

**Running Head:** City Centre Alcohol-Related Harm

**Interventions for disorder and severe intoxication in and around licensed premises, 1989–2009**

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## **Abstract**

*Aims.* To systematically review rigorous evaluation studies into the effectiveness of interventions in and around licensed premises that aimed to reduce severe intoxication and disorder.

*Methods.* A systematic search was conducted. Papers that rigorously evaluated interventions based in and around licensed premises to reduce disorder or intoxication were included.

*Results.* Fifteen studies were identified, three randomised controlled trials and twelve non-randomised quasi-experimental evaluations. Outcome measures were intoxication (n = 6), disorder (n = 6), and intoxication and disorder (n = 3). Interventions included responsible beverage service training (n = 5), server violence prevention training (n=1) enhanced enforcement of licensing regulations (n = 1), multi-level interventions (n = 5), licensee accords (n = 2) and a risk-focused consultation (n = 1). Intervention effects varied, even across studies using similar interventions.

*Conclusions.* Results suggest that server training courses that are designed to reduce disorder have some potential, although there is a lack of evidence to support their use to reduce intoxication. Generalization was limited by study weaknesses which included small sample sizes, inadequate reporting and non-randomised allocation. It is argued that research on alcohol-related harm in and around licensed premises should focus on intervention development, unifying outcome measures, and that evaluations should consider a range of outcome measures.

## **INTRODUCTION**

Urban centres characterised by a high density of on-premises licensed for the sale and consumption of alcohol typically produce a substantial share of all alcohol-related harm, and are particularly associated with severe intoxication and violent injury [1, 2]. Interventions in these night time economy (NTE) environments are therefore important in reducing alcohol-related harm. There exists a large and growing literature detailing environment-specific risk factors that have in turn motivated a range of interventions for the NTE [3]. The current review extends earlier reviews that have focussed mostly on server training [4], and recognises that the complexities associated with intervening in NTEs requires that evaluations should consider multiple outcomes. Furthermore, intervention development needs to account for the numerous factors that might aid delivery, requiring that practitioners attend to intervention development, piloting, evaluation, reporting and implementation [5]. This review seeks to provide a broad review covering both violence and alcohol misuse and offers researchers and practitioners a broad summary of the current research that is needed to plan and evaluate future interventions, while emphasising some of the common limitations of past research.

## **METHODOLOGY**

### *Search Strategy*

Figure one presents an overview of the review process and identifies the number of studies identified at each stage of the review process. Science Direct (Social Sciences, Psychology, Nursing and Health Professionals, Medicine and Dentistry, Arts and

Humanities), MEDLINE, CINAHL, IBSS, ASSIA, ERIC, Sociological Abstracts and Social Services Abstracts databases were accessed. The 'grey' literature was searched via citation searches, searches on relevant websites such as research councils, National Institute on Alcohol Abuse and Alcoholism, the National Drug Research Institute, the Institute of Alcohol Studies, several governmental department of health websites, and by contacting authors directly (see also Appendix 1).

---Insert Figure One about here---

### *Eligibility of Studies*

The search terms required that the intervention had been conducted in or around licensed premises (e.g. bars, pubs, and night clubs) and had assessed alcohol-related disorder, violence or intoxication, as a quantitatively defined outcome. Qualitative studies were excluded. Titles and abstracts from studies published between 1989 and 2009 were screened for relevance.

*Efficacy Criteria for Best Evidence.* To be included studies needed to address a clearly defined issue and present a clear description of the intervention. As the number of randomized controlled trial interventions in this field is low, efficacy criteria also allowed quasi-experimental designs so allowing the inclusion of a more broad range of interventions . The study design needed to be prospective with a minimum two week follow-up of intervention effects, that at least one control group was included in the design, and that pre- and post-intervention data were presented. By October 2009 searches had returned 1,327 references. Titles and abstracts were screened for relevance following which 49 papers were eligible for further appraisal. Fifteen

original empirical studies [6-20] met eligibility criteria, thirteen studies were identified from electronic databases [6-8, 10-13, 15-20], one study was identified from grey literature searches [9], and one study was identified from citation follow-ups [14].

## **RESULTS**

### **Description of trials**

The fifteen eligible studies varied with regards research design, unit of allocation, outcome measure, and follow-up duration (Table 1). Five studies adopted a randomized controlled trial methodology, the remaining nine used quasi-experimental controlled methods. Units of allocation included licensed premises (n = 8), local community (n = 3), police patrol or city area (n = 2), and the city (n = 2). Outcome measures included test purchasing using ‘pseudo-intoxicated’ confederates (n = 6), observation (n = 3), patron breath alcohol concentration (BrAC) (n = 3), server behavior (n = 1), police-recorded assault data (n = 4), hospital injury data (n = 1), the number of arrests for disorderly conduct (n = 1), and total number of other arrests (n = 1). Eight studies used more than one outcome measure [6, 8-13, 15]. Follow-up duration ranged from two weeks [8] to five years [20]. One intervention [18] was directed at a specific population (teenagers) and one study took place in student bars [21]. Studies were conducted in North America (n = 5), Australia (n = 5), Sweden (n = 3) and Canada (n = 2). Due to variable quality, the strength of evidence associated with each intervention was weighted according to the quality of the evaluation using the five-point Maryland Scale of Scientific Methods (Table 1) [22].

-=Insert Table 1 about here=-

### *Premises-level interventions*

Licensed premises were the smallest unit of allocation and were used in eight evaluations [8, 10, 12, 14-17, 21]. Five of the eight PL intervention studies deployed interventions at the point of sale using responsible beverage server (RBS) training packages [8, 12-15] that sought to develop servers' capacity to identify risks (such as rapid drinking) and equip them with skills to proactively address them. RBS content varied, although all contained some reference to the effects of alcohol and methods for preventing intoxication, three included some manager-specific element to the training [8, 12, 15]. Four evaluations used pseudo-intoxicated confederates, a method that typically involves an actor approaching premises staff and requesting an alcoholic drink while feigning intoxication, or requesting several drinks in a short period of time. Refusal of service is the desired outcome. One evaluation [13] observed premises characteristics ('cosy', 'high', 'rowdy') according to a visual scale and collected measures of breath alcohol concentration from patrons. One intervention [15] assessed risk factors for intoxication pre- and post-intervention (e.g. alcohol promotions) and policies (e.g. ID checks and refusal criteria).

Lang *et al.* [15] report a reduction in the percentage of patrons rated by researchers as extremely drunk leaving intervention premises, compared to control premises ( $P < 0.05$ ), but no change in the percentage of patrons who had observed violence, in patron BrAC, or in refusals of service to pseudo-intoxicated confederates. Johnsson and Berglund [21] found that an educational programme based on the Alcohol Skills Training Programme [23] had no significant effect on patron BrAC. However, they

did report a significant decrease in patron reported prevalence of "rowdiness" in intervention premises compared to control premises at a one-month follow-up

Of the quasi-experimental evaluations of RBS, Howard–Pitney *et al.* [12] found that a one–day training programme for servers and managers had no demonstrable impact on observed server behavior, including ID checks, responsible serving and environmental signs of responsible serving (e.g. encouraging consumption of low-alcohol or non-alcoholic drinks through advertising). Similarly, Lang *et al.* [15] did not find a significant difference in patron's BrAC in experimental and control premises, and no difference in service refusals to pseudo-intoxicated confederates, but did find a significant change in the number of patrons subjectively rated as extremely drunk by observers (observers were blind to the premises condition). Gliksman *et al.* [8] found a significant effect of a manager and server staff training programme on structured ratings of server behavior in response to simulated drunkenness situations in experimental premises ( $F(1,34)=8.73, P<0.01$ ), compared to control premises, at a two week follow-up. The 12-point structured ratings, which were agreed upon by observers and actors blind to premises' study conditions, ranged from unsolicited service and pressurising confederates to consume alcohol, through to refusing service.

### *Premises risk assessments*

Numerous studies have identified a range of PL risk factors that are associated with patron intoxication and violence. Two studies incorporated these risk factors into interventions in the form training packages for premises staff, the aim being to equip staff with the skills required to recognise and proactively address them [10, 17].

Toomey *et al.* [17] created bespoke intoxication reduction training packages for managers based on a risk-needs audit the goal being to develop premises policies that would facilitate a reduction in patron intoxication. The audit covered areas including premises location, clientele, operational procedures and management structure. Compared to control premises, the study found a risk assessment and training programme intervention was not associated with any change in alcohol sales to pseudo-intoxicated confederates.

Using RCT methodology, Graham *et al.* [10] evaluated the *Safer Bars* program, a program that shared some characteristics of a RBS intervention combined with a premises risk assessment, the emphasis being violence reduction [24, 25]. It combined a risk assessment workbook with a training programme for managers and staff. The workbook contained a checklist of 92 items that were associated with the risk of violence and the training program instructed staff on how to identify and proactively challenge risk. The intervention reduced ratings of “severe physical aggression” exhibited by patrons in intervention premises compared to control premises ( $t=5.12$ ,  $df=28$ ,  $P < 0.001$ ). Ratings were conducted by research staff who were blind to premises' experimental condition. The effect of the programme on aggression exhibited by staff could not be evaluated due to floor effects.

### *Community level interventions*

Eight studies evaluated interventions at the community [11, 18], police patrol area [6, 19, 20], city [7, 9] or county [16] level. Community level interventions included the enhanced enforcement of licensing laws [6, 16] and multi-type interventions [9, 11, 18-20] .

### *Enforcement*

Enforcement related interventions usually involve intervention premises receiving greater attention from police officers' together with an increase in the penalties premises are subject to should they violate license conditions.

Eight studies considered some element of enforcement [6, 7, 9, 11, 16, 18-20], one evaluated the effect of enforcement alone. This study in New South Wales, Australia [6], evaluated the effect of enforcement on levels of disorder in the intervention police patrol areas using a randomised controlled trial methodology. Uniformed police officers visited each target premises two to three times each week for two months. If breaches of the licensing conditions were observed officers would speak to bar staff and managers, document the circumstances, and in some cases issue a penalty notice. The effect of the intervention was evaluated using police-recorded assaults and hospital recorded injuries over a six month period. The study was not found to have any impact on the number of assault-related hospital admissions, number of property damage offences or arrests, or number of offensive conduct offences. However, intervention premises (n = 5) showed an increase in the total number of offences ( $\chi^2=10.6$ ,  $df=2$ ,  $p<0.05$ ), the total number of arrests ( $\chi^2=27.1$ ,  $df=2$ ,  $p<0.05$ ), the total number of recorded assaults ( $\chi^2=6.5$ ,  $df=2$ ,  $p<0.05$ ), the total number of arrests for assaults ( $\chi^2=7.5$ ,  $df=2$ ,  $p<0.05$ ) compared to the control group (n = 5) at a two month follow-up.

One intervention combined brief responsible server training with greater enforcement [16], facilitated by an additional twenty police personnel hours per week over a one

year period. Eligibility was restricted to premises deemed to be high-risk for irresponsible serving practices. Warnings, followed by first and second citations, were issued to premises found to be in violation of licensing conditions. Servers were also provided with information on how to recognise the overt signs of excessive intoxication and shown a ten minute RBS-type instructional video, although the number of servers who received this training was not reported. In addition, cards explaining alcohol service laws were provided to licensees on request. The intervention was implemented across one county in Michigan and compared to a control county. The effect of this intervention on the incidence of serving alcohol to intoxicated customers was assessed using test purchasing by pseudo-intoxicated confederates. The intervention was associated with a significant increase in the percentage of service refusals to pseudo-intoxicated confederates compared to control premises at a three month follow-up ( $\chi^2=4.3$ ,  $df=1$ ,  $p<0.05$ ), however this was not sustained and at a six month follow-up no significant intervention effect was apparent ( $\chi^2=1.9$ ,  $df=1$ ,  $p=0.17$ ).

### *Multi-level Interventions*

The shared 'ownership' of alcohol-related problems across partners including communities, local government, police and licensees, has encouraged the development of multi-agency programs. These typically implement a range of interventions including RBS, enforcement and revisions to local legislation. Community mobilization attempts to influence norms, legislation and licensed premises policies and can be used to exert pressure on local police to enforcement legislation and on premises to address risk factors.

One community level intervention, the *STAD project*, is cited twice in this review as the authors evaluated the effect of the project on intoxication [19] and disorder [20] in separate research articles. Three other interventions used a combination of community mobilization, RBS and enforcement [11, 19, 20]. One intervention [18] used community mobilization and enforcement, one intervention [9] employed RBS, enforcement and a licensee accord, and one intervention incorporated a licensee accord with enforcement [7].

#### *Licensee accords*

Two multi-level studies [7, 9] evaluated the effect licensee accords on police recorded assaults and intoxication. Felson *et al.* [7] evaluated the *Geelong Accord* in which voluntary accords between licensees, police and local government were established. The accord introduced charges on patrons' entry to premises after 11pm and denied free re-entry, banned the provision of free alcoholic drinks, limited promotions, banned extended happy hours, and imposed a minimum unit price per drink. The accord further enhanced police enforcement, prohibited public drinking, enhanced the enforcement of laws prohibiting the sale of alcohol to children, and encouraged the prosecution of illegal ID use. Finally, premises managers agreed to provide alcohol-free entertainment for underage youths, to call taxis for intoxicated customers and to ensure that premises staff conformed to licensing laws. Felson *et al.* [7] report that the ratio of serious assaults for the Geelong area, compared to the mean of six other cities in Victoria, decreased from 0.79 in 1991/92 to 0.63 in 1992/93. Although this effect was not statistically assessed by the study authors, estimates suggest that it was not significant ( $\chi^2=0.77$ , df 1, P=0.38).

In the study by Hawks *et al.* [9], licensees in Fremantle, a busy entertainment area near Perth, Western Australia, signed an accord that promoted responsible alcohol service, introduced an entry charge in nightclubs after a certain time and prohibited alcohol discounting. Simultaneously, police in the area committed greater resources to enforcing licensing legislation. The effect of this twelve month intervention on the service of alcohol to pseudo-intoxicated confederates and on police-recorded assaults was evaluated at the city level over a two year period. The study reported no statistically significant change in the proportion of pseudo-intoxicated confederates being served alcohol or recorded assaults observed between the premises in intervention area and matched premises in a similar control area at a twelve month follow-up.

Wagenaar *et al.* [18] reported the evaluation of an intervention using RCT methods that combined community mobilization and enforcement that sought to reduce arrests among young people in Minnesota and Wisconsin, US. In each of the seven intervention areas, community organizers worked with stakeholders such as local government, police, alcohol vendors, schools and the media to reduce the availability of alcohol to young people. No significant reduction in arrests were found at a two year follow-up.

Two quasi-experimental studies evaluated the effect of multi-level interventions and demonstrated significant reductions in disorder or intoxication. Holder *et al.* [11] evaluated the effect of a five-part intervention to reduce alcohol-related injury in three US communities compared to matched comparison sites. The multi-level intervention included community mobilization and “media advocacy”, beverage server policies

were developed, off-licensed staff were trained, drink-driving detection efforts were increased and restrictions on alcohol availability were increased. These stages were implemented over a 32 month period from July 1993 onwards. Injury data were only available for two pairs of control and intervention areas. Although Holder *et al.* [11] observed a 43% decline in assault-related injuries treated in an emergency department, this effect did not reach statistical significance (95% CI -71%, 11%). The intervention was associated with a significant 2% ( $P < 0.001$ , 95% CI -3%, -1%) reduction in hospital admissions for assault-related injury, compared to control communities at a one year follow-up.

Wallin *et al.* [20][19] evaluated the effect of the *STAD* project on police-recorded assaults and pseudo-intoxicated tests purchases. This multi-level intervention included community mobilization, a two-day RBS training programme and stricter licensing law enforcement. The intervention was implemented in northern central Stockholm, with southern central Stockholm acting as the control. Wallin *et al.* [20] observed an estimated 29% ( $P < 0.001$ ) reduction in police-recorded assaults in the experimental area compared to the control area over a 6 year period. No intervention effect was detected on the refusal of service to pseudo-intoxicated confederates at three or five year follow-up [19].

---Insert Table One About Here---

## **DISCUSSION**

There is only limited evidence that premises-level interventions reduce intoxication and disorder. Five studies used randomised controlled trial methods to evaluate interventions, of which three focused on preventing disorder [6, 10, 18], one focused on reducing intoxication [14], and one was concerned with both [13]. None can be compared easily due to differences in intervention technique. Of the RCTs for violence prevention interventions, server training appears to be the most successful, although content varies considerably. No other intervention reduced violence. One intervention evaluated using RCT methods demonstrated a significant *increase* in patron BrAC [14]. Ten evaluations did not use RCT methods of which three reported a significant reduction in disorder [7, 11, 20] and three reported significant reductions in intoxication [8, 15, 16]. Premises-level interventions were the most commonly used intervention type and were most likely to reduce disorder, but not intoxication. Two community-level interventions were evaluated using RCT methods [6, 18] and neither reported a significant reduction in disorder. Of the other five community-level evaluations [7, 9, 11, 19, 20], only three reported significant reductions in disorder [7, 11, 20], but varied considerable in respect of intervention content.

Considerable variation in outcome measures were observed. Of the nine studies evaluating changes in disorder, seven used police records, of which six used police recorded assaults [6, 7, 9, 11, 15, 20] and one used arrests for disorderly conduct [18]. One study used surveyor ratings of patron and staff aggression [10] and one used patron ratings [13]. The use of pseudo-intoxicated confederates to assess server behavior was used in nine studies [8-10, 12, 14-17, 19]. Follow-up periods ranged from two weeks [8] to six years [20]. RBS training was associated with shorter assessment periods, while multi-type interventions and enforcement were associated

with longer follow-ups. The limited quality of evaluations reflects the considerable difficulties involved with implementing and evaluating interventions in and around licensed premises. A large number of studies relied on inappropriate control groups, failed to achieve random allocation or did not blind participants or evaluators to study conditions. These limitations are likely due to post hoc involvement of evaluation teams.

### *Summary*

The evidence that interventions in the NTE can reduce intoxication and disorder is limited. A significant impediment to a more robust statement on effectiveness stems from the considerable variability across studies in respect of intervention type, outcome measures and methods. This suggests that it is of critical importance complex interactions across the physical environment, individuals and the local community are considered, and that therefore multiple outcomes are used when evaluating interventions in the NTE. However, research is required to unify disparate measures of harm so that studies can be compared. Furthermore, if the levels of harm attributable to the NTE are to be effectively addressed it is important that future studies attend to the preliminary stages of intervention development, including piloting, before implementation and evaluation [5]. In many of the studies reviewed here, evaluators only become involved in the latter stages, once interventions had been implemented.

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## References

1. World Health Organization (2004) Global status report on alcohol 2004 (Geneva, World Health Organization).
2. Brantingham, P. J. & Brantingham, P. L. (1981) Mobility, notoriety and crime: a study in the crime patterns of urban nodal points, *Journal of Environmental Systems* 11, 89-99.
3. Graham, K. & Homel, R. (2008) Raising the bar: preventing aggression in and around bars, pubs and clubs (Cullompton, Willan Publishing).
4. Ker, K. & Chinnock, P. (2007) The effectiveness of interventions in the alcohol server setting for preventing injuries (review), *The Cochrane Library*.
5. Medical Research Council (2008) Developing and evaluating complex interventions: new guidance (London, Medical Research Council).
6. Burns, L. & Coumarelos, C. (1993) Policing pubs: evaluation of a licensing enforcement strategy. (Sydney, New South Wales Bureau of Crime Statistics and Research).
7. Felson, M. R., Berends, R., Richardson, B. & Veno, A. (1997) Reducing pub hopping and related crime, in: Homel, R. (Ed.) *Policing for Prevention: Reducing Crime, Public Intoxication and Injury*, pp. 115-132 (Monsey, N. Y., Criminal Justice Press).
8. Gliksman, L., McKenzie, D., Single, E. et al. (1993) The role of alcohol providers in prevention: an evaluation of a server intervention programme, *Addiction*, 88, 1195-1203.
9. Hawks, D., Rydon, P., Stockwell, T. et al. (1999) The evaluation of the Fremantle police–licensee accord: impact on serving practices, harm and the wider community (Sydney, Curtin University/National Drug Research Institute).
10. Graham, K., Osgood, D. W., Zibrowski, E. et al. (2004) The effect of the *Safer Bars* programme on physical aggression in bars: results of a randomized controlled trial, *Drug and Alcohol Review*, 23, 31-41.
11. Holder, H., P.J., G., Ponicki, W. R. et al. (2000) Effect of community–based interventions on high–risk drinking and alcohol–related injuries, *JAMA*, 284, 2341-2347.
12. Howard–Pitney, B., Johnson, M. D., Altman, D. G., Hopkins, R. & Hammond, N. (1991) Responsible alcohol service: a study of server, manager and environmental impact, *American Journal of Public Health*, 81, 197-199.

13. Johnsson, K. O. & Berglund, M. (2003) Education of key personnel in student pubs leads to a decrease in alcohol consumption among the patrons: A randomized controlled trial, *Addiction*, 98, 627-633.
14. Krass, I. & Flaherty, B. (1994) The impact of a responsible service training on patron and server behavior: a trial in Waverley (Sydney), *Health Promotion Journal of Australia*, 4, 51-58.
15. Lang, E., Stockwell, T., Rydon, P. & Beel, A. (1998) Can training bar staff in responsible serving practices reduce alcohol-related harm?, *Drug and Alcohol Review*, 17, 39-50.
16. McKnight, A. J. & Streff, F. M. (1994) The effect of enforcement upon service of alcohol to intoxicated patrons of bars and restaurants, *Accident Analysis and Prevention*, 26, 79-88.
17. Toomey, T. L., Wagenaar, A. C., Gehan, J. P. et al. (2001) Project ARM: alcohol risk management to prevent sales to underage and intoxicated patrons, *Health Education and Behavior*, 28, 186-199.
18. Wagenaar, A. C., Murray, D. M. & Toomey, T. L. (2000) Communities Mobilizing for Change on Alcohol (CMCA): effects of a randomized trial on arrests and traffic crashes, *Addiction*, 95, 209-217.
19. Wallin, E., Gripenberg, J. & Andréasson, S. (2005) Overserving at licensed premises in Stockholm: effects of a community action program, *Journal of Studies on Alcohol*, 64, 270-277.
20. Wallin, E., Norstrom, T. & Andreasson, S. (2003) Alcohol prevention targeting licensed premises: a study of effects on violence, *Journal of studies on alcohol*, 64, 270-277.
21. Johnsson, K. O. & Berglund, M. (2003) Education of key personnel in student pubs lead to a decrease in alcohol consumption among the patrons: a randomized controlled trial, *Addiction*, 99, 627-633.
22. Sherman, L. W., Gottfredson, D. C., MacKenzie, D. L. et al. (1997) Preventing crime: what works, what doesn't, what's promising (Washington, D.C., US Office of Justice Programs).
23. Fromme, K., Marlatt, G. A., Baer, J. S. & Kivlahan, D. R. (1994) The Alcohol Skills Training Program: a group intervention for young adult drinkers, *Journal of Substance Abuse Treatment*, 11, 143-154.
24. Graham, K. (1994) Safer Bars: assessing and reducing risks of violence (Toronto, Centre for Addiction and Mental Health).
25. Braun, K., Graham, K., Bois, C. et al. (2000) *Safer Bars* trainer's guide (Toronto, Centre for Addiction and Mental Health).

26. Goudriaan, H., Lynch, P. J. & Nieuwbeerta, P. (2004) Reporting to the police in western nations: a theoretical analysis of the effects of social context, *Justice Quarterly*, 21, 933-969.

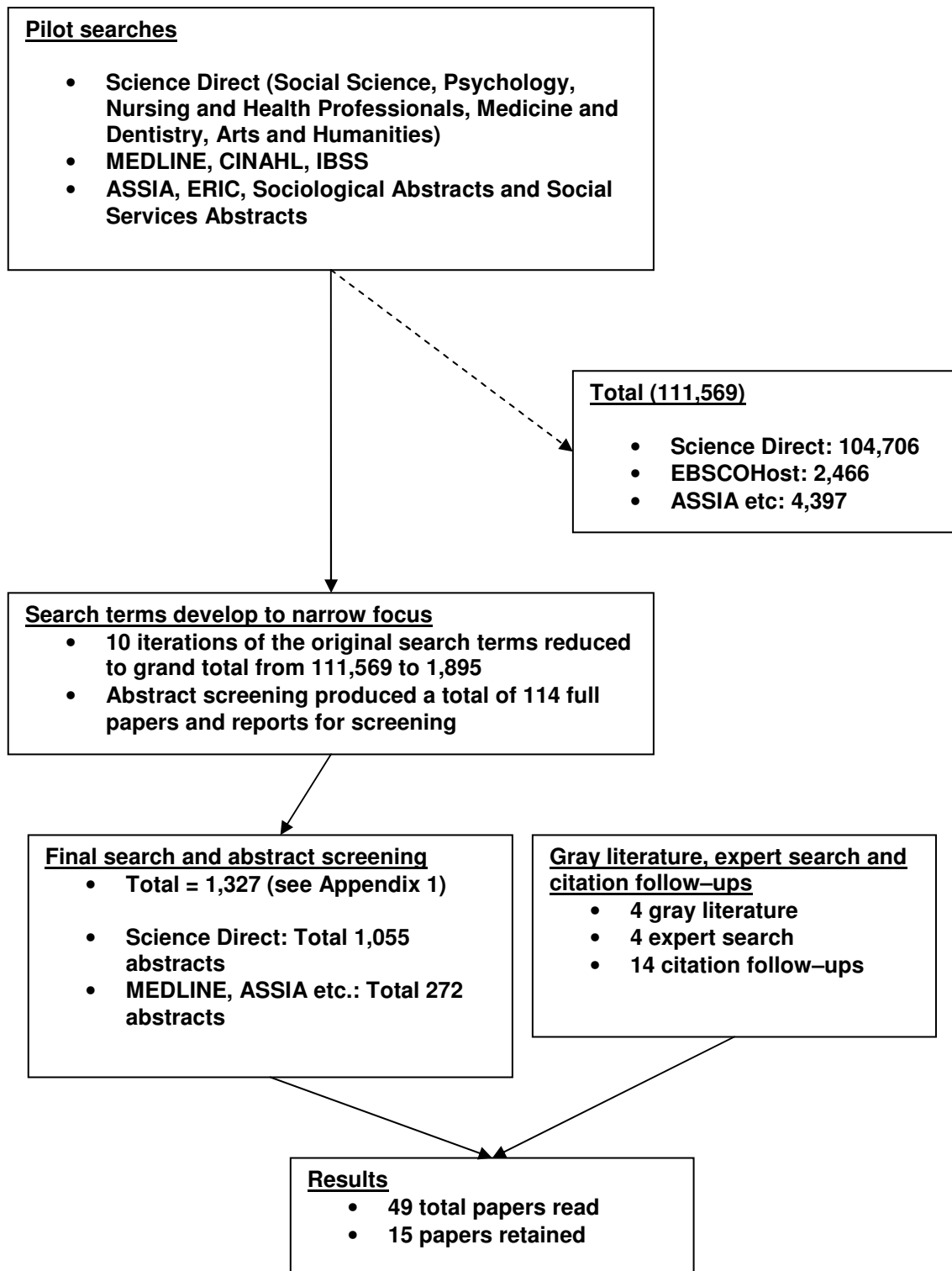
## TABLES AND FIGURES

### CAPTIONS

Figure 1 -- Schematic of the review process

Table 1 -- Studies retained for the final review, described by outcome, direction and significance of the effect ("+" for desirable) and methodological rigour described using the Maryland Scale of Scientific Method

FIGURE 1



<b>Table 1</b>						
<b>Outcome type</b>	<b>Author</b>	<b>Intervention type</b>	<b>Unit of intervention</b>	<b>Outcome description (follow-up)</b>	<b>Strength<sup>i</sup></b>	<b>Effect</b>
Disorder						
	Burns & Coumarelos (1995)	Enforcement	Police patrol area	Recorded offences (6 mths)	5	-*
				Arrests (6 mths)		-*
				Assault admissions (6 mths)		ns
				Offensive conduct (6 mths)		ns
	Felson et al (1997)	Accord	City	Incidence ratio of assaults (12 mths)	3	ns
	Graham et al (2004)	Responsible beverage service training	Premises	Observed severe physical aggression (12 mths)	5	+***
				Observed moderate physical aggression (12 mths)		+**
	Hawks et al (1999)	RBS; Enforcement; Accord	Area	Recorded assaults (12 mths)	3	ns
	Holder et al (2000)	RBS; Community mobilization; Enforcement	Community	ED attendance (55 mths)	3	+ <sup>‡</sup>
				Proportion of ED attendance as assaults (55 mths)		ns
	Johnsson & Berglund (2003)	RBS	Premises	Rowdy premises environment (1 mth)	5	+ <sup>‡</sup>
				Patron BAC		ns
	Wagenaar (2000)	Community mobilization; Enforcement	Community	Arrests for disorderly conduct (30 mth)	5	ns
	Wallinet al (2003)	RBS; Enforcement	Area	Police recorded violence (60 mth)	3	+***
Intoxication						
	Gliksman et al (1993)	RBS	Premises	Observed server behavior (2 wks)	4	+**
	Hawks et al (1999)	RBS; Enforcement; Accord	Area	Pseudo intoxicated test purchases (12 mth)	3	ns
	Howard-Pitney et al (1991)	RBS	Server; Premises	Pseudo intoxicated test purchases (1 mth)	4	ns
	Johnsson & Berglund (2003)	RBS	Premises	Customer BAC (1 mth)	5	ns
	Krass & Flaherty (1994)	RBS	Premises	Customer BAC (1 mth)	5	-*
	Lang et al (1998)	RBS	Area	Customer BAC (3 mth)	4	ns
				Observations of intoxication (3 mth)		+*

				Observed risk factors (3 mth)		ns
				Pseudo intoxicated test purchases (3 mth)		
	McKnight & Streff (1994)		County	Pseudo intoxicated test purchases (12 mth)	3	+*
				Pseudo intoxicated test purchases (12 mth)		+*
				Pseudo intoxicated test purchases (12 mth)		ns
	Toomey et al (2001)		Premises	Pseudo intoxicated test purchases (4-6 wks)	3	ns
	Wallin et al (2003)		Area	Pseudo intoxicated test purchases (36 mth; 60 mth)	3	ns

\*p<0.05, \*\*p<0.01, \*\*\*p<0.001

‡ P-value unavailable

<sup>i</sup>Maryland Scale of Scientific Methods [22]

**Level 1.** Correlation between a crime prevention program and a measure of crime or crime risk factors at a single point in time.

**Level 2.** Temporal sequence between the program and the crime or risk out- come clearly observed, or the presence of a comparison group without demonstrated comparability to the treatment group.

**Level 3.** A comparison between two or more comparable units of analysis, one with and one without the program.

**Level 4.** Comparison between multiple units with and without the program, controlling for other factors, or using comparison units that evidence only minor differences.

**Level 5.** Random assignment and analysis of comparable units to program and comparison groups.

## Appendix 1 Search terms used in search strategy

Search terms: October 2009

EBSCO Host (CINAHL, IBSS, MEDLINE)

(alcohol or intoxicat\* or liquor or spirits or drunk\* or drink\* or Breathaly\*)

AND

("licensed premise\*" or nightclub or disco or pub or bar or hotel or "night time economy" or "licens\* environment" or outlet)

AND

(violen\* or assault\* or injur\* or wound or harm or disorder or arrest\* or crime\* or convict\* or homicid\* or murder\* or attack\* or weapon\* or "public order" or nuisance or crowding)

NOT

(HIV or AIDS or diarrh\* or mouse or mice or rat or fruit or chemi\* or protein or acid\*)

Science Direct

pub-date > 1986 and pub-date > 1986 and (doc-info(#docsubtype#FLA#) or doc-info(#docsubtype#REV#)) and pub-date > 1986 and tak(alcohol or intoxicat\* or liquor or spirits or drunk\* or drink\* or Breathaly\*) AND ("licensed premise\*" or nightclub or disco or pub or bar or hotel or "night time economy" or "licens\* environment" or outlet) AND (violen\* or assault\* or injur\* or wound or harm or disorder or arrest\* or crime\* or convict\* or homicid\* or murder\* or attack\* or weapon\* or "public order" or nuisance or crowding) AND NOT (HIV or AIDS or

diarrh\* or mouse or mice or rat or fruit or chemi\* or protein or acid\*) AND  
EXCLUDE(smi, "5238,5831,7199", "Desalination, Water Research, Experimental and  
Clinical Psychopharmacology")