds	Crowdedness	Patron violence	t=7.87**

Note. * p<0.05, ** p<0.01, *** p<0.001.

74. Venue comfort

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓

Overall comfort of the venue in terms of lay-out and seating (Roberts, 2007), and smokiness and temperature (Forsyth et al., 2005; Quigley et al., 2003), is negatively correlated with patron aggression. The Queensland Community Safety Action projects (Homel et al., 2004a) found that increases in the level of on-premises comfort predicted less aggression and fewer violent incidents. Specifically, there were significant inverse relationships between venue comfort and physical aggression (B=-0.251, p=0.025), and between the number of chairs with armrests and non-physical aggression (t=2.21, p=0.029). Similarly, Homel and Clark (1994) found significant correlations between inadequacy of seating and frequency and severity of on-premises aggression (r^2=0.19, p<0.01 and r^2=0.22, p<0.01, respectively). Significant predictors of aggression were found to be: barstool availability (frequency of aggression, r^2=-0.19, p<0.01; severity of aggression, r^2=-0.20,

$p<0.01$); poor ventilation (frequency, $r^2=0.29$; $p<0.01$; severity, $r^2=0.25$, $p<0.01$) and; smokiness (frequency, $r^2=0.31$; severity, $r^2=0.30$) (Homel & Clark, 1994). Similarly, in a study of bar room violence in New Jersey in the United States, Roberts (2007) found that physical and non-physical (eg verbal abuse) aggression occurred in 65.7 percent ($n=35$) of researcher observations of bars deemed 'uncomfortable', compared to 29 percent of observations of 'somewhat uncomfortable' bars ($n=31$), and 12.2 percent ($n=82$) of comfortable bars. Differences between bars were statistically significant ($\chi^2(2)=34.57$, $p<0.01$) (Roberts, 2007).

Ventilation and heat are also likely to be significant predictors of violence (Graham et al., 2006a; Homel et al., 2004a). Quigley et al. (2003) found that compared to non-violent bars, violent bars were significantly warmer ($t(325)=6.25$, $p<0.01$), less ventilated ($t(325)=4.67$, $p<0.01$), and more smoky ($t(325)=5.66$, $p<0.01$). Similarly, Roberts (2007) found that aggression occurred more often in 'smoky' bars compared to 'somewhat smoky' and 'mostly smoke free' bars ($\chi^2(2)=27.55$, $p=0.01$), and in 'hot' bars compared to 'somewhat warm' and 'cool' bars ($\chi^2(2)=20.36$, $p=0.01$). However, these physical environmental characteristics tended to be associated with certain kinds of social environments, and when social environmental variables were controlled in one study (Graham et al., 2006a), physical characteristics such as crowding and poor ventilation became non-significant.

Nonetheless, the research conducted in this area may indicate that increased patron anxiety and irritability resulting from less than desirable venue comfort translates into interpersonal aggression and violence (Graham, 2008).

75. Venue design and structural plan

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓✓

The original observational study that quantified the association between the aggression and the bar room environment was conducted in licensed premises in Vancouver, Canada (Graham et al., 1980). It found that venues with a lot of inside patron movement tended to have more aggression. MacIntyre and Homel (1997) noted that patron crowding, and in turn aggression, were increased by the impractical and colliding flow of pedestrian activity between areas. For example, these colliding areas might be the bar and dance floor, entry and exit points, and pool tables and seating areas. The relationship between venue design, crowding and aggression also included venue capacity, thus highlighting an interaction between venue size and design in predicting patron aggression. This was also supported by a study conducted by Quigley et al. (2003) where aggressive and violent confrontations were observed in high-movement areas such as around pool tables and dance floors. In fact, more than 85 percent of 'violent' bars had billiards tables and more than 77 percent had dance floors—percentages significantly different from 'non-violent' bars with $\chi^2=61.89$ and $\chi^2=66.84$, respectively (Quigley et al., 2003). In their systematic review, (Hughes et al., 2011) also found associations between recreational games (eg pool, billiards) and dance floors, and increased aggression and violence. General crime also correlated positively with these factors in all of the reviewed studies except those in which the recreational games decreased the boredom of patrons (Hughes et al., 2011).

A relatively wide range of studies documenting the relationship between high-movement areas, such as dance floors and games, and aggression and violence, shows the importance of reducing potential in-house congestion areas by deliberate structural venue design. One example of this type of research in practice, is the 2009 Victorian design guidelines for licensed venues (Macwhirter, 2009), which specifies the relevance of such factors as venue structural design, patron movement, and the positioning of patron activity areas and flow. The guidelines provide clear and practical recommendations for making venues less conducive to patron aggression and violence, and while they are based on a small body of literature, the general content fits with modern behavioural theory and the available evidence. In the bid to create a standardised frame of reference for good practice in the NTE, the act of establishing such guidelines might be seen as a worthy exercise in itself.

76. Venue entrance queues

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓

Graham et al. (2006a) found that patron and staff aggression was connected to whether there was a line-up of patrons waiting to enter the premises. Statistical analysis demonstrated several significant positive relationships for line-up and aggressive occurrences ($p<0.01$), frequency of aggression ($p<0.05$), severity of patron aggression ($p<0.05$), and severity of staff aggression ($p<0.001$). Further, research has also identified line-ups going into licensed premises as a relatively common location for fights to break out (Graham & Wells, 2001). This link between violence and entrance line-up is mediated by several factors, including the general frustration resulting from long waits in queues and queue jumping, guest-passes and bribery of door staff for entrance, as well as the presence and conduct of overbearing door staff (Graham & Homel, 2008; Leather & Lawrence, 1995; Roberts & Britain, 2004). Any of these factors potentially contributes to the general level of patron frustration, which in turn is reflected in patron behaviour on the premises. The frustration associated with waiting in queue may make patrons less willing to conduct themselves appropriately once inside the venue. Further, staff and patron tolerance of aggression or unfairness experienced in the queue may signal an environment of permissiveness, and further add to aggression and violence in the line-up as well as inside the venue (Graham & Homel, 2008; Homel et al., 2004a).

It would appear that properly organised and supervised queues with a focus on decreasing patron boredom, equal treatment, and respectful door-staff would counter some of the subsequent problems inside the venue.

77. Venue Order and cleanliness

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓✓✓

The general cleanliness of individual premises also appears to be a relatively reliable predictor of aggression in licensed venues. Homel and Clark (1994) found that bar cleanliness was negatively correlated with severity (r^2=-0.25) and frequency (r^2=-0.22) of aggressive on-premises incidents, and both Graham et al. (2006a) and Forsyth (2006) reported that venue messiness was significantly associated with frequency ($p<0.001$) and severity ($p<0.05$) of aggression. Roberts (2007) found that physical and non-physical (eg verbal abuse) aggression occurred in 65.5 percent of researcher observations of 'unclean' bars (n=35), 36.4 percent of 'somewhat unclean bars' (n=22), and 12.1 percent of 'mostly clean' bars (n=91) ($\chi^2(2)=36.57$, $p<0.01$). Further, in a systematic review of the literature investigating environmental factors associated with alcohol-related problems, Hughes et al. (2011) examined 53 empirical studies conducted since 1990. They found that poor cleanliness was associated with increased intoxication, violence, aggression, lax RSA-practice, and police call-outs across 27 empirical studies.

While seemingly relatively strong, the link between venue cleanliness and venue aggression and intoxication is probably indirect. Venue messiness is likely only a relevant factor when combined with other more direct variables—such as how busy the bar is, staff crowd control capabilities, and the social permissiveness of the venue environment in general (Graham & Homel, 2008). This is supported by the finding that cleanliness became non-significant in one study that controlled for variables in the social environment (Graham et al., 2006a). As such, the correlation between an unclean bar and patron aggression could be a bi-product of staff being busy with other areas of service as a result of a high customer flow (and crowding) causing them to neglect bar tidiness as well as, for example, RSA practice, crowd management, or other factors which have been related more directly to patron aggression (Graham & Homel, 2008; Hauritz & Homel, 1998). On the other hand, poor venue tidiness could also play a causal role by signalling to the patron that the particular

establishment is not concerned with cleanliness issues, indicating a permissive and careless environment relatively tolerant of belligerent behaviour (Graham & Homel, 2008). This latter conclusion is supported in other studies where management indifference and leniency represented by factors such as a messy venue were found to contribute to patron aggression (Leather & Lawrence, 1995).

78. Venue Staff-to-patron ratio

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **?**

The studies looking at the relationship between on-premises aggression and staff-to-patron ratio have produced mixed results. An Australian study on violence in licensed venues found no relationship between staff number and on-premises aggression (Hauritz & Homel, 1998). Another Australian study on violence in licensed venues, found significant negative associations between staff number and frequency (r^2=0.27, p<0.01) and severity (r^2=0.30, p<0.01) of aggression (Homel & Clark, 1994). In contrast, a Canadian study on predictors of bar room violence found positive correlations between staff number and severity of staff aggression towards patrons (p<0.05) (Graham et al., 2006a). Overall, there does not appear to be a clear relationship between staff-to-patron ratio and aggression, although having sufficient staff for the number of patrons seems like a reasonable approach and good business.

79. Venue Staff gender

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: **?**

The relationship between staff gender and aggression and violence, is not consistent enough to make any firm conclusions. Findings do indicate that it is not so much a matter of gender, but rather one of social gender roles and the stringency of these roles. Burly male security staff and female servers in skimpy outfits may communicate macho attitudes to patrons and heighten anxiety and rowdiness, and in turn, aggression (Graham & Homel, 2008). While anecdotal evidence indicates that female security staff can help diffuse problem situations, the one study of the role of female security staff suggests that they tend to adopt the more confrontational approaches of their male counterparts (Hobbs et al., 2007).

80. Venue Staff Drinking

Intervention type: **Reduce harm**
Societal level: **Community**
Available evidence: **Literature**
Effectiveness rating: ✓

Aggression in patrons and staff at licensed venues has also been associated with staff drinking on the job. Roberts (2007) conducted 444 hours of structured observations in 25 licensed drinking establishments in Hoboken, New Jersey in the United States. Drinking by security staff significantly predicted aggression ($\chi^2(1)$=45.65, p<0.01), as did drinking by bartenders and servers ($\chi^2(1)$=44.60, p<0.01) (Roberts, 2007). This highlights the importance of proper enforcement of venue staff regulations.

Alcohol consumption and staff professionalism support the hypothesis that in-house security on licensed premises is related not solely to security personnel, but instead to teamwork and the proper management of

all staff, including bartenders, servers, non-servers and security personnel. Particularly relevant and important to overall venue security are employee conduct and professionalism, RSA, and staff-to-patron ratio.

Restricting staff from consuming alcohol while on duty could be seen as most appropriate for late-night venues. However, as a general rule, setting a standard that ensures a person serving alcohol is sober enough to make wise choices should be considered best practice. The most realistic level of blood alcohol concentration is probably best related to local drink-driving guidelines.

81. Violent venues register (Sch 4, NSW Liquor Act 2007)

Intervention type: **Reduce supply**
Societal level: **Societal**
Available evidence: **Delphi**
Effectiveness rating: **

The New South Wales government's Office of Liquor and Gaming Regulation owns this intervention. It involves placing conditions on the operations of the most violent licensed premises to reduce the sale of alcohol, restrict access to the venue, and to improve security. It addresses poorly managed licensed premises (venues placing profit before preventing alcohol-related harm) and the responsible service of alcohol. The process is regularly assessed for effectiveness, comparing venue violence levels before and after applying conditions. Quarterly reports are widely reported in the media and have shown a decline in assaults in and around licensed venues across NSW since the intervention started (BOCSAR, 2013).

4. Synthesis and summary

This section synthesises and summarises the findings from the literature review and Delphi study. League tables identify the intervention types in the study and classify them according to a rating system, based on the one developed by (Babor et al., 2010). They also include the findings of the Delphi study.

4.1. Evidence Rating System

A rating system was developed for this report to enable the interventions discovered in both the literature review and the Delphi study to be rated according to their impact or level of effectiveness. Ratings are outlined in Table 6 below.

A separate rating system was used for the interventions rated in the Delphi study to show clearly the differences in rating processes. Built on the same logic as the system used for the literature review, the Delphi system uses the mean ratings from the panel scores on relevant outcome variable (such as 'reducing alcohol consumption').

Table 6: Evidence and effectiveness rating system

Symbol	Criteria
✓✓✓	The highest level of impact for the literature review—a study must have substantial compelling evidence for its effectiveness, both in Australia and internationally. All relevant literature supports the intervention.
✓✓	The second level—an intervention must have strong evidence for positive outcomes. Studies may be confined to a context outside Australia, or may have limited evidence of impact within Australia. These studies may also have small effect sizes.
✓	The third level—studies must have research that supports an intervention's effectiveness. In these studies effect sizes are small and the number of studies may be limited.
?	A study where evidence for an intervention's effectiveness is inconclusive. This may mean the evidence both supports and contradicts the intervention, or that research in the area is so limited a conclusion cannot be drawn.
x	A study where evidence for an intervention's effectiveness is not supported. Evidence consistently produces reliable findings that indicate a lack of, or poor outcomes, for reducing harm.
***	The highest rating in the Delphi study—when the current evidence from the literature is unclear but the ratings from the Delphi suggest an intervention is highly effective. Interventions were given this rating if their mean effectiveness rating for any of the outcome variables was between 7.1 and 10.
**	The second rating—when interventions do not have clear evidence in the literature, but receive moderate support from the ratings in the Delphi (3.1 and 7).
*	The third and lowest rating—when interventions do not have support from the literature, and receive low mean ratings of effectiveness from the Delphi (0 to 3).

4.2. Reducing supply

Interventions to reduce supply include any measures associated with the supply of alcohol. The current report found that the literature has only minimal strategies for reducing supply, and the Delphi study revealed the same issue. Reducing a society's supply of alcohol was shown consistently to have the most impact/effectiveness. Measures rated as the most effective include: restricting the hours of alcohol sales (intervention 68), especially in on-premise venues; minimum legal purchase age or MLPA (54); and reducing the density of alcohol outlets (48).

Restricting trading hours has the strongest evidence base in Australia and recent work identified midnight as the pivotal hour after which intoxication and subsequent harms increase significantly (Chikritzhs & Stockwell, 2002, 2006; Miller et al., 2014c). Reducing the MLPA from 21 to 18 years has been demonstrated to increase episodes of binge drinking and increase the rate of traffic accidents.

Increases in the density of alcohol outlets have been found to be associated with increases in the number of violent crimes committed in a certain geographical area. This relationship exists for both on-licence premises and street violence (Livingston, 2008; Livingston et al., 2010) and for off-licence outlets and family and domestic violence (Liang & Chikritzhs, 2011). While explicit examples of interventions that reduced the density of outlets (such as licence buy-back schemes) were not found, some governments in Australia have enacted 'freezes' or caps on the number of liquor licences being granted (especially late night licences). The Victorian government reviewed this intervention and extended the freeze until 2015, although the report was never made public.

The intervention that consistently scored the highest in the Delphi study for reducing supply was the Western Australian liquor licence restriction, s 64 (10), which involved cutting back trading hours for packaged liquor and reducing the types and size of liquor that can be sold. This intervention involves the police applying to the Director of Liquor Licensing for liquor restrictions for a town, some adjoining towns or even a region. It can also be for a particular licensed venue requesting conditions to be placed on the licence. The intervention was rated as being moderately effective in the Delphi study for reducing alcohol-related assaults, reducing intoxication, preventing crime, reducing alcohol-related harm, and reducing alcohol consumption.

A second intervention from the Delphi which received moderate effectiveness ratings for reducing alcohol-related aggression, reducing intoxication, preventing crime, reducing alcohol-related harm, and reducing alcohol consumption was sch 4 New South Wales violent venues register (81). It involves applying conditions to the operations of the most violent licensed premises. These conditions are designed to reduce the sale of alcohol, restrict access to a venue, and to improve security. This intervention addresses poorly-managed licensed premises, venues placing profit before alcohol-related harm, and the responsible service of alcohol.

4.3. Reducing demand

Demand reduction covers many major areas such as restricting advertising/marketing, prevention programs, early-intervention programs for people exhibiting alcohol problems, education measures, treatment, and policy-level measures such as pricing controls (some may view this as supply reduction).

As with supply reduction, reducing demand tended to have a small number of interventions identified within both the literature and through the Delphi study. The literature review identified one intervention that could be considered to have the highest level of evidence for impact. This was a societal intervention of increasing the price of alcohol, including excise and taxation (57). Increasing alcohol's price has been associated consistently with a reduction in alcohol consumption, as well as alcohol-related harm. The Delphi study revealed two interventions which both received moderate effectiveness ratings on the Delphi for certain variables. The first was alcohol warning labels (9), a societal intervention that received a moderate effectiveness rating for reducing alcohol consumption. The second was an individual intervention, known as the Early Intervention Pilot Program (24), which incorporates a variety of prevention measures, and was rated moderately for reducing alcohol consumption, intoxication, alcohol-related harm, and for preventing crime.

4.4. Reducing harm

Within the literature, there was a paucity of well-researched and strong evidence-based interventions for reducing alcohol-related harm. Four interventions reached the second highest level of effectiveness according to the rating system, and these were targeted police interventions (55), Safer Bars (64), mandatory plastic glasses (30), and community interventions such as STAD (16). All these interventions could be considered to be at the community level.

Targeted interventions by police involve highly visible enforcement of drinking laws on and around licensed premises, and have been found to reduce alcohol-related assaults, as well as harm more generally. Safer Bars is a comprehensive strategy which focuses on training staff in pragmatic and applied methods for dealing with and reacting to problem behaviour and aggression by patrons, and has been found to be effective in changing staff attitudes and reducing bar room aggression (Graham, Jelley, & Purcell, 2005). Using plastic glasses in venues is an effective strategy for reducing harm that is related to glassware injuries and assaults, and is an easy-to-implement strategy. Community interventions typically include community mobilisation such as publicity campaigns, local task force activities, and community forums and discussion groups. Emphasis is also usually placed on RSA practice, security staff capabilities, environmental safety factors, and police enforcement of liquor laws. While this strategy appears promising, it was implemented in a context of very low-level (if any) regulation or enforcement, and is unlikely to have any further impact in Australia.

The Delphi study revealed 43 interventions that were rated as being moderately effective on a variety of other measures. The three most effective interventions for all outcome variables were sections of legal Acts. Firstly, 175(1a) Liquor Control Act (41; M=5.82), followed by Liquor Licence Restriction s 64 (10; M=5.36), and finally sch 4 of the New South Wales violent venues register (81; M=5.08). The latter two interventions are measures to reduce supply. This supports the idea that reducing supply of alcohol can assist in reducing harm. The interventions all involve placing restrictions for alcohol consumption on entire communities. This is consistent with the literature review in which interventions that placed restrictions on the community as a whole have the strongest evidence base (eg MLPA; alcohol outlet density).

Only one intervention within the Delphi study was rated as being very effective for reducing alcohol consumption. This intervention is s 175(1a) of Western Australia's Liquor Control Act (41). It was the only intervention in the Delphi study to achieve this rating for any outcome measure. The interventions also received moderate ratings for reducing assaults, harm, intoxication, and for preventing crime. The intervention gives an Indigenous community the ability to apply to the Minister for Racing Gaming and Liquor for their community to be declared a restricted area. Once declared, it is unlawful to take liquor into the community and or consume it in the community.

Reducing the alcohol content of beverages served after midnight (4) fared well across a variety of measures, being found moderately effective for reducing consumption, intoxication, alcohol-related assaults, alcohol-related harm, and preventing crime. In line with this, banning the sale of shots and similar alcoholic beverages (46) was rated moderately for the same outcome variables. This is promising as these strategies are very easy to implement and can be applied simultaneously, allowing their effects to be compared for evaluation.

Although they did not rate as highly as the interventions above, free availability of water (29), and limiting the percentage of alcohol in drinks (4) are logical interventions for reducing intoxication, and in turn reducing alcohol-related harm. Although they are not necessarily considered a solution for alcohol-related harm, they have their part in the complex process of harm reduction.

4.5. Limitations

One limitation of the current report is the way in which a Delphi study is conducted. For this report it involved bringing together a panel of researchers and individuals who are involved in the processes (eg police officers and public servants) and asking them to rate many differing interventions that they may never have experienced. This means that panel members with no prior knowledge of an intervention could rate it as being low in effectiveness. This could reduce the overall mean effectiveness of the intervention. This means that many of the ratings from the Delphi study may be misrepresented as being lower than they would have been had they been rated by a panel of experts.

A further limitation is that the scope of the environmental scan is unclear. While a wide range of international stakeholders and experts were contacted, their participation was anonymous and so it was not known whether there were a substantial number of participants globally. However, offline communication indicated that responses had come from the Netherlands, the United Kingdom, the United States and Canada, along

with Australia. To redress this limitation, it would be ideal to have an online, updateable and maintained register of these interventions and their evidence base. The alternative would be to repeat this review regularly, probably triennially.

4.6. Mandatory versus voluntary interventions

A range of the research reviewed in this study highlighted the difficulties and benefits associated with voluntary compared to mandatory measures (Chikritzhs et al., 2007b). This has been identified as an issue in measures ranging from restricting advertising alcohol to using ID scanners (36) and CCTV (15) in nightclubs. A recent, large-scale study of licensing interventions specifically compared a system of voluntary measures in Geelong to a system of mandatory measures in Newcastle (Miller et al., 2012c). The study demonstrated patrons in Newcastle were more likely to report having been refused service when intoxicated in the past 12 months. Further, observational data showed that RSA practice was significantly more likely in Newcastle where practices were mandated across the board. In contrast, many venues observed in Geelong were not even signatories to the liquor accord and operated outside any voluntary harm-reduction schemes.

Further, some of the venues that purported to be part of such schemes operated on ad hoc bases, according to their own definition of need, and were often influenced by financial considerations. The implementation and use of ID scanners in Geelong provides a perfect example. While ID scanners were meant to have been operating in every late night venue in Geelong, in reality this applied only to liquor accord members. At least two of the venues operating past 1 am did not have ID scanners working at any time during the 18month observation period. Other venues, not part of the accord and operating up to 1 am, did not have ID scanners at all. Substantial issues also arose about the quality of the system being used, but most concerning were the scanning practices of different venues. Similar concerns exist with CCTV systems. The key lesson was that good operators were penalised and bad operators could get away with promises that did not have consequences.

Key informants in the study identified the following benefits of mandatory systems:

- it created a level playing field for all venue operators;
- venue operators were clear about the rules;
- regulatory authorities were able to act immediately on infringements; and
- a clear message was sent to patrons that the government and community were serious about responsible alcohol consumption.

To summarise, where possible the evidence shows that mandatory measures are more likely to be effective than voluntary systems. While voluntary measures allow poor practice to remain while penalising good operators, mandatory systems provide businesses with a predictable operating environment.

4.7. Enforcement

A recurring finding of this review has been the need for effective enforcement of restrictions. Abundant evidence shows that enforcement is a crucial element among the range of factors needed to successfully implement measures (Babor et al., 2010; Chikritzhs et al., 2007b; Hughes et al., 2011). Without such enforcement, interventions typically have limited impact or fail. Enforcing restrictions is almost entirely left to police, although using a wide range of people for detection (eg liquor licensing authorities) has been identified as a more effective and cost-effective approach. Restrictions often fall short of their full potential, simply because there are too few police. In these cases, alternative enforcement strategies should be considered (see user pays policing intervention, 72). What might be considered is appointing specially trained liquor licensing officers who can monitor server behaviour, report, and then assist the police to charge licensees or others who breach restrictions. These inspectors would not be serving police officers, but might be employed by licensing bodies or even police, and would require extra resourcing which might be covered through

additional levies on licensing fees. A core consideration would be good ongoing operational relationships between police and licensing to achieve the scheme's maximum effect. It is conceivable that with the cooperation of state, territory and Commonwealth governments, hypothecated alcohol taxes or levied liquor licence fees could be used to fund the enforcement of restrictions. The public is likely to support this move (Tobin et al., 2010).

It is not enough, however, to simply enforce. The penalties imposed must be substantial enough to outweigh any financial, personal or social gains to be made in violating the restrictions. The threat of considerable financial loss, when well publicised, is in itself a significant deterrent to those who might otherwise act irresponsibly (Chikritzhs et al., 2007b).

4.8 Cost-effectivenessness

Cost-effectiveness is a key element to consider in relation to the interventions reviewed. Almost no information exists on how cost-effective most interventions might be, despite governments around the world spending substantial amounts of money on interventions. Research is also lacking which documents the costs of alcohol relating to some elements. For example, although Australia has good estimates for the direct costs of alcohol (Collins & Lapsley, 2008) and the costs of alcohol-related harm to others (Laslett et al., 2010), there is little evidence on how much cost is associated with night-time entertainment precincts in terms of harms, police and emergency services responses and how this might relate to the benefits to communities in terms of employment and associated trade. However, some key principles also apply. For example, prevention has consistently been found to be more efficient and is far preferable when it comes to harm such as assault and injury. Interventions such as restricting trading hours in Newcastle, came at almost no cost to the local community and was found to have prevented almost 5,000 assaults (Kypri et al., 2014) and 340 emergency department attendances a year (Miller et al., in press). Previous work on general prevention trials in schools have also demonstrated some economic benefit in terms of preventing subsequent substance use and antisocial behaviour (Kuklinski et al., 2012). The benefits of these types of preventative interventions need to be compared to an intervention such as intensive policing, which, while effective, has substantial budgetary implications for a range of governments.

4.9 Conclusions

Many interventions are moderately supported in the Delphi study and require further investigation. Often they have not been formally evaluated and the Delphi relies on opinions of those who are experts in the area and those who are on the ground implementing the strategies. As can be seen in the tables below, 41 interventions received a moderate rating of effectiveness for at least one of the outcome measures. While the low ratings given in the Delphi study may appear disappointing, it is not surprising given the reality that most of the interventions act to reduce harm in specific contexts and would therefore only be a part of an overall strategy to reduce alcohol-related harm.

This study has identified a large number of interventions for reducing alcohol-related harm, and most of these have very minimal evidence bases. This is concerning as resources are potentially being spread too broadly, resulting in a lack of community resources, and thus evidence for promising interventions. A further concern is that the bulk of interventions have been developed to reduce alcohol-related harm, and as a result there exists few supply and demand reduction strategies. Strategies for both supply and demand, if effective, have the ability to have a flow-on effect for reducing harm, such that if alcohol supply and demand are reduced, then this results in less alcohol-related harm.

While the most effective solutions have been found to act at the societal level, in the absence of government action, a clear demand exists for more interventions that focus at community, social, family, or individual levels, even if they are not going to have the same level of impact. Further thought is needed to determine how to intervene with those people who do not respond to interventions at a societal or community level.

Table 7: Summary table of interventions to reduce supply of alcohol effectiveness ratings

Intervention	Level	Evidence for impact	Recommendation
Minimum legal purchase age (54)	Societal	✓✓✓	International evidence suggests increasing the minimum purchasing age is effective.
Reducing alcohol outlet opening hours (63) (68)	Societal	✓✓✓	Strong international evidence exists for the relationship between reducing alcohol outlet opening hours and alcohol consumption.
Reducing alcohol outlet density (48)	Societal	✓✓	Evidence suggests increased density of alcohol outlets is associated with increased levels of harm in the community.
Restricting the sale of specific beverage types (14)	Societal	✓	Research demonstrates an association between full-strength beer and alcohol-related problems, however this research is minimal
Violent venues register: *Liquor Act 2007* NSW, sch 4: Conditions placed on the most violent licensed premises to reduce sale of alcohol, restrict access to venue, and to improve security (81)	Societal	**	Delphi panel reports revealed moderate effectiveness for reducing alcohol-related assaults and alcohol-related harm, alcohol consumption and intoxication, as well as for preventing crime.
Including emergency services, health and social services in liquor licence planning assessment process (52)	Societal	**	Delphi panel reported moderate effectiveness of this intervention for reducing alcohol-related assaults, and alcohol-related harm
Secondary supply restrictions (65)	Community	**	Delphi panel reported as moderately effective for reducing alcohol-related harm, alcohol consumption and intoxication.

Key: ✓✓✓Very strong evidence for positive outcomes including substantial and/or compelling evidence of effectiveness in Australia and internationally. ✓✓Strong evidence for positive outcomes, however some small effect sizes have been found. ✓Moderate evidence for positive outcomes, however, small effect sizes have been found and/or contradictory evidence, or a lack of literature in the area. *** Current evidence unclear or insufficient to conclude causality. Delphi survey suggests high effectiveness. ** Current evidence unclear or insufficient to conclude causality. Delphi survey suggests moderate effectiveness. * Current evidence unclear or insufficient to conclude causality. Delphi survey suggests low effectiveness. ? Current evidence is unclear or insufficient to conclude causality. Requires and warrants further investigation. x Evidence repeatedly indicates absence of reliable positive effect of restriction on alcohol consumption and/or alcohol-related harms. In some instances, there may be evidence of counter-productive outcomes.

Table 8: Summary table of interventions to reduce demand of alcohol effectiveness ratings			
Intervention	**Level**	**Evidence for impact**	**Level of Evidence**
Alcohol price including excise and taxation (57)	Societal	✓✓✓	Strong evidence base for effectiveness internationally
Developmental prevention interventions (19)	Individual	✓✓	Some evidence for effectiveness, but should be used in conjunction with other interventions to increase effectiveness
Alcohol advertising and promotion (3)	Social	✓	Strong associations found between advertising and subsequent high levels of consumption and increased harm. Few results available on the impact of reducing advertising, although positive effects found
Education (25)	Social	✓	Some interventions shown to be effective, although the interventions are normally low frequency. Research needed into high prevalence campaigns such as those used for smoking
Acamprosate (51)	Individual	✓	Evidence for using acamprosate, if used in conjunction with therapy. Research base is in its infancy
Family-based alcohol use prevention (28)	Family	✓	Evidence of some impact, although more sophisticated research is required
Good Sports (31)	Community	✓	Some evidence of culture change in clubs that adopt although these are only a small proportion. Needs further evaluation
Social Norms (25)	Social	?	Only one evaluation in Australia and did not show long-term effects
Naltrexone (51)	Individual	?	Some evidence for short-term effects, but is mixed for long-term effects. Minimal research in the area
Early intervention program (24)	Individual	**	Delphi study revealed moderate effectiveness for reducing alcohol consumption, intoxication and alcohol-related harm. Also, moderate support for preventing crime
Alcohol warning labels (9)	Societal	**	Moderate effectiveness ratings from the Delphi study for reducing alcohol consumption

Table 9: Summary table of interventions to reduce alcohol-related harm with effectiveness ratings

Intervention	Level	Evidence for impact	Level of Evidence
Safer Bars (64)	Community	✓✓	Has received international support. Further evaluation in Australia is needed
Police interventions—targeted (55)	Community	✓✓	Evidence for effectiveness, mainly in Australia
Consequence policing (18)	Societal	✓✓ **	Empirical support given in one study, although it showed a strong impact across several indicators (eg police assaults and emergency department attendances). Moderate effectiveness ratings from Delphi for reducing assaults, intoxication, preventing crime, reducing harm and consumption
Mandatory polycarbonate (plastic) glassware (30)	Community	✓✓	Evidence for effectiveness particularly for reducing injury as a result of glass
Community interventions for example STAD (16)	Community	with enforcement ✓✓ without enforcement ☒	Evidence limited for sustained success of these approaches in Australia
Risk-based licensing (60)	Community	✓ **	Strong rationale in favour despite lack of evaluation. Intervention may be useful over the longer term if penalties are appropriate in size. Moderate effectiveness ratings from the Delphi for reducing assaults, harm, intoxication and for preventing crime. Enforcement is crucial
Alcohol-free or 'dry' zones (23)	Community	✓	Strong rationale in favour. Alcohol-free zones within entertainment districts allow for greater control of behaviour on the streets and around licensed venues and constitute best practice, despite the lack of specific evidence
Police interventions—random (55)	Community	✓	Some evidence supports effectiveness, but only small effect sizes found. Evidence for a lack of effectiveness in some studies
RSA training (61)	Community	with enforcement ✓ without enforcement ☒	RSA training not a satisfactory approach to reducing alcohol consumption and harms. Only a support to more effective restrictions. RSA should be mandatory for all servers of alcohol.
Alcohol management plans: liquor restricted area s 175 (1a) Liquor Control Act—an Indigenous community can apply for their community to be declared an alcohol-restricted area (6)	Societal/ Community	✓ ***	Some evidence for effectiveness in the Northern Territory. Received strong support from the Delphi for reducing alcohol consumption. Moderate ratings for reducing assaults, harm, intoxication, and for preventing crime
ID scanners (36)	Community	with enforcement ? without enforcement ☒	Evidence remains mixed, with substantial issues about enforcing proper practice regarding privacy and informed consent. Once framework is in place, mandatory implementation is indicated with minimum equipment standards

Table 9: Summary table of interventions to reduce alcohol-related harm with effectiveness ratings cont.

