

Environmental factors in drinking venues and alcohol-related harm: the evidence base for European intervention

Karen Hughes¹, Zara Quigg¹, Lindsay Eckley¹, Mark Bellis¹, Lisa Jones¹, Amador Calafat², Matej Kosir³ & Ninette van Hasselt⁴

Centre for Public Health, Liverpool John Moores University, Liverpool, UK,¹ European Institute of Studies on Prevention (IREFREA), Palma de Mallorca, Spain,² Institute for Research and Development 'Utrip', Utrecht, Ljubljana³ and Trimbos Institute, Utrecht, the Netherlands⁴

ABSTRACT

Aims Reducing alcohol-related harm in young people is a major priority across Europe. Much alcohol use and associated harm in young people occurs in public drinking environments. This review aims to identify environmental factors in drinking establishments that are associated with increased alcohol consumption and associated harm and to understand the extent of study in this area across Europe. **Methods** A systematic literature search identified studies that had explored associations between physical, staffing and social factors in drinking environments and increased alcohol use or alcohol-related harm. **Results** Fifty-three papers were identified, covering 34 studies implemented in nine countries. Most studies had been implemented in non-European countries and many had collected data more than a decade prior to the review. The majority had used observational research techniques. Throughout the studies, a wide range of physical, staffing and social factors had been associated with higher levels of alcohol use and related harm in drinking environments. Factors that appeared particularly important in contributing to alcohol-related problems included a permissive environment, cheap alcohol availability, poor cleanliness, crowding, loud music, a focus on dancing and poor staff practice. However, findings were not always consistent across studies. **Conclusions** Drinking establishments, their management and the behaviours of the young people who use them vary widely across Europe. While international research shows that environmental factors in drinking settings can have an important influence on alcohol-related harm, there is currently a scarcity of knowledge on the relevance and impacts of such factors in modern European settings. Developing this knowledge will support the implementation of strategies to create drinking environments in Europe that are less conducive to risky drinking and alcohol-related harm.

Keywords Alcohol, alcohol-related harm, drinking environments, prevention, young people.

Correspondence to: Karen Hughes, Centre for Public Health, Liverpool John Moores University, 5th Floor, Kingsway House, Hatton Garden, Liverpool L3 2AJ, UK. E-mail: k.e.hughes@ljmu.ac.uk

Submitted 12 April 2010; final version accepted 14 June 2010

INTRODUCTION

Reducing alcohol use and related harm in young people is a major European public health priority [1]. Young Europeans typically consume greater quantities of alcohol per drinking session than older drinkers [2], and many report binge drinking and drunkenness [3,4]. These drinking patterns are reflected in the disproportionate burden of alcohol-related harm seen in young Europeans. More than 25% of deaths in 15–29-year-old males and more than 10% in females are associated with alcohol use,

occurring largely through violence, road traffic crashes and unintentional injuries [5]. Although drinking patterns vary widely across Europe, many countries have seen increasing levels of hazardous and harmful alcohol consumption in young people in recent years [5]. Even in southern European countries such as Italy, Portugal and France, where drinking cultures have been characterized traditionally by daily, moderate consumption with meals [2], prevalence of heavy episodic drinking in 15–16-year-olds has increased over the last decade (five or more drinks on one occasion, as measured by the European

School Survey Project on Alcohol and other Drugs (ESPAD) survey [6]). This has raised concerns that drinking patterns associated typically with northern European cultures, including heavy alcohol use for the purpose of intoxication, are spreading across Europe [7].

Much alcohol use by young Europeans takes place in public drinking environments, such as pubs, bars and nightclubs (drinking venues) [8]. Well-managed drinking venues can provide some level of social protection for drinkers (e.g. preventing drunk customers from accessing more alcohol), yet at the same time the convergence of large numbers of drinkers in public places creates conditions conducive to harm (e.g. confrontation and encounters with aggressive strangers). Thus, public drinking environments see high levels of alcohol-related harm, including drunkenness, aggression, sexual assault, public disorder, unintentional injury, drink driving and road traffic crashes [9–14]. However, studies exploring alcohol-related harm in drinking environments often find that large proportions of incidents are concentrated in and around just a small proportion of drinking venues [15,16], suggesting that certain characteristics of these venues are contributing to alcohol-related problems. Thus, over the last few decades researchers have used a range of techniques to explore associations between environmental factors in drinking venues and alcohol use and related harm [17,18]. Among the most influential has been the work of Graham *et al.* [19–26] in Canada and Homel *et al.* [27–37] in Australia. Their research has facilitated the development of interventions to modify environmental factors in drinking environments to make them less conducive to alcohol-related harm [17]. Thus, staff training and venue risk assessment in Canada, and community prevention measures incorporating codes of practice for drinking venues in Australia, have achieved reductions in aggression occurring in drinking environments [17].

