

Original Article

# Do relaxed trading hours for bars and clubs mean more relaxed drinking? A review of international research on the impacts of changes to permitted hours of drinking

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**Abstract** Trading hours of licensed premises have been progressively relaxed since World War II across much of the English-speaking world as part of a global trend towards liquor deregulation. This review was informed by a systematic search of studies published in the English language since 1965 which sought to evaluate the public health and safety impacts of changes to liquor trading hours for on premise consumption – namely ‘pubs’ and clubs in the United Kingdom, ‘hotels’ and ‘taverns’ in Australia and New Zealand and ‘bars’ in North America. The systematic search was supplemented by materials identified from the ‘grey literature’, mostly government reports. A total of 49 unique studies met the inclusion criteria of which only 14 included baseline and control measures and were peer-reviewed. Among these, 11 reported at least one significant outcome indicating adverse effects of increased hours or benefits from reduced hours. Controlled studies with fewer methodological problems were also most likely to report such effects. It is suggested that differences between findings from Australia and the United Kingdom following the Licensing Act 2003 are most likely due to differences in methodological approach. It is concluded that the balance of reliable evidence from the available international literature suggests that extended late-night trading hours lead to increased consumption and related harms. Further well-controlled studies are required to confirm this conclusion.

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## Introduction

The United Kingdom is one of the number of countries to have experienced a growth in alcohol consumption and related problems over the past decade (Plant and Plant, 2007; Stockwell 2004; Meier *et al*, 2008). It was estimated that hazardous alcohol consumption contributed four per cent of the total global burden of disease in 2002 – a figure that rises to approximately 10 per cent for economically developed countries (Rehm and Room, 2005). In 2008, the World Health Assembly recognized these trends by endorsing a resolution calling for international collaborative action to reduce the adverse effects of hazardous alcohol use with a special focus on reducing harms experienced by young people.

Debates regarding effective and socially acceptable measures to reduce the considerable burden of alcohol-related death, injury and illness have also raged in the United Kingdom with the charge being sometimes laid that alcohol policy there has been unduly influenced by the alcohol industry (Room, 2004; Stockwell, 2004). A BBC TV Panorama special aired on 6 June 2004 (Stockwell, 2004) suggested that there may have been censoring of a 2003 government White Paper to omit mentioning of published studies suggesting adverse effects of increased alcohol availability (for example, Chikritzhs and Stockwell, 2002). Further evidence of such influence was that the official government response to the upsurge in alcohol-related problems was to deregulate still further with the enactment in November 2005 of the Licensing Act 2003 that abolished statutory closing time for licensed premises in England and Wales. The Chikritzhs and Stockwell's (2002) study is but one of many studies that will be reviewed here and compared against those studies recently conducted in England and Wales that have attempted to examine the effect of unrestricted trading hours on alcohol consumption, crime and health.

The present review summarizes and updates evidence from a number of countries spanning four decades regarding the impact of relaxation of trading hours on a variety of indices of alcohol consumption and related harms. Studies published in the peer-reviewed literature as well as those accessed from the 'grey literature' of government reports were included. In keeping with other comprehensive reviews (for example, Babor *et al*, 2003; Loxley *et al*, 2004), it will be concluded that where increased trading hours have actually occurred (as opposed to new policy which brings about limited change), they are associated with increased consumption and related harms. In light of this conclusion, a brief critique is offered of the designs and methodologies employed in evaluations of the UK and other studies. Summaries of the outcomes of various studies into the UK experience with extended trading hours can be found in Hough and Hunter (2008) and Hough *et al* (2008b).

Deregulation of alcohol availability through increased ease of access to liquor licenses, privatization of government liquor monopolies and more generous trading hours has been a common pattern in economically developed countries since World War II. This has afforded many opportunities to examine the public health and safety impacts of specific kinds of increased alcohol availability, a number of which have been studied and reported. Unfortunately, at first sight, the available studies offer a confusing picture of positive, negative and null results (Stockwell, 1995; Babor *et al*, 2003). Furthermore, the picture becomes still less clear given evident variety in the pervasiveness of changes in trading hours that have been evaluated, as well as in the quality of the outcome measures and research designs that have been employed. The present review attempts to sift more carefully through the available evidence, offering a methodological critique that places more emphasis on studies that have evaluated a significant change in availability, using appropriate measures and a sound, controlled research design. The results of studies with weaker designs will also be summarized, such as cross-sectional studies that compare outcomes at one point in time between areas with different trading hours and simple 'before and after' designs that do not control for unmeasured trends and confounding factors.

The evaluation of alcohol policy experiments is challenging. There are many social and economic factors, which impact on patterns of drinking and levels of related harms, not least changes in disposable income and hence the affordability of alcohol (Meier *et al*, 2008; Office of the BC Provincial Health Officer, 2008), changes in alcohol tax levels (Stockwell and Crosbie, 2001) and in the enforcement of drink-driving laws (McKnight and Voas, 2001). Very few evaluations of alcohol policy changes take account of changes in these crucial social and economic drivers of consumption – and some make potentially erroneous conclusions as a result. In a few rare instances, study designs control for such unmeasured, confounding effects by including control observations from within the study area, from a similar adjacent area or even from both.

Finally, there is the serious challenge of choosing appropriate outcome measures. These too can be misleading. At least two published evaluations of policing practices designed to reduce alcohol-related violence in and around licensed premises have primarily relied on levels of police charges for assaults (Putnam *et al*, 1993; Burns *et al*, 1995) that increased during the intervention. Brinkman *et al* (2000) have since pointed out that in these instances the measures used were highly likely to have been inflated by an increased police presence around bars and that significant declines were found in these same studies in measures of assault injuries presenting to emergency departments, measures which are unlikely to suffer from the same kind of bias. It is also suggested that specific indicators of alcohol-related violence (for example, violent incidents late at night in and around licensed premises) are superior to more general

measures of violent crime (for example, total violent incidents in a given area at all times of day and night). It is not, however, recommended to use alcohol 'flags' on crime data whereby officers are required to indicate whether they believe that alcohol was a factor in an incident – it is commonly found that these are not used consistently and do not generate research quality data (Brinkman *et al*, 2000).

## Methods

Peer reviewed scientific research studies that address the quantifiable effects of changes to trading hours for licensed premises are uncommon. A large proportion of the literature in this domain, especially most UK evaluations released in recent years, has yet to be peer reviewed. For the purposes of this review, therefore, a broad-based literature search, which included both peer-reviewed and grey literatures, was adopted.

The review specifically focused on studies that investigated the effects of changes to hours and days of sale affecting on-premise drinking (that is, pubs, clubs, restaurants and nightclubs). Using combinations of search terms ('alcohol', 'availability', 'liquor', 'licensed', 'licensing', 'policy', 'extend', 'drink', 'hour', 'evaluation' and 'late'), electronic databases (Pubmed and ProQuest Social Science journals) were mined to locate peer-reviewed material. The National Drug Research Institute (NDRI) library collection was extensively searched for published and unpublished materials. Internet search engines (Google and Google Scholar) were used to locate unpublished university, government and non-government organization websites.

All relevant studies identified by the search process and published up to December 2008 were included. Studies were classified according to the strength of their design, including: (I) studies of association with no explicit baseline measure and no control observations; (II) studies with baseline comparison points, but no control observations; and (III) studies with baseline and control observations. Reports that had been superseded by more recent publications (for example, Chikritzhs *et al*, 1997) or publications produced by the liquor industry (for example British Beer and Pub Association reports) were excluded. One study that involved multiple components, only part of which included a control region, was placed in both categories II and III (Gray *et al*, 1998). A group of five case studies conducted by the University of Huddersfield Applied Criminology Centre as part of an evaluation of recent changes to the UK Licensing Act (Newton *et al*, 2008a,b,c,d,e) have been listed independently.

## Results

In all, 49 unique studies on the effect of changes to trading hours for on-premise licensed alcohol consumption and/or related harms were identified.

No randomized controlled trials were identified, and most studies were retrospective evaluations of government policy changes. Australian, UK and, to a lesser extent, Canadian studies dominated the literature – only a handful of studies from developing nations or of indigenous populations were identified. In the wake of recent alcohol policy change in England and Wales, a suite of case studies currently found only in the grey literature have increased the numbers of studies appearing for the United Kingdom.

The type and quality of measures used varied, the most common including road traffic crashes/impaired driver offences; emergency department (ED) attendances; interpersonal violence and disorderly conduct. Other less frequently used measures included self-reported alcohol consumption; alcohol sales data; blood alcohol concentrations (BACs); liver cirrhosis; alcohol dependence; alcohol psychosis and dependence; pancreatitis; self poisoning; admissions to sobering-up shelters and women's refuges. The majority of studies retrospectively examined the effect of increased late-night trading hours on levels of harms, and both negative and positive consequences have been documented. Design quality, rigour, reliability and generalizability of findings varied substantially, even within categories.

Only a few studies lacked both a baseline measure and a control group (I,  $n=4$ ), and over half of all studies identified (II,  $n=31$ ) while reporting baseline data still lacked a crucial control group. In all, 19 of 21 studies identified from the United Kingdom did not include a control group, and over half had not yet been peer reviewed ( $n=14$ ), doubtless due to the recency of the UK legislative changes that many of them have focused on. Less than a third of all studies identified included both baseline and control measures (III,  $n=14$ ) though all of these had been peer reviewed.

A supplement to this paper available on [www.carbc.ca](http://www.carbc.ca) provides summary tables classified into each of the three groups of different study designs (Supplementary Tables 1–3). Only those in group III are detailed here in Table 1 below.

### Summary of studies of association

The four studies in this category span three decades and two countries (two each in the United States and Australia). Although in every case, the authors report significant associations between changes in trading hours and alcohol consumption and/or harm in the predicted direction, the absence of formal baseline or control comparisons leave these results open to a variety of unmeasured sources of confounding. For example, an Australian study found striking, and significant associations between the hours that bars in Sydney, New South Wales, could remain open and the number of violent assaults identified as occurring on these premises over the period of the study (Briscoe and Donnelly, 2003). Unfortunately, there were no controls for the size of these types of venue and patronage (for example, adjustment for volume of alcohol sales) as, for example, 24-hour

**Table 1:** Summary of studies with baseline and control observations

<i>First author, year, location, type of publication</i>	<i>Description</i>	<i>Results</i>	<i>Potential confounding/limitations</i>
Smith (1978) Australia (peer reviewed)	Examined effect of Sunday trading in Perth city on numbers of road traffic casualties. Used remainder of state as control region.	Significant increase for Sundays.	Unable to identify alcohol-related casualties and those associated with licensed premises. Could not rule out possibility of a temporal redistribution of crashes.
Duffy and Plant (1986) The United Kingdom (peer reviewed)	Examined effect of 1-hour increase in closing on liver cirrhosis and alcohol dependence deaths, total alcohol-related deaths, hospital admissions for drunkenness and drink-driving in Scotland. Used England and Wales as control region.	No significant negative effects. Apparent decrease in public drunkenness.	Concurrent economic recession, relative price increase for alcohol and changes to policing. Did not consider potential lagged effects associated with measures of chronic harm.
Smith (1988a) Australia (peer reviewed)	Examined effect of four-hour closing time increase on road traffic casualties. Used time of day as an internal control.	Significant overall increase.	Unable to identify alcohol-related crashes and those associated with licensed premises.
Smith (1988b) Australia (peer reviewed)	Examined effect of Sunday trading in Brisbane city on numbers of road traffic casualties and property damage crashes. Used remainder of state as control region.	Significant overall increases for both measures.	Numbers instead of rates were used. Unable to identify alcohol-related casualties and those associated with licensed premises.
Smith (1988c) Australia (peer reviewed)	Examined effect of change from 2200 hours close to 'free' closing times in Tasmania on numbers of road traffic casualties. Used time of day as an internal control and South Australia as an external control.	No significant overall change. Significant increase between 2200 and 0600 hours and accidents more likely to occur after midnight.	Total numbers of trading hours for hotels did not change.



Table 1: Continued

<i>First author, year, location, type of publication</i>	<i>Description</i>	<i>Results</i>	<i>Potential confounding/limitations</i>
Smith (1990) Australia (peer reviewed)	Examined effect of initial 2-hour closing time increase for Sundays and subsequent 8-hour increase on Sunday in numbers of road traffic casualties. Used time of day as an internal control.	Significant increase after closing time following 8-hour increase. No change for smaller 2-hour increase on Sunday. No evidence of decline during other time periods. Overall increase in traffic casualties.	Few licensed premises responded to the initial 2-hour extension. Unable to identify alcohol-related casualties and those associated with licensed premises.
McLaughlin and Harrison-Stewart (1992) Australia (peer reviewed)	Examined effect of a short-term closing time increase in City of Fremantle on consumption levels of 18–28-year-old men using residential survey. Used a Perth region as a control.	No significant change. Heavier drinkers in both areas most likely to report using extended trading hours.	Few respondents (local residents) actually attended licensed premises during the event. Atypical heavy police presence throughout the study period. Inadequate sample size for detecting a small effect.
Pinot de Moira and Duffy (1995) UK (peer reviewed)	Examined effect of 1-hour increase in closing on mortality rates for liver cirrhosis, pancreatitis, alcoholic poisoning, alcohol dependence and alcoholic psychosis in England and Wales. Used Scotland as control region.	Significant increase in alcoholic poisoning, no change for other measures.	Problematic choice of control region (Scotland in economic recession). Inappropriate choice of alcohol measures (all long-term conditions with exception of poisoning).
Gray <i>et al.</i> (1998) Australia (peer reviewed)	Examined effect of trading hour restrictions for licensed premises on local alcohol consumption levels in Tennant Creek community. Used whole of Northern Territory as a control region.	Significant decline in per capita alcohol consumption in Tennant Creek, no decline for the Northern Territory as a whole.	Range of concurrent interventions. Restrictions also affected off-premise sales.

Table 1: Continued

<i>First author, year, location, type of publication</i>	<i>Description</i>	<i>Results</i>	<i>Potential confounding/limitations</i>
Chikritzhs and Stockwell (2002) Australia (peer reviewed)	Examined effect of 1–2 hours closing time extension after midnight on police reported assaults and volumes of alcohol sales attributable to individual licensed premises in Perth. Used assaults associated with premises trading with standard hours as controls.	Significant increase in reported assaults and corresponding significant increase in volumes of high alcohol content beverage sales. Monthly assault rate doubled in extended hours premises and were not changed in control venues.	Could not determine whether significant increases were due to greater levels of alcohol consumption by individuals or greater numbers of patrons attending late trading premises (or both). Non-randomized premises.
Vingilis <i>et al</i> (2005) Canada/the United States (peer reviewed)	Examined effect of extended drinking hours from 0100 to 0200 on positive BAC driver traffic fatalities in Ontario on alcohol and non-alcohol-related traffic crash driver fatalities. Total Ontario fatalities and trends in New York and Michigan casualties used as controls. Also measured alcohol sales.	No significant change in alcohol-related driver fatalities. Overall beer consumption declined.	Limited statistical power. Limited use of extended hours by licensees. Lower BAC testing rates in control regions and concurrent road safety initiatives in operation.
Vingilis <i>et al</i> (2006) Canada/the United States (peer reviewed)	Examined effect of extended closing hours from 0100 to 0200 on alcohol-related road traffic casualties occurring in Windsor, Ontario. Used Detroit, Michigan USA as external control areas. Examined potential cross-border effects.	Significant increase in total and alcohol-related casualties in Windsor. No change in total casualties for the total Ontario region. Windsor increases partly due to ‘repatriation’ of Windsor drivers involved in crashes across border in neighbouring Detroit. No evidence of increased numbers of Detroit drivers crashed in Windsor.	Low uptake of extended hours in Ontario outside of Windsor city.



Table 1: Continued

<i>First author, year, location, type of publication</i>	<i>Description</i>	<i>Results</i>	<i>Potential confounding/limitations</i>
Chikritzhs and Stockwell (2006) Australia (peer reviewed)	Examined the effect of 1–2-hour closing time extension after midnight on numbers of positive BAC road traffic crashes, driver BAC levels and volumes of alcohol sales attributable to individual licensed premises in Perth. Used crashes associated with premises trading with standard hours as controls.	Significant increase when controlled for crashes associated with normally trading premises and the introduction of mobile breath testing stations to Perth freeways. Corresponding significant increases in high alcohol content beverage sales. No significant relation with driver BACs.	Could not determine whether higher numbers of crashes due to greater levels of alcohol consumption by individuals or greater numbers of patrons attending late trading premises (or both). Non-randomized premises.
Chikritzhs and Stockwell (2007) Australia (peer reviewed)	Examined the effect of 1–2-hour closing time extension after midnight on positive driver BAC levels among patrons of late trading premises by time of day, age and sex. Used driver BACs among patrons of normally trading premises as controls.	Male patrons of late trading premises aged 18–25 years and apprehended between midnight and 0200 hours had significantly higher BACs. Female patrons of late trading premises apprehended for drunk driving between 2200 hours and midnight (before closing time) had significantly lower BACs.	Non-randomized premises. Potential patron drinking at multiple locations.

venues may have much higher patronage, be open for many more hours and hence have a much higher likelihood of a violent incident being reported to the police. Concurrent and potentially confounding regulatory changes unrelated to trading hours limit confidence in the results of the other studies (Douglass *et al*, 1979; Ligon and Thyer, 1993; d'Abbs *et al*, 1994). Nonetheless, three of these studies were published in peer-reviewed journals and they can be regarded as suggestive but certainly not definitive evidence of an association between longer trading hours and increases in violent incidents.

### **Summary of studies with baseline but no control observations**

A total of 31 studies were classified under this heading spanning four decades, eight countries and in some cases (the United States, the United Kingdom and Australia), still more subnational jurisdictions (Raymond, 1969; Toomath and Nguyen, 1974; Bruce, 1980; Knight and Wilson, 1980; Hoadley *et al*, 1984; Goddard, 1986; Northridge *et al*, 1986; Smith, 1987; Rhodes *et al*, 1990; Goddard, 1991; d'Abbs *et al*, 1996; Walker and Biles, 1997; Gray *et al*, 1998; Graham *et al*, 1998; d'Abbs *et al*, 2000; Lange and Voas, 2000; Ragnarsdottir *et al*, 2002; Bellis *et al*, 2006; Babb, 2007; Duailibi *et al*, 2007; London Ambulance Service, 2007; Newton *et al*, 2007; Sivaramasingam *et al*, 2007; Vingilis *et al*, 2007; Goddard, 2008; Newton and Hirschfield, 2008; Newton *et al*, 2008a, b, c, d, e; and Hough *et al*, 2008a, b).

In almost every instance, interpretations of the findings from these studies are compromised by a failure to control for other concurrent regulatory, economic or policy changes (for example, changes to the drinking age laws in New Zealand, economic recessions in Scotland and changes to drink-driving laws in Canada). In several other instances, the studies can be criticized for failing to show a significant uptake in new available trading hours (for example, in Canada and in the United Kingdom) or for having inadequate periods/points of observation (for example, limited time series) to fully assess the impact of the change in trading hours. The UK studies (Hough *et al*, 2008a; Newton *et al*, 2008a, b, c, d, e) can be regarded more as an examination of the impact of the Licensing Act 2003 on overall levels of crime and violence rather than the study of the specific impacts of extended trading hours of bars and clubs. Of the 31 studies, observed impacts in the predicted direction (that is, increased hours lead to increased problems and vice versa) were reported for at least one outcome measure in nine studies, in the opposite direction in seven, in both directions for different measures in five and no significant results in ten studies. In short, the pattern of results was extremely mixed and no fixed conclusion, one way or the other, is warranted.

### **Summary of studies with both baseline and control observations**

A total of 14 studies met the criteria for being included in the group that had the strongest study designs. The majority of these studies examined the impact

of increases to trading hours using numbers of road traffic casualties as a primary measure ( $n=9$ ). Leaving concerns regarding other design and measurement issues to one side, 11 of the 14 studies reported effects in the expected direction on at least one outcome measure (rates of harm or hazardous consumption) and three found no effect or an inverse association. Design and methodological problems were apparent in many of the studies. Once more there were many instances in which the change to trading hours was associated with other interventions or concurrent economic changes that might have differentially impacted on intervention and control sites. Furthermore, there was again the concern in several instances that the case for conducting a study in the first place was weak as there was limited or no take-up of available extra hours (Smith, 1988a, 1990; McLaughlin and Harrison-Stewart, 1992; Vingilis *et al*, 2005). Another interpretational issue is whether only a shift in the time of occurrence of problem events was shown as opposed to a significant impact on overall levels of harm. This criticism can be levelled at the many early Australian studies reported between 1978 and 1990. In many instances increased rates of harm occurred coinciding with new trading hours (for example, late at night or in the early hours of the morning), but there was no significant impact reported on overall levels of harm. Other studies (Chikritzhs and Stockwell, 2002, 2006, 2007) of the impact of extended trading hours given to a select number of hotels in Perth, Western Australia, did not suffer from these particular problems though, arguably, can still be criticized for non-random selection of hotels with extended versus non-extended hours. However, it is unlikely that the finding of increased problems at premises with extended trading hours compared with controls can be explained away entirely by increased patronage as significant increases in blood alcohol levels of patrons caught by roadside breath testing were detected after they had been drinking at extended trading hours premises.

## Discussion

Our search for literature evaluating the impact of changes to trading hours of liquor licenses permitted to sell alcohol for consumption on the premises (bars, taverns, hotels, restaurants and so on) identified 49 relevant studies from eight countries across four decades of which 29 were peer reviewed and 20 were government reports or other grey literature. There was huge heterogeneity in study design, outcome measure and statistical treatment of the data with few studies of high quality. Just over half of the studies (25) reported significant adverse impacts associated with increased trading hours or the converse, positive impacts of decreasing the hours of trading. Among studies that included both baseline and control data of some kind, a higher proportion (79 per cent) reported significant effects in the predicted direction on at least one outcome measure. Further, among this latter group of studies those with fewest

methodological problems, which were able to demonstrate actual change in alcohol availability, were more likely to yield positive results. Although further well-controlled studies are needed, it is concluded that the balance of the present evidence (taking into account the relative reliability of the studies and their outcomes) suggests that under most circumstances, increasing trading into the early hours for on-premise liquor consumption licenses will result in increased alcohol use and related harms such as violence. There are likely to be regional variations in the extent to which alcohol consumption and related outcomes are affected, driven to some extent by the timing of trading hours extensions or reductions (for example, early in the evening versus after midnight), cultural practices, social norms, drinking patterns, prevalence of harms, administrative processes for data reporting and a range of other community-specific characteristics.

The studies were categorized into three broad groups according to very basic design features: whether or not they included baseline data and used control or comparison areas or liquor outlets. The most striking weakness of a large proportion of studies reviewed here was the absence of either external (that is, nearby regions or communities) or internal (that is, non-alcohol-related harms, alternative times of day) control observations with which to adjust, at least in part, for underlying trends (for example, systematically increasing numbers of hospital admissions, greater police enforcement) or macro-level changes (for example, economic recession). Yet, it is important to note that some studies, including control observations, were undermined by problematic comparisons with external regions, which were also undergoing substantial macroeconomic change (for example, Duffy and Plant, 1986; Pinot de Moira and Duffy, 1995). For many studies in the categories I and II, the omission of control observations was an indicator of further substantial limitations, including failure to account for the impact of concurrent policy change likely to have confounded outcomes (for example, increased police activity focused on alcohol-related problems); fundamental lack of actual change in the policy purported to have been evaluated (for example, limited uptake of unrestricted trading hours policy); singular reliance on potentially unreliable self-reported levels of alcohol consumption; inadequate sample size/numbers of observations; inappropriate cross-seasonal comparisons or overly brief periods of observation and absence of strong, reliable and consistent measures of alcohol consumption (for example, sales data) and alcohol-related harms. In part, many of these limitations can be attributed to the nature of the studies themselves. Most were retrospective evaluations of multifaceted regulatory changes made by governments with limited consideration given to future evaluation. Many studies have relied on administrative data collected for other purposes and without access to comprehensive and reliable alcohol-specific data.

Overall, in addition to baseline measures and control observations, the most reliable studies of the category III were characterized by (i) strong and

consistent alcohol-specific measures that reliably reflect local alcohol consumption (for example, objective alcohol sales data, assaults in and around licensed premises, BAC-positive road traffic crashes); (ii) careful consideration of potential confounders (for example, other concurrent policy changes/interventions, such as responsible beverage service, enhanced police activity, potential redistribution/mobility of drinkers between regions and drinking locations) with solid attempts to control for these in statistical analyses; (iii) use of time series designs with adequate length and appropriate application of statistical analyses which control for autocorrelated data and (iv) an ability to compare licensed premises with and without late trading hours. It can be concluded overall that studies with stronger designs were more likely to find positive relationships between changes in on-premise trading hours and rates of alcohol consumption and related harms.

There is still a need for further empirical studies of the impacts of significant changes to trading hours on rates of alcohol use and related harms using controls for concurrent economic and other regulatory changes utilizing validated measures of alcohol-related consumption and harm. In particular, further well-controlled studies relating trading hours to levels of violence are needed. Although 17 of the identified reports specifically examined interpersonal violence (many recently from the United Kingdom), only one included baseline and control measures (Chikritzhs and Stockwell, 2002). Among the four peer-reviewed studies (including the latter), all found positive associations between length of trading hours and interpersonal violence. In comparison, results among the uncontrolled and non-peer-reviewed studies were mixed. Of particular interest, a common feature among recent UK studies, which included measures of interpersonal violence, was that policy changes to remove set closing times were noted to have had minimal overall impact on actual trading hours kept by licensed premises and to have occurred during a period of increased police enforcement activity. Police enforcement activity in and around licensed premises has the potential both to increase reporting of crime events (Brinkman *et al*, 2000) as well as to deter them (Jeffs and Saunders, 1983). As far as it could be ascertained, none of these studies were able to control for potential confounding by changes to police activity. It is suggested that had the United Kingdom case studies been able to link violent incidents to particular licensed venues and also compare those that took advantage of the extra hours and those which did not, they may have well reported similar results to the Australian studies (for example, Chikritzhs and Stockwell, 2002), for example, there was a significant increase in violence in and around those trading premises later. Although the sky did not exactly fall in after the Licensing Act 2003 for England and Wales in terms of demonstrable overall increases in all crimes of violence or changes in total population consumption of alcohol (Hough and Hunter, 2008), employment of the Perth methodology (Chikritzhs and Stockwell, 2002) might yet have shown significant effects on the subgroup

of violent events that occur directly in and around licensed premises late at night. It should be noted, however, that the authors of the UK studies were commissioned by the Home Office to evaluate the overall impact of the Licensing Act 2003 on crime and disorder and not specifically the effects of extended trading hours on alcohol-related violence – a subtle but important difference.

Supplementary Information accompanies the paper on Crime Prevention and Community Safety website (<http://www.palgrave-journals.com/cpcs>)  
Supplementary Tables 1–3

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