Intervention	Level	Evidence for impact	Level of Evidence
Liquor accords (1)	Societal	with enforcement ? without enforcement ☒	In an environment of low regulation, accords may improve communication. Accords can provide a platform for implementing effective approaches but voluntary accords may be counterproductive in some circumstances
Supervised taxi ranks (71)	Community	✓	Strong rationale in favour despite lack of evaluation; dependent on identified need
Night-time buses and trains (71)	Community	✓	Strong rationale in favour despite lack of evaluation; dependent on identified need
CCTV (15)	Community	? **	Strong rationale in favour. Ideally, CCTV should be part of an overall security plan. CCTV has a major benefit in terms of solving crimes already committed
Test purchasing (70)	Societal/ Community	✓ **	Minimal evidence in the UK found a positive effect. Needs investigating in Australia. Was rated in the Delphi as moderately effective for reducing intoxication, consumption, harm, and for preventing crime
Patron banning notices (11)	Societal/ Community	**	Effectiveness uncertain. Further research required. Received moderate ratings on the Delphi for reducing assaults and harm, as well as preventing crime
Patron banning notices for family violence offenders (11)	Societal/ Community	**	Effectiveness promising. Further research required. Received moderate ratings on the Delphi for reducing assaults and harm, as well as preventing crime
Precinct ambassadors (56)	Societal/ Community	**	Strong rationale in favour despite lack of evaluation. Received moderate ratings for reducing assaults and harm, as well as for preventing crime
User pays policing (72)	Societal/ Community	**	Moderate rationale in favour despite lack of evaluation if hired through police services but further research recommended. General hiring of off-duty police directly, not recommended. Received moderate ratings in the Delphi for reducing assaults, harms and for preventing crime
Security plans (67)	Societal/ Community	**	Strong rationale in favour despite lack of evaluation. Received moderate effectiveness ratings in the Delphi for reducing alcohol-related assaults, and alcohol-related harm
RSA marshals (62)	Societal/ Community	**	Moderate rationale in favour for larger venues despite lack of evaluation. Moderate support from the Delphi for reducing alcohol-related assaults, harm, consumption, intoxication, and for preventing crime

Table 9: Summary table of interventions to reduce alcohol-related harm with effectiveness ratings cont.

Intervention	Level	Evidence for impact	Level of Evidence
Mandatory high visibility clothing (33)	Societal/ Community	**	Moderate rationale in favour despite lack of evaluation. Found to be moderately effective for reducing alcohol-related assaults, harm, and for preventing crime
Internal radio networks (58)	Community	**	Strong rationale in favour despite lack of evaluation. Received moderate ratings from the Delphi for reducing assaults, and preventing crime
External radio networks (58)	Community	**	Strong rationale in favour despite lack of evaluation. Received moderate ratings from the Delphi for reducing assaults, harm, preventing crime, reducing consumption and intoxication
Liquor restricted premises s 152P Liquor Control Act (WA)—once declared, it is unlawful for anyone to take liquor onto the premises (42)	Societal	**	Moderate support for effectiveness in reducing alcohol-related assaults and harm, as well as reducing alcohol consumption and intoxication, and for preventing crime
Drunk tanks (22)	Societal	**	Moderate effectiveness ratings from the Delphi for reducing assaults and harm, as well as preventing crime
Mandatory treatment (NT) (44)	Individual	**	Moderate effectiveness ratings from the Delphi for reducing consumption and intoxication, as well as reducing harm
Holyoake family alcohol and drug programs (Tas) (35)	Individual	**	Moderate support from the Delphi for reducing alcohol-related harm, and consumption
No sale of shots, or cheap drinks/ promotion (46)	Community	**	Moderately effective ratings for reducing intoxication and consumption as well as for reducing alcohol-related assaults and harm
Alcohol to finish 30 minutes before closing (8)	Community	**	Moderate effectiveness ratings from the Delphi for reducing alcohol-related assaults and harm, preventing crime, and reducing consumption and intoxication
Free water (29)	Community	**	Moderately effective ratings for reducing alcohol consumption and intoxication, and for preventing crime and reducing alcohol-related harm
Random breath testing in venues (59)	Community	**	Moderately effective ratings for reducing assaults, harm, consumption, intoxication, and for preventing crime
Banning multi buy promotions (two for one deals), especially from off-licence premises (12)	Community	**	Moderate effectiveness ratings from the Delphi for reducing alcohol-related assaults, harm, consumption, and intoxication. Susceptible to industry simply reducing price
No RTD beverages more than 6% (4)	Community	**	Moderate effectiveness ratings from the Delphi for reducing alcohol-related assault and harm, reducing consumption and intoxication, and for preventing crime

Table 9: Summary table of interventions to reduce alcohol-related harm with effectiveness ratings cont.

Intervention	Level	Evidence for impact	Level of Evidence
Banning orders (11)	Societal	**	Moderate effectiveness ratings from the Delphi for reducing alcohol-related assault and harm, reducing consumption and intoxication, and for preventing crime
Preparing youth and parents for night-life (53)	Community	**	Moderately effective ratings for reducing alcohol-related assaults, harm, consumption and intoxication
People management by pedestrianising roads (50)	Community	**	Moderate ratings of effectiveness received for reducing alcohol-related assaults, harm and for preventing crime
Involving health and safety officials in licensing (40, 52)	Community	**	Rated as moderately effective for reducing alcohol-related harm
Energy drink restrictions (26)	Community	**	Received moderate ratings of effectiveness in the Delphi for reducing alcohol-related assaults, alcohol-related harm, as well as consumption and intoxication
Drug dogs (21)	Community	**	Rated as moderately effective for both solving and preventing crime
Multi Agency Liquor Taskforce / Liquor Advisory Board (45)	Societal	*	Received low ratings from the Delphi for all outcome measures
Lockouts (43)	Community	☒?	Evidence shows lack of impact and some potential negative consequences. May be considered as a pragmatic but short-term approach to reducing acute workload pressures on police during late-night hours. Should be regarded as a support strategy, secondary to other more effective mandatory restrictions
Drink Safe precincts (20)	Societal	☒ **	Minimal evidence, and results of evaluations mixed. Received moderate ratings of effectiveness on the Delphi for reducing alcohol-related assaults, reducing alcohol-related harm, consumption and intoxication, as well as preventing crime. Found ineffective by an Auditor General's report
People management by strategically placing food outlets (50)	Community	*	Low effectiveness ratings for reducing assaults, harm, and for preventing crime

5. Recommendations

Based on the literature reviewed and the ratings of the expert panel, the research team identified the following initiatives/strategies as the interventions most effective in reducing alcohol-related harm. While acknowledging the competing priorities faced by jurisdictions and agencies dealing with alcohol-related harm in the community, this report recommends that these interventions should be implemented to reduce alcohol-related harm. Beyond the specific recommendations is an additional section on 'Further matters for consideration'. This section discusses several key issues relating to the wider policy contexts in which interventions are implemented. While not directly informed by the evidence for effectiveness of specific interventions, we propose that these topics may be important for determining the ultimate effect achieved by even the strongest intervention.

5.1 Australian Government Responses

Price

Alcohol taxes and excises should be reformed

Rationale: Consistent with several reviews of taxation and public health, the most evidence-based measure to reduce alcohol consumption is to increase the price of alcohol. Alcohol consumption is price sensitive and even small increases in price can result in decreases in consumption and decreases in harm. Diverse models exist for reforming taxation of alcohol. A volumetric taxation system would increase price as alcohol content of beverages increases, encouraging the production and consumption of lower strength beverages. Revenue could go into general taxation. However, various indicators suggest that the community would be more likely to support such a measure if it were ring-fenced to support prevention and treatment effort.

Reducing alcohol availability

Regulatory measures should be implemented to reduce discount alcohol sales

In particular, bans on bulk-buys, two-for-one offers, shop-a-dockets and other promotions based on price, deserve consideration as policy responses that could reduce heavy episodic drinking. Further, some states have regulations pertaining to discounting which should be more strictly enforced both on and off licensed venues.

Rationale: To reduce demand for alcohol, promotions used to encourage consumption will require further regulation. A wide range of research has identified the impact of such promotions in terms of increasing people's consumption beyond their intended levels (Jones et al., 2012).

State and local governments should investigate mechanisms through which they can reduce the density of alcohol outlets in specific areas that experience unacceptable levels of harm.

Rationale: A strong body of evidence shows the association between the number of liquor outlets in any given area and the levels of harm experienced. This is especially the case for more disadvantaged areas. It is recommended that trials of policy interventions such as liquor licence buy-backs, fixed-term licences and freezes on current numbers of liquor licences be trialled and evaluated.

Prevention

Parenting programs should be provided that address the risks of alcohol-affected parents

Rationale: Strong evidence shows that well-implemented parenting support programs (such as the positive parenting program and nursing home visit programs) which are targeted at alcohol-dependent parents, especially of newborns, can have a substantial benefit in terms of the adult's alcohol consumption, and also in terms of the children's developmental prospects.

Controls on alcohol promotions

This review demonstrates the impact of alcohol advertising in influencing the intent to drink of naïve/young people, contributing to more problematic drinking patterns, and impacting across the population. In light of this, the following policy approaches are recommended:

Significant changes are required to the advertising and promotion environment

Some policy options are:

Banning promotion and advertising of all alcohol products

The simplest and most effective response would be to ban all alcohol advertising and promotions (including promotion in sports). A large body of literature has consistently shown the impact of alcohol advertising, both in terms of increasing consumption of current drinkers as well as influencing the development of new generations of drinkers. In particular, promotion of alcohol through major cultural outlets such as having sporting people covered in alcohol company promotions or through product placement in film, television and music has been found to increase consumption and associated harm. The successful reductions achieved in the prevalence of smoking have been testament to the effectiveness of advertising restrictions for that substance. In lieu of such an approach, a softer option is outlined below.

Advertising should be restricted to show only pictures of the product and description of its characteristics and to exclude any people or scenes that portray drinking as fun or associated with attractive people.

Rationale: It is often claimed that advertising is solely about securing market share. However, it is evident that many current marketing and promotions approaches groom young children to be future drinkers and encourage higher levels of drinking in adult populations. Removing people and any extraneous information from advertising may moderate the harmful associations developed by impressionable drinkers and children and reduce future demand for alcohol.

Government should manage the oversight of regulations on the promotion of alcohol

Repeated independent evaluations have demonstrated the failure of Australia's current voluntary advertising regulation system. Industry oversight of standards presents substantial problems and a lack of accountability and transparency, amounting to regulatory failure. It is recommended that an independent panel, appointed by government and free from industry involvement, be established with statutory powers to set standards and manage complaints.

Education

The National School Education Curriculum should adopt a consistent approach to including alcohol education in schools, as part of the focus on health and wellbeing

Rationale: Solid education can provide an important basis for healthier behaviour later in life and a consistent approach is strongly recommended in light of the current evidence.

Mandating public messages about alcohol

Rationale: Current levels of awareness and knowledge of the harms of alcohol and levels of least risk drinking remain poor. Several strategies are required to address this to ensure consumers are given adequate levels of information from which to inform their behaviour:

National minimum standards for education AND PUBLIC MESSAGING regarding alcohol and its associated harms should be developed, especially focused on ageappropriate content and high frequency exposure

Rationale: This review found that current education campaigns, which involve soft messages and are ad hoc, have little or no effect and some have even been found to have negative consequences. However, the literature on smoking has demonstrated that constant messaging using graphic and salient messages can have a positive impact on people's behaviour, when coupled with other approaches.

National Health and Medical Research Council guidelines for low-risk drinking should be incorporated on all advertising for products which have greater than three percent alcohol

Rationale: Current levels of awareness and knowledge about low-risk drinking guidelines are poor. It should be mandatory to provide constant reminders on all advertisements, rather than vague calls for 'responsible drinking', which have been found to encourage drinking.

Mandatory government-produced public health advertisements should be alongside all alcohol advertising

Every alcohol advertisement should be followed immediately by mandatory government-produced public health advertisements funded via a levy on all sales by alcohol producers and retailers. These should inform the public of the harms associated with drinking, and address social norms around intoxication.

Rationale: French authorities have used this model. Concern about rising levels of childhood obesity led the French Government to take action on junk food advertising in 2004. It passed public health legislation under which advertisements on television or radio 'for beverages containing added sugar, salt or artificial sweeteners and for food products processed and sold in France must contain seven percent health information'. For example, on television and in cinemas health messages are shown on a thin horizontal band (corresponding to 7% of the height of the screen), or as a screened notice displayed just after the advertisement (Jolly, 2011).

Warning Labels should be compulsorily placed on all alcohol products

Rationale: Research on warning labels, including tobacco labelling, has shown evidence that these labels can help raise awareness of specific risks. Combined with other approaches to reducing harm, they can be effective ways to communicate risk at the point of consumption. It is difficult to reduce demand without accurate information being disseminated to consumers at the point of consumption.

Minimum purchase age restrictions be reviewed

Rationale: This and other reviews have found that restricting access to alcohol for young people saves lives and reduces levels of problem drinking in the community. While this move clearly targets only one section of the community, in the absence of other measures such as restrictions on advertising, availability and price increases, this measure will substantially reduce alcohol supply, demand and harm in the community. Raising the legal purchase age to 21 has some public support (Toumbourou et al., 2014) and informed debate about the issue should be encouraged in the community. Different formulations of age restrictions, such as different age limits for on-premise and packaged liquor sales can be modelled to assess their differential impact.

5.2 State Government Policy

Trading hour restrictions

Australian jurisdictions should consider imposing trading hour restrictions. These restrictions should be applied consistently across regions to ensure businesses can compete on a level playing field.

Rationale: The research evidence covered in this review shows that alcohol-related intoxication and harm increases by between 15 and 20 percent every hour of trading after midnight (Chikritzhs & Stockwell, 2002, 2006; Chikritzhs & Stockwell, 2007; Pennay et al., In press). This review has also found that the most evidence-based approach to reducing intoxication levels is through closing all venues earlier (Kypri et al., 2011; Kypri et al., 2014; Miller et al., 2012c). Research has also shown that when trading hours restrictions are applied widely, they can lead to positive changes in drinking culture (Miller et al., 2012c).

Greater resources should be directed towards enforcing liquor licensing laws

Current regulatory and enforcement frameworks require further refinement and investment. In particular, responsible service of alcohol (RSA) measures are evidently insufficient and require more stringent regulation and more comprehensive and systematic enforcement regimes.

Rationale: Police and other regulatory bodies need strong legislative frameworks to allow them to act on venues that fail to implement RSA. Relevant state legislation must allow for the straightforward identification of people who are too intoxicated to be on licensed premises (specifically defined according to evidence-based signs) or served alcohol. Subsequent liquor licensing commission and judicial processes need to be streamlined so that there are significant, actual consequences for venues breaching RSA laws and that their penalties are enacted quickly. A further need exists for standardised, systematically collected, publicly available data about specific venues. This would facilitate the identification of those failing to meet their licence conditions and enable appropriate responses where required (Wiggers, 2007). It is recommended that a user-pays system of risk-based licensing be adopted in all states that incorporates a specific element for the funding of more police to enforce liquor licensing laws.

Risk-based licensing

Rationale: Risk-based licensing has been found to have moderate effects in the only evaluation to date. However, a stronger imperative is the need for governments to recover some of the substantial costs associated with licensing venues. Schemes are able to compensate for these costs by having higher-risk venues pay higher fees and will then be more financially able to act on alcohol-related harm.

Violent venues registers should be implemented in every state

Rationale: The introduction of the violent venues register in New South Wales has had a measurable impact on alcohol-related harm in the community. It also informs the public of the level of continuing harm associated with some venues.

A comprehensive review of Liquor Accords, including a cost-benefit analysis, should be implemented

Rationale: The proliferation of liquor accords across Australia comes in the face of mixed evidence and often involves the expenditure of substantial government resources. No recent evidence shows that accords achieve their goals of reducing harm. Some evidence suggests that liquor accords make the scene more complex, especially when licensees can point to belonging to an accord as proof of action when they continue to run problematic venues. A need exists to review the legislative framework on which they operate across the

country. This is especially relevant to issues such as whether licensees can be compelled to belong to, and whether they are obliged to share data with, statutory agencies.

Premises or area specific alcohol-free conditions

This intervention is currently incorporated within s 64 of the WA Liquor Control Act (1988) *and gives local communities and enforcement officials the ability to act (invoke restrictions) to reduce alcohol-related harm. Individuals or communities can apply to the Director of Liquor Licensing to restrict the sale of alcohol from specific premises, towns or regions for a period to be determined.*

Rationale: This intervention deserves further evaluation as it received strong support from the Delphi study and provides local communities and agencies with the ability to respond quickly to alcohol-related problems at the local level.

Medications for problem drinkers and other supportive treatment options

Rationale: The review identified that both acamprosate and naltrexone have evidence of effectiveness. It may be appropriate to look at the further use of such drugs in dealing with both treatment and tertiary prevention by examining parole conditions that include options for medication use and compliance. Further research and policy trials are required to identify innovative use of such therapeutic mechanisms to enact change.

5.2.1 Harm reduction initiatives

Licenced venues

The following are highlighted as being evidence-based and are recommended as reasonably straightforward and effective interventions.

Safer Bars trials

Rationale: The Safer Bars program for licenced venues has a consistently strong evidence base and trials should be conducted in Australian states.

Mandatory polycarbonate (plastic) glassware

Rationale: Polycarbonate glassware has been consistently found to reduce the severity and prevalence of injuries associated with glass in licenced venues.

Test Purchasing to monitor sales to minors

Rationale: Research in New Zealand, the United States and the United Kingdom has consistently shown that using underage people to conduct test purchases of alcohol, and giving police the powers to conduct such operations, are more effective in reducing harm. They are also far more in terms of the costs associated with alternative means of policing purchase age limits. Australian police are currently unable to conduct such operations resulting in inefficient and ineffective deployment of resources.

Mid-strength alcohol after midnight

Rationale: Alcohol-related harm increases as more alcohol is consumed. Evidence from several Australian studies shows that midnight is the key time after which alcohol-related harm increases. A single trial has suggested that serving mid-strength alcohol after midnight has substantial effects on intoxication and harm. This intervention warrants inclusion in community-wide responses and any form of risk-based licensing options.

Police forces and governments should explore the systematic and high profile use of fines and move-on orders for individual antisocial behaviour Consequence Policing

Such initiatives might be accompanied by high profile media and social media campaigns.

Rationale: The review found that consequence policing, supported by laws that enable people to be fined for being drunk on the street, are effective ways for police to reduce a substantial proportion of alcohol-related harm. Informing the public of the likelihood of being apprehended, and the penalties involved can enhance intensive policing. High profile campaigns (eg using Facebook with Facebook 'friends' of licenced venues), which make people aware of the extent of surveillance and the high cost of penalties, warrant further implementation and well-designed evaluation. This will always be a temporary measure only, as the costs of such intensive policing are disproportionately high.

5.3 Further research

This study has highlighted several areas that warrant consideration for further research.

Cost-effectiveness research

Rationale: Throughout the literature, research which documents cost-effectiveness is lacking. While price and cost-effectiveness should not be the only consideration, it is an important part of the decision-making process when it comes to determining which projects should be funded with public money.

Interventions targeting recidivist offenders where alcohol is a factor

Rationale: Very few interventions targeted recidivist offenders where alcohol plays a role in their offending behaviour. This should be considered a fertile area for intervention as recidivist offenders account for a large proportion of alcohol-related harm in the community. Further research into programs that deal with them is strongly recommended.

Banning Orders for problem patrons

Rationale: Most states operate some system of banning orders for problem patrons. These systems vary widely and there is substantial doubt about which system works best. A further program of research around these orders is recommended, especially in relation to using this measure for domestic violence offenders.

Lockouts should be reviewed

Lockouts are widely used throughout Australia. However, most current research remains unclear about the benefits, or suggests that the benefits may be counter-balanced by harms. A comprehensive review of lockouts as a policy response is recommended.

5.4 Further matters for consideration

As discussed above (Section 5), this section contains a discussion of points for consideration beyond the evidence. It looks at which individual interventions are effective and the contextual factors that influence their ability to reach their full potential.

5.4.1 Strategic responses

Strategic implementation and rigorous evaluation of interventions that reduce the supply and demand of alcohol in Australia by australian, state and territory governments

Rationale: A substantial amount of money is spent every year on interventions that are not based on evidence and have no evaluations. Investing in well-designed evaluations is a significant way to ensure interventions are effective and system investments are sustainable and evidence-based. It is recommended that the Australian, state and territory governments should document the wide range of programs currently being undertaken. They should ensure resources are allocated for an evaluative framework that would include a cost-benefit analysis. A key component should be mandatory reporting requirements for publicly-funded intervention evaluations and that such reports be made available to the public.

Systemic, evidence-based, developmentally-focused prevention interventions that are coordinated by a single overseeing committee should be commissioned to coordinate community efforts across Australia

This strategy should ensure the adoption, evaluation and dissemination of best practice interventions that reduce the demand for and harms from alcohol from the pre-natal stages of life onwards.

Rationale: This review found that a strong body of literature on preventing alcohol demand comes from programs focusing on human developmental stages, especially early development. It is recommended that a national program of service delivery and continual refinement synthesises current approaches across Australia into a clear framework and approach. Projects such as Communities That Care and the Pathways to Prevention program show promising results and are cost-effective. Adopting such programs will substantially reduce future alcohol demand and its consequent harm in the generations ahead.

Australia should adopt a comprehensive data system to document the level of harm in communities and the sources of this harm

A systematic measure of alcohol-related harm—an Alcohol-Related Harm Index (ARHI)—should be established with readily available data across the Australian, state and territory governments and made available to the community for analysis

Rationale: A key finding of this and other reviews has been the inability of local communities and governments to identify how much of the harm occurring in their area is related to alcohol. Without this information, communities are unable to have sophisticated discussions about these levels and the measures they would like put in place. Having valid data available will enable the effectiveness of the intervention to be monitored.

The Australian, state and territory governments should work strategically towards comprehensive and cost minimised data sharing between health, social and law enforcement agencies AND research institutions

Rationale: Providing information across agencies is one successful mechanism through which local agencies and governments can identify and respond to alcohol-related harm. The World Health Organization recommends that national governments should: 'Strengthen collaboration between data producers, including national statistical authorities, national agencies/ministries responsible for violence and crime prevention, and research institutions to improve availability and quality of data on violence and crime'. Recent evidence shows that combining information from law enforcement, health and social support services (including non-government organisations) can substantially improve the identification and response to alcohol-related harm (Droste et al., 2014).

A 'last drinks' monitoring system should be implemented by police across Australia to identify those involved in alcohol-related crime and to identify high-risk venues

Rationale: The literature shows that an effective method for dealing with alcohol-related harm is the uniform adoption of mandatorily collected 'last drinks' data. This information is collected from police who are associated with targeted interventions by regulatory authorities. The Alcohol Linking Project in New South Wales demonstrated a significant reduction in harm associated with licenced venues by systematically collecting basic information about where an individual, arrested for an alcohol-related offence, had bought their last drinks (Wiggers et al., 2004).

A 'last drinks' monitoring system should be trialled in Australian emergency departments

Rationale: The literature demonstrates that the uniform adoption of mandatorily collected 'last drinks' data from emergency departments is an effective method for dealing with alcohol-related harm, when combined with responses such as police visits or visits to licensees from hospital staff. Collecting this data from patients attending the emergency department in Cardiff, Wales was found to be associated with a reduction of up to 40 percent of violence-related offences attending in the department (Shepherd, 2007). This finding has been replicated in a number of sites and a systematic review recently found this to be effective in (Droste et al., in press).

A working party should be set up to work towards standardising data collection systems and records across all jurisdictions, including wholesale alcohol purchase data and police records

Rationale: A key element of the systemic measures recommended above is the adoption of standard data across Australia, which is in line with best practice from around the world. The working party should include: (i) individuals with a national perspective who also bring relevant national and international collaborative research links; and (ii) local practitioners who can inform on ground-level community issues and data.

A comprehensive set of guidelines should be developed around the role of the alcohol industry in health and law enforcement policy formulation

Australian governments should adopt the World Health Organization position of consultation with industry on implementation that: 'the alcohol industry has no role in the formulation of alcohol policies, which must be protected from distortion by commercial or vested interests' (Chan, 2013).

Rationale: Substantial confusion exists about the appropriate level of industry engagement that governments should allow in order to ensure that effective policy is formulated and the best outcomes are achieved for the community. Previous examples regarding the behaviour of the alcohol industry provide a compelling case for the approach taken in tackling the tobacco issue where industry was perceived as a vested interest. Industry cannot be objective, and as with tobacco, effective change can best be achieved (and sometimes only achieved) if government is able to act in the interests of social order and public health without interference from vested interests. Alcohol industry actions promoting ineffective policy were recently and clearly shown in industry submissions to the Australian National Preventative Health Taskforce. It is important to acknowledge the industry's strong financial interest in selling more alcohol and increasing demand for their product. In light of this, appropriate guidelines akin to those of the World Health Organization, should be developed to contain the industry influence on alcohol policy.

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7. Appendix A

Listed below are those interventions funded by the Australian National Preventive Health Agency, but which do not have evaluation reports to include in this review. They have been categorised by type of intervention. The amount of funding they received from ANPHA is also listed, showing the significant amount of money being spent on interventions for which effectiveness is unknown.

7.1 Community Approach

Eastern Goldfields YMCA Inc (WA)—This project focuses on providing both preventive and diversionary services and activities to young people aged 12–24 years in the Kalgoorlie-Boulder region of Western Australia. The project uses a 'whole of community' approach through working with community partners to address the issue of youth binge drinking in the community.

Mulungu Aboriginal Corporation Medical Centre (Qld)—$280,908 for the Mareeba Young and Awesome: makin' music, makin' moves, makin' over and makin' out project. This project will provide a wide range of community activities and skills development for young Indigenous Australians in this rural Queensland community.

Eastern Goldfields YMCA Inc (WA)—$424,879 for the Stronger Communities project. This project will provide a whole-of-community preventive approach to binge drinking in the Kalgoorlie-Boulder area.

Carpentaria Shire Council (Qld)—$493,000 for the Carpentaria Shire Interagency Binge Drinking Working Group—community initiative to combat binge drinking in youth project. The project will strengthen agency and community networks in Normanton and Karumba to increase participation in social, cultural and sporting activities.

David Wirrpanda Foundation Inc (WA)—$500,000 for the Gwabba Yorga–Gabba Warra project. This is aimed at Aboriginal and Torres Strait Islander girls 12–17 years engaged through netball competitions in Perth and several regional Western Australian towns.

Clarence Valley Council (NSW)—$497,790 for the Eyes Wide project. This will bring together young people, local service providers and health agencies in a model responsive to a dispersed population with limited youth services in Grafton and the regional towns of the Clarence Valley.

7.2 Reducing harm

Gap Youth Centre Aboriginal Corporation (NT)—$500,000 for the Off the Street project. This project will provide a safe alcohol-free entertainment venue for young people on Saturday nights in Alice Springs.

Mushroom Marketing Pty Ltd (National)—$500,000 for the Live Solution—have a better time with live music project. This project will promote the enjoyment of a better live music experience by avoiding binge drinking.

The Salvation Army Melbourne Project 614 (Vic)—$495,000 for the Youth Street Teams project. This project will employ a multi-faceted early intervention approach to address high-risk activities and the harms associated with young people binge drinking in Melbourne's Central Business District. This project has partnered with the City of Melbourne, Victoria Police and Metro Trains to implement a coordinated approach to reduce binge drinking among young people and improve safety in the Melbourne CBD. A major component of the project is the provision of a street outreach program in the CBD on Friday and Saturday nights

Youthsafe (NSW)—$356,678 for the resilience building approach to preventing and managing binge drinking among young workers project. This project will develop, deliver and evaluate a resilience-based binge

drinking program of preventive resources and training to support apprentices and trainees in both work and community settings across Sydney, the Hunter and Far Northern New South Wales.

Shire Wide Youth Services Inc (NSW)—$500,000 for the Be A Smarty When You Party project. The project aims to reduce binge drinking by providing street outreach, alcohol-free activities and events, and drop-in support services in the Sutherland and St George areas.

Multicultural Centre for Women's Health (Vic)—$492,267 for the Healthy Lives, Health Futures project. The project takes a community development approach across Victoria to improve the capacity of young people from immigrant and refugee backgrounds to reduce their risk of alcohol-related harm.

Adelaide City Council (SA)—$151,018 for the Green Team West End Youth project. The project will extend the voluntary street outreach program currently conducted during Schoolies Week at Victor Harbor to a Saturday night presence in Adelaide's CBD

7.3 Education

Ngnowar Aerwah Aboriginal Corporation (WA)—This project aims to address binge drinking among young people aged 12–24 years in the Wyndham area by raising awareness of harms, providing alternative activities, mentoring and referrals.

Anglicare NT (NT)—$300,000 for the Imagine, Create, Inspire project. This project focuses on youth engagement and awareness using peer education strategies and social media to encourage healthier behaviours in Darwin and Palmerston.

Queensland Remote Aboriginal Media Aboriginal Corporation (Qld)—$255,610 for the In Our Own Words: young people working together to address binge drinking in remote Aboriginal communities in Queensland project. This project will bring young Indigenous people from remote Cape York and Gulf of Carpentaria communities together to produce a series of radio programs for their local communities addressing the issues of binge drinking.

Mushroom Marketing (National)—$80,000 for this project aims at harnessing the power of live contemporary music to challenge the issue of youth binge drinking. Across the project period more than 80 Live Solution live music events and 20 educational music event workshops will be activated in all states in both metropolitan and regional locations.

Incolink (Vic)—300,000 for the Drink Safe Mate project. This project will target 8,000 young workers in the Victorian building and construction industry through health education and capacity building approaches.

Re-Engage Youth Services (SA)—$497,445 for the Southern Collaborative Response to Binge Drinking project. This project will provide alcohol-free events and use social media to deliver health promotion messages in the communities of Marion and Onkaparinga.

Mitchell Community Health Service (Vic)—$500,000 for the Whenever You're Likely To Drink project. This project aims to develop a coordinated community response to raise awareness of the health risks caused by binge drinking in the Hume communities of Broadford, Wallan and Seymour.

Glenorchy City Council (TAS)—$248,637 for the Interactive Online project. This project will use social media to inform and educate young people on the risks and consequences of binge drinking.

Leeton Shire Council (NSW)—$440,462 for the Bidgee Binge project. The project is an interactive, multi-faceted program aimed at reducing binge drinking among young people in the Leeton, Griffith and Narrandera areas.

CuriousWorks (NSW)—$95,439 for the Western Sydney Alcohol Awareness Video Initiative project. This project will provide education and skills training for young people in the Penrith area as they develop and produce videos for their peers that promote the harms of binge drinking.

Bathurst Regional Council (NSW)—$495,071 for the SMARTS—Smashed Arts project. This project will engage young people in the Bathurst region by providing health education messages and alternative entertainment opportunities.

Ngnowar Aerwah Aboriginal Corporation (WA)—$300,000 for the Wyndham Youth Reconnect project. The project will target at-risk local youth by providing health education programs and alternative recreation activities.

Cloncurry PCYC (Qld)—$278,981 for the Chill Out project. This project will provide a local solution to binge drinking in Cloncurry and Mt Isa through health awareness sessions and sporting and recreation activities.

Champions: Kingston, Manuka, Canberra City, Braddon, Dickson, Belconnen and Woden (ACT)—$539,653.40 for this project which aimed to increase awareness of alcohol-related harm, personal responsibility and positive decision-making in relation to the use of alcohol among 18–24 year olds in the Australian Capital Territory. The key message of Champions ACT is to encourage young people to look after their friends by emulating 'Champions' who feature in a range of promotional material, targeted advertising and social media.

Melton Shire Council (Vic)—$287,282 for the Saturday Nights!! Live!! project. This project will provide a weekly range of alcohol-free events for young people in the Melton and Taylors Hill communities while using peer educators to raise awareness of the harms associated with binge drinking.

Australian Red Cross (Qld)—$300,000 for the Binge on Life program. The program aims to provide alternative arts activities for youth on Palm Island and Central West communities to tackle the issue of binge drinking.

8. Appendix B

Below is a list of DrinkWise education programs that were located through extensive searching, particularly through media releases or the DrinkWise website. Where evaluation data could be located it is reported, however this data was limited and often only summarised on the website without any link to the evaluation report.

Responsible Drinking on Campus—DrinkWise and Macquarie University jointly developed this intervention. It is a three-stage three-year study of alcohol attitudes, behaviours, and practices for students, with the intention of developing a model for managing alcohol on-campus. The first stage involved surveying students and staff, as well as high school partners and parents of children who participated in the university's swim school in order to get a better understanding about their views about alcohol. The second stage involves more focused research using focus groups, and the third stage will evaluate the effectiveness of a related intervention.

Long-term social change campaign to influence generation change towards responsible consumption of alcohol—This project is jointly funded by DrinkWise and the Australian Government's Department of Health and Aging. It focuses on influencing people's attitudes and behaviours towards the consumption of alcohol. It intends to empower parents, so they can positively influence their children's future drinking behaviour, and in particular reverse the trend of teenagers drinking at an early age. A major aim of this campaign is to encourage the next generation to believe that drinking to get drunk is socially unacceptable.

Red Dust Role Models—DrinkWise, in partnership with Red Dust Role Models, deliver education programs to Indigenous Australians in Alice Springs schools, town camps, and remote communities. The campaign aims to effectively and appropriately educate people on the harmful effect alcohol consumption can have, both on the individual and on their family. DrinkWise notes that in developing this program it has considered education, early intervention, and peer-led mentoring in order to provide a holistic and integrated approach.

Kids and Alcohol Don't Mix—The aim of the program is to assist parents in delaying the age at which their child first consumes alcohol. The campaign encourages parents to talk about, and implement a strategy to appropriately deal with the situation in which their child asks about drinking alcohol. The campaign has received media attention in major newspapers, as well as television and radio. Some initial evaluation of this program is reported on the DrinkWise website, however only outcome data is reported and as such cannot be compared to any initial data that was obtained. Although it is noted that attitudinal change has occurred for parents it is difficult to determine this without the appropriate information being reported. Further, the evaluation was conducted by a marketing research company that focuses on statistics such as the number of people who visit a website. These are not appropriate evaluations of effectiveness for harm reduction associated with alcohol.

Drinking—Do it properly—This campaign is designed to influence young adults to drink responsibly, in particular to moderate the intensity and frequency of binge drinking occasions. An aim of the campaign is to make binge drinking/drinking to get drunk a socially unacceptable behaviour, and instead to encourage safe and moderate drinking. Once again, some evaluation results are available, though these are focused on how much people are considering change, rather than an evaluation of any actual change.

Kids Absorb Your Drinking—This campaign focused on encouraging the Australian community to change their attitudes towards alcohol in order to promote a safer and more responsible drinking culture. Initial evaluations indicate that a third of parents reported reducing the amount of alcohol consumed in front of their children, and six percent reported not drinking in front of children. Approximately 40 percent of parents indicated reducing drinking in order to be a good role model or to set a good example, and 14 percent indicated that TV advertising has been a factor in these decisions. However, using a marketing company to evaluate research is not an appropriate form of peer-review evidence. Further, the program was evaluated using a sample of 512 people which is very small considering the program was implemented Australia-wide. The findings cannot be generalised to the wider population.

Lions Australia—Drinkwise provided Lions Australia with $25,000 to develop an interactive mobile and internet presentation to educate 18–25 year olds about the dangers associated with excessive alcohol consumption and teach them to drink responsibly.

Indicators for estimating trends in alcohol-related assault: evaluation using police data from Queensland, Australia

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Received 3 September 2018
Revised 14 December 2018
Accepted 19 December 2018

To cite: Nepal S, Kypri K, Attia J, *et al*. *Inj Prev* Epub ahead of print: [*please include* Day Month Year]. doi:10.1136/injuryprev-2018-042985

ABSTRACT

Monitoring levels of alcohol-related harm in populations requires indicators that are robust to extraneous influence. We investigated the validity of an indicator for police-attributed alcohol-related assault. We summarized offence records from Queensland Police, investigated patterns of missing data, and considered the utility of a surrogate for alcohol-related assault. Of 242 107 assaults from 2004–2014, in 35% of cases the drug used by the offender was recorded as 'unknown'. Under various assumptions about non-random missingness the proportion of assaults judged to be alcohol-related varied from 30%–65%. We found a sharp increase in missing data from 2007 suggesting the downward trend from that point is artefactual. Conversely, we found a stable and increasing trend using a time-based surrogate. The volume of missing data and other limitations preclude valid estimation of trends using the police indicator, and demonstrate how misleading results can be produced. Our analysis supports the use of an empirically-based surrogate indicator.

INTRODUCTION

Alcohol consumption is a cause of assault through the interaction of its physiological effects with characteristics of individuals and drinking environments.[1 2] The biphasic effect of alcohol produces euphoria and greater confidence as blood alcohol concentration (BAC) increases, then fatigue, irritability and lack of coordination as BAC decreases. At BACs as low as 0.02 g/dL, drinkers exhibit impaired coordination, ataxia, decreased mentation, poor judgement and labile mood.[3 4] Intoxicated patrons can be more readily provoked to violence by adverse conditions, such as crowding at premises, poor lighting and ventilation, and lack of comfortable seating.[5]

Alcohol-related harm and its causes are frequently in the news media[6] and the subject of political debate.[7] Such discourse often involves competing claims about basic facts, for example, whether a particular problem is increasing or decreasing, let alone what should be done about it.

We need valid indicators of alcohol-related harm to help monitor trends and facilitate rational policy development.[8] Archival data are commonly used to create indicators; however, alcohol involvement is not routinely recorded, and when recorded, an objective measure may not be used.[9] For example, standard indicators for alcohol-related assault may rely on police to make a subjective judgement about whether the offender is affected by alcohol. Conversely, road safety laws require a BAC test in the event of an injury crash.[10]

As part of a project evaluating the effectiveness of a new liquor licensing scheme, we focused on Queensland, where this intervention came into effect in 2009. We applied formal guidelines to evaluate the use of an indicator for police-attributed alcohol-related assaults.

METHODS

We summarised de-identified unit records of assaults by the Queensland Police, from January 2004 to December 2014. There were 15 variables including date and time of offence, postcode, offence code, type of offence, offender's/victim's gender and age, the attending officer's opinion of whether the offender was affected by alcohol or other drugs (coded as other drugs, many drugs, volatile substance), and offender's intoxication level. We examined each variable including the number of missing values in key classes. Using the Australia and New Zealand Standard Offence Classification,[11] we aggregated the assaults based on the severity: (1) assaults causing physical injury and (2) assaults causing no/minor physical injury.[11] We excluded 21 380 assaults on police officers as they were defined by who the victims were and therefore were highly susceptible to changes in operational directives or coding practices.[11]

We employed the *International Guide for Monitoring Alcohol Consumption and Related Harm (MACRH)*[8] which recommends five options for establishing valid indicators: (1) use alcohol-specific cases; (2) identify subsets of alcohol-related events; (3) use control indicators by examining events in the same dataset that are rarely or not alcohol-related; (4) use research data to estimate an alcohol attributable fraction and adjust incidence rates accordingly; (5) develop composite indicators.

Applying the first recommendation, we investigated the standard police indicator and found it to be problematic (explained below). We followed the second recommendation, identifying a surrogate measure, that is, assaults occurring at times at which assaults are commonly alcohol-related, that is, 'high alcohol hours' (HAH). These hours were determined for the National Alcohol Indicators Project (NAIP) by using traffic injury data from 1990 to 1997. BAC data were aggregated by days of the week and time of day, creating 42 categories. For each category, the proportion of BACs

Table 1 Alleged drug use status of offenders

Drug used	Number of assaults
Unknown	**83 973**
Alcohol	**73 390**
Alcohol only	70 706
Alcohol and other drugs	2507
Alcohol and many drugs	7
Alcohol and volatile substance	38
Affected by alcohol; Not affected by	19
Alcohol and unknown	113
All other drugs	**3853**
Other drugs	3058
Many drugs	302
Other drugs and volatile substance	5
Other drugs and not affected by	2
Other drugs and unknown	10
Many drugs and volatile substance	1
Many drugs and unknown	3
Volatile substance	472
Not affected by alcohol/other drugs	**80 891**
Total	**242 107**

Table 2 Results of sensitivity analysis

Total assaults	**242 107**
Assaults with known drug involvement	**158 134**
Assaults with unknown drug involvement	**83 973**
Alcohol-related assaults	**73 390**
Estimate for alcohol-related assaults assuming alcohol involvement status was missing at random (MAR)*	(73 390/(73 390+80 891+3853))×100=**46.4%**
Estimates for alcohol-related assaults arrived under five assumptions concerning non-random (MNAR) alcohol-involvement status†	
When none of the missing cases are alcohol involved	(73 390/242 107)×100=30.3%
When one-fourth of the missing cases are alcohol involved	(73 390+20 993/242 107)×100=38.9%
When half of the missing cases are alcohol involved	(73 390+41 986/242 107)×100=47.6%
When three quarters of the missing cases are alcohol involved	(73 390+62 980/242 107)×100=56.3%
When all missing cases are alcohol involved	(73 390+83 973/242 107)×100=64.9%

*(Alcohol-related assaults/(assaults with drug involvement known))×100.
†((Alcohol-related assaults+% of missing cases that may be alcohol involved)/total assaults)×100.

exceeding the legal limit was compared with the overall proportion of BACs exceeding the legal limit. If the proportion of BACs exceeding the legal limit was one SD or more above the overall proportion, these times were classified as HAH.[12]

The third recommendation is to use a variable to control for changes in service delivery, which is relevant to the evaluation of interventions, but not to estimating trends, per se, so we do not describe it here. *MACRH*'s fourth and fifth recommendations involve estimation of an alcohol-attributable fraction reflecting estimates of risk associated with various levels of exposure to alcohol and the prevalence of those exposures in the population.[8 13] Regrettably, this approach is only feasible if there are up-to-date risk estimates and high-quality prevalence data available at frequent intervals to account for changes in alcohol exposure over time.[9]

To investigate service delivery variables,[13] we asked the police whether they changed their data collection methods over the study period and reviewed official documents to identify changes in the number of police deployed each year.

RESULTS

From 2004 to 2014, police recorded 242 107 assaults. In 30% of cases (table 1), the substance judged to be consumed by the offender was alcohol, while in 35% of cases it was recorded as 'unknown'. The online data dictionary did not provide a description of this variable, making it impossible to ascertain which, if any, psychoactive substance police judged the offender to have consumed in the 'unknown' cases. We concluded that this variable would be unusable due to the amount of missing data and high potential for bias from even modest non-randomness in the distribution of missing data over time.

To understand the repercussions of missing alcohol-involvement status, we conducted a sensitivity analysis about the true values of 'unknown' cases (table 2). Assuming data were missing at random, that is, the missing cases had the same distribution by type as the alcohol-related cases, 46% of assaults were alcohol related. When we assumed that data were missing not at random, the proportion of alcohol-related assaults ranged between 30% (assuming none of the 'unknown' cases were alcohol related) and 65% (assuming all of the 'unknown' cases were alcohol related).

The proportion of missing data and lack of information on reasons for missingness makes the standard indicator unusable. As an alternative, we investigated the merit of employing a surrogate indicator, namely, assaults during HAH,[12] avoiding reliance on the subjective judgement of alcohol involvement.

Figure 1 shows the distribution of (1) assaults deemed by police to be alcohol related, (2) 'unknown' cases and (3) assaults during HAH. The sharp increase in the number of 'unknown' cases from 2007 undermines the credibility of the standard indicator and may have created a spurious decreasing trend in the incidence of alcohol-related assaults. From 2008 to 2014, the proportion of 'unknown' cases ranged from 45% to 57% for assaults causing physical injury and 41%–52% for assaults causing no/minor physical injury. Conversely, the trend in HAH assaults was relatively stable and increasing.

The proportion of 'unknown' cases was higher in LAH assaults (49%–67%) than in HAH assaults (35%–43%). In addition to the high level of uncertainty about alcohol involvement in police-attributed alcohol-related assaults, 36% had missing data for the degree of intoxication.

DISCUSSION

From 2004 to 2014, according to police, 46% of assaults in Queensland were alcohol related, and the incidence of such assaults decreased from 8551 in 2005 to 5331 in 2014. However, the true proportion of assaults that were alcohol related during this period could be between 30% and 65% depending on assumptions about missing data. We showed that the indicator is sufficiently unreliable to give a misleading impression of the direction of the trend, under non-extreme assumptions about the true values of missing data. In the absence of a valid indicator reflecting direct attribution of alcohol-involvement, and following the second recommendation from *MACRH*, that is, assaults during HAH,[8] we found a stable, increasing trend.

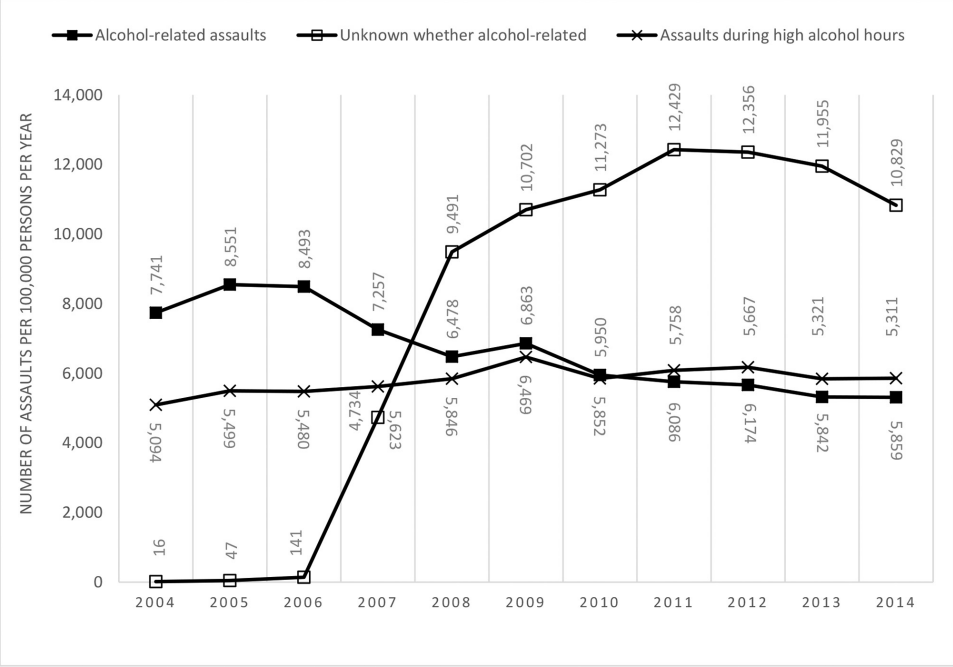

Figure 1 Trends in assault judged by police to be alcohol related versus assaults occurring during high alcohol hours.

We document our exploration of pitfalls in a commonly used indicator in order to assist others in their deliberations about trends in alcohol-related harm, and for evaluating jurisdiction-wide policies and programmes. A limitation of our study is that datasets such as the one we relied on only include cases that are reported to the police. In the USA, from 2006 to 2010, 52% of all violent incidents went unreported,[14] typically because the victims did not go to the police.[14] Assaults also go unreported because police have other priorities, especially during the peak hours of the weekend when they cannot attend to all the incidents brought to their attention.[15] It is likely that unreported assaults are distributed differently over time and space, by injury severity and offender substance use status, as has been found in traffic injury.[16] Our use of a time-based surrogate circumvents problems arising from bias in subjective attributions of offender alcohol involvement.

The NAIP[12] estimates relied on data from the 1990s, and it is plausible that the pattern of harm within the 24-hour cycle has changed as alcohol markets have grown and liberalised.[17]

What is already known on the subject

- Alcohol consumption is a common cause of assault.
- It is unclear whether police data record alcohol involvement in assault reliably.

What this study adds

- We found that alcohol involvement status was often missing in police data.
- Analysing the pattern of missing data revealed a probably spurious downward trend in the indicator for police-attributed alcohol-related assault.
- A time of day–based indicator produced a stable, increasing trend over the same period.

Our investigation highlights the importance of updating such research and the need for proactive approaches to evaluate alcohol-related interventions. It is not safe to assume that routine data alone will be sufficient to address important policy questions after they have been implemented.[18]

CONCLUSION

The volume of missing data and lack of specification concerning the substance use status of offender preclude valid estimation of trends in alcohol-related assault using the police indicator. Our analysis demonstrates how misleading results can be produced by changes in police practices, that is, so-called service delivery variables.[13] For estimating trends and evaluating state-wide interventions, our data support the use of a temporal surrogate.

Acknowledgements We thank the Queensland Police for providing the data.

Contributors SN was involved in the design of the study, analysis, writing and revision of the manuscript. All coauthors were involved in the design of the study, writing and in providing critique necessary for revision of the manuscript.

Funding This project was funded by Australian Research Council Discovery grant (DP150100441). KK's contribution was funded by a National Health and Medical Research Council Senior Research Fellowship (1041867).

Competing interests None declared.

Patient consent for publication Not required.

Provenance and peer review Not commissioned; externally peer reviewed.

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Drug and Alcohol REVIEW

APSAD

Drug and Alcohol Review (2017)
DOI: 10.1111/dar.12501

Effectiveness of community-based interventions for reducing alcohol-related harm in two metropolitan and two regional sites in Victoria, Australia

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Abstract

Introduction and Aims. *The relationship between alcohol intoxication and harm is well known, and many community-based interventions have been introduced in an attempt to reduce the rates of alcohol-related harm. The current paper uses two metropolitan and two regional Australian cities as sites to investigate the impact of community-based interventions on the reduction of alcohol-related harms.* ***Design and Methods.*** *Data for injury-related emergency department (ED) presentations and police attended assaults during high-alcohol hours (i.e. 20:00–06:00 h, Friday and Saturday nights) were obtained for each site from 2000 to 2015 for ED presentations and from 2000 to 2016 for police assaults. Autoregressive integrated moving average time series analyses were conducted to determine the impact of the community-based interventions introduced at each site for reducing these rates of ED injury presentations and police attended assaults.* ***Results.*** *None of the community-level interventions that were introduced across the four sites resulted in a reduction in ED presentation rates or assault rates.* ***Discussion and Conclusions.*** *The majority of interventions introduced across the four sites were proposed and implemented by local liquor accords. Given none of the interventions demonstrated a reduction in ED injury presentation rates or police attended assault rates, it is argued that local liquor accords may not be best placed to propose alcohol-related harm reduction measures, and instead, there should be a focus on the implementation of evidence-based regulatory strategies, such as restricted trading hours.* [Curtis A, Coomber K, Droste N, Hyder S, Palmer D, Miller PG. Effectiveness of community-based interventions for reducing alcohol-related harm in two metropolitan and two regional sites in Victoria, Australia. *Drug Alcohol Rev* 2017;00:000-000]

Key words: alcohol, alcohol-related harm, intervention.

Introduction

The combined social cost of alcohol and illicit drug use in Australia is approximately AUD55.2bn a year [1]. In 2007, almost two-thirds of Australian men who were physically assaulted said that the perpetrator had been drinking or taking drugs, and 28% of victims had been consuming alcohol or drugs themselves [2]. Almost half of women physically assaulted and 84% of women who were sexually assaulted said that the perpetrator had been drinking or taking drugs [2]. Of those reporting involvement in aggressive encounters in night-time entertainment precincts, 88% had consumed alcohol prior to the incident [3].

While there is some evidence for successful strategies for reducing alcohol-related harm, including trading hour and sale restrictions [4–9], these require implementation at a state level, which requires agreement among all relevant parties, which is not often reached. In the absence of such political will, many community-based interventions have been introduced by local government and local liquor accords in an attempt to reduce alcohol-related harm. A 'liquor accord' combines persons from local businesses (particularly licensees), council, police, local government and government agencies and community agencies, in a voluntary partnership with the intention of developing solutions to alcohol-related problems [10]. Liquor accords are primarily an Australian intervention, although New Zealand has 'alcohol accords', but these have not received any formal evaluation.

There have been community-based interventions implemented to reduce alcohol-related harm internationally

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Received 14 July 2016; accepted for publication 7 September 2016.

with some success reported. The Stockholm Prevents Alcohol and Drug Problems (STAD) project was a multi-component approach to reduce public drunkenness, alcohol-related violence and to create a safer night-time economy in Stockholm [11]. Key components of the program were the responsible service of alcohol (RSA) programs aimed towards educating the servers, security and owners. Results of the 5 year period included a 29% reduction in violent crimes [12] and an increased refusal of service rate for drunk patrons [13]. However, a subsequent six-city expansion of the STAD program has shown that while uptake was good in all cities with very high levels of fidelity in implementation, the serving practice or alcohol-related harm did not change [14]. This might be a result of extremely low baseline at the beginning of the trial, where police operated in a reactive mode, only attending licensed venues when called to intervene in violent altercations that were beyond the capacity of venue security. The concept of RSA before STAD was almost non-existent, with pseudo-patron studies showing that in the initial round of observations, 95% of bars would serve an actor portraying heavily intoxicated behaviour who had staggered to the bar, had problems sitting down or standing at the bar and had fallen asleep briefly before attempting to order the beer. The improvement to only 47% of bars still serving these intoxicated individuals still represents a basic failure of RSA [15]. Starting from such a baseline, virtually any intervention would be likely to see an improvement.

Another example from Stockholm is an intervention labelled 'Student08', which was developed by STAD and the police in an attempt to decrease violent crime associated with alcohol consumption at student parties at licensed premises in Stockholm [16]. It involved cooperation between STAD, the city police, the licensing board and the Swedish Tax agency: information and education about restaurant regulations, and increased enforcement by police and increased inspections by the tax agency. An evaluation conducted between 2008 and 2010, using violence-related emergency room attendances, found a 23% reduction in violence among young people between 18 and 20 years of age [16].

While many interventions have been introduced, these have not usually been supported by independent, rigorous research and have not demonstrated any effectiveness for reducing alcohol-related harm in Australia [17], particularly in both metropolitan and regional sites within Australia [18,19].

Three evaluations have been conducted on liquor accords or aspects of accords in Australia. These were conducted in Geelong, Ballarat and Fremantle. The first evaluation of the Geelong liquor accord found a 52% reduction in assaults 12 months after the accord was implemented [20] although the assault data included in the evaluation covered Geelong and outer suburbs within a 90 km radius. Further, there were no alcohol indicators for the assault, other than time committed [20,21], resulting in difficulties attributing the noted decline only to the effect of the liquor accord [17]. Recent regulations and additions to the Geelong liquor accord, such as ID scanners, have been subjected to evaluation and have been found to have little impact on reducing the number of emergency department (ED) presentations for alcohol-related injury from 2005 to 2011 [22]. Further, a larger study using police assault data and ED presentation data for alcohol-related assault found that these rates have actually been increasing over time [23].

The Ballarat liquor accord first implemented a 03:00 h lockout in 2003 making it the city with the longest running licensed venue lockout requirement [24]. In 2010, the lockout time was changed to 02:30 h as a trial run from March until September [25], and after the trial period the licensees in the accord continued the 02:30 h lockout voluntarily. Other key regulations included in the Ballarat accord include a shot curfew preventing shots from being ordered after 01:00 h, a blanket patron banning process, which involves ensuring an individual banned from one venue is banned from all venues who are members of the accord unless they undergo an appeal process, and a focus on adhering to Victorian RSA standards [26]. One evaluation of the original 03:00 h lockout found that it had an impact on reducing offences, including a 39% decrease in assaults and a 17% reduction in property damage [27], although this finding was not evident in the rate of alcohol-related ED presentations from 1999 to 2009. The ED data from 1999 to 2009 revealed a reduction in alcohol related assaults and intoxication rates in the 6 months prior and 6 months after the 03:00 h lockout [24], indicating that the lockouts alone could not account for the change. After the initial decline in the rate of ED presentations, the rates began to increase and eventually grew higher than the rates in Geelong [24].

The Fremantle liquor accord regulations include cover charges, guidelines for RSA and the prohibition of discounts on drinks and drink promotions [17]. The Fremantle accord also includes a Better Practices Committee, who set the RSA training standards and training programs for licensed venues [28]. The evaluation of the Fremantle liquor accord is considered to be a more rigorous evaluation than other accord evaluations because of the inclusion of a control site and the substantial amount of data collected before and after the intervention [29]. The outcome measures in the evaluation were as follows: surveys from patrons, residents, businesses and taxi drivers regarding perceived changes during this time; risk assessments; and the use of pseudo patrons for measuring service of alcohol to those who are under age or visibly intoxicated [17]. Other data included pre-intervention and post-intervention included drink-

driving charges, road crashes, assaults associated with individual premises and server practices [29]. There were no significant changes in opinions, risk assessments, pseudo patrons and other measures after the implementation of the accord, and there were no significant changes between the control site and the implementation site, which was suggested to be a result of the control area's implementation of its own accord [29].

Generally, past research has shown little support for the effectiveness of community-based interventions, and in particular, there is a lack of peer-reviewed research investigating the effectiveness of community-based interventions on ED injury presentations and assault data for particular sites. The current article seeks to correct this gap in the literature using two metropolitan and two regional cities in Australia as sites to investigate the impact of community-based interventions on the reduction of alcohol-related harms. In particular, ED injury presentation data and police attended assault data are utilised to determine the impact of community-based interventions for reducing alcohol-related harm.

Methods

Setting

Four Victorian sites were utilised for the current paper: two metropolitan (Melbourne CBD and Frankston) and two regional (Geelong and Shepparton). On the basis of the 2011 Census of Population and Housing [30], the population of the Melbourne CBD is 93 625. Frankston is located in the outer southern suburbs of Melbourne, about 40 km south of the Melbourne CBD, with 126 458 people. Geelong is located in South Western Victoria, about 75 km south west of the Melbourne CBD, and has a population of 210 875. Shepparton is located in North Central Victoria, about 180 km north of Melbourne, and has a population of 60 499. The reason for choosing these sites was twofold: First, they provide a sample of both metropolitan and regional sites; and second, they all have long-standing liquor accords that have been implementing various interventions to reduce alcohol-related harm, alongside local government (or municipal) councils, some since the early 1990s.

Data and analyses

Emergency department data. Emergency department presentation data were obtained from the Victorian Emergency Minimum Dataset, and patient statistical local area was utilised to determine the location. In classifying patients into Geelong, Frankston and Shepparton, Victorian Statistical Local Area Maps were consulted [31]. The statistical local areas used for analysis for Shepparton were Greater Shepparton City Parts A and B; for Frankston were Frankston City, East and West; and for Geelong were Greater Geelong City Parts A and B, Corio Inner, Newtown, Queenscliff, South Barwon Inner and Surf Coast East and West. ED presentation data for Melbourne were not utilised given the numerous hospitals that patients are able to attend in the area and the difficulty associated with determining which attendances presented as a result of intoxication or an injury that occurred in the central business district of Melbourne. The data were obtained for midnight to 06:00 h Friday and Saturday nights (HAH) for the period of January 2000 to December 2015, given that the use of HAH identifies 56% of all ED injury cases with prior alcohol involvement [32]. Further, only data for those presentations where the patient was over 15 years of age were used, given the existing age category of 15–19 years in the Victorian Emergency Minimum Dataset database, as well as the low likelihood that those aged below this were attending an ED for an alcohol-related incident. ED presentations were differentiated into a diagnosis of injury using International Classification of Disease S and T codes. For the ED data, the identifier HAH1 will be utilised.

A quarterly rate of ED presentations per 10 000 local government area (LGA) population was used as the denominator (obtained from Australian Bureau of Statistics, 2016), as this allowed a more accurate comparison between sites to be made.

Assault data. Police recorded assaults were obtained for the four sites, including Melbourne, over the period from January 2005 to June 2016 from Crime Statistics Victoria. For assault data, the high alcohol hours of 20:00–06:00 h on Friday and Saturday nights are utilised (HAH2), given findings that assault offences involving alcohol tend to occur between these hours [33,34].

A quarterly rate of assaults per 10 000 LGA population was used as the denominator (obtained from Australian Bureau of Statistics, 2016). As LGA population was not available for 2015 and 2016, these figures were created on the basis of the previous 10 years of LGA population. However, for Melbourne, assault data raw numbers are used, rather than a rate per LGA population. Melbourne data have been analysed in this way given that calculating the rate based on the population in the LGA would be misleading as many people travel into the city of Melbourne during HAH2 who do not actually live within the area. This decision is primarily based on findings from a previous study [35], whereby only 10.9% of people interviewed attending the Melbourne CBD came from within the City of Melbourne LGA (unpublished

data [3]). While there are also visitors to the regional centres, the numbers are likely to be relatively small compared with the metropolitan centres because of significant travel distance and times, minimal public transport access and considerably less late night entertainment options.

Analyses. All analyses were conducted using STATA 14.0 [36]. Autoregressive integrated moving average (ARIMA) time series analyses were used to determine the effect of community-based interventions introduced at the four sites for reducing alcohol-related harm [37,38]. While seasonal ARIMA models were

Table 1. *Interventions implemented in Melbourne, Geelong, Frankston and Shepparton from 2005 to 2015 to reduce alcohol-related harm*

Name of intervention	Site implemented (year)	Description
Designated area CBD ban	M (2007–) F (March 2009–) S (March 2010–)	An area in an entertainment precinct where alcohol-related violence and antisocial behaviour has occurred. Police can issue a designated area CBD ban for a person for up to 72 h.
Responsible practice guidelines	M[a] (June 2007–)	A resource aimed at enhancing safety and reducing the level and impact of crime and violence in and around licenced venues. It focuses on reducing the harms associated with excessive alcohol consumption.
02:00 h lockout	M[a] (June–September 2008) F[a] (January 2009–) S (August–November 2008)	No person is allowed to enter a licenced premise after 02:00 h.
03:00 h lockout	S (November 2008–)	No person is allowed to enter a licenced premise after 03:00 h.
Patron banning	M (2011–) F[a], S (August 2011–)	Licensees and police can ban a patron from a venue for troublesome behaviour.
Shatterproof glass	M (July 2009–) F[a] (November 2011–)	All alcohol served in shatterproof glasses at high-risk nightclubs in Melbourne's CBD.
'No excuses' campaign	M[a] (December 2009–)	An awareness campaign that aims to make patrons aware that licensees can refuse them entry or ask them to leave.
Party bus legislation	M (August 2010–)	Party buses required to hold BYO permit if passengers bring own alcohol; or a liquor licence if they sell alcohol.
Liquor licence freeze	M[a] (2011–)	No new licences for bars, pubs and nightclubs operating after 01:00 h unless the applicant can show exceptional circumstances.
Safe taxi rank	M (December 2011–) G[a] (January 2005–) F[a] (November 2005–)	M: Taxi ranks, which are staffed by a security officer in a distinct uniform, are monitored by security cameras and have additional lighting and clear signage. G: Designated taxi rank staffed by security guards between 01:00 h and 06:00 h on Saturday and Sunday mornings. F: Taxi ranks staffed by security personnel, 01:00–05:00 h. The rank also has four CCTV cameras.
'Don't miss the party' campaign	M[a] (June 2014–)	An awareness campaign that aims to reduce the number of alcohol related interpersonal assaults in and around night-time venues.
Operation nightlife 1	G (January–July 2007)	Maximum police visibility during high-risk hours.
Night watch radio program	G[a] (March 2007–)	Connection of security staff via radio with relevant personnel.
ID scanners	G[a] (October 2007–)	Matches ID images to photographs to detect fake IDs.
Operation Razon	G (April 2008–)	Undercover police at licenced venues.
'Just think' campaign	G[a] (June 2008–)	Local celebrities endorsing 'safe' drinking patterns and reduced violence.
Operation nightlife 2	G (June 2009–)	Improved radio contact between police and licensees.
Fine strategy	G (July 2010–)	Primary focus on using fines, rather than arrests, to deal with antisocial behaviour.
'So you know' campaign	G[a] (August 2010–) S[a] (August 2012–)	Awareness posters focusing on fines.
Risk-based licensing	M, G, S (January 2010–)	Venues are charged an annual fee, plus a 'risk loading', which is based on factors such as trading hours, capacity and licence type.
Frankston drink safe project	F (June 2005–May 2007)	Education outside of venues on Friday and Saturday nights.
Night life radio project	S[a] (August 2011–)	This involves venues and police communicating through radio.

[a]Intervention was introduced by the local liquor accord. BYO, bring your own; CBD, central business district; F, Frankston; G, Geelong; M, Melbourne; S, Shepparton.

explored during preliminary data analysis, it was decided that ARIMA models were more appropriate because of the following: (i) the lack of a clear, repetitive seasonal pattern in any of the data (e.g. consistent peaks each summer); and (ii) the lack of a good model fit for the seasonal ARIMA models that were examined.

The standard modelling strategy for time series analyses was used [37]. ED presentation data were aggregated by quarter as time series models were unable to be adequately fitted to monthly data, and assault data were aggregated by month. Separate analyses were conducted for each site. Parameter *P*-values and the Akaike information criterion were used to determine the final model [39]. All independent variables (i.e. interventions) were designated as dichotomous 'event' variables (0 = pre-intervention, 1 = intervention, 0 = post-intervention (if applicable)), and univariable ARIMA models were used to identify the best-fitting lag for each intervention included in the model. The specified lag indicates when an intervention has the largest impact; however, this lag may not necessarily be statistically significant. For example, a lag of two in a monthly time series indicates an intervention has the largest impact 2 months after implementation. Multivariable ARIMA modelling was then used to examine the influence of all intervention variables on harms within each site.

Interventions. All of the alcohol-related harm reduction interventions implemented in the four sites of interest are shown in Table 1. Those interventions that were introduced by liquor accords have been identified.

Results

Emergency department data

There were 15 856 ED presentations during HAH1 for injury from January 2000 to December 2015. Of these, 6491 were in Geelong, 3423 were in Shepparton and 5941 were in Frankston.

Injury presentations

Figure 1 shows the rate of injury related ED presentations during HAH1 in Geelong, Shepparton and Frankston.

The effect of community interventions on the rate of ED injury presentations for Geelong, Shepparton and Frankston during HAH1 was examined using an ARIMA model.

For Geelong, data were differenced to produce a stationary series, with the final specified model: arima (0,1,1; Portmanteau test for white noise Q = 21.01, P = 0.86). The STATA default number of lags was used for all Portmanteau tests for white noise. All interventions were then entered into the model to determine if they had any impact on the rate of ED presentations. The multivariable ARIMA model indicated that none of the interventions introduced in Geelong had a significant effect on the rate of HAH1 ED injury presentations (Table 2).

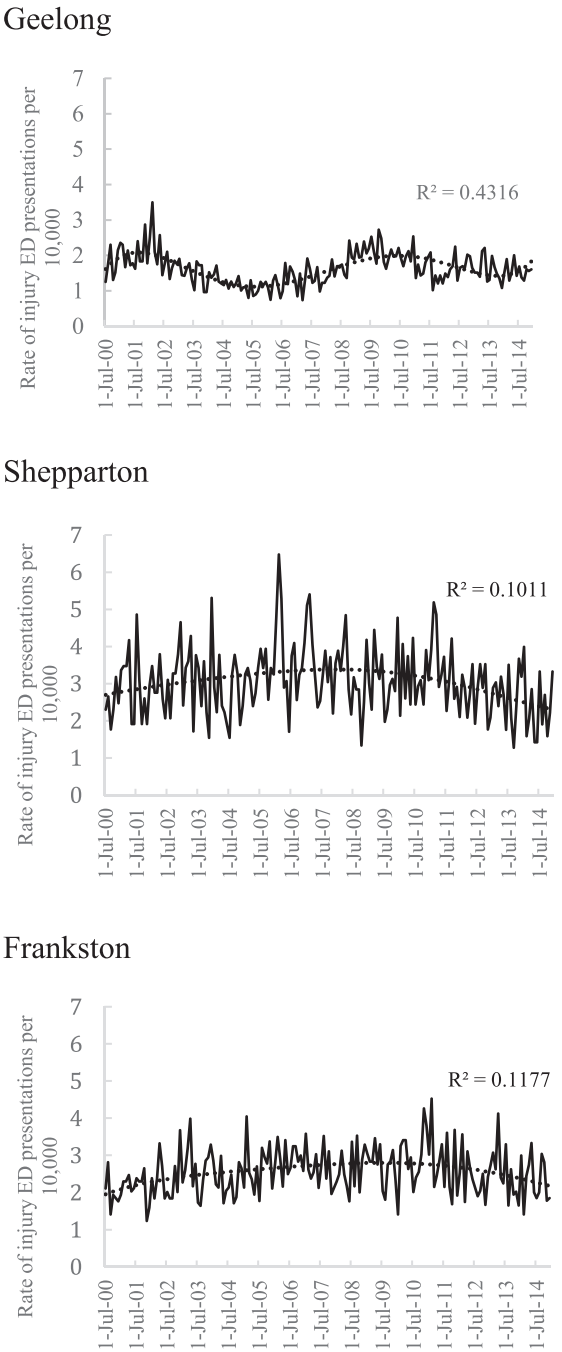

Figure 1. *Rate of injury emergency department (ED) presentations per 10 000 for Geelong, Shepparton and Frankston.*

Table 2. *The effect of interventions implemented in Geelong, Shepparton and Frankston on emergency department injury presentations*

Intervention	Coefficient (95% CI)	*P*-value
Geelong		
Nightlife 1 (lag 1)/Night Watch Radio Program (lag 1)	0.14 (−2.78, 3.06)	0.925
ID scanner (lag 1)	1.16 (−24.99, 27.31)	0.931
Just think (lag 1)/Razon (lag 1)	1.27 (−8.09, 10.64)	0.790
Nightlife 2 (lag 1)	−0.07 (−1.11, 0.96)	0.888
So you know (lag 1)/Fines (lag 1)	−0.73 (−13416.09, 13414.64)	1.000
Risk-based licensing (lag 2)	0.03 (−22608.92, 22609)	1.000
Moving average (lag 1)	−0.59 (−0.83, −0.35)	<0.001
Shepparton		
Patron banning (lag 1)/Night life radio project (lag 1)	−2.49 (−6.14, 1.15)	0.180
Designated area ban (lag 0)	0.88 (−7.88, 9.65)	0.843
So you know (lag 1)	−1.26 (−4.74, 2.22)	0.477
02:00 h lockout (lag 0)	−2.64 (−12.72, 7.43)	0.607
03:00 h lockout (lag 1)	−0.63 (−8.34, 7.08)	0.873
Safe taxi rank/CCTV (lag 1)	−0.72 (−2.30, 0.85)	0.368
Risk-based licensing (lag 1)	−0.13 (−12.88, 12.62)	0.984
Auto-regression (lag 1)	−0.80 (−1.05, −0.54)	<0.001
Auto-regression (lag 2)	−0.71 (−0.99, −0.43)	<0.001
Auto-regression (lag 3)	−0.40 (−0.67, −0.13)	<0.01
Frankston		
Patron ban (lag 1)/Shatterproof glass (lag 1)	−1.09 (−2.88, 0.70)	0.234
Designated area ban (lag 1)/Lockouts (lag 1)	0.03 (−1.92, 1.99)	0.974
Drink safe project (lag 1)	0.86 (−1.04, 2.75)	0.377
Risk-based licensing (lag 1)	−0.37 (−1.22, 1.96)	0.648
Moving average (lag 1)	−0.82 (−0.98, −0.66)	<0.001

Note: Where two interventions were introduced within the same time period, they are tested as a combined effect. CCTV, closed-circuit television; CI, confidence interval.

The same analysis was conducted for Shepparton during HAH1. Again, data were differenced to produce a stationary series. The best-fitting model was specified as arima(3,1,0). The model fitted the data well: $Q = 28.08$, $P = 0.51$. The multivariable ARIMA model, with all interventions entered as predictors, indicated that none of the interventions introduced in Shepparton had a significant effect on the rate of ED presentations during HAH1 for injury.

The effect of interventions for Frankston was then examined. A stationary series was obtained through first-order differencing with the best-fitting model identified as arima(0,1,1). A constant was not included in this model, therefore representing a simple exponential smoothing model. The model fitted the data well: $Q = 24.74$, $P = 0.69$. The multivariable ARIMA model indicated that none of the interventions had a significant effect on the rate of HAH1 ED presentations in Frankston.

Assault data

Overall, there were 11 674 assaults recorded for HAH2 over the period from January 2005 to June 2016 in Melbourne, Frankston, Geelong and Shepparton. Of these, 7152 were in Melbourne, 1261 in Geelong, 1408 were in Shepparton and 1853 were in Frankston. Figure 2 shows the number of assaults in Melbourne and the rate of assaults in Geelong, Shepparton and Frankston.

The effect of interventions on the count of assaults in the Melbourne area during HAH2 was examined using an ARIMA model. The data were differenced, and the final model specified as an arima(3,1,0; $Q = 52.97$, $P = 0.08$). All interventions were then entered into the model to determine their impact on the number of assaults. This multivariable ARIMA model indicated that none of the interventions had a significant effect on the count of assaults in Melbourne during HAH2.

For Geelong, as the model was already stationary no differencing was applied. The best-fitting model identified was arima(1,0,1; $Q = 33.43$, $P = 0.76$). The ultivariable ARIMA model, with all interventions entered as predictors, indicated that none had a significant effect on assault rate during HAH2 in Geelong.

An ARIMA was then conducted for Shepparton during HAH2. The data were already stationary, and the final model specified as arima(0,0,0), indicating the data were simply white noise. The model fitted the data well: $Q = 41.79$, $P = 0.39$. All interventions were examined in a multivariate ARIMA model. As patron banning

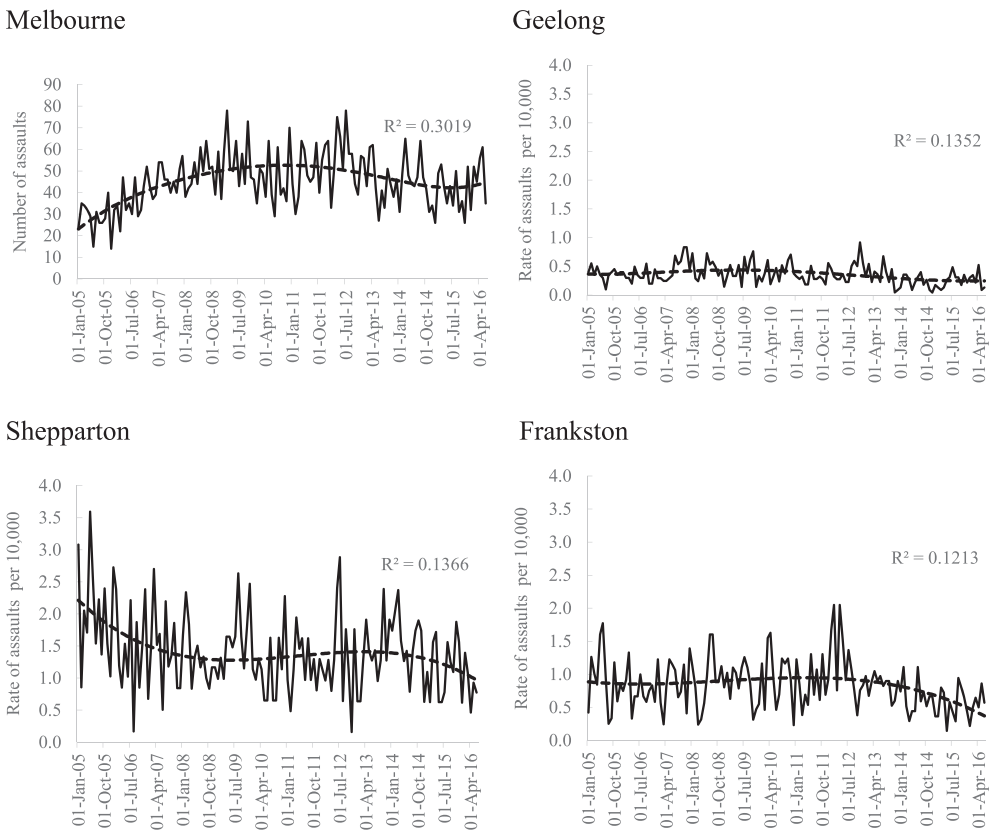

Figure 2. *Number of assaults in Melbourne and rate of assault per 10 000 in Geelong, Shepparton and Frankston.*

and the nightlife radio project came into effect at the same time, we were unable to delineate their separate effects, and as such, they are reported as a combined variable in Table 3. The multivariable ARIMA model indicated that none of the interventions had a significant effect on the assault rate during HAH2.

Lastly, the effect of interventions on the assault rate in Frankston was examined. The data did not require differencing, and the best-fitting model was an arima (1,0,1; Q = 37.46, $P = 0.58$). The multivariable ARIMA model examining the impact of the interventions indicated that none had a significant effect on the assault rate during HAH2.

Discussion

The current paper investigated the impact of a variety of community-based interventions, including those proposed by liquor accords, which were introduced to address alcohol-related harm in four sites in Victoria, Australia. Overall, there were no significant effects of any interventions on ED presentations for injury during high alcohol hours over the period of 2000–2015 for Geelong, Shepparton or Frankston. In both Geelong and Shepparton, injury presentations have remained relatively stable over the 15 year period, and ARIMA models revealed that none of the interventions included in this paper had a significant impact in terms of reduction of harms. In Geelong, this has been in the context of varying police interventions [40,41] and a substantially declining density of late night venues.

The ARIMA models revealed no associations with the interventions implemented on assault counts/rates across any of the four sites.

Given there was no impact by the interventions on both ED presentations and assault numbers/rates, it can be concluded that these likely had no effect in reducing these particular harms. This finding might be explained by the lack of mandatory interventions that have been implemented across these four sites. All of the interventions investigated in the current paper were voluntary, were introduced by local liquor accords and tend to focus on controlling patron behaviour once the person is intoxicated, or were more broadly educational in nature [17]. While one international community-based voluntary intervention has achieved large reductions in violent assaults (Student08) in Stockholm, no other relevant interventions were able to be located that have been able to achieve such impact. Instead, previous research has demonstrated that mandatory measures, which focus on reducing both the price and availability of alcohol, along with how late a person can consume alcohol, are overwhelmingly more effective at reducing harm [4,42–45].

Table 3. *The effect of interventions implemented in Melbourne, Geelong, Shepparton and Frankston on assaults*

Intervention	Coefficient (95% CI)	*P*-value
Melbourne		
Patron ban (lag 4)	9.26 (−27.83, 46.34)	0.625
CBD ban (lag 1)	−3.32 (−25.08, 18.44)	0.765
Lockouts (lag 1)	2.07 (−16.22, 20.37)	0.824
Licence freeze (lag 1)	−10.63 (−40.26, 19.00)	0.482
Safe taxi rank (lag 1)	−6.03 (−35.22, 23.17)	0.686
Responsible practice guidelines (lag 1)	−4.45 (−56.23, 47.33)	0.866
No excuses (lag 1)	−14.85 (−68.03, 38.32)	0.584
Don't miss the party (lag 1)	−0.20 (−18.01, 17.60)	0.982
Party bus laws (lag 1)	−0.82 (−20.21, 18.56)	0.934
Shatterproof glass (lag 1)	4.59 (−10.11, 19.31)	0.540
Risk-based licensing (lag 1)	6.31 (−34.98 47.60)	0.765
Auto-regression (lag 1)	−0.77 (−0.94, −0.60)	<0.001
Auto-regression (lag 2)	−0.63 (−0.82, −0.43)	<0.001
Auto-regression (lag 3)	−0.39 (−0.53, −0.25)	<0.001
Geelong		
Nightlife 1 (lag 1)	−0.13 (−0.31, 0.05)	0.149
Night watch radio program (lag 1)	0.15 (−0.05, 0.35)	0.148
ID scanner (lag 1)	−0.06 (−0.26, 0.145	0.591
Just think (lag 1)	−0.14 (−0.38, 0.09)	0.236
Nightlife 2 (lag 1)	0.08 (−0.10, 0.26)	0.393
So you know (lag 1)	−0.15 (−1.24, 0.94)	0.788
Fines (lag 1)	0.07 (−1.08, 1.23)	0.901
Risk-based licensing (lag 0)	−0.12 (−0.33, 0.09)	0.279
Razon (lag 1)	0.06 (−0.20, 0.31)	0.664
Auto-regression (lag 1)	0.90 (0.67, 1.13)	<0.001
Moving average (lag 1)	−0.80 (−1.10, −0.48)	<0.001
Shepparton		
Patron banning (lag 1)/Nightlife radio project (lag 1)	0.05 (−0.42, 0.51)	0.842
So you know (lag 1)	0.11 (−0.56, 0.78)	0.749
02:00 h lockout (lag 1)	−0.39 (−2.72, 1.94)	0.742
03:00 h lockout (lag 1)	0.14 (−0.29, 0.58)	0.511
Safe taxi rank/CCTV (lag 1)	−0.20 (−0.81, 0.41)	0.517
Risk-based licensing/Designated area ban (lag 1)	−0.38 (−0.89, 0.13)	0.145
Frankston[a]		
Patron ban (lag 4)	−0.13 (−0.44, 0.17)	0.376
Designated area ban (lag 4)	0.16 (−0.55, 0.87)	0.659
Lockouts (lag 1)	−0.22 (−0.83, 0.39)	0.484
Drink safe project (lag 1)	−0.31 (−0.69, 0.07)	0.110
Risk-based licensing (lag 1)	−0.10 (−0.59, 0.38)	0.681
Auto-regression (lag 1)	0.51 (0.15, 0.86)	<0.01
Moving average (lag 1)	−0.18 (−0.56, 0.19)	0.338

[a]Shatterproof glass was dropped for Frankston due to collinearity. Note: Where two interventions were introduced within the same time period, they are tested as a combined effect. CCTV, closed-circuit television; CI, confidence interval.

This is distinct from 'lockouts', which still allow people to drink later into the night [24]. An important consideration is whether local liquor accords are best placed to be developing and implementing interventions to address alcohol-related harm, given none of the interventions they had introduced across the four sites over a 15 year period have demonstrated any effect on ED presentations or assault rates. Further, their voluntary nature and the lack of consequences for venue operators not doing what they promise mean that 'accords' or 'forums' are unlikely to be successful when financial bottom-lines are threatened [46,47].

Limitations

There are some limitations with the current study. Firstly, there were interventions that were introduced within the same quarter across all sites, which was the timeframe that had to be used for ARIMA analyses to ensure adequate model fit. This is problematic as we are unable to discern the individual effects on injury or assault rate for each intervention that is introduced. However, given there was no significant impact overall, it is safe to assume the measures implemented across the four sites were not successful. This

is an important finding when compared with multi-faceted interventions such as those implemented in Newcastle [7,48] and Sydney [49], which did show a major impact on police assaults and ED attendances [42,50]. Secondly, ED injury presentations and recorded assaults are likely to be an underrepresentation of actual occurrences of alcohol-related harm in the night-time economy, given many people would likely sustain injuries or be involved in fights and not attend an ED or report it to police. A third limitation is the lack of a control series or site for the data. This occurred because of a lack of available data for non-HAH hours and an inability to locate comparable control sites for each of the sites utilised, given those which may be considered suitable have often implemented a series of their own interventions to address alcohol-related harm. Fourthly, the authors did not have access to any information regarding the fidelity of implementation of, or adherence to, the interventions discussed in the current paper, and as such, it is difficult to determine whether this influenced the outcomes. Lastly, because of the large number of interventions tested within the models, simplified modelling techniques were used, resulting in an inability to detect potential gradual effects of the interventions.

Conclusion

The current paper investigated the impact of community-based interventions introduced at two metropolitan and two regional sites in Victoria, Australia. While each site implemented a variety of interventions in an attempt to reduce alcohol-related harm over a lengthy period of time, none of these had a significant impact on the ED injury presentations or assault rate. This highlights the importance of ensuring that any interventions are properly documented, including plans for evaluation, prior to the intervention. Finally, it is of vital importance that those considering reforms to address alcohol-related harm implement consistent, evidence-based regulatory interventions.

Conflict of interest

Peter Miller receives funding from Australian Research Council and Australian National Health and Medical Research Council, grants from NSW Government, National Drug Law Enforcement Research Fund, Foundation for Alcohol Research and Education, Cancer Council Victoria, Queensland government and Australian Drug Foundation, travel and related costs from Australasian Drug Strategy Conference. He has acted as a paid expert witness on behalf of a licensed venue and a security firm.

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Ingenium Research

Measuring the Australian Night Time Economy 2016-17

A project for the Council of Capital City Lord Mayors

Prepared by the team at Ingenium Research

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14 September 2018

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Document Information

Project reference number	P18-02-01
File name	P18-02-01_Measuring-the-Australian-NTE_2016-17_v15.docx
Title	Measuring the Australian Night Time Economy 2016-17
Version number	V15
Last update	14/09/18
Name of authors	Andrew License, Anna Edwards
Name of reviewer	Terry Bevan
Document status	Public
Review status	Complete
Approval status	Final

Table of Contents

Glossary of terms

This section lays out the key terms referred to in this report and their meaning.

Term	Definition
Establishment(s)	Actively trading business(es) recorded in the Australian Bureau of Statistics Business Register (ABSBR) as at 30th June in the reporting year.
Employment	The number of employees associated with the establishment(s).
Turnover ($m)	The sales and service income generated by the establishment(s), exclusive of goods and service tax (GST).
LGA	Local Government Area – usually a city council or shire area. Each section in this report reviews the trend within the listed LGA. Please note that LGAs are not homogenous in terms of population size, geographic scale or density of establishments, which can make comparisons difficult.
LGSCN	Local Government Safe Cities Network – a committee operated by the Council of Capital Cities Lord Mayors (CCCLM).
NTE	Night Time Economy – economic activity which occurs at establishments primarily between the hours of 6 p.m. and 6 a.m. The NTE can be broken down into Core, Non-Core and Supply as per the table below.

Sector	Description
Core NTE	The activities that provide primary establishment services to NTE leisure users in the evening (6pm to midnight) and night-time (midnight to 6am). The Core NTE is split into sub-sectors of Drink, Entertainment and Food.
Non-Core NTE	Establishments that primarily operate during the day but may provide integral services to the Core NTE, such as public and private transport, hotels and other forms of accommodation, retail services and public services such as policing, health services, parking and lighting. These tend to be presented at a higher aggregated data level due to availability of data at a more detailed level. Non-Core indicates the scale of the supply chain with which the Core NTE is linked.
Supply NTE	As with Non-Core NTE these establishment types tend to operate during the day but are part of the Core NTE supply chain through the production or wholesaling of food, drink or entertainment products for resale. Similar to Non-Core NTE, these activities are presented as an aggregate.
Non-NTE	This refers to all the other economic activities outside the NTE definition.
Total Economy	Refers to the sum of all economic activity within a defined geography.

Please note that within this document several charts present the trend in establishments, employment and turnover in an indexed manner, so that the quantum of the figures is expressed such that the individual trends can be compared. Figures are indexed to 2009 (with 2009 equal to 1.0) with performance in subsequent years shown relative to this starting point.

1. The Australian NTE

1.1. Introduction

The Council of Capital City Lord Mayors (CCCLM) has developed a globally unique statistical tool which captures the scale, diversity and direction of the development of local, state and federal Night Time Economy (NTE) activity in Australia.

Consistency of local comparative performance measurement has been a hallmark of the approach of the work commissioned by the Local Government Safe Cities Network (LGSCN[1]) over the last eight[2] years and these outcomes can be accessed by participating local government areas (LGAs) that sign up to the use of CCCLM's NTE Profiler tool.

In this latest iteration the scope of this tool has been extended beyond the current LGSCN members to examine and evidence data for 88 LGAs[3]. This includes those LGAs that are among the top 21 growing cities in Australia as well as a number of LGAs selected on the basis of their population or because they are known to be working on their NTE strategy.

This report provides a summary of key findings from the updated tool covering the 2016 and 2017 financial years. This is presented firstly as an overview of NTE performance at a federal and state/territory level, followed by an executive summary for each state and each of the twelve current LGA members of the LGSCN. These summaries are provided alphabetically by state (denoted by the title and the Australian map in the document header), from Australian Capital Territory through to Western Australia. More detailed tables around the Core NTE for these areas and the trend over time from 2009 to 2017 are available in the appendix (Section 10.3, page 33).

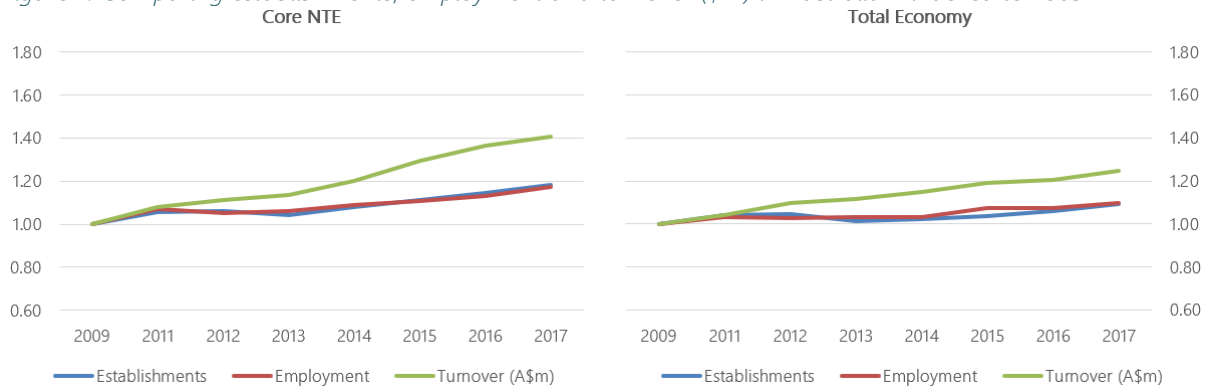
1.2. The Australian NTE

The NTE in Australia continues to be a significant contributor to the economy as a whole, accounting for 17% of all establishments in both 2016 and 2017 across the Core, Non-Core and Supply NTE sectors. Of the 2.2 million businesses in Australia in 2017, the NTE consists of 374,835 establishments and grew at a faster rate between 2016 and 2017 than the total economy (3.4% compared to 3.1%). These NTE establishments employ a total of three million people (growing 1.9% from 2016) and generate almost $715 billion in turnover (an increase of 2.7% since 2016 – which is an above inflation rise[4]).

In 2017, the Core NTE comprises 106,000 establishments, employing over 1,087,000 people and generating nearly $127 billion in turnover, representing 5%, 9% and 4% of the total economy respectively. The Core NTE in Australia continues to grow at a faster rate than that of wider economy as demonstrated in Figure 1 below.

[1] Previously known as the National Local Government Drug and Alcohol Advisory Committee (NLGDAAC).
[2] Excluding 2010 as the original study reviewed trends between 2009 and 2011 only.
[3] A full list of the 88 areas analysed and their Core NTE establishment density ranking is provided in the appendix (Section 10.4, p21).
[4] Compared to an inflation rate of 1.9% (Reserve Bank of Australia Consumer Price Index June 2016-17).

Figure 1: Comparing establishments, employment and turnover ($m) in Australia – indexed to 2009



Source: Based on Australian Bureau of Statistics CABEE 2013-2017 dataset, Ref: WTS1/2_Aus

Between 2016 and 2017, Core NTE:

- establishments increased by 3.2% (compared to 3.1% in the wider economy),
- employment increased by 3.7% (compared to 2.1%) and
- turnover increased by 3.1%, which was slightly less than witnessed in the wider economy (3.5%).

Food establishments remain the key driver behind the Core NTE's growth, accounting for over 67,000 (or 63%) of the sector in 2017. This share has grown consistently over the past eight years rising from 57% in 2009 to its peak in 2017. Drink and Entertainment establishments have also increased over the same period, albeit at a slower rate compared to Food, leading to their share of Core NTE establishments declining. Despite this, both Drink and Entertainment maintain a strong Core NTE market share in terms of turnover (15% and 33% respectively), due to establishments in these sub-sectors having a higher average turnover per establishment than those in Food.

Figure 2: Australia's Core NTE split by sub-sector for establishments, employment and turnover ($m)

Source: Based on Australian Bureau of Statistics CABEE 2013-2017 dataset, Ref: WTS1/1_Aus

1.3. The Australian NTE in the states and territories

Of all the states and territories, New South Wales and Victoria are the largest contributors to the Australian Core NTE across establishments (34% and 28% respectively), employment (30% and 25%) and turnover (30% and 26%) as shown in Table 1. While New South Wales has the largest Core NTE, it has grown at a slower rate than that of Australia across all the key metrics. All states have witnessed growth in their Core NTE, particularly Victoria and Queensland who have grown at a quicker rate than the national average.

While the territories tend to have smaller NTEs, they look to be increasing their establishment base at a much swifter rate, particularly the Australian Capital Territory, whose growth is matched in employment and turnover. Conversely, Northern Territory has remained fairly static in terms of employment and is the only area to witness a drop in its Core NTE turnover (-1.5%). Across the board it is clear the Core NTE continues to be a growth sector with positive change occurring across nearly every measured factor.

Table 1: Core NTE by state/territory in 2017 with change from 2016-17

State/Territory	Establishments		Employment		Turnover ($m)	
	Number	Change 16-17	Number	Change 16-17	Number	Change 16-17
New South Wales	36,196	3.1%	329,355	2.4%	$38,656	1.7%
Victoria	29,857	3.4%	270,760	4.5%	$32,660	3.9%
Queensland	19,117	3.8%	221,645	5.0%	$25,276	4.1%
Western Australia	9,953	3.2%	116,935	4.8%	$13,609	4.4%
South Australia	6,441	2.4%	76,815	0.6%	$8,594	0.7%
Tasmania	1,960	3.6%	23,330	8.3%	$2,645	5.4%
Australian Capital Territory	1,752	4.0%	29,695	6.1%	$3,200	5.1%
Northern Territory	754	4.7%	18,700	0.1%	$2,172	-1.5%
Australia	106,000	3.2%	1,087,230	3.7%	$126,811	3.1%

Source: Based on Australian Bureau of Statistics CABEE 2013-2017 dataset, Ref: WTS2/State_Core_NTE

This picture is slightly different when looking at the individual sub-sectors within the Core NTE, as shown in Table 2, Table 3 and Table 4 over leaf.

As is the case with Australia as a whole, the Core NTE growth is primarily driven by the Food sub-sector, which has witnessed establishment growth across every state and territory of between 3-5%. By comparison growth in the Drink sub-sector is more modest in the larger states and has even declined in some areas, particularly South Australia and Northern Territory. This is similar for Entertainment, where there has been relatively good growth in establishments but modest growth in employment and turnover. Tasmania again shows the highest increase in turnover within the Food and Entertainment sub-sectors. Its decline in Drinks turnover suggests a transition with which establishments and employment have not yet fully processed.

Table 2: Drink by state/territory in 2017 with change from 2016-17

State/Territory	Establishments Number	Establishments Change 16-17	Employment Number	Employment Change 16-17	Turnover ($m) Number	Turnover ($m) Change 16-17
New South Wales	2,910	1.5%	43,560	1.0%	$6,507	1.1%
Victoria	2,371	1.4%	28,080	0.8%	$4,261	1.5%
Queensland	1,143	-0.1%	24,335	4.3%	$2,836	3.8%
Western Australia	980	2.5%	17,275	2.1%	$2,635	6.6%
South Australia	792	-0.4%	11,935	-4.2%	$1,516	-0.3%
Tasmania	234	4.5%	3,635	5.5%	$435	-5.8%
Australian Capital Territory	110	10.0%	2,150	-2.3%	$274	0.3%
Northern Territory	50	0.0%	2,415	-6.4%	$243	-6.4%
Australia	8,595	1.3%	133,395	1.1%	$18,707	1.9%

Table 3: Entertainment by state/territory in 2017 with change from 2016-17

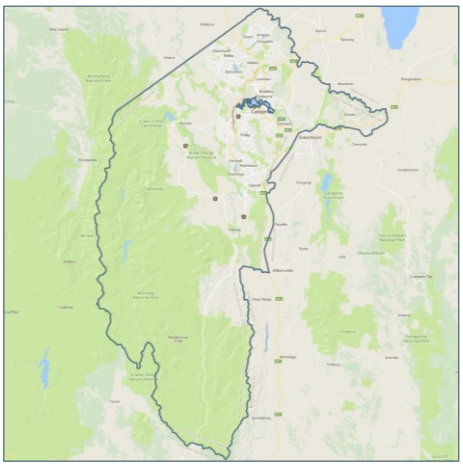
State/Territory	Establishments Number	Establishments Change 16-17	Employment Number	Employment Change 16-17	Turnover ($m) Number	Turnover ($m) Change 16-17
New South Wales	11,029	2.7%	90,060	-1.0%	$13,188	-1.6%
Victoria	8,262	3.7%	66,675	4.5%	$11,350	3.1%
Queensland	5,628	3.7%	57,100	3.0%	$8,858	1.6%
Western Australia	2,640	2.5%	19,465	0.4%	$3,206	-2.1%
South Australia	1,671	2.4%	14,785	-0.7%	$2,226	-1.8%
Tasmania	522	1.2%	5,175	8.8%	$804	6.7%
Australian Capital Territory	441	2.8%	6,920	2.4%	$928	0.1%
Northern Territory	231	4.5%	6,130	-4.2%	$945	-5.9%
Australia	30,399	2.8%	266,310	1.5%	$41,505	0.4%

Table 4: Food by state/territory in 2017 with change from 2016-17

State/Territory	Establishments Number	Establishments Change 16-17	Employment Number	Employment Change 16-17	Turnover ($m) Number	Turnover ($m) Change 16-17
New South Wales	22,257	3.5%	195,735	4.4%	$18,960	4.3%
Victoria	19,224	3.6%	176,005	5.1%	$17,049	5.1%
Queensland	12,346	4.2%	140,205	5.9%	$13,582	5.9%
Western Australia	6,333	3.6%	80,190	6.5%	$7,768	6.5%
South Australia	3,978	3.1%	50,095	2.2%	$4,853	2.2%
Tasmania	1,204	4.6%	14,515	8.7%	$1,406	8.7%
Australian Capital Territory	1,201	3.9%	20,625	8.4%	$1,998	8.4%
Northern Territory	473	5.3%	10,155	4.6%	$984	4.7%
Australia	67,006	3.6%	687,525	5.2%	$66,600	5.2%

Source: Based on Australian Bureau of Statistics CABEE 2013-2017 dataset, Ref: WTS2/State_Core_NTE

2. The NTE in Australian Capital Territory (ACT)



ACT's Core NTE is driven by an above average concentration of Food establishments, which has grown consistently over the last eight years.

Food establishments in ACT represent 69% of the Core NTE, rising from 62% in 2009. It is the main reason for growth within the Core NTE, with the Drink (6% of Core NTE) and Entertainment (25%) sub-sectors maintaining around the same number of establishments that were present in 2009.

The Core NTE has seen growth (see Table 5) in establishments (+4.0%), employment (+6.1%) and turnover (+5.1%), that exceeds growth rates observed at the national level and are some of the strongest Core NTE growth rates in the country.

Table 5: Core NTE summary for Australian Capital Territory

Measure	Core NTE 2017	% Change 16-17	% Total Economy ACT	% Total Economy AUS
Establishments	1,752	↑ 4.0%	6.4%	4.7%
Employment	29,695	↑ 6.1%	13.4%	8.9%
Turnover ($m)	$3,200	↑ 5.1%	5.9%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

As noted above, most of this growth can be attributed to Food, with establishments (+3.9%), employment (+8.4%) and turnover (+8.4%) all increasing between 2016 and 2017, continuing the robust growth shown since 2009 (Figure 3).

In addition to having a higher concentration of Food compared to the national average, the structure of the sub-sector is also quite different. There is a much higher presence of cafes and restaurants in ACT than in Australia as a whole (81% compared to 66%) as demonstrated in Figure 4.

Figure 3: Trend in ACT's Food sub-sector

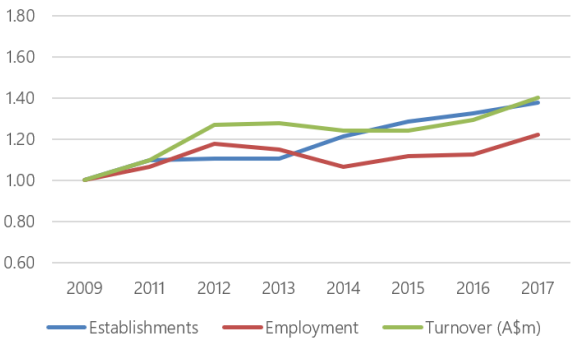
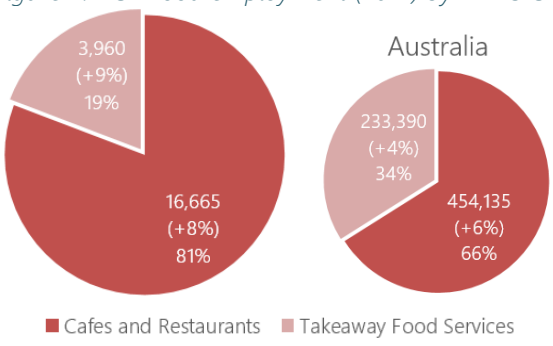


Figure 4: ACT Food employment (2017) by ANZSIC

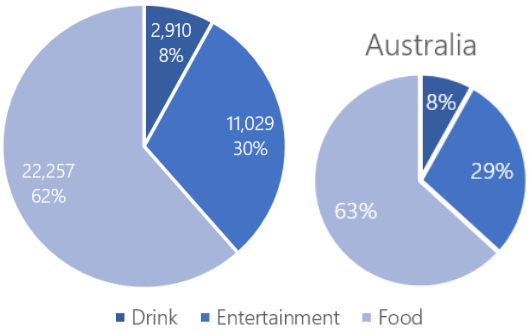


3. The NTE in New South Wales (NSW)

NSW is the largest contributor to Australia's Core NTE, accounting for 34% of Core NTE establishments and 30% of Core NTE employment and turnover.

The distribution of NSW's Core NTE is broadly similar to that of Australia, which is not unsurprising given it is major contributor to the Australian NTE. Approximately 8% of establishments are Drink based (compared to 8% in Australia), 30% are in Entertainment (29%) and 62% are in Food (63%).

Figure 5: NSW's establishments by sub-sector

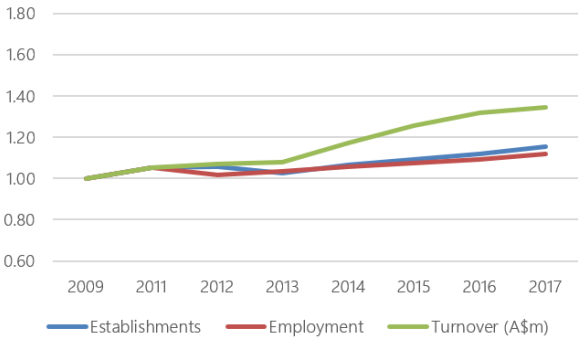


Food establishments in NSW increased by 3.5% over the 2016 to 2017 period (compared to +3.6% nationally), which led to similar expansions in employment (+4.4% compared to +5.2% nationally) and turnover (+4.3% compared to +5.2%).

Whilst Food is the key driver of the Core NTE it is also worth noting that NSW possesses the largest Drink and Entertainment sub-sectors in Australia. Both of these sectors have remained fairly static in size between 2016 to 2017, but this is also the case nationally.

Between 2016 and 2017 the Core NTE in NSW grew across establishments (+3.1%), employment (+2.4%) and turnover (+1.7%) (see Table 6), although the growth in these key metrics occurred at a slower rate than observed at the national level (+3.2% in establishments, +3.7% in employment and +3.1% in turnover). While Core NTE growth in NSW is slightly slower than that of Australia, the main driver behind this growth is common; namely increases in the size of the Food sub-sector across all key metrics.

Figure 6: Trend in NSW's Core NTE



In summary, NSW's Core NTE is the largest amongst all the states and territories but has experienced slower than average growth in recent years compared to the Core NTE in Australia as a whole. It's Core NTE distribution is similar to that of Australia with around 62% of establishments focused on Food activities, which continue to grow at a quicker pace than that of Drink and Entertainment activities.

Table 6: Core NTE summary for New South Wales

Measure	Core NTE 2017	% Change 16-17	% Total Economy NSW	% Total Economy AUS
Establishments	36,196	3.1%	4.8%	4.7%
Employment	329,355	2.4%	8.5%	8.9%
Turnover ($m)	$38,656	1.7%	3.8%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

3.1. NSW: City of Newcastle

Newcastle has the seventh largest Drink sub-sector of the 88 LGAs analysed measured by the number of establishments.

Newcastle's Core NTE represents an above average proportion of its total economy compared to that of NSW and Australia (see Table 7). In addition, it has grown at a much faster rate between 2016 and 2017 than NSW across establishments (8.4% compared to 3.1% in NSW), employment (7.8% compared to 2.4%) and turnover (7.8% compared to 1.7%).

Newcastle has a higher than average concentration of Drink establishments (14% of the Core NTE) compared to NSW (8%) and Australia (8%), driven primarily by pubs, taverns and bars as opposed to liquor retailing.

Table 7: Core NTE summary for City of Newcastle

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	NSW	AUS
Establishments	822	8.4%	6.3%	4.8%	4.7%
Employment	12,890	7.8%	13.4%	8.5%	8.9%
Turnover ($m)	$1,432	7.8%	5.4%	3.8%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

The proportion of Core NTE employment that is based in Drink establishments is also higher than average, although turnover represents a lower proportion of the Core NTE than that witnessed at the state or federal level, indicating a lower than average turnover.

While Drink looks to be stronger than average in Newcastle, it should also be noted that the Food sub-sector has grown by over 10% in terms of establishments, employment and turnover between 2016 and 2017, indicating a recent shift in NTE focus for the LGA.

Figure 7: Newcastle's employment by sub-sector

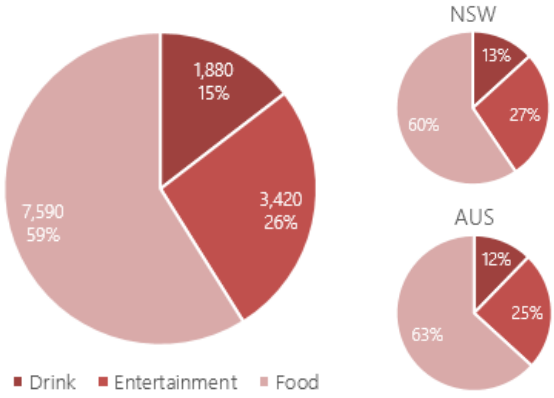
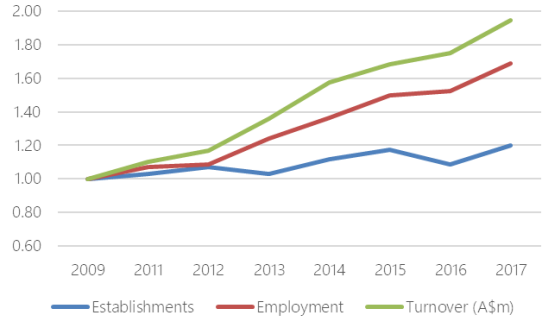
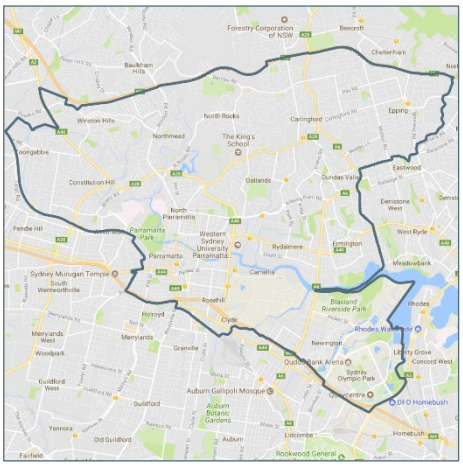


Figure 8: Trend in Newcastle's Food sub-sector



3.2. NSW: City of Parramatta



Parramatta's Food sub-sector is the seventh largest of the 88 LGAs analysed, in terms of the number of establishments.

Parramatta has a particularly strong Food sub-sector in terms of establishments, making up 77% of the Core NTE, which is much higher compared to NSW (61%) and Australia (63%). Employment (66%) and turnover (48%) are lower in this sub-sector, however, suggesting Paramatta has a higher proportion of smaller establishments.

Parramatta's boundary was recently changed in 2016, with parts of the previous boundary being combined with parts of The Hills Shire, Auburn City, Holroyd City and Hornsby Shire, meaning a slight disconnect in figures between 2015 and 2016.

Table 8: Core NTE summary for City of Parramatta

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	NSW	AUS
Establishments	1,171	2.9%	4.8%	4.8%	4.7%
Employment	8,075	2.6%	7.9%	8.5%	8.9%
Turnover ($m)	$1,034	1.3%	3.5%	3.8%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Over the course of 2016 to 2017, the number of establishments in all three sub-sectors (Food, Drink and Entertainment) grew in Parramatta in terms of the number of establishments, employment and turnover. Although this was at a slightly slower rate than witnessed in these sub-sectors in NSW.

While the Food sub-sector is the primary driver behind Parramatta's Core NTE performance (48% of Core NTE turnover or $496m), it has remained static over the past few years in terms of growth, as explored in Figure 9.

Figure 9: Trend in Parramatta's Food sub-sector

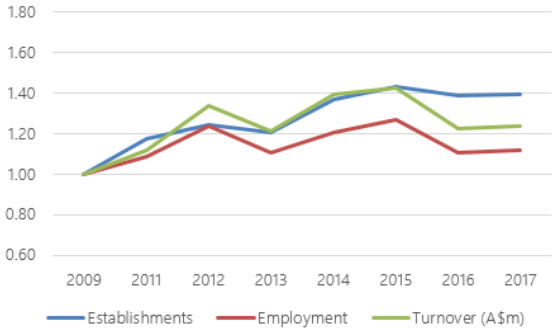
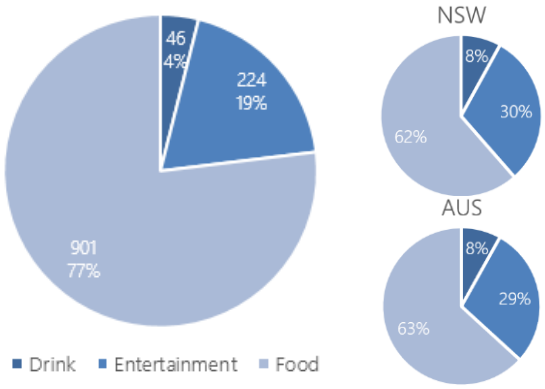
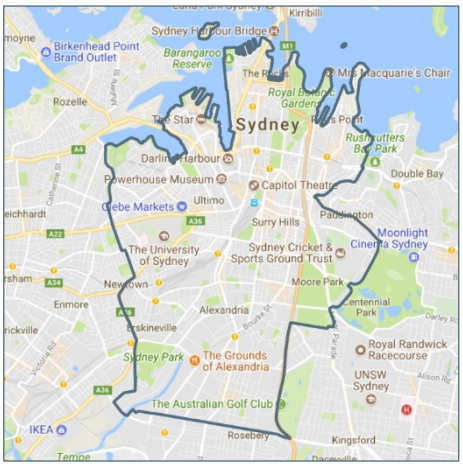


Figure 10: Parramatta establishments by sub-sector



3.3. NSW: City of Sydney



Sydney has the strongest and most concentrated NTE in Australia, with over 180 Core NTE establishments per km².

Sydney's Core NTE is a clear strength for the LGA (Table 9) as it represents almost 11% of all of Sydney's establishments. In terms of establishments per km², it is ranked:

- first in Drink (22 per km²),
- second in Entertainment (33 per km²) and
- first in Food (128 per km²).

Each of these sub-sectors experienced continued growth between 2016 and 2017, suggesting these positions are likely to be maintained in the future. Overall growth in turnover has occurred much faster than inflation (6.3% compared to 1.9%[4]).

Table 9: Core NTE summary for City of Sydney

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	NSW	AUS
Establishments	4,872	1.8%	10.8%	4.8%	4.7%
Employment	35,580	6.2%	7.8%	8.5%	8.9%
Turnover ($m)	$4,059	6.3%	4.1%	3.8%	3.8%

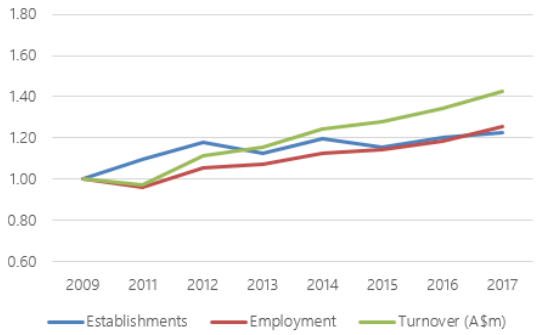
Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Food remains Sydney's strongest NTE sub-sector, accounting for 70% of all NTE establishments in 2017, which is well above the averages for NSW (61%) and Australia (63%).

The greatest growth over this period was in the Drink sub-sector, with increases in establishments (+4.9%), employment (+8.7%) and turnover (+6.5%), well above the NSW and national averages. This growth comes off the back of decline between 2014 and 2015 (-8%) following the introduction of the lockouts in February 2014.

Entertainment in Sydney is growing at a faster rate than that of NSW in terms of employment (+2.4% compared to -1.0%) and turnover (+5.0% compared to -1.6%). This is driven primarily by strong performance in creative and performing arts, consisting of over 460 establishments (+4% since 2016) employing 3,100 people (+12% since 2016) and generating nearly $572m in turnover for the LGA (+20% since 2016). Should this growth continue it may help Sydney to first place in terms of the density of Entertainment establishments.

Figure 11: Trend in Sydney's Core NTE



4. The NTE in Northern Territory (NT)

The Core NTE in NT is smaller than other states and territories, but it represents a higher proportion of the total economy across all key metrics.

The Core NTE represents approximately 5.2% of all establishments in NT (compared to 4.7% nationally), in addition to 13.9% of employment (8.9% nationally) and 6.6% of turnover (3.8%), highlighting that this is an important sector for the NT's total economy (Table 10).

Figure 12: Core NTE growth 2016-2017 in NT

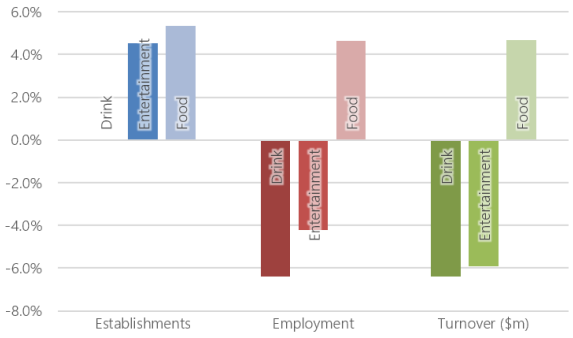
Whilst the Drink sub-sector has not lost any establishments since 2016, its employment and turnover have both decreased by 6.4%. Entertainment has increased in establishments (+4.5%) but decreases in employment and turnover (-4.2% and -5.9%).

These decreases in employment and turnover have been effectively negated through strong growth in the Food sub-sector across establishments (+5.3%), employment (+4.6%) and turnover (+4.7%).

NT has increased its Core NTE establishments at the quickest rate of all states and territories in Australia between 2016 and 2017 (+4.7%). Unfortunately, this has not transferred through to employment, which has remained relatively static (+0.1%), or turnover which has seen a small decline (-1.5%). This suggests that the newer firms are likely to be very small in nature and that increases may follow in future years.

The main drivers of the employment and turnover change are the Drink and Entertainment sub-sectors which have both observed losses from 2016 to 2017.

Figure 13: Sub-sector NTE growth 2016-2017 in NT



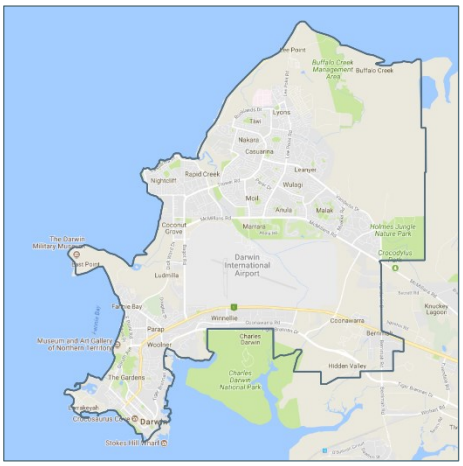
In summary, NT's Core NTE is relatively small but particularly important in terms of its contributions to the wider economy within the territory (13.9% of all employment in NT). It has seen many new establishments added in the last year, but this has yet to impact on employment and turnover, which have seen losses in Drink and Entertainment, but have been maintained due to a growing Food sub-sector.

Table 10: Core NTE summary for Northern Territory

Measure	Core NTE 2017	% Change 16-17	% Total Economy NT	% Total Economy AUS
Establishments	754	↑ 4.7%	5.2%	4.7%
Employment	18,700	↑ 0.1%	13.9%	8.9%
Turnover ($m)	$2,172	↓ -1.5%	6.6%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

4.1. NT: City of Darwin



Darwin's Core NTE represents nearly 6% of all establishments in the LGA, which is above the territory and national average.

The structure of Darwin's Core NTE is slightly different to that of NT and Australia, with less reliance on Drink (4% of Core NTE establishments) and Entertainment (27%) and more of an emphasis on Food establishments (69%).

This is also supported when looking at growth rates by sub-sector, with Drink and Entertainment witnessing slight declines between 2016 and 2017 across establishments (-5% and -3% respectively), employment (-4% and -2%) and turnover (-4% and -1%). This suggests a potential shift towards an even greater emphasis on Food in the future.

Table 11: Core NTE summary for City of Darwin

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	NT	AUS
Establishments	409	3.5%	5.8%	5.2%	4.7%
Employment	5,640	6.6%	11.5%	13.9%	8.9%
Turnover ($m)	$627	5.9%	4.4%	6.6%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

This shift seems more likely when considering that Darwin experienced strong growth in the Food sub-sector over the same period in terms of establishments (+7%), employment (+13%) and turnover (+13%).

Establishment growth in Food over this period is driven by an increase in takeaway food services (+10%), with a lower growth in cafe and restaurant establishments (+4%). Turning to employment and turnover though, it is cafes and restaurants driving the growth (+14% employment, +15% turnover).

Figure 14: Darwin's Food Employment by type

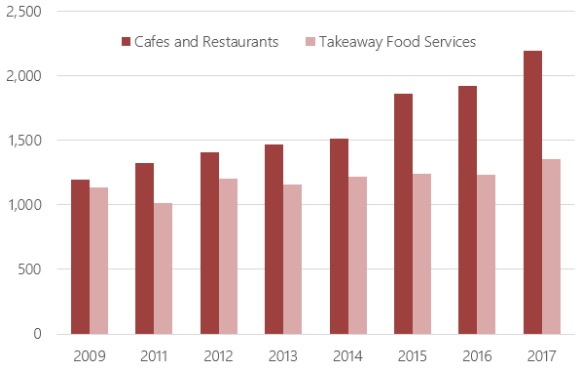
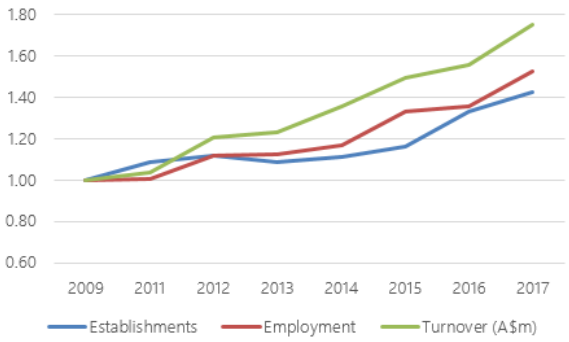


Figure 15: Trend in Darwin's Food sub-sector



5. The NTE in Queensland (QLD)

QLD has the third largest Core NTE in Australia across all key metrics and is growing at faster pace than that of VIC and NSW.

The Core NTE in QLD consists of over 19,100 establishments, employing over 221,600 people and generating $25.3bn in turnover. Each of these key metrics have grown in the last year by 3.8%, 5.0% and 4.1% respectively, which is quicker than the national average (+3.2%, +3.7% and +3.1%).

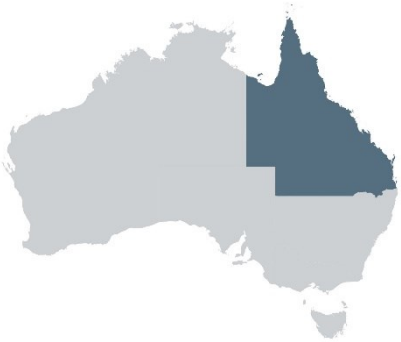
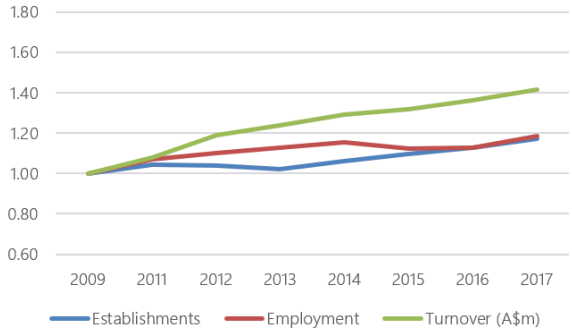


Figure 16: Trend in QLD's Core NTE



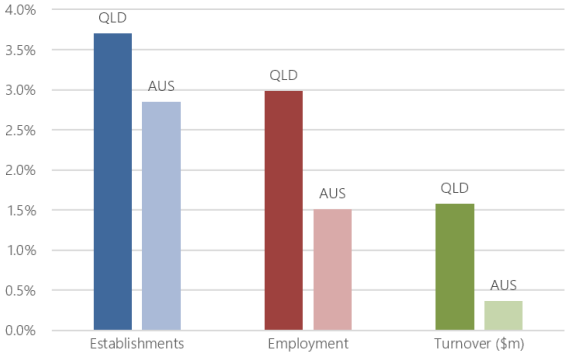
The state's Core NTE has also been assisted by strong growth in Entertainment from 2016 to 2017 that has occurred at almost double the national average for employment (+3.0% compared to +1.5% in Australia) and turnover (+1.6% compared to +0.4%).

The same is also true of the Drink sub-sector, which experienced particularly strong growth across employment (+4.3%) and turnover (+3.8%), although a small decline in establishments (-0.1%).

The structure of the Core NTE in QLD is similar to that of Australia, although with slightly less reliance on Drink establishments (6% of Core NTE compared to 8% nationally) and more reliance on Food (65%, 63% nationally).

As with most other states and territories, growth in the Core NTE is primarily due to an increase in the Food sub-sector, which has increased in establishments (+4.2%), employment (+5.9%) and turnover (+5.9%) between 2016 and 2017.

Figure 17: Growth in QLD's Entertainment 2016-17



In summary, QLD's Core NTE is one of the largest in Australia and is growing at a rate quicker than Australia, NSW and VIC. Its Core NTE structure is similar to that of Australia, with slightly less reliance on Drink and more emphasis on Food. Between 2016 and 2017 QLD's Core NTE has grown in employment and turnover across all Core NTE sub-sectors. If this trend continues, its size could rival that of VIC and NSW.

Table 12: Core NTE summary for Queensland

Measure	Core NTE 2017	% Change 16-17	% Total Economy QLD	% Total Economy AUS
Establishments	19,117	↑ 3.8%	4.4%	4.7%
Employment	221,645	↑ 5.0%	9.2%	8.9%
Turnover ($m)	$25,276	↑ 4.1%	4.0%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

5.1. QLD: Brisbane City Council

Brisbane has the largest Food and Entertainment sub-sectors across the 88 LGAs, as well as the largest Core NTE.

Brisbane naturally ranks highly in all three NTE sub-sectors, due to its geographical size, which makes comparisons to other LGAs difficult and leads to a much lower concentration per km^2 than that of other areas.

Brisbane's proportional split in Food, Drink and Entertainment is similar to QLD and Australia in establishments, employment and turnover. While similar in this vein, Brisbane's wider economy has more of a reliance on the Core NTE than that of QLD and Australia, as demonstrated in Table 13 below, with the Core NTE representing a higher than average proportion of the total economy.

Table 13: Core NTE summary for Brisbane City Council

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	QLD	AUS
Establishments	6,196	3.8%	5.0%	4.4%	4.7%
Employment	69,725	5.6%	10.8%	9.2%	8.9%
Turnover ($m)	$7,652	5.3%	4.2%	4.0%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

All of Brisbane's Core NTE sub-sectors (Drink, Entertainment and Food) grew between 2016 and 2017 across all measures, although some sub-sectors grew quicker than others.

The largest percentage growth was witnessed in Food employment (+7%) and turnover (+7%), representing an addition of 3,190 jobs and $317m in turnover to the sub-sector. As highlighted in Figure 18, this trend has been fairly continual for almost a decade and doesn't show any signs of slowing, meaning Food will remain key.

Figure 18: Trend in Brisbane's Food sub-sector

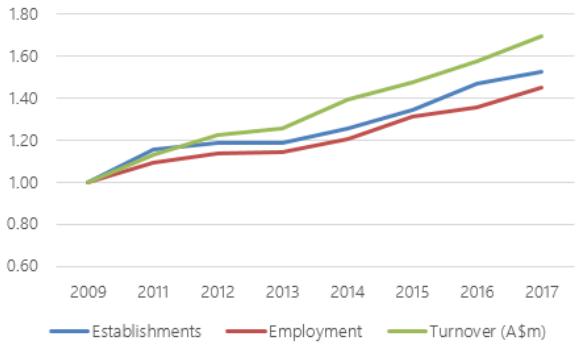
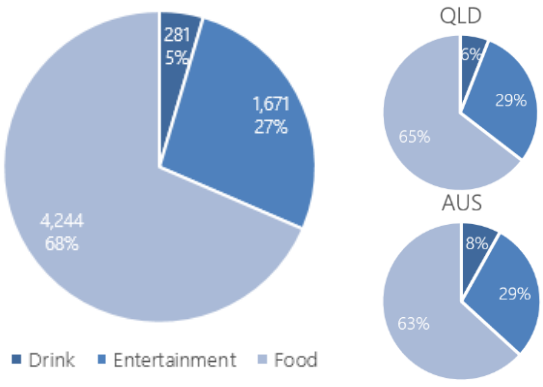
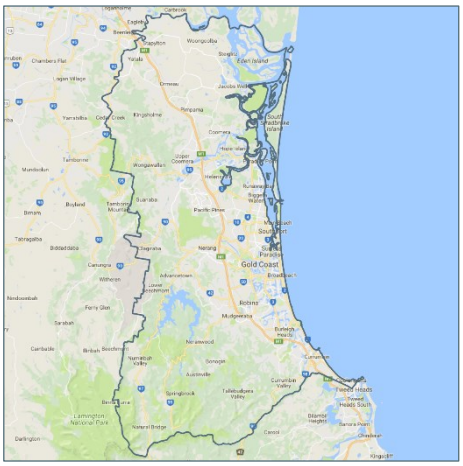


Figure 19: Brisbane's establishments by sub-sector



5.2. QLD: City of Gold Coast



Gold Coast has the third largest Core NTE of all 88 LGAs analysed and the second largest Entertainment sub-sector.

In a similar fashion to Brisbane, Gold Coast's large physical size means it naturally ranks highly, particularly in Food (sixth) and Entertainment, but lower in terms of density. Entertainment represents a larger proportion of Core NTE establishments (32%) than it does in the state (29%) and Australia (29%) and this is also true when it comes to employment and turnover.

The Core NTE has grown across most measures over the 2016 to 2017 period and at a faster rate than witnessed in QLD and Australia. This growth has not occurred across all sub-sectors though, with Drink declining by 7% in establishments.

Table 14: Core NTE summary for City of Gold Coast

Measure	Core NTE 2017	% Change 16-17	% Total Economy LGA	% Total Economy QLD	% Total Economy AUS
Establishments	3,216	4.1%	5.0%	4.4%	4.7%
Employment	34,530	6.9%	11.3%	9.2%	8.9%
Turnover ($m)	$3,849	7.3%	4.4%	4.0%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Entertainment and Food have both experienced growth in employment and turnover between 2016 and 2017. While Entertainment has grown at a quicker rate than QLD and Australia between 2016 and 2017 its growth since 2012 is relatively static. It has not grown as quickly as the Food sub-sector as demonstrated in Figure 20 and Figure 21. Over the 2016 and 2017 period employment in Food has increased by 10% (+1,935 jobs) compared to an increase of 5% in Entertainment (+500 jobs).

Figure 20: Trend in Gold Coast's Entertainment

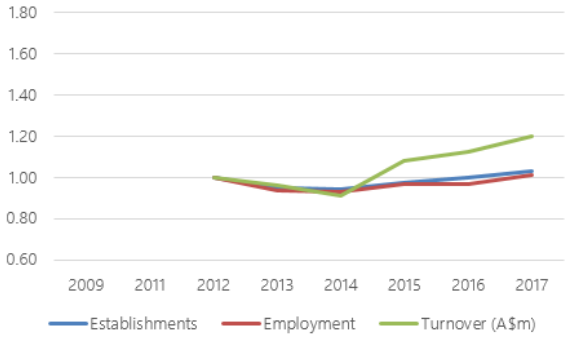
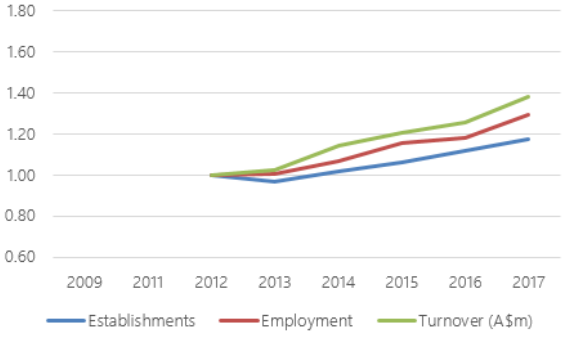


Figure 21: Trend in Gold Coast's Food sub-sector

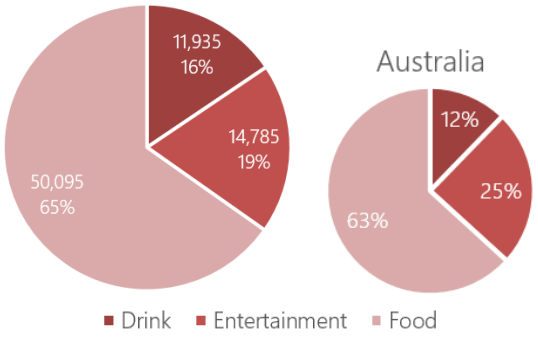


6. The NTE in South Australia (SA)

SA has a modestly sized Core NTE, which has a greater focus on Drink activities than other states and less reliance on Entertainment activities.

SA's Core NTE employs almost 77,000 people across 6,441 establishments and generated $8.6bn in turnover in 2017 (Table 15). Almost 12,000 of these employees (16%) are based in Drink establishments, which represents a much higher proportion than seen in the Core NTE nationally (12%).

Figure 22: SA's employment by sub-sector



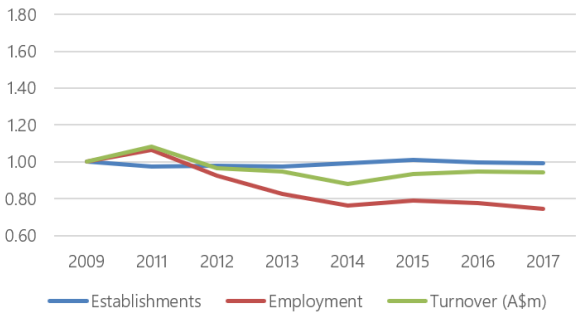
While the Drink sub-sector represents an above average concentration of Core NTE activities in SA, it has observed little to no change in its establishment base over the last eight years, along with a slow reduction in employment and turnover.

Entertainment has also experienced a decline in establishments over the 2009 to 2015 period but looks to be resurging in 2016 and 2017. Food on the other hand is the main driver for growth from 2016 to 2017, having increased in establishments (+3.1%), employment (+2.2%) and turnover (+2.2%).

Entertainment represents a much lower proportion of employment in SA's Core NTE (19%) compared to Australia (25%) whereas the concentration of Food based establishments is broadly similar, albeit slightly higher (65% in SA compared to 63% in Australia).

Growth in the Core NTE in SA has been relatively static over the 2016 to 2017 period, with establishments increasing by 2.4% (below the national rate of +3.2%) and employment and turnover increasing by 0.6% and 0.7% respectively.

Figure 23: Trend in SA's Drink sub-sector



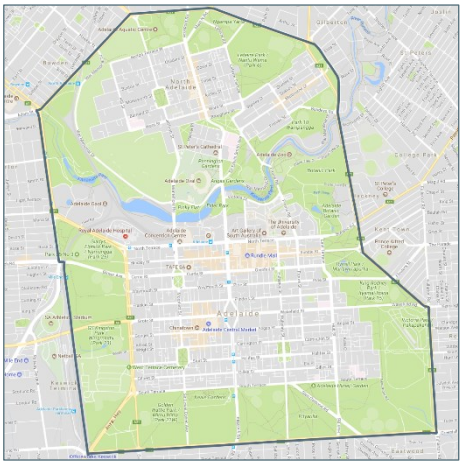
In summary, the Core NTE in SA is slightly different to that of Australia, with more emphasis on Drink and less focus on Entertainment. These two sectors have witnessed relatively static growth between 2016 and 2017 and in the period prior to this, whilst Food has continued to rise. This could signify a potential shift in NTE focus from Drink to Food based activities or could simply suggest a move to smaller Drinks venues given the number of establishments has remained effectively unchanged over the last eight years.

Table 15: Core NTE summary for South Australia

Measure	Core NTE 2017	% Change 16-17	% Total Economy SA	% Total Economy AUS
Establishments	6,441	2.4%	4.4%	4.7%
Employment	76,815	0.6%	9.3%	8.9%
Turnover ($m)	$8,594	0.7%	3.9%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

6.1. SA: City of Adelaide



Adelaide has the second largest concentration of Drink establishments per km² out of the 88 LGAs analysed.

Adelaide's Core NTE is very different to that of SA and Australia, with a much higher concentration of Drink establishments (16% compared to 12% in SA and 8% in Australia) and significantly smaller proportion of Entertainment establishments (15% compared to 26% in SA and 29% in Australia).

Adelaide's disparity with SA and Australia is also apparent when looking at the proportion of the total economy that the Core NTE represents (see Table 16) across establishments (5%), employment (13%) and turnover (5%).

Table 16: Core NTE summary for City of Adelaide

Measure	Core NTE 2017	% Change 16-17	% Total Economy LGA	SA	AUS
Establishments	808	-2.2%	5.2%	4.4%	4.7%
Employment	11,365	2.8%	13.1%	9.3%	8.9%
Turnover ($m)	$1,186	3.0%	4.8%	3.9%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Core NTE establishments in Adelaide declined by 2.2% over 2016 to 2017. This loss was experienced across all three sub-sectors, although employment and turnover have increased in Entertainment (+3%, +4% respectively) and Food (+4%, +4%), indicating a move to larger establishments.

By comparison, employment and turnover in Drink contracted by 1% over the same period (Figure 25), driven mainly by pubs, taverns and bars, which represent 91% of the sub-sector. This activity is important to Adelaide's live music scene, with a high number of gigs occurring in this venue type[5].

Figure 24: Adelaide's establishments by sub-sector

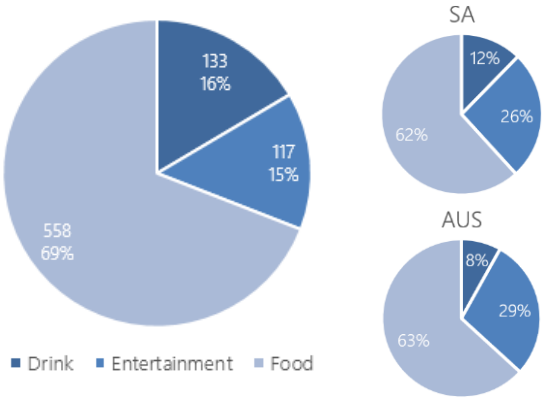
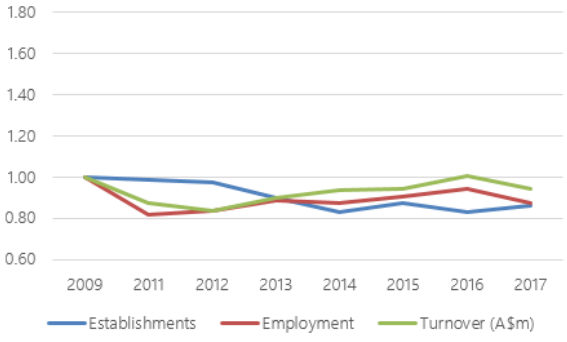


Figure 25: Trend in Adelaide's Drink sub-sector



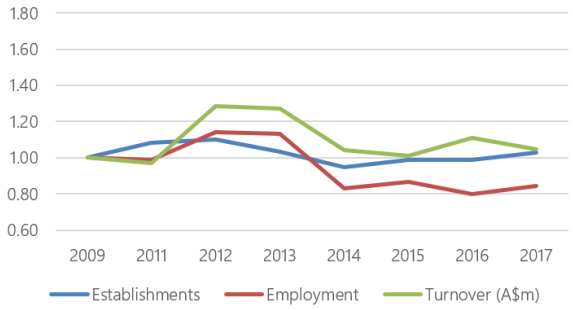
[5] Music SA, (2017), Adelaide Live Music Census 2017 (recorded in May)
http://www.musicsa.com.au/wp-content/uploads/2017/12/LMO-Adelaide-Live-Music-Census-2017_v2.pdf

7. The NTE in Tasmania (TAS)

The Core NTE in TAS represents a higher than average proportion of the total economy and is growing at a quicker pace than seen nationally.

As shown in Table 17, TAS' Core NTE accounts for 5.2% of all TAS establishments (compared to 4.7% nationally), 9.4% of all employment (compared to 8.9%) and 4.1% of all turnover (compared to 3.8%). Over the 2016 to 2017 period each of these metrics have increased at a faster rate than Australia.

Figure 26: Trend in TAS's Drink sub-sector



This would be welcome within TAS, as Drink activities represent 12% of all Core NTE establishments (compared to 8% nationally), 16% of Core NTE employment (compared to 12%) and 17% of turnover (compared to 15%).

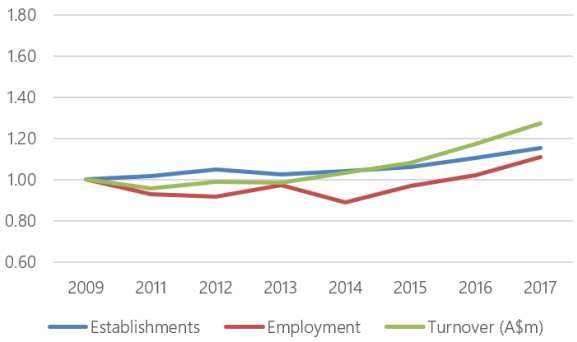
Given TAS' rural nature, it might be expected that the two key cities, Hobart and Launceston, drive the Core NTE. However, the two cities account for 40% of Core NTE establishments, 39% of employment and 36% of turnover, indicating that there are other Core NTEs operating elsewhere across the state.

This is particularly true of employment (+8.3%), due to strong growth across all three sub-sectors:

- Drink (+190 / +5.5%)
- Entertainment (+420 / +8.8%)
- Food (+1,165 / +8.7%).

The increase in Drink is particularly positive, given that almost half of other states and territories have witnessed decline within this sub-sector over the last couple of years (including TAS). This could mean the sub-sector is experiencing some form of revival.

Figure 27: Trend in TAS's Food sub-sector



In summary, TAS' Core NTE is one that is important to the states' total economy (5.2% of all TAS establishments) and is growing at a rate quicker than the national average, particularly in employment. This is driven by strong growth between 2016 and 2017 across all three Core NTE sub-sectors, with Food contributing the greatest number of jobs. Recent growth in Drink establishments, could signify a potential resurgence for the sub-sector following a steady decline over the last few years.

Table 17: Core NTE summary for Tasmania

Measure	Core NTE 2017	% Change 16-17	% Total Economy TAS	% Total Economy AUS
Establishments	1,960	3.6%	5.2%	4.7%
Employment	23,330	8.3%	9.4%	8.9%
Turnover ($m)	$2,645	5.4%	4.1%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

7.1. TAS: City of Hobart

Core NTE employment represents 14% of all employment in Hobart.

As can be seen in Table 18, Core NTE employment represents a much higher proportion of total employment than across Tasmania (9%) and Australia (9%). The same is true of establishments (8% compared to 5% in TAS and Australia) and turnover (5% compared to 4% in TAS and Australia).

While the number of Core NTE establishments in Hobart increased (+5.6%) between 2016 and 2017, employment in the Core NTE remained fairly static (declining by 0.3%), while turnover increased only slightly (+0.2%). This suggests a higher number of smaller establishments.

Table 18: Core NTE summary for City of Hobart

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	TAS	AUS
Establishments	469	5.6%	7.6%	5.2%	4.7%
Employment	6,575	-0.3%	13.7%	9.4%	8.9%
Turnover ($m)	$708	0.2%	5.3%	4.1%	3.8%

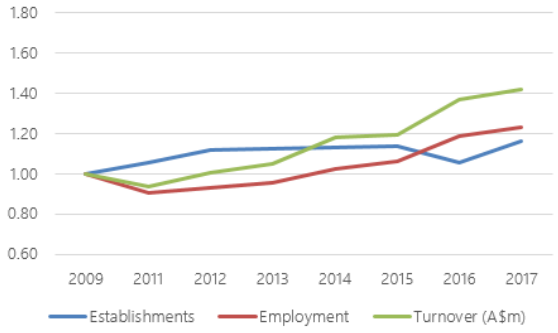
Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

The maintaining of Hobart's employment and turnover position is driven mainly by an increase in Food establishments (+10%), which increased in employment and turnover by 4% each. Conversely the Drink and Entertainment sub-sectors saw declines in employment of 7% and 6% respectively.

This could signify a shift in the composition of Hobart's Core NTE towards a more Food focused approach. It will be important to review this trend in future years to understand the changes.

Figure 28: Hobart's Entertainment sub-sector

Figure 29: Trend in Hobart's Food sub-sector

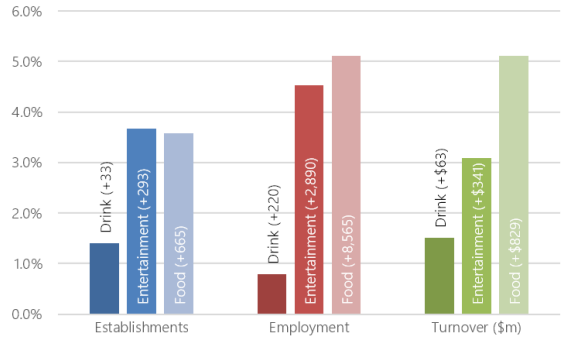


8. The NTE in Victoria (VIC)

The Core NTE in VIC is the second largest in Australia and is expanding at a faster rate than NSW and Australia as a whole.

VIC's Core NTE (Table 19) accounts for 28% of Australia's Core NTE establishments, 25% of its employment and 26% of its turnover. As with NSW, the distribution of the Core NTE amongst sub-sectors is broadly similar to that of Australia, except with a slightly increased focus on Food activities.

Figure 30: Sub-sector NTE growth 2016-2017 in VIC



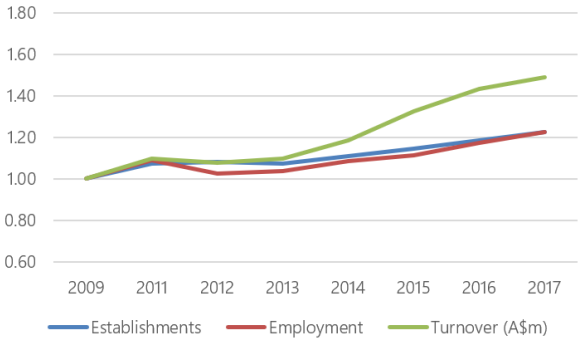
The increase across key metrics in Food was comparable to that of Australia, whilst growth in Entertainment surpassed the national trend. While Drink employment grew (+0.8%), it was slightly less than the trend seen nationally (+1.1%).

The increase in Drink was driven by a similar increase (+1.1%) in employment in pubs, taverns and bars, whilst liquor retailing declined (-0.8%). Comparatively in the Food sub-sector, growth was relatively consistent across takeaway food services (+3.8%) and cafes and restaurants (+5.8%).

Between 2016 and 2017, the Core NTE in VIC grew across establishments (+3.4% compared to 3.2% nationally), employment (+4.5% compared to +3.7%) and turnover (+3.9% compared to +3.1%).

The above average growth witnessed in VIC's Core NTE is courtesy of strong increases across every metric and sub-sector between 2016 and 2017. This is particularly true in the Entertainment and Food sub-sectors (Figure 30) which added 11,455 jobs to the Core NTE during this period.

Figure 31: Trend in VIC's Core NTE



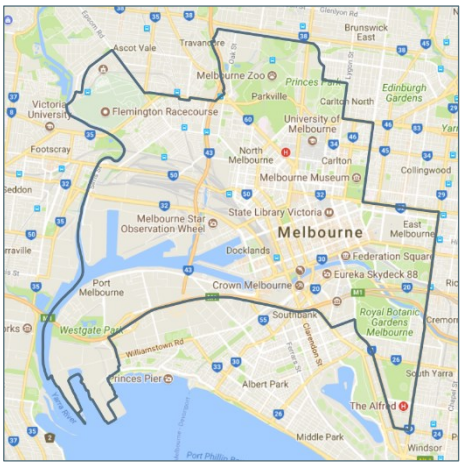
In summary, the Core NTE in VIC is one of the largest in the country and is growing more quickly than that of NSW and Australia. It is particularly strong in Food and Entertainment activities, which have grown considerably over the last year. The Drink sub-sector has grown at a similar pace to the national trend, which is positive considering the decline seen in other areas. Should these trends continue VIC's share of the Australian Core NTE is likely to increase in future years.

Table 19: Core NTE summary for Victoria

Measure	Core NTE 2017	% Change 16-17	% Total Economy VIC	% Total Economy AUS
Establishments	29,857	3.4%	5.1%	4.7%
Employment	270,760	4.5%	8.4%	8.9%
Turnover ($m)	$32,660	3.9%	3.7%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

8.1. VIC: City of Melbourne



Melbourne's NTE continues to be driven by growth in its Food sub-sector. It has the second largest concentration of Core NTE and Food establishments per km² of the 88 LGAs analysed.

The number of Core NTE establishments remained relatively steady between 2016 and 2017 (-1.2%), while employment (+7.4%) and turnover (+6.5%) continued to rise, suggesting larger establishments with higher turnover.

In 2017 Food continued to be Melbourne's strongest Core NTE sub-sector, accounting for 70% of its NTE establishments and employment and 65% of its turnover. This is considerably higher than Victoria (64% of establishments) and Australia as a whole (63% of establishments) as demonstrated in Figure 32.

Table 20: Core NTE summary for City of Melbourne

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	VIC	AUS
Establishments	2,405	-1.2%	6.3%	5.1%	4.7%
Employment	30,370	7.4%	10.5%	8.4%	8.9%
Turnover ($m)	$3,219	6.5%	4.1%	3.7%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Growth in employment and turnover in the Core NTE was driven by the Food sub-sector, which experienced a 12% rise between 2016 and 2017.

By comparison, establishments (-6%), employment (-3%) and turnover (-6%) in the Drink sub-sector declined during this two-year period and Entertainment remained fairly static, declining by 1% in establishments, 2% in employment and 1% in turnover.

Figure 32: Melbourne's establishments by sub-sector

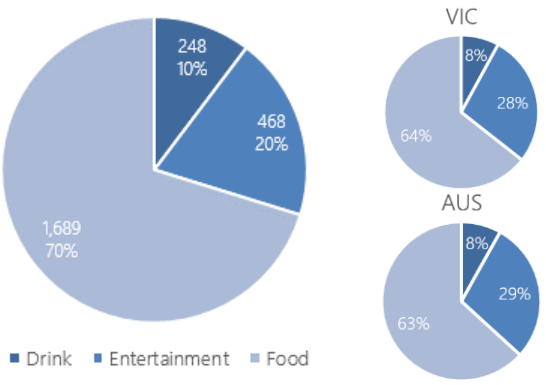
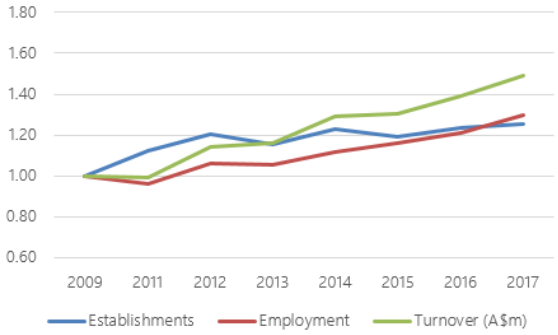


Figure 33: Trend in Melbourne's Food sub-sector



8.2. VIC: Maroondah City Council

Maroondah's Core NTE is relatively small, with less reliance on Drink and an emphasis on Food.

Food is key in Maroondah accounting for 67% of Core NTE establishments, 63% of employment and 54% of turnover. This is slightly higher than that of Victoria and Australia.

All aspects of Maroondah's Core NTE grew slightly between 2016 and 2017, with the exception of the Food sub-sector, which experienced growth in the number of establishments (+2.1%) but a decline in employment (-5.7%) and turnover (-5.4%).

Table 21: Core NTE summary for Maroondah City Council

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	VIC	AUS
Establishments	363	2.8%	3.9%	5.1%	4.7%
Employment	2,775	0.7%	5.5%	8.4%	8.9%
Turnover ($m)	$313	3.7%	2.2%	3.7%	3.8%

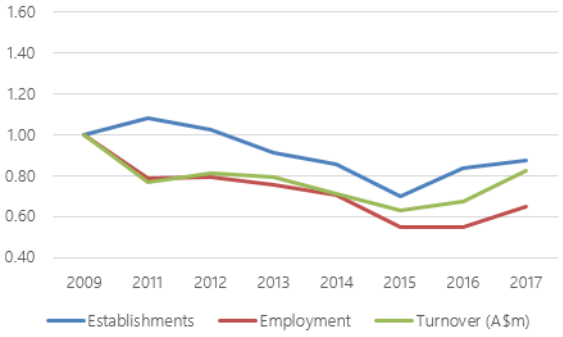
Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Food experienced particularly strong growth (see Figure 34) from 2015 to 2016 (+17.4%). This suggests that the lull in 2017 could be a settling period, but it should continue to be monitored in future iterations.

The Entertainment sub-sector achieved strong growth between 2016 and 2017, thanks to the creative and performing arts activities industry, which saw an additional 110 employees added to the sub-sector. This helped it recover from its historical downward trend (see Figure 35).

Figure 34: Trend in Maroondah's Food sub-sector

Figure 35: Trend in Maroondah's Entertainment



8.3. VIC: Port Phillip City Council

Of the 88 LGAs analysed, Port Phillip has the sixth highest concentration of Core NTE establishments per km² and the fifth highest concentration of Entertainment establishments.

Entertainment is a key strength of Port Phillip accounting for 38% of its Core NTE establishments, 31% of employment and 42% of turnover, which is quite different to that of Victoria and Australia as a whole. The Drink sub-sector represents a similar proportion to that of the state, whereas Food is a much smaller proportion by comparison (as shown in Figure 36).

The trend in Entertainment is driven primarily by a large number of establishments, employment and turnover in the creative and performing arts space.

Table 22: Core NTE summary for Port Phillip City Council

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	VIC	AUS
Establishments	1,274	2.7%	6.2%	5.1%	4.7%
Employment	13,845	5.9%	12.6%	8.4%	8.9%
Turnover ($m)	$1,593	7.3%	5.5%	3.7%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Over the 2016 to 2017 period, Port Phillip experienced growth across all three measures, with employment and turnover growing quicker than rates witnessed at the state and national level.

While Entertainment is one of Port Phillip's key sub-sectors, its growth has been relatively slow between 2016 and 2017 across establishments (+1.3%) with stronger growth in employment (+3.5%) and turnover (+7.9%). As with several LGAs in this report, Food is the sub-sector, that has grown the most over the last eight years (Figure 37).

Figure 36: Port Phillip's establishments by sub-sector

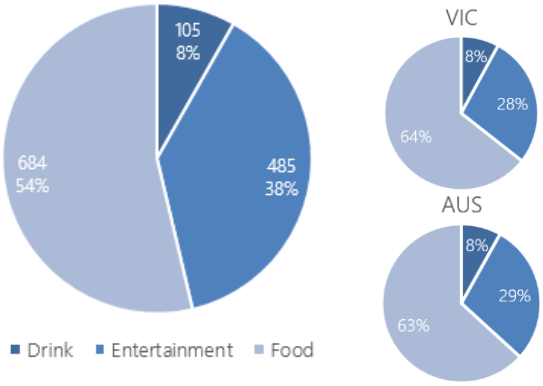
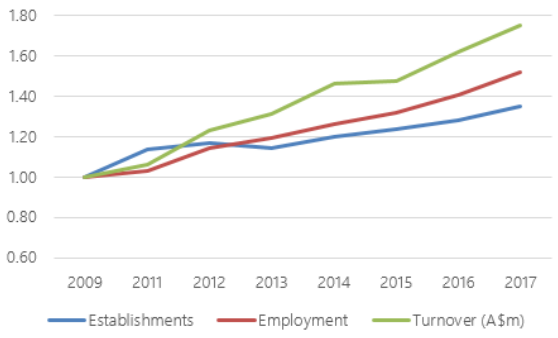


Figure 37: Trend in Port Phillip's Food sub-sector



9. The NTE in Western Australia (WA)

WA has stronger than average Food and Drink sub-sectors and has the fourth largest Core NTE of all Australia's states and territories.

Whilst the number of establishments in WA overall economy grew at a much slower rate than the national average between 2016 and 2017 (1.5% compared to 3.1% nationally), the number of establishments in WA's Core NTE increased at the same rate as the national average (+3.2%).

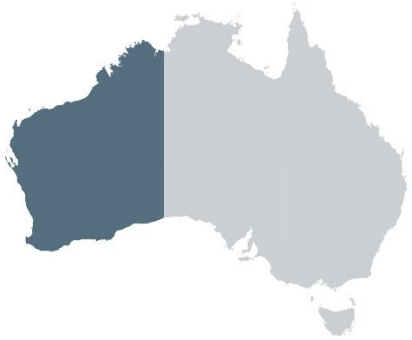
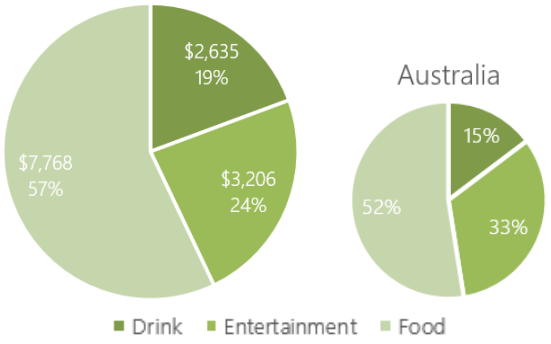


Figure 38: WA's and Australia's Core NTE turnover



WA's strongest NTE sub-sectors are Food and Drink, which hold a higher proportion of the Core NTE across all metrics. Entertainment, however, is weaker than the national average, representing a lower proportion of the Core NTE across all metrics:

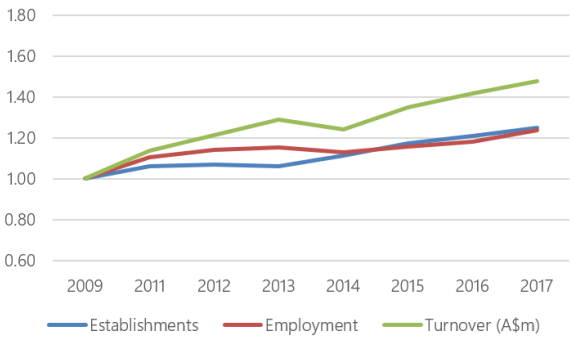
- Establishments: 26% in WA, 29% nationally
- Employment: 17% in WA, 25% nationally
- Turnover: 24% in WA, 33% nationally

This sub-sector also grew at a lower rate than the national average between 2016 and 2017.

The Core NTE in WA grew across all three metrics between 2016 and 2017. In particular, employment and turnover in WA's Core NTE, grew at a much stronger rate than the national average (+4.8% and +4.4% respectively compared to +3.7% and 3.1% nationally).

The Food sub-sector in WA experienced particularly strong employment and turnover growth between 2016 and 2017 (both +6.5%). The Drink sub-sector also experienced particularly strong increase in turnover (+6.6%), primarily in liquor retailing (+14%).

Figure 39: Trend in WA's Core NTE sector



In summary, WA's Core NTE is the fourth largest of Australia's states and territories. The state has a strong Food and Drink sub-sector but a comparatively weaker Entertainment sub-sector, suggesting an opportunity for development. Over the last year, WA's Core NTE has grown at a faster rate than its overall economy, especially in Food turnover and employment, as well as Drink turnover.

Table 23: Core NTE summary for Western Australia

Measure	Core NTE 2017	% Change 16-17	% Total Economy WA	% Total Economy AUS
Establishments	9,953	3.2%	4.4%	4.7%
Employment	116,935	4.8%	8.8%	8.9%
Turnover ($m)	$13,609	4.4%	3.3%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_State

9.1. WA: City of Perth[6]

Of the 88 LGAs analysed, Perth's Drink sub-sector ranks sixth highest in terms of establishments per km^2 and third for turnover and employment density.

The Drink sub-sector represents 14% of Perth's Core NTE. This compares to just 8% Australia wide. Not only does Perth have a stronger than average Drink sub-sector, this sub-sector experienced growth between 2016 and 2017 in establishments (+8.8%), employment (+2.1%) and turnover (+2.0%).

In Perth's Core NTE overall, the number of establishments increased but employment and turnover declined. This is against the trend witnessed across WA, as can be seen in Figure 40.

Table 24: Core NTE summary for City of Perth

Measure	Core NTE 2017	% Change 16-17	% Total Economy		
			LGA	WA	AUS
Establishments	605	1.2%	5.0%	4.4%	4.7%
Employment	9,430	-4.0%	8.2%	8.8%	8.9%
Turnover ($m)	$962	-4.5%	2.8%	3.3%	3.8%

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/1_LGA

Drink was the only Core NTE sub-sector in Perth to experience growth during this period, with both Entertainment and Food experiencing declines in employment (-12.2% and -4.3% respectively) and turnover (-12.9% and -4.2%).

Compared to Drink, Perth's Entertainment sub-sector is relatively smaller, representing just 15% of all Perth's Core NTE turnover. This compares to Entertainment representing 33% Australia wide.

Figure 40: Change in Core NTE in Perth and WA

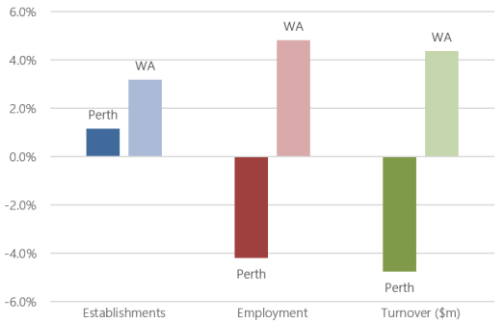
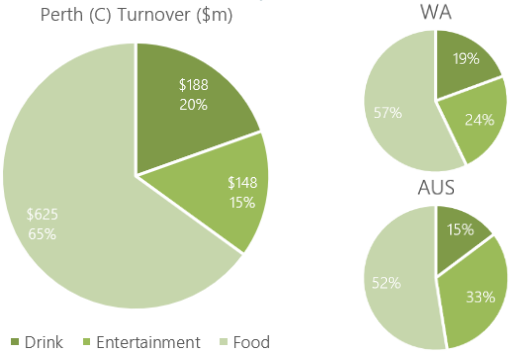


Figure 41: Perth's turnover by sub-sector



[6] Please note that due to changes in ABS methodologies that there is a disconnect from 2015 to 2016 data, as explained in the method.

10. Appendix

10.1. Sources

Table 25: Sources for images used

Council Area	Source
Australian Capital Territory	Supplied by CCCLM
City of Adelaide	www.flickr.com/photos/dynamix00/
Brisbane City Council	www.flickr.com/photos/lennykphotography/
City of Darwin	www.flickr.com/photos/httpwwwflickrcomphotostopend/
City of Gold Coast	www.flickr.com/photos/bruvva/
City of Hobart	www.flickr.com/photos/michelphan/
Maroondah City Council	www.qicgre.com/places/eastland
City of Melbourne	Supplied by City of Melbourne Council
City of Newcastle	www.visitnewcastle.com.au/
City of Parramatta	www.dailytelegraph.com.au/newslocal/parramatta/praise-for-parramattas-proud-beating-heart/news-story/ea490bf9fae8e906f245bb4997b78ad0
City of Perth	www.flickr.com/photos/steve_ellis/2709732487/
Port Phillip City Council	www.flickr.com/photos/scott-s_photos/
City of Sydney	www.flickr.com/photos/mklapper/

10.2. Methodology

10.2.1. Definitions

As noted in the Glossary (p4), the NTE refers to economic activity which occurs at establishments primarily between the hours of 6 p.m. and 6 a.m. This is then broken down further into Core, Non-Core and Supply.

These NTE sectors are defined using the Australian and New Zealand Standard Industrial Classification (ANZSIC) system, which are aligned with definitions used in previous work in the United Kingdom and New Zealand. The codes used to define Core, Non-Core and Supply are provided below.

Table 26: Core NTE ANZSIC definition

NTE Sub-Sector	ANZSIC	Description
Drink	4123	Liquor Retailing
	4520	Pubs, Taverns and Bars
Entertainment	551[7]	Motion Picture and Video Activities
	900	Creative and Performing Arts Activities
	911	Sports and Physical Recreation Activities
	912	Horse and Dog Racing Activities
	913	Amusement and Other Recreation Activities
	920	Gambling Activities
	4530	Clubs (Hospitality)
	9534	Brothel Keeping and Prostitution
Food	4511	Cafes and Restaurants
	4512	Takeaway Food Services

[7] For all LGAs except City of Sydney, Motion Picture and Video Activities (ANZSIC 551) is captured as a Supply NTE activity. For City of Sydney, the Floor and Employment Survey in the original Sydney Cost Benefit Analysis work (2011) allowed further disaggregation of this ANZSIC to reach Motion Picture Exhibition (ANZSIC 5513), i.e. cinemas, meaning it can still be presented in the following years. This level of ANZSIC detail is not normally available at LGA level via ABS request due to small numbers that would not pass confidentiality rules.

Table 27: Non-Core NTE ANZSIC definition

NTE Sub-Sector	ANZSIC	Description
Care	771	Public Order and Safety Services
	840	Hospitals
Creative Education	8212	Arts Education
Cultural	601	Libraries and Archives
Design	692	Architectural, Engineering and Technical Services
Food	411	Supermarket and Grocery Stores
	4121	Fresh Meat, Fish & Poultry Retailing
	4122	Fruit & Vegetable Retailing
	4129	Other Specialised Food Retailing
Hospitality	4400	Accommodation
Infrastructure	29	Waste Collection, Treatment and Disposal Services
	751	Central Government Administration
	753	Local Government Administration
	772	Regulatory Services
	9531	Laundry and Dry-Cleaning Services
Other Education	8219	Adult, Community and Other Education n.e.c.
Promotion	694	Advertising Services
Research	695	Market Research and Statistical Services
Retail/Other	422	Electrical and Electronic Goods Retailing
	425	Clothing, Footwear and Personal Accessory Retailing
	426	Department Stores
	427	Pharmaceutical and Other Store Based Retailing
	4241	Sport and Camping Equipment Retailing
	4242	Entertainment Media Retailing
	4243	Toy and Game Retailing
	4244	Newspaper and Book Retailing
	4245	Marine Equipment Retailing
Sports Education	8211	Sports and Physical Recreation Instruction
Transport	472	Rail Passenger Transport
	482	Water Passenger Transport
	4621	Interurban and Rural Bus Transport
	4622	Urban Bus Transport (including Tramway)
	4623	Taxi and Other Road Transport
	9533	Parking Services

Table 28: Supply NTE ANZSIC definition

NTE Sub-Sector	ANZSIC	Description
Drink	12	Beverage and Tobacco Product Manufacturing
	3606	Liquor and Tobacco Product Wholesaling
Entertainment	551	Motion Picture and Video Activities
	552	Sound Recording and Music Publishing
Food	11	Food Product Manufacturing
	4513	Catering Services

10.2.2. Data sources

Data was acquired from the Australian Bureau of Statistics (ABS) via bespoke request from their Counts of Australian Businesses, including Entries and Exits (CABEE), June 2013 to June 2017 dataset[8]. Through a collaborative approach with the ABS, the bespoke request covered the ANZSICs set out in Section 10.2.1 (p29) for a total of 88 LGAs, including:

- The current and previous members of the LGSCN (15 LGAs),
- Areas considered to be in the top 21 growing cities[9] of Australia (13 LGAs),
- A selection of areas that had a large population density (per km^2), were listed as a city council area or a 'major city of Australia' and met the confidentiality constraints of the ABS (55 LGAs),
- An additional set of areas in NSW which are actively working on their NTE strategy (5 LGAs).

This extended the coverage of the analysis considerably when compared to previous years, which included members of the LGSCN only. In addition to this extended LGA coverage, data was acquired from the CABEE dataset for federal and state / territory figures.

This dataset was analysed and modelled using additional ABS datasets including labour force data[10] and industry turnover[11] data. Once finalised data was presented across the geographic areas of LGA, state / territory and Australia as a whole, by a variety of ANZSIC groupings including NTE sector and sub-sector.

In some cases, ANZSIC level data can be provided, but in others the numbers can be small leading to large percentage swings when reviewing comparatively between years. This can be problematic as the ABS applies perturbation[12] techniques when dealing with smaller numbers in order to maintain confidentiality of businesses involved in the dataset. This is the main reason why ANZSIC data is not published widely within this document and is only used in those LGAs where numbers are large enough.

Important points to note about the CABEE dataset

The CABEE dataset captures actively trading establishments with an Australian Business Number (ABN) who are registered for Goods and Services Tax (GST) as at the 30th June each year. Establishments without an ABN or that are not registered for GST are excluded from the dataset.

Most establishments are counted as a single unit, at the location of their registered address, or at the address with the highest employment. Establishments operating from multiple locations (for example large cinema chains) may only be counted once. Conversely, establishments whose legal structure means they have registered for separate ABNs may be counted multiple times.

Irrespective of any diversity of business activity undertaken, each establishment is classified to a single ANZSIC code based on the main source of industry value added (sales of goods and services, wages and salaries or number of employees as a proxy), which is generally based on a description provided by the business. ANZSIC classifications may therefore not reflect all activities of one establishment, particularly where different activities are undertaken at different locations and the establishment is counted as a single unit.

[8] ABS Catalogue 8165.0 - Counts of Australian Businesses, including Entries and Exits, Jun 2013 to Jun 2017 http://www.abs.gov.au/ausstats/abs@.nsf/mf/8165.0

[9] Smart Cities Plan: https://smart-cities.dashboard.gov.au/all-cities/overview

[10] ABS Catalogue 6202.0 - Labour Force http://www.abs.gov.au/ausstats/abs@.nsf/mf/6202.0

[11] ABS Catalogue 8155.0 – Australian Industry http://www.abs.gov.au/ausstats/abs@.nsf/mf/8155.0

[12] The ABS Catalogue 8165.0 (link at footnote 8) for CABEE explains the use of perturbation in the context of business counts. Additional information on the perturbation technique is available in the Census of Population and Housing dataset (ABS Catalogue 2011.0.55.001) http://www.abs.gov.au/ausstats/abs@.nsf/Lookup/by%20Subject/2011.0.55.001~2016~Main%20Features~Data%20Quality%20and%20Random%20Perturbation~18

10.2.3. Changes to geographic boundaries

Between the 2015 iteration of this study and this 2016-17 iteration there have been a number of LGA boundary changes introduced across Australia.

One LGA affected within this report is the City of Parramatta, the boundary of which was revised in 2016[13]. This change saw parts of the previous Parramatta boundary combined with parts of The Hills Shire, Auburn City, Holroyd City and Hornsby Shire. While figures for this LGA do not look too different between 2015 and 2016, it should be noted that there is a disconnect in the time series between these years and this should be borne in mind when reviewing data over this period.

Another LGA affected was City of Perth, the boundary of which was also revised in 2016[14], absorbing part of the City of Subiaco (south of Aberdare Road). As above, this change creates a disconnect in the time series between 2015 and 2016. As 2016 and 2017 data for City of Perth was acquired from the CABEE 2017 dataset, both reporting years make use of the new LGA boundary.

In addition to this, the City of Perth is affected by a change in ABS methodology introduced in the CABEE 2017 dataset, which means data can now be provided by non-standard geographies (i.e. LGA, postcode, etc.).

Previously, ABS could only provide data at Statistical Area 2 (SA2) boundaries and LGA boundaries had to be constructed using these building blocks. This approach correlates for other LGAs except in the case of Perth where the LGA boundary is particularly small. In this case the SA2s used cover a larger area than the LGA boundary, meaning that in the past more businesses have been counted in the data than are actually in the LGA (approximately 40% more). This should also be considered when reviewing data between 2015 and 2016.

As noted above, the approach of using SA2 areas as a proxy for LGA boundaries correlates for other LGAs, the ABS change to the use of actual LGA boundaries should be borne in mind when comparing 2016 or 2017 results to earlier years at an LGA level. Data at a state, territory or national level are unaffected by this change.

10.2.4. Revision to 2015 state, territory and federal employment and turnover figures

Please note, that during the course of this iteration of the research, an anomaly was identified in the 2015 employment and turnover estimates for state, territory and federal levels. These figures have been revised within this latest report and may differ from the previously published report[15]. There is no impact on LGA figures, which remain unchanged between this 2016-17 report and the previous report.

[13] https://www.cityofparramatta.nsw.gov.au/council/governance-of-the-council/wards
[14] https://www.perth.wa.gov.au/city-perth-boundary-map
[15] Houghton, M. and Rowell, A. (2017), The Australian Night Time Economy 2015, Ortus Economic Research

10.3. Core NTE sub-sector tables for states, territories and LGAs

10.3.1. Australian Capital Territory

Table 29: Australian Capital Territory – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	109	109	102	101	106	106	100	110	10	10.0%
Entertainment	427	422	415	407	415	418	429	441	12	2.8%
Food	872	957	965	962	1,059	1,119	1,156	1,201	45	3.9%
Establishments	**1,408**	**1,488**	**1,482**	**1,470**	**1,580**	**1,643**	**1,685**	**1,752**	**67**	**4.0%**
Drink	1,940	2,115	1,860	1,685	1,820	2,085	2,200	2,150	-50	-2.3%
Entertainment	5,555	5,745	5,355	5,500	5,875	6,165	6,760	6,920	160	2.4%
Food	16,920	18,010	19,890	19,425	18,020	18,895	19,030	20,625	1,595	8.4%
Employment	**24,415**	**25,870**	**27,110**	**26,610**	**25,715**	**27,145**	**27,990**	**29,695**	**1,705**	**6.1%**
Drink	$250	$264	$294	$166	$295	$270	$273	$274	$1	0.3%
Entertainment	$694	$698	$609	$594	$679	$837	$927	$928	$1	0.1%
Food	$1,426	$1,565	$1,807	$1,820	$1,768	$1,771	$1,844	$1,998	$154	8.4%
Turnover (A$m)	**$2,370**	**$2,528**	**$2,710**	**$2,580**	**$2,742**	**$2,877**	**$3,044**	**$3,200**	**$156**	**5.1%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

10.3.2. New South Wales

Table 30: New South Wales – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	2,717	2,777	2,786	2,735	2,818	2,817	2,868	2,910	42	1.5%
Entertainment	10,981	11,157	10,960	10,472	10,501	10,664	10,738	11,029	291	2.7%
Food	17,644	18,987	19,352	18,907	20,082	20,763	21,505	22,257	752	3.5%
Establishments	**31,342**	**32,921**	**33,098**	**32,114**	**33,401**	**34,244**	**35,111**	**36,196**	**1,085**	**3.1%**
Drink	44,125	44,890	40,940	41,150	40,660	42,670	43,115	43,560	445	1.0%
Entertainment	80,685	79,710	83,085	84,220	85,455	88,175	90,935	90,060	-875	-1.0%
Food	169,940	185,045	175,820	178,970	185,515	186,060	187,570	195,735	8,165	4.4%
Employment	**294,745**	**309,645**	**299,845**	**304,340**	**311,630**	**316,905**	**321,620**	**329,355**	**7,735**	**2.4%**
Drink	$4,925	$5,007	$4,971	$5,135	$5,525	$6,054	$6,436	$6,507	$72	1.1%
Entertainment	$9,551	$9,246	$9,895	$9,459	$10,024	$12,709	$13,398	$13,188	-$210	-1.6%
Food	$14,323	$16,084	$15,973	$16,532	$18,207	$17,440	$18,170	$18,960	$790	4.3%
Turnover (A$m)	**$28,799**	**$30,337**	**$30,839**	**$31,126**	**$33,757**	**$36,203**	**$38,004**	**$38,656**	**$652**	**1.7%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

Table 31: City of Newcastle – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	111	101	98	102	104	111	104	111	7	6.7%
Entertainment	278	276	277	259	266	243	219	231	12	5.5%
Food	400	412	428	412	447	470	435	480	45	10.3%
Establishments	**789**	**789**	**803**	**773**	**817**	**824**	**758**	**822**	**64**	**8.4%**
Drink	1,740	1,540	1,765	1,950	1,775	1,675	1,710	1,880	170	9.9%
Entertainment	3,830	3,420	3,760	3,450	3,520	3,470	3,415	3,420	5	0.1%
Food	4,490	4,800	4,875	5,565	6,125	6,730	6,835	7,590	755	11.0%
Employment	**10,060**	**9,760**	**10,400**	**10,965**	**11,425**	**11,875**	**11,960**	**12,890**	**930**	**7.8%**
Drink	$173.3	$160.0	$160.3	$180.2	$173.0	$158.8	$164.3	$180.9	$16.6	10.1%
Entertainment	$459.1	$400.8	$463.7	$437.2	$426.3	$477.8	$501.0	$514.6	$13.6	2.7%
Food	$378.4	$417.4	$442.7	$514.2	$597.0	$637.4	$662.5	$736.4	$73.9	11.2%
Turnover (A$m)	**$1,010.8**	**$978.2**	**$1,066.7**	**$1,131.6**	**$1,196.3**	**$1,274.0**	**$1,327.8**	**$1,431.8**	**$104.1**	**7.8%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

Table 32: City of Parramatta[16] – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	45	46	46	41	37	34	43	46	3	7.0%
Entertainment	240	250	235	222	217	225	198	224	26	13.1%
Food	646	761	804	778	886	924	897	901	4	0.4%
Establishments	**931**	**1,057**	**1,085**	**1,041**	**1,140**	**1,183**	**1,138**	**1,171**	**33**	**2.9%**
Drink	550	700	680	710	570	490	535	565	30	5.6%
Entertainment	2,350	2,245	2,255	1,965	2,010	2,120	2,080	2,205	125	6.0%
Food	4,745	5,160	5,885	5,240	5,735	6,020	5,255	5,310	55	1.0%
Employment	**7,645**	**8,100**	**8,815**	**7,910**	**8,310**	**8,630**	**7,870**	**8,075**	**205**	**2.6%**
Drink	$75.4	$86.9	$61.6	$65.5	$55.6	$46.4	$85.3	$90.2	$4.9	5.7%
Entertainment	$282.1	$263.0	$277.9	$248.3	$243.2	$292.1	$445.3	$448.3	$3.0	0.7%
Food	$399.8	$448.3	$534.7	$484.3	$558.6	$570.3	$490.3	$495.7	$5.3	1.1%
Turnover (A$m)	**$757.3**	**$798.2**	**$874.2**	**$798.1**	**$857.4**	**$908.7**	**$1,020.9**	**$1,034.2**	**$13.2**	**1.3%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

Table 33: City of Sydney – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	416	430	562	546	576	530	547	574	27	4.9%
Entertainment	835	874	838	783	826	823	859	870	11	1.3%
Food	2,730	3,065	3,290	3,148	3,354	3,254	3,378	3,428	50	1.5%
Establishments	**3,981**	**4,369**	**4,690**	**4,477**	**4,756**	**4,607**	**4,784**	**4,872**	**88**	**1.8%**
Drink	4,310	3,990	4,805	5,180	5,285	5,145	5,125	5,570	445	8.7%
Entertainment	6,735	6,575	6,785	6,915	7,285	7,200	7,430	7,610	180	2.4%
Food	17,300	16,650	18,335	18,255	19,305	20,065	20,930	22,395	1,465	7.0%
Employment	**28,345**	**27,210**	**29,930**	**30,350**	**31,875**	**32,410**	**33,485**	**35,580**	**2,095**	**6.3%**
Drink	$445.1	$422.4	$534.7	$586.3	$631.1	$597.2	$602.3	$641.6	$39.3	6.5%
Entertainment	$939.5	$886.1	$961.8	$1,006.5	$1,014.2	$1,139.2	$1,186.4	$1,245.2	$58.8	5.0%
Food	$1,458.0	$1,447.3	$1,666.0	$1,687.1	$1,880.8	$1,900.4	$2,028.6	$2,172.3	$143.7	7.1%
Turnover (A$m)	**$2,842.6**	**$2,755.8**	**$3,162.5**	**$3,279.9**	**$3,526.1**	**$3,636.8**	**$3,817.3**	**$4,059.1**	**$241.8**	**6.3%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

10.3.3. Northern Territory

Table 34: Northern Territory – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	54	55	62	57	56	60	50	50	0	0.0%
Entertainment	235	239	221	229	221	207	221	231	10	4.5%
Food	365	397	394	389	406	415	449	473	24	5.3%
Establishments	**654**	**691**	**677**	**675**	**683**	**682**	**720**	**754**	**34**	**4.7%**
Drink	1,960	2,055	3,205	3,270	5,285	2,730	2,580	2,415	-165	-6.4%
Entertainment	3,320	4,025	2,290	2,280	2,940	5,860	6,400	6,130	-270	-4.2%
Food	6,720	7,205	8,830	8,515	7,905	9,235	9,705	10,155	450	4.6%
Employment	**11,995**	**13,285**	**14,325**	**14,070**	**16,130**	**17,825**	**18,685**	**18,700**	**15**	**0.1%**
Drink	$215	$221	$385	$427	$599	$293	$260	$243	-$17	-6.4%
Entertainment	$377	$475	$268	$216	$354	$971	$1,005	$945	-$59	-5.9%
Food	$566	$626	$802	$851	$776	$866	$940	$984	$44	4.7%
Turnover (A$m)	**$1,158**	**$1,322**	**$1,455**	**$1,494**	**$1,729**	**$2,129**	**$2,204**	**$2,172**	**-$32**	**-1.5%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

[16] Please note that the Parramatta LGA boundary was revised in 2016 causing a disconnect in the time series from 2015 to 2016. For additional details please see Section 10.2.3, page 31.

Table 35: City of Darwin – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	21	23	23	19	17	15	19	18	-1	-5.3%
Entertainment	124	126	118	105	101	99	113	110	-3	-2.7%
Food	197	214	220	214	219	229	263	281	18	6.8%
Establishments	**342**	**363**	**361**	**338**	**337**	**343**	**395**	**409**	**14**	**3.5%**
Drink	315	320	515	515	525	435	430	415	-15	-3.5%
Entertainment	1,905	1,830	1,755	1,620	1,610	1,555	1,700	1,675	-25	-1.5%
Food	2,330	2,340	2,605	2,620	2,725	3,100	3,155	3,550	395	12.5%
Employment	**4,550**	**4,490**	**4,870**	**4,760**	**4,860**	**5,090**	**5,290**	**5,640**	**350**	**6.6%**
Drink	$37.9	$39.1	$46.6	$47.8	$51.2	$41.0	$41.9	$40.1	-$1.8	-4.3%
Entertainment	$228.5	$214.4	$216.4	$205.6	$195.3	$214.2	$244.7	$242.9	-$1.7	-0.7%
Food	$196.2	$203.5	$236.5	$242.1	$265.8	$293.7	$305.9	$344.3	$38.4	12.6%
Turnover (A$m)	**$462.6**	**$457.0**	**$499.5**	**$495.5**	**$512.3**	**$548.9**	**$592.5**	**$627.4**	**$34.9**	**5.9%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

10.3.4. Queensland

Table 36: Queensland – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	1,217	1,183	1,153	1,138	1,127	1,147	1,144	1,143	-1	-0.1%
Entertainment	5,735	5,782	5,669	5,414	5,382	5,392	5,427	5,628	201	3.7%
Food	9,369	10,070	10,104	10,150	10,778	11,328	11,845	12,346	501	4.2%
Establishments	**16,321**	**17,035**	**16,926**	**16,702**	**17,287**	**17,867**	**18,416**	**19,117**	**701**	**3.8%**
Drink	21,115	22,635	24,975	23,630	22,915	23,555	23,340	24,335	995	4.3%
Entertainment	44,295	45,145	53,685	58,025	56,465	55,115	55,445	57,100	1,655	3.0%
Food	121,965	132,455	127,930	129,485	136,870	131,595	132,345	140,205	7,860	5.9%
Employment	**187,375**	**200,235**	**206,585**	**211,140**	**216,255**	**210,270**	**211,135**	**221,645**	**10,510**	**5.0%**
Drink	$2,081	$2,274	$2,742	$2,692	$2,741	$2,655	$2,733	$2,836	$103	3.8%
Entertainment	$5,479	$5,462	$6,882	$6,805	$6,857	$8,485	$8,721	$8,858	$137	1.6%
Food	$10,280	$11,513	$11,623	$12,577	$13,433	$12,335	$12,820	$13,582	$761	5.9%
Turnover (A$m)	**$17,840**	**$19,249**	**$21,247**	**$22,074**	**$23,032**	**$23,475**	**$24,275**	**$25,276**	**$1,001**	**4.1%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

Table 37: Brisbane City Council – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	262	280	271	268	262	259	278	281	3	1.1%
Entertainment	1,597	1,703	1,675	1,563	1,583	1,573	1,611	1,671	60	3.7%
Food	2,780	3,214	3,307	3,294	3,490	3,739	4,078	4,244	166	4.1%
Establishments	**4,639**	**5,197**	**5,253**	**5,125**	**5,335**	**5,571**	**5,967**	**6,196**	**229**	**3.8%**
Drink	4,580	4,480	4,475	4,890	4,555	4,295	4,500	4,605	105	2.3%
Entertainment	14,295	12,285	16,960	16,595	16,415	16,605	17,725	18,095	370	2.1%
Food	32,345	35,435	36,865	37,095	38,990	42,470	43,830	47,020	3,190	7.3%
Employment	**51,225**	**52,200**	**58,300**	**58,580**	**59,960**	**63,370**	**66,055**	**69,725**	**3,670**	**5.6%**
Drink	$417.4	$423.2	$406.5	$451.8	$443.7	$407.0	$444.8	$446.2	$1.3	0.3%
Entertainment	$1,834.2	$1,525.4	$2,091.1	$2,101.5	$1,988.3	$2,285.2	$2,519.8	$2,589.4	$69.7	2.8%
Food	$2,726.4	$3,080.1	$3,349.3	$3,428.2	$3,799.2	$4,022.4	$4,299.6	$4,616.1	$316.5	7.4%
Turnover (A$m)	**$4,978.0**	**$5,028.7**	**$5,846.9**	**$5,981.5**	**$6,231.2**	**$6,714.6**	**$7,264.2**	**$7,651.8**	**$387.6**	**5.3%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

Table 38: City of Gold Coast – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	142	136	133	133	137	128	-9	-6.6%
Entertainment	988	940	931	961	988	1,021	33	3.3%
Food	1,757	1,700	1,795	1,865	1,965	2,067	102	5.2%
Establishments	**2,887**	**2,776**	**2,859**	**2,959**	**3,090**	**3,216**	**126**	**4.1%**
Drink	2,045	2,130	2,340	2,260	2,480	2,270	-210	-8.5%
Entertainment	10,160	9,535	9,435	9,825	9,810	10,310	500	5.1%
Food	16,975	17,120	18,110	19,655	20,015	21,950	1,935	9.7%
Employment	**29,180**	**28,785**	**29,885**	**31,735**	**32,305**	**34,530**	**2,225**	**6.9%**
Drink	$185.8	$196.7	$227.8	$214.0	$239.8	$220.0	-$19.8	-8.3%
Entertainment	$1,252.4	$1,207.3	$1,143.4	$1,352.1	$1,407.2	$1,500.7	$93.4	6.6%
Food	$1,542.2	$1,582.4	$1,764.8	$1,861.4	$1,939.7	$2,128.8	$189.1	9.7%
Turnover (A$m)	**$2,980.4**	**$2,986.4**	**$3,136.0**	**$3,427.6**	**$3,586.7**	**$3,849.4**	**$262.7**	**7.3%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

10.3.5. South Australia

Table 39: South Australia – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	799	779	783	780	792	806	795	792	-3	-0.4%
Entertainment	1,766	1,774	1,702	1,614	1,578	1,600	1,632	1,671	39	2.4%
Food	3,134	3,303	3,420	3,419	3,572	3,708	3,860	3,978	118	3.1%
Establishments	**5,699**	**5,856**	**5,905**	**5,813**	**5,942**	**6,114**	**6,287**	**6,441**	**154**	**2.4%**
Drink	16,075	17,150	14,880	13,260	12,230	12,690	12,455	11,935	-520	-4.2%
Entertainment	14,790	14,405	11,600	12,240	13,255	14,320	14,885	14,785	-100	-0.7%
Food	39,555	41,300	41,970	41,430	46,125	48,150	49,000	50,095	1,095	2.2%
Employment	**70,420**	**72,855**	**68,445**	**66,930**	**71,615**	**75,160**	**76,340**	**76,815**	**475**	**0.6%**
Drink	$1,604	$1,736	$1,548	$1,518	$1,412	$1,500	$1,521	$1,516	-$5	-0.3%
Entertainment	$1,879	$1,773	$1,487	$1,307	$1,601	$2,167	$2,267	$2,226	-$42	-1.8%
Food	$3,334	$3,590	$3,813	$3,915	$4,527	$4,513	$4,747	$4,853	$106	2.2%
Turnover (A$m)	**$6,817**	**$7,099**	**$6,848**	**$6,740**	**$7,540**	**$8,181**	**$8,534**	**$8,594**	**$60**	**0.7%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

Table 40: City of Adelaide – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	118	109	112	110	133	131	142	133	-9	-6.3%
Entertainment	123	119	122	113	115	114	121	117	-4	-3.3%
Food	505	511	560	533	520	521	563	558	-5	-0.9%
Establishments	**746**	**739**	**794**	**756**	**768**	**766**	**826**	**808**	**-18**	**-2.2%**
Drink	2,335	2,225	1,900	2,125	2,355	2,255	2,330	2,305	-25	-1.1%
Entertainment	1,600	1,735	2,040	1,710	1,925	1,660	1,650	1,700	50	3.0%
Food	6,445	6,190	6,420	6,530	6,270	7,100	7,080	7,360	280	4.0%
Employment	**10,380**	**10,145**	**10,360**	**10,360**	**10,550**	**11,015**	**11,060**	**11,365**	**305**	**2.8%**
Drink	$214.4	$209.1	$172.6	$196.3	$229.5	$213.6	$225.5	$223.4	-$2.2	-1.0%
Entertainment	$191.5	$203.3	$251.5	$216.4	$233.0	$228.7	$240.0	$248.9	$8.9	3.7%
Food	$543.0	$538.0	$583.4	$603.3	$610.9	$672.4	$686.2	$714.0	$27.9	4.1%
Turnover (A$m)	**$948.9**	**$950.4**	**$1,007.5**	**$1,016.0**	**$1,073.4**	**$1,114.7**	**$1,151.7**	**$1,186.3**	**$34.6**	**3.0%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

10.3.6. Tasmania

Table 41: Tasmania – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	227	246	250	235	215	224	224	234	10	4.5%
Entertainment	562	596	561	539	515	529	516	522	6	1.2%
Food	1,043	1,062	1,095	1,069	1,085	1,107	1,151	1,204	53	4.6%
Establishments	**1,832**	**1,904**	**1,906**	**1,843**	**1,815**	**1,860**	**1,891**	**1,960**	**69**	**3.6%**
Drink	4,310	4,260	4,925	4,885	3,585	3,740	3,445	3,635	190	5.5%
Entertainment	3,975	5,585	5,120	5,280	3,415	5,025	4,755	5,175	420	8.8%
Food	13,100	12,165	12,015	12,720	11,630	12,710	13,350	14,515	1,165	8.7%
Employment	**21,390**	**22,005**	**22,060**	**22,890**	**18,630**	**21,475**	**21,550**	**23,330**	**1,780**	**8.3%**
Drink	$415	$402	$533	$529	$433	$420	$461	$435	-$27	-5.8%
Entertainment	$500	$688	$667	$623	$406	$781	$753	$804	$50	6.7%
Food	$1,104	$1,057	$1,091	$1,085	$1,141	$1,191	$1,293	$1,406	$113	8.7%
Turnover (A$m)	**$2,019**	**$2,147**	**$2,291**	**$2,237**	**$1,980**	**$2,393**	**$2,508**	**$2,645**	**$137**	**5.4%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

Table 42: City of Hobart – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	71	70	69	64	59	62	59	61	2	3.4%
Entertainment	118	118	115	119	123	118	107	101	-6	-5.6%
Food	264	278	295	297	298	301	278	307	29	10.4%
Establishments	**453**	**466**	**479**	**480**	**480**	**481**	**444**	**469**	**25**	**5.6%**
Drink	1,215	995	1,020	1,075	1,060	1,100	1,145	1,060	-85	-7.4%
Entertainment	1,285	1,370	1,270	1,565	1,485	1,445	1,410	1,325	-85	-6.0%
Food	3,395	3,085	3,165	3,245	3,480	3,600	4,040	4,185	145	3.6%
Employment	**5,895**	**5,445**	**5,455**	**5,885**	**6,020**	**6,145**	**6,595**	**6,575**	**-20**	**-0.3%**
Drink	$110.5	$96.8	$92.7	$99.4	$103.2	$104.0	$111.4	$104.5	-$6.9	-6.2%
Entertainment	$154.1	$160.4	$156.6	$197.8	$179.7	$198.6	$204.5	$197.9	-$6.6	-3.2%
Food	$286.2	$268.0	$287.8	$299.9	$339.0	$341.1	$391.3	$406.0	$14.6	3.7%
Turnover (A$m)	**$550.8**	**$525.2**	**$537.1**	**$597.1**	**$621.9**	**$643.7**	**$707.3**	**$708.4**	**$1.1**	**0.2%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

10.3.7. Victoria

Table 43: Victoria – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	2,286	2,284	2,262	2,229	2,284	2,327	2,338	2,371	33	1.4%
Entertainment	7,746	7,999	7,854	7,659	7,750	7,908	7,969	8,262	293	3.7%
Food	14,327	15,807	16,173	16,236	17,013	17,650	18,559	19,224	665	3.6%
Establishments	**24,359**	**26,090**	**26,289**	**26,124**	**27,047**	**27,885**	**28,866**	**29,857**	**991**	**3.4%**
Drink	30,485	30,745	26,250	25,405	27,085	27,010	27,860	28,080	220	0.8%
Entertainment	53,730	56,850	49,775	51,760	54,305	59,910	63,785	66,675	2,890	4.5%
Food	136,765	153,165	150,465	151,710	158,225	159,360	167,440	176,005	8,565	5.1%
Employment	**220,980**	**240,765**	**226,490**	**228,880**	**239,615**	**246,280**	**259,085**	**270,760**	**11,675**	**4.5%**
Drink	$3,503	$3,597	$3,395	$3,366	$3,706	$3,869	$4,197	$4,261	$63	1.5%
Entertainment	$6,927	$7,139	$6,532	$6,081	$6,795	$10,298	$11,009	$11,350	$341	3.1%
Food	$11,527	$13,313	$13,670	$14,660	$15,529	$14,937	$16,220	$17,049	$829	5.1%
Turnover (A$m)	**$21,958**	**$24,048**	**$23,597**	**$24,107**	**$26,029**	**$29,105**	**$31,426**	**$32,660**	**$1,233**	**3.9%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

Table 44: City of Melbourne – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	256	254	258	240	260	273	265	248	-17	-6.4%
Entertainment	456	495	501	468	488	475	473	468	-5	-1.1%
Food	1,325	1,639	1,686	1,658	1,732	1,652	1,697	1,689	-8	-0.5%
Establishments	**2,037**	**2,388**	**2,445**	**2,366**	**2,480**	**2,400**	**2,435**	**2,405**	**-30**	**-1.2%**
Drink	3,655	3,305	3,160	3,470	3,645	3,625	3,385	3,285	-100	-3.0%
Entertainment	6,430	5,300	5,470	5,590	5,560	5,210	5,520	5,420	-100	-1.8%
Food	13,860	15,640	16,000	16,780	17,370	18,230	19,385	21,665	2,280	11.8%
Employment	**23,945**	**24,245**	**24,630**	**25,840**	**26,575**	**27,060**	**28,290**	**30,370**	**2,080**	**7.4%**
Drink	$360.2	$345.0	$287.0	$320.6	$355.3	$343.2	$326.8	$307.1	-$19.7	-6.0%
Entertainment	$770.8	$621.7	$674.6	$707.7	$673.8	$716.8	$816.8	$810.4	-$6.4	-0.8%
Food	$1,168.1	$1,359.5	$1,453.5	$1,550.8	$1,692.3	$1,726.6	$1,878.5	$2,101.4	$222.8	11.9%
Turnover (A$m)	**$2,299.1**	**$2,326.2**	**$2,415.1**	**$2,579.1**	**$2,721.4**	**$2,786.7**	**$3,022.2**	**$3,218.9**	**$196.7**	**6.5%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

Table 45: Maroondah City Council – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	24	26	21	18	18	16	20	21	1	5.0%
Entertainment	112	121	115	102	96	78	94	98	4	4.3%
Food	197	216	221	212	231	224	239	244	5	2.1%
Establishments	**333**	**363**	**357**	**332**	**345**	**318**	**353**	**363**	**10**	**2.8%**
Drink	215	260	240	270	265	265	285	295	10	3.5%
Entertainment	1,135	890	900	855	800	625	625	735	110	17.6%
Food	1,275	1,365	1,465	1,420	1,530	1,575	1,850	1,745	-105	-5.7%
Employment	**2,630**	**2,520**	**2,600**	**2,545**	**2,590**	**2,470**	**2,755**	**2,775**	**20**	**0.7%**
Drink	$29.8	$36.2	$21.6	$24.9	$25.6	$25.2	$30.3	$31.4	$1.0	3.4%
Entertainment	$136.3	$104.6	$110.7	$108.0	$96.8	$86.3	$92.0	$112.0	$20.0	21.7%
Food	$107.5	$118.8	$133.1	$131.4	$149.0	$149.1	$179.3	$169.5	-$9.8	-5.4%
Turnover (A$m)	**$273.6**	**$259.6**	**$265.4**	**$264.3**	**$271.4**	**$260.7**	**$301.6**	**$312.9**	**$11.3**	**3.7%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

Table 46: Port Phillip City Council – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	112	115	109	114	117	119	113	105	-8	-7.1%
Entertainment	466	483	468	453	473	454	479	485	6	1.3%
Food	506	577	591	580	608	627	648	684	36	5.6%
Establishments	**1,084**	**1,175**	**1,168**	**1,147**	**1,198**	**1,200**	**1,240**	**1,274**	**34**	**2.7%**
Drink	1,605	1,565	1,540	1,570	1,625	1,560	1,465	1,500	35	2.4%
Entertainment	3,440	3,540	3,690	3,560	3,840	4,010	4,125	4,270	145	3.5%
Food	5,310	5,465	6,070	6,345	6,720	6,990	7,485	8,075	590	7.9%
Employment	**10,360**	**10,565**	**11,300**	**11,475**	**12,190**	**12,555**	**13,070**	**13,845**	**775**	**5.9%**
Drink	$172.5	$174.3	$139.8	$145.3	$158.4	$147.8	$145.1	$146.4	$1.3	0.9%
Entertainment	$412.4	$415.1	$455.1	$450.6	$465.6	$551.7	$614.1	$662.9	$48.8	7.9%
Food	$447.5	$474.9	$551.3	$586.5	$654.9	$661.9	$725.2	$783.2	$58.0	8.0%
Turnover (A$m)	**$1,032.4**	**$1,064.3**	**$1,146.2**	**$1,182.4**	**$1,278.9**	**$1,361.3**	**$1,484.5**	**$1,592.5**	**$108.1**	**7.3%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

10.3.8. Western Australia

Table 47: Western Australia – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	912	933	928	927	929	951	956	980	24	2.5%
Entertainment	2,420	2,524	2,498	2,411	2,437	2,519	2,576	2,640	64	2.5%
Food	4,635	4,979	5,094	5,123	5,497	5,862	6,113	6,333	220	3.6%
Establishments	**7,967**	**8,436**	**8,520**	**8,461**	**8,863**	**9,332**	**9,645**	**9,953**	**308**	**3.2%**
Drink	16,175	17,350	16,685	18,245	14,635	16,430	16,915	17,275	360	2.1%
Entertainment	14,870	17,710	18,890	18,745	19,090	18,855	19,385	19,465	80	0.4%
Food	63,555	69,545	72,295	72,125	72,985	74,110	75,265	80,190	4,925	6.5%
Employment	**94,605**	**104,605**	**107,870**	**109,115**	**106,710**	**109,395**	**111,565**	**116,935**	**5,370**	**4.8%**
Drink	$1,973	$2,248	$2,125	$2,410	$1,883	$2,338	$2,473	$2,635	$162	6.6%
Entertainment	$1,881	$2,191	$2,477	$2,345	$2,384	$3,142	$3,275	$3,206	-$69	-2.1%
Food	$5,357	$6,045	$6,568	$7,102	$7,163	$6,947	$7,291	$7,768	$477	6.5%
Turnover (A$m)	**$9,211**	**$10,484**	**$11,170**	**$11,856**	**$11,430**	**$12,427**	**$13,038**	**$13,609**	**$571**	**4.4%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_State

Table 48: City of Perth[17] – Core NTE Establishments, Employment and Turnover ($m) – by sub-sector

Measure / Sector	2009	2011	2012	2013	2014	2015	2016	2017	Change 2016-17 Number	Change 2016-17 Percentage
Drink	91	98	109	116	100	91	80	87	7	8.8%
Entertainment	129	131	126	128	113	98	62	65	3	4.8%
Food	457	502	516	534	556	599	456	453	-3	-0.7%
Establishments	**677**	**731**	**751**	**778**	**769**	**788**	**598**	**605**	**7**	**1.2%**
Drink	1,775	1,590	1,755	2,010	1,930	1,940	1,900	1,940	40	2.1%
Entertainment	2,150	1,810	1,490	1,405	1,385	1,330	1,190	1,045	-145	-12.2%
Food	6,505	6,245	6,365	6,795	6,490	7,335	6,735	6,445	-290	-4.3%
Employment	**10,430**	**9,640**	**9,610**	**10,210**	**9,805**	**10,600**	**9,825**	**9,430**	**-395**	**-4.0%**
Drink	$170.4	$158.5	$159.5	$185.8	$187.9	$183.6	$184.3	$188.1	$3.8	2.0%
Entertainment	$257.5	$211.9	$183.6	$177.7	$167.6	$183.0	$170.5	$148.5	-$22.0	-12.9%
Food	$548.3	$542.7	$578.2	$628.0	$632.6	$694.6	$652.6	$625.2	-$27.4	-4.2%
Turnover (A$m)	**$976.2**	**$913.1**	**$921.3**	**$991.5**	**$988.1**	**$1,061.1**	**$1,007.4**	**$961.7**	**-$45.7**	**-4.5%**

Based on 2018 Australian Bureau of Statistics data (CABEE 2013-2017 dataset), Ref: WTS1/3_LGA

[17] Please note that the Perth LGA boundary was revised in 2016 and is also affected by a change in ABS methodology, both of which cause a disconnect in the time series from 2015 to 2016. For additional details please see Section 10.2.3, page 31.

10.4. Core NTE density rankings

Table 49: Ranking of Core NTE establishments density per km² across the 88 LGAs analysed – part one

Position	LGA Name	State	Establishments	Density Per km²
1	City of Sydney	NSW	4,872	182.5
2	Waverley Council	NSW	702	74.7
3	North Sydney Council	NSW	738	70.3
4	Yarra City Council	VIC	1,305	66.9
5	City of Melbourne	VIC	2,405	64.3
6	Port Phillip City Council	VIC	1,274	61.5
7	City of Adelaide	SA	808	51.8
8	City of Perth	WA	605	44.2
9	Inner West Council	NSW	1,512	42.7
10	Woollahra Municipal Council	NSW	511	41.5
11	Burwood Council	NSW	289	40.7
12	City of Stonnington	VIC	985	38.3
13	City of Canada Bay Council	NSW	608	30.6
14	Willoughby Council	NSW	587	26.2
15	Randwick City Council	NSW	828	22.8
16	Glen Eira City Council	VIC	828	21.4
17	Georges River Council	NSW	788	20.6
18	City of Boroondara	VIC	1,236	20.5
19	Maribyrnong City Council	VIC	569	18.2
20	Bayside City Council	VIC	635	17.1
21	Moreland City Council	VIC	850	16.7
22	City of Ryde	NSW	648	16.0
23	City of Darebin	VIC	848	15.9
24	Bayside Council	NSW	769	15.4
25	Moonee Valley City Council	VIC	637	14.8
26	City of Parramatta	NSW	1,171	14.0
27	City of Monash	VIC	1,130	13.9
28	City of Whitehorse	VIC	884	13.7
29	Cumberland Council	NSW	891	12.4
30	City of Canterbury Bankstown	NSW	1,289	11.7
31	City of Charles Sturt	SA	485	8.9
32	City of Stirling	WA	911	8.7
33	Kingston City Council	VIC	768	8.4
34	City of Burnside	SA	223	8.1
35	Banyule City Council	VIC	492	7.9
36	Hobsons Bay City Council	VIC	436	6.8
37	Manningham City Council	VIC	736	6.5
38	Fairfield City Council	NSW	656	6.5
39	Ku-ring-gai Council	NSW	547	6.4
40	City of Hobart	TAS	469	6.0
41	Maroondah City Council	VIC	363	5.9
42	Northern Beaches Council	NSW	1,418	5.6
43	City of Joondalup	WA	550	5.6
44	City of Brimbank	VIC	641	5.2

Table 50: Ranking of Core NTE establishments density per km² across the 88 LGAs analysed – part two

Position	LGA Name	State	Establishments	Density Per km²
45	City of Greater Dandenong	VIC	663	5.1
46	Knox City Council	VIC	580	5.1
47	Brisbane City Council	QLD	6,196	4.6
48	City of Newcastle	NSW	822	4.4
49	City of Blacktown	NSW	904	3.8
50	City of Darwin	NT	409	3.7
51	City of Frankston	VIC	406	3.1
52	City of Mitcham	SA	227	3.0
53	Sutherland Shire Council	NSW	990	3.0
54	City of Gold Coast	QLD	3,216	2.4
55	City of Casey	VIC	914	2.2
56	Liverpool City Council	NSW	593	1.9
57	The Hills Shire Council	NSW	731	1.9
58	Wyndham City	VIC	730	1.3
59	Penrith City Council	NSW	515	1.3
60	City of Whittlesea	VIC	611	1.2
61	Hume City Council	VIC	609	1.2
62	Hornsby Shire Council	NSW	527	1.2
63	Campbelltown City Council	NSW	355	1.1
64	Wollongong City Council	NSW	776	1.1
65	Mornington Peninsula Shire	VIC	735	1.0
66	Lake Macquarie City Council	NSW	582	0.9
67	City of Greater Geelong	VIC	949	0.8
68	Central Coast Council	NSW	1,189	0.7
69	Albury City Council	NSW	207	0.7
70	Melton City Council	VIC	351	0.7
71	Sunshine Coast Council	QLD	1,396	0.6
72	Maitland City Council	NSW	241	0.6
73	City of Ballarat	VIC	441	0.6
74	Byron Shire	NSW	327	0.6
75	Nillumbik Shire Council	VIC	246	0.6
76	Moreton Bay Regional Council	QLD	1,042	0.5
77	Cairns Regional Council	QLD	755	0.4
78	City of Wodonga	VIC	115	0.3
79	Port Stephens Council	NSW	216	0.3
80	City of Launceston	TAS	310	0.2
81	Townsville City Council	QLD	601	0.2
82	City of Greater Bendigo	VIC	393	0.1
83	Hawkesbury City Council	NSW	298	0.1
84	Port Macquarie-Hastings Council	NSW	307	0.1
85	Mackay Regional Council	QLD	311	0.0
86	Toowoomba Regional Council	QLD	527	0.0
87	Bathurst Regional Council	NSW	155	0.0
88	Queanbeyan-Palerang Regional Council	NSW	184	0.0

The Impact of Twenty Four-Hour Public Transport in Melbourne, Australia: An Evaluation of Alcohol-Related Harms

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ABSTRACT. Objective: Transporting people out of nightlife districts is often cited as a major issue associated with alcohol-related harm. The Victorian Government introduced 24-hour public transport (24hr PT) in Melbourne, Australia, on Friday and Saturday nights in January 2016. After the 1-year trial period, funding was extended for a further 4 years, at a cost of more than AU$300 million to date. The current study aimed to determine whether 24hr PT reduced harms associated with the nightlife of Melbourne and whether there has been an increased number of people using the transport and visiting Melbourne city on Friday and Saturday nights. **Method:** Police assault data, ambulance attendance data, crash data, public transport use data, and pedestrian counting data were analyzed to determine the impact of 24hr PT on harms in the nightlife of Melbourne, as well as changes in the number of people using public transport and attending the city. **Results:** There was no change from 2015 to 2016 in the number of police-recorded assaults, ambulance attendances, or crashes for the entirety of the night. There were significantly more people out in the city later in the evening, and more people using trains and trams during the 24hr PT time (i.e., 1 A.M.–5 A.M.). **Conclusions:** The initiative did not decrease harm in Melbourne nightlife, in contrast to industry, government, and expert predictions. With expenditures of more than AU$300 million, the costs and benefits of this initiative require further consideration and research, especially when it is proposed in opposition to evidence-based solutions, such as closing venues earlier. (*J. Stud. Alcohol Drugs, 80,* 314–318, 2019)

ON JANUARY 1, 2016, Melbourne, Australia introduced 24-hour public transport (24hr PT) on Friday and Saturday nights. Specifically, at the beginning of 2016, train services on Friday and Saturday nights were increased from their approximately 1 A.M. cessation time to run each hour from 1 A.M. to 5 A.M. on all metropolitan lines, tram services on popular routes were expanded to run throughout the night, regional bus services had an additional service at 2 A.M. (previously ceased at 1 A.M.), and night bus services continued to operate in areas not serviced by trains. These expanded services provided shift workers and nightlife patrons a cheap and convenient way to travel to and from the city, which was a key aim of Public Transport Victoria in introducing this initiative (Public Transport Victoria, 2017). To date, the implementation of 24hr PT service on Friday and Saturday nights, including the cost of protective services officers—members of law enforcement whose role is solely to monitor train stations to ensure the safety of public transport users—has cost more than AU$300 million.

Although it has been argued that public transport availability is one way to reduce alcohol-related harms through the dispersal of patrons away from nightlife precincts (Graham & Homel, 2008; Graham et al., 2006; Homel & Clark, 1994; Homel et al., 2004) and through a potential reduction in the number of drink-driving incidents if fewer people are choosing to drive, it may also have opposite or unintended effects. Increasing the availability of cheap transport options for nightlife patrons may provide an incentive to stay out later and spend more money on alcohol or other drugs. This is particularly problematic, given that Miller et al. (2014a) identified midnight as the "witching hour," after which there was a substantial increase in the number of harmful incidents, including physical assaults, occurring in nighttime entertainment precincts. Such incidents often require police and ambulance responses, which can be resource intensive. Police resources are also increased through the necessity to place more officers on the streets, in response to the increased number of persons in the city. It is also possible that harms previously focused in the nighttime precincts of the central business district may migrate to other areas, such as outer suburban and regional train and bus stations, because of later patron traffic to and from these areas.

Received: August 19, 2018. Revision: May 8, 2019.

This study was funded by the Centre for Social and Early Emotional Development at Deakin University and Australian Research Council Discovery Project DP150100441.

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The aim of the current research was to determine whether the introduction of 24hr PT in Melbourne, Australia, reduced established metrics of alcohol-related harm: police recorded assaults, ambulance attendances, and road crash data. An assessment of the changes in foot traffic and public transport use data were included to identify changes in the number of persons within the central business district of Melbourne during high alcohol hours (defined as 8 P.M.–6 A.M. Friday and Saturday nights). Changes in the number of people using public transport were also examined, because any increases would have important implications for the ongoing resourcing of 24hr PT.

Method

Setting

The introduction of 24hr PT in Melbourne occurred on January 1, 2016. Before this time, trains operated from Flinders Street Station, the major metropolitan station, until approximately 1 A.M., at which time they ceased running until approximately 5 A.M. Trams ran on all lines until around the same time, and night buses were available semiregularly from the central business district. The introduction of 24hr PT meant trains would run from Flinders Street Station every hour for 24 hours from Friday night until Sunday morning, and trams on popular lines would run regularly throughout the night. Bus services would run as per usual.

Data

This study used secondary data obtained by the authors for the purpose of evaluating changes from 2015 to 2016, that is, before and after the introduction of 24hr PT. The different data sources obtained for the analysis are outlined below.

Police recorded assaults. All police recorded assaults were obtained from Crime Statistics Australia in an aggregate format for high alcohol hours from January 2015 to December 2016 in postcode 3000 (Melbourne central business district postal area), as these were the data available to the research team. This allowed for any differences in the number of assaults from pre- to post-introduction of 24hr PT in the Melbourne central business district to be observed.

Ambulance attendances. Drug- and alcohol-related ambulance attendances from January 2015 to December 2016 during high alcohol hours (defined above) were analyzed, collected as part of the *Ambo Project: Drug and Alcohol-Related Ambulance Attendances* (Lloyd & McElwee, 2011). These are ambulance attendances in which the consumption of alcohol and other drugs (both illicit drugs and misused pharmaceuticals) contributed acutely to the need for the ambulance attendance. Ambulance attendances occurring in Melbourne postcodes 3000 and 3006 (Southbank entertainment district postal area) were used, as these postcodes comprise the majority of the Melbourne central business district.

Road crash data. Road crash data was obtained from the VicRoads online crash statistics platform (VicRoads, 2018). Data for all crashes that occurred between 2015 and 2016 were used to determine whether 24-hour public transport had an impact on crash rates. As the data did not contain information about the involvement of alcohol, the high alcohol hours of 10 P.M. Friday to 6 A.M. Saturday, and 6 P.M. Saturday to 6 A.M. Sunday were used; these periods have been identified as the hours during which most alcohol-related driving crashes occur (Chikritzhs et al., 2000) and 24-hour public transport is available. (The high alcohol hours for road crashes will hereafter be referred to as "road crash–high alcohol hours.") We included only crashes that occurred within the same area that the 24-hour train network services in order to determine if the introduction of 24-hour trains affected the number of road crashes in this area during high alcohol hours.

Public Transport Use data. Public transport use count data per hour was obtained for 2015 and 2016 for the night network.

Foot traffic. Melbourne City Council has pedestrian counting devices in various places across the central business district. The sensor is installed on an awning or a street pole, allowing it to count people on the footpath below. It has the ability to record multidirectional pedestrian movements. The data are stored on an onsite data logger, subsequently transferred to a central server every 10 minutes via a 3G communication box, and then sent to the data visualization website every hour. The data from these counters are publicly available on the council website, and the data presented in this section were obtained via that website (www.pedestrian.melbourne.vic.gov.au). As there are four counters located around Flinders Street Station, these counts were combined and averaged for the purpose of analysis.

Analysis

Only descriptive data are provided, for the following reasons: (a) the small number of police-recorded assaults during high-alcohol hours (average $n = 95$ per quarter in 2015 and average $n = 108$ per quarter in 2016); (b) issues associated with using Melbourne central business district population as a denominator, including unpublished data that shows only 11% of persons who attend the nightlife report their postcode of residence to be within the nightlife area they are attending (Miller et al., 2013); and (c) the steady increase in the population (Australian Bureau of Statistics, 2018). For ambulance attendances, pedestrian traffic, public transport use data, and road crash data, a series of *t* tests (or Mann–Whitney *U* tests, in which nonparametric testing was required) were conducted for each high alcohol hour,

comparing the 2015 average numbers with 2016 average numbers, to determine if there were any significant changes after the introduction of 24-hour public transport. Bonferroni's correction was used given that, for each variable of interest, 20 significance tests were conducted (corrected α = .002).

Results

Police-recorded assaults

Police-recorded assaults that occurred in Melbourne central business district (postcode 3000) during high alcohol hours were slightly higher in 2016 than 2015 in three quarters; it was lower in July–September (Supplemental Figure A).

Ambulance attendances

A series of *t* tests, or Mann–Whitney *U* tests where Levene's test was violated, were conducted to determine if there were any significant differences in the mean number of ambulance attendances for each hour of the high alcohol hours for 2015 and 2016. Using the Bonferroni's corrected alpha, no differences were found for any hour of the night (Supplemental Table A, Supplemental Figure B).

Road crash data

A series of independent samples *t* tests were used to determine whether there were any significant differences in road crashes between 2015 and 2016 during road crash–high alcohol hours in areas that are accessible by 24-hour public transport.

There was no reduction in the average number of road crashes across both Friday and Saturday nights between 2015 and 2016. Although there was a significantly higher crash rate on Sunday morning between 1 A.M. and 1:59 A.M. (M_{2015} = 1.65 vs. M_{2016} = 1.11; t = 3.28, p = .002; Supplemental Table B, Supplemental Figure C) in 2015 than 2016, it appears this was more likely a result of a displacement of road crashes over the adjacent hours, rather than a specific impact of 24hr PT.

Public transport use data

A series of *t* tests, or Mann–Whitney *U* tests where Levene's test was violated, were conducted to determine if there were differences in the number of people using public transport from 2015 to 2016. In 2016, trains had a significantly higher number of users than in 2015 for every hour, except for Saturday morning between 6 A.M. and 6:59 A.M. This pattern was the same for trams in which, for each hour of data available, significantly more people used trams in 2016 compared with 2015, except Sunday 5 A.M.–6:59 A.M. In contrast, buses were much less likely to be used in 2016 when compared with 2015 (Supplemental Table C, Supplemental Figures D–F).

Foot traffic

Train stations. A series of *t* tests were conducted to determine whether between 2015 and 2016 there were differences in hourly average pedestrian numbers at key train stops during high alcohol hours (Supplemental Table D, Supplemental Figures G–J). There were more people counted in the hours following 12 A.M. in 2016 than there were in 2015 near Flinders Street Station (the main central business district station), and this is consistent for each hour until 4 A.M. on Saturday morning and 6 A.M. on Sunday morning. However, the only hours for which there were significant differences were Saturday from 1 A.M. to 4:59 A.M. and Sunday between 2 A.M. and 2:59 A.M. and between 4 A.M. and 5:59 A.M. Further, at Spencer Street Station, there were significantly more pedestrians counted in 2016 for every hour in high alcohol hours, except Saturday 11 P.M.–11:59 P.M.

Tram stops

On Friday night/Saturday morning there were more pedestrians counted each hour at both key tram stops; however, the only significant differences were on Friday between 8 P.M.–8:59 P.M., Saturday 2 A.M.–3:59 A.M., and Saturday 8 P.M.–8:59 P.M.

Discussion

To determine if there was any change in alcohol-related harms and the number of people in the city following the introduction of 24-hour public transport in Melbourne, Australia, changes in police assault data, ambulance attendance data, road crash data, pedestrian counts, and public transport use data were evaluated. Although there was no change from 2015 to 2016 in the number of police recorded assaults or ambulance attendances, there was a significant reduction in road crashes on Sunday mornings between 1 A.M. and 1:59 A.M. during road crash–high alcohol hours in the areas now serviced by the 24hr PT. Further, there were significantly more people out in the city later in the evening, and more people using trains and trams during the 24hr PT time.

Without information about the number of extra police or protective service officers on the streets and around key PT hubs, it is difficult to determine whether an increased police presence had a deterrent effect on the number of assaults occurring within nighttime precincts or whether incidents were subject to early intervention and de-escalation. Future evaluation of 24hr PT should consider the inclusion of police tasking data. Further research could also examine the

location of assault; for example, changes in the number of assaults on the street as compared with on public transport would be of particular interest, given the increase in people using trains and trams. This is also applicable to ambulance attendance data, whereby the coding of whether the attendance occurred at public transport stations or on public transport would provide further information.

Although there was a significant reduction in road crashes on Sunday mornings from 1 A.M.–1:59 A.M. during road crash–high alcohol hours, there were no changes from 2015 to 2016 across the entire night. This indicates there was a likely displacement effect, particularly given that road crashes were higher in the hours adjacent.

The current findings should be considered in light of the following limitations, including the short timeframe of the evaluation and the range of confounding factors in nightlife contexts, from policy changes to such everyday changes as the weather. It is also necessary to consider that this evaluation only assesses the impact of 24hr PT in the year following its implementation. Absence of observed reduction in alcohol-related harm may be the result of the brief assessment period. Further studies are recommended to determine if 24hr PT is associated with longer term impact on alcohol-related harms. In addition, we were unable to obtain the cost of harms in the nightlife in Melbourne central business district, which would have enabled us to determine the cost-worthiness of the initiative. Evaluating the cost-effectiveness of any nightlife intervention is important and should be prioritized as an area for future research. Last, a priori power analyses were unable to be conducted because of the lack of literature to estimate effect sizes. Although post hoc power analyses indicated that there was minimum power to detect moderate to large effects, there may have been insufficient power to detect small effect sizes.

Policy implications

There is a strong body of evidence from around the world regarding effective interventions for reducing alcohol-related harm in nightlife (Babor et al., 2010). The strongest is for the restriction of very late-night trading hours (Kypri et al., 2016; Miller et al., 2012; Miller et al., 2014b) and limiting the density of outlets selling alcohol (Livingston, 2008). Such measures are unpopular with the alcohol industry, which uses an array of strategies to avoid such restrictions. One of its most common claims is that alcohol is not the cause of violence, and, for that reason, if the government provided adequate public transport, the patrons that the industry just profited from would not then fight on the street. The findings in this research are the first we are aware of to show that this was definitely not the case in the context of a large city with 24-hour trading hotels, nightclubs, and a large casino. Although the Victorian government is unlikely to put in place evidence-based measures such as restricted trading hours while it receives very substantial political donations from the alcohol industry (Kypri et al., 2019), the current study and adjoining work (Curtis et al., 2019) show that the 24hr PT experiment was very good for the industry but failed to reduce the harms associated with alcohol and the related cost to the community. While this study reports on only one site and trends may differ if the city operates with earlier trading hours or reduced outlet density, the current findings do not suggest that increasing public transport will reduce alcohol-related harm associated with late-night entertainment precincts.

Conclusions

As of the end of 2016, 24hr PT did not appear to be associated with a decrease in alcohol-related harms, despite the expenditure of over AU$300 million and more spent on added police resources. The current findings are contrary to past researchers' expectations that providing an option for nightlife patrons to leave the city would reduce alcohol-related harms (Graham & Homel, 2008; Graham et al., 2006; Homel & Clark, 1994; Homel et al., 2004) and the claims made by the alcohol industry in many submissions to government reviews. These findings challenge the assumptions regarding the importance of transport in nightlife districts and suggest industry calls for increased transport are less likely to be effective than measures with strong empirical support, such as restricted trading hours and reduced number of venues in nightlife precincts.

Acknowledgments

We thank Simon Stevens and Trevor Cornwill for their support in conducting this project. For data from the Ambo project, we acknowledge the coding team at Turning Point, managed by Ms. Sharon Matthews, who created this unique dataset. We thank Ambulance Victoria for their partnership in this project, the Victorian Department of Health and Human Services for their funding of the Ambo project, and the patients upon whom the dataset is based.

Conflict of Interest Statement

Peter Miller receives funding from Australian Research Council and Australian National Health and Medical Research Council; grants from NSW Government, National Drug Law Enforcement Research Fund, Foundation for Alcohol Research and Education, Cancer Council Victoria, Queensland government, and Australian Drug Foundation; and travel and related costs from Australasian Drug Strategy Conference. He has acted as a paid expert witness on behalf of a licensed venue and a security firm.

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