Similar prevention measures have been developed and implemented successfully in Europe [e.g. the Stockholm Prevents Alcohol and Drug Problems (STAD) project in Sweden [38–41]]. Overall, however, there is limited knowledge regarding alcohol-related harm in European drinking venues, what environmental factors may contribute to this and what can be done to reduce it [42]. With increasing hazardous and harmful drinking among young people, strengthening the European evidence base to inform the development of healthier drinking environments is crucial. This paper reports the findings from a systematic literature review undertaken as the first stage of a multi-country study of drinking environments in Europe. The Alcohol Measures for Public Health Research Alliance (AMPHORA) study is exploring environmental influences on alcohol use and related harm in pubs, bars and nightclubs in four European countries: the Nether-

lands, Slovenia, Spain and the United Kingdom. The systematic literature review sought to identify existing studies in this area and their outcomes, and particularly to understand the extent of study in this area across Europe.

A SYSTEMATIC REVIEW OF THE LITERATURE

Methods

Ten health, social sciences and education databases and 10 key websites (see Fig. 1) related to alcohol research were searched for studies published since 1990. A comprehensive search strategy was developed using a combination of free text and controlled English language vocabulary terms, and adapted for each database. Full details of the search strategy used are available on request from the authors. The combined searches retrieved 5114 papers. A database of retrieved literature was compiled using the Endnote software package. Following title review and removal of duplicates, 535 papers were identified for abstract review. Of these, 98 were selected for full text review. Database and website searches were supplemented by checking the reference lists of retrieved papers, relevant reviews and book chapters, identifying a further 34 studies. Full text could not be accessed for five papers, leaving a total of 127 papers that were examined for inclusion (see Fig. 1).

The literature review intended to identify published studies that had explored associations between environmental factors in drinking venues and alcohol-related harms. Consequently, a broad inclusion criterion was adopted covering any study type that linked environmental factors to drinking behaviours (e.g. drunkenness) and harms including injury, assault, road traffic crashes, crime and service of alcohol to underage or drunk customers. Descriptive studies that solely hypothesized links between environmental factors and harm were excluded [43], but qualitative studies in which researchers had observed the circumstances surrounding alcohol-related harm were included, even if no statistical analysis had been undertaken. The review focused on environmental factors that could be identifiable through naturalistic observational research (the method to be used in the present study) and modified locally through environmental interventions. Consequently, factors such as staff length of service and level of training [44], patron characteristics (e.g. age, ethnicity, individual activities, drinking group composition) [45–47], and factors dependent on regulation such as hours of alcohol service [48,49] were not included.

RESULTS

A total of 53 papers were identified in the review, covering 34 studies conducted in nine countries: United States,

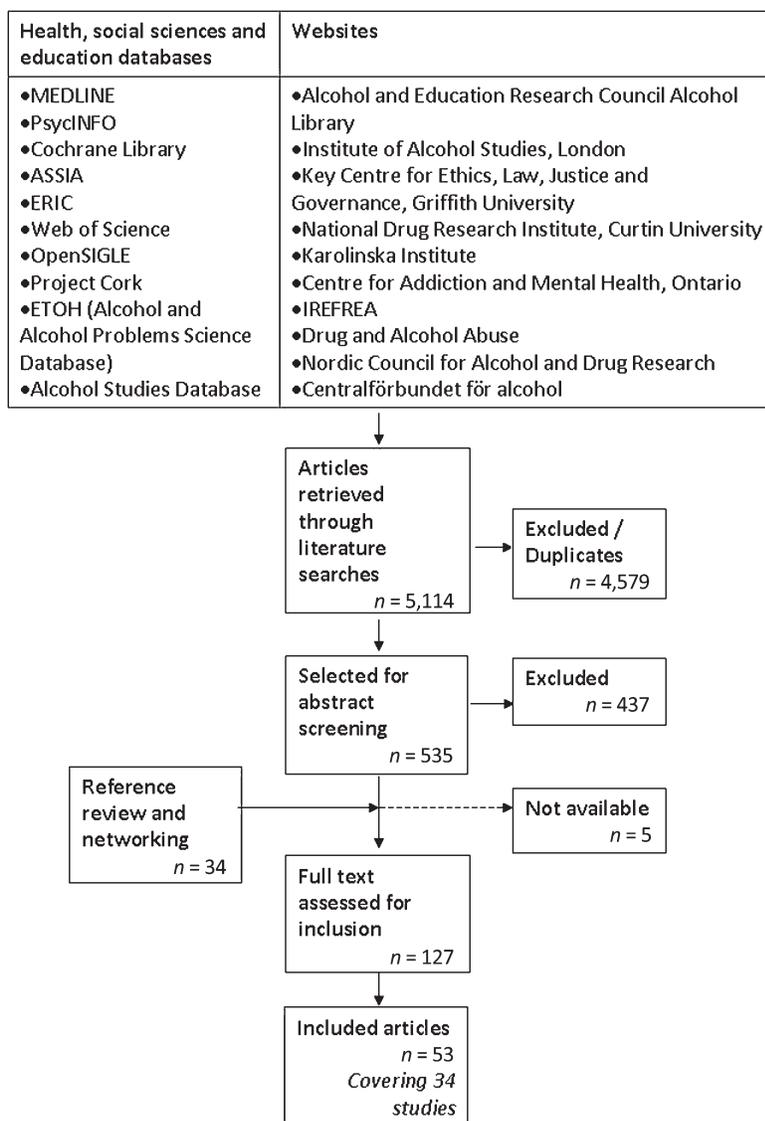


Figure 1 Search strategy: literature sources and process

$n = 12$ [44,50–62]; Australia, $n = 8$ [27–37,48,49,63–65]; United Kingdom, $n = 5$ [66–70]; Canada, $n = 3$ [19–26]; France, $n = 2$ [71,72]; Bulgaria = 1 [73]; the Netherlands, $n = 1$ [45–47]; Spain, $n = 1$ [74]; and Sweden, $n = 1$ [39–41]. Two-thirds ($n = 22$) of the studies had used observational research techniques, often in combination with other research methods including qualitative interviews, survey data, secondary data analyses (e.g. police-recorded crime data), patron breathalyser tests and alcohol purchase attempts using pseudo-drunk actors. Most were naturalistic observations, although some included experimental techniques (e.g. adjusting music volume). Several studies had used similar research methods, incorporating tools initially developed by Graham *et al.* in Canada (e.g. [19–25,32–37,58,69,70]). Other study types included retrospective surveys, cross-sectional and time-series analyses, experimental studies and randomized controlled trials.

The environmental factors identified in the studies as being associated with increased or reduced alcohol use and harm were grouped into three categories [17]: physical factors, social factors and staffing factors. Table 1 shows those environmental factors in drinking venues that have been associated with increased or reduced measures of alcohol use and access (higher consumption, intoxication, service to drunk or underage customers), and the countries in which these links have been identified. The review identified 13 studies in this area, five of which had been conducted in Europe. Six of the identified studies reported on data that had been collected over a decade prior to the review (1998 or earlier [20,45–47,50,51,63,64]), including three US studies and all studies from Australia, Canada and the Netherlands. Dates of data collection were not published for two French studies (published 2004 [71] and 2008 [72]). The Swedish study identified was conducted at

Table 1 Environmental factors associated with alcohol use and service practices.

Environmental factor	Country in which links identified						
	USA	Australia	Canada	Netherlands	France	Sweden	Bulgaria
Physical factors	Poor ventilation			↑●			
	Poor cleanliness			↑●		◆ ^a	
	Crowded venues	↓◆		↑●		↓◆	
	Crowded dance floors	↑■ ^b					
	Noisy, loud music			↑●	↑▲	↑■	↓◆ ^c
	Lighting	↑■ ^b					
	Venue style	↓◆ ^d ■ ^b		↑● ^e			
Social factors	Cheap drinks, drinks promotions	↑●■					↑+ ^b
	Permissive environment ^f			↑●		↓◆	
	Live bands, juke boxes, discos, dancing	↑■ ^b	↑■	↑●	↑▲		
Staff factors	Food availability			↓●			
	Younger staff	↑◆					
	Friendly staff			↓●			
	All female staff			↓●			
	Warning signs, staff policies ^g	↓◆					
Continuing to serve drunk customers		↑■					
References	[44,50–54]	[63,64]	[20]	[45–47]	[71,72]	39–41	[73]

Key to symbols: ●: intoxication; ■: alcohol use, binge drinking, high risk drinking, abusive drinking; ◆: over-serving (to pseudo-drunk customers); +: underage drinking; ▲: drinking speed; ↑: indicates an increase associated with the environmental factor; ↓: indicates a decrease associated with the environmental factor. ^a'Average' hygiene in restrooms was associated with reduced service refusal to pseudo-drunk customers, compared with 'good + bad' hygiene. ^bLinked through qualitative/ethnographic research without statistical analysis [48]—moderate lighting observed to be associated with increased risk of alcohol abuse, compared with bright or low lighting; tranquil artwork observed to be associated with controlled social drinking. ^cProbability of over-serving was higher at a communicable noise level, than at high level, low level or no music. ^dUpscale establishment. ^eShabby decor, no theme, low expenditure on furnishings, low maintenance. ^fCanada: 'anything goes' atmosphere, swearing and overt sexual contact. Sweden: poor overall order at the premises. ^gAgainst the service of alcohol to drunk customers. Only findings that have been associated with increases or reductions in alcohol measures are shown. Thus findings where associations were absent, mixed or unclear are not included in the table.

three different time-periods (1996, 1999, 2001[39–41]) and findings relating to environmental factors were not consistent between study periods. Table 2 shows environmental factors in bars and nightclubs that have been associated with alcohol-related harm (e.g. aggression, crime, injury and drink driving), and the countries in which these links have been identified. Twenty-three studies in this area were identified, seven of which had been conducted in Europe. Fifteen studies had concluded data collection over a decade prior to the review (1998 or earlier [19–23,26–37,55–57,63–67]). Dates of data collection were not provided for two studies published in 2000 (United Kingdom [68]) and 2007 (United States [58]).

Physical factors associated with higher levels of alcohol use and harms

A range of physical factors, including poor ventilation, poor cleanliness, crowding, noise, low lighting, high temperature, shabby decor and low maintenance, have been associated with increased aggression in bars and nightclubs in various countries, either individually or

combined when measuring the overall bar environment (Table 2). However, such combined measures can produce contradictory results and have been associated with lower levels of crime in UK nightclubs. In Canadian bars, many of these physical factors have also been associated with higher levels of patron intoxication (Table 1). In Europe, loud music volume has been linked to faster drinking speed and alcohol consumption in the Netherlands and France, but to lower levels of over-serving in Sweden (the sale of alcohol to individuals who are already drunk, measured through sales to pseudo-drunk actors; however, relationships between music level and over-serving were not seen in a follow-up study). Studies have also found over-serving to be more likely in less crowded venues, while in Sweden, 'average' ratings of cleanliness in washrooms have been related to a higher likelihood of over-serving than either 'good' or 'bad' ratings. In the United Kingdom, low-impact resistant glassware (which breaks more easily) has been associated with increased injuries to bar staff. Here, the low-impact-resistant glassware was marketed as 'toughened' glassware and was being tested for its utility in reducing injuries in bars.

Table 2 Environmental factors associated with alcohol-related problems.

Environmental factors		Countries in which a link has been identified					
		USA	Australia	Canada	UK	Spain	Bulgaria
Physical factors	Poor ventilation/smokiness	↑●	↑●	↑●			
	Poor cleanliness	↑●	↑●	↑●	↑●■		
	Crowded venues/dance floors/bars	↑●	↑●	↑●			
	Noisy, loud music	↑●	↑● ^a	↑●			↑●
	Low lighting		↑●				
	High temperature	↑●					
	Combined variable including the above	↑●			↑●↑↓■		
	Seating		↑● ^b	↑● ^c			
	Low impact-resistance glassware				↑+		
	Unattractive bars (e.g. shabby)	↑●		↑●			
	Line up			↑●			
Social factors	Cheap drinks and drinks promotions	↑●	↑●				↑●
	Permissive environment ^d	↑● ^a	↑●	↑●	↑●■		↑●
	Games (e.g. pool, billiards)	↑●	↓● ^e	↑●	↑●■		↑●
	Dancing, juke boxes, discos, bands, etc.	↑●	↑●▲	↑●			
	Illegal activity (e.g. drugs, prostitution)	↑●	↑●	↑●	↓● ^f		
	Beer, spirits, high volume alcohol sales		↑●◆				
	Non-alcoholic drinks on sale	↓■					
	Drunk customers		↑●	↑●	↑●■		↑●
	Availability of food	↓■	↓●	↓●			
	Staff characteristics	↑●(Most ♂)	↓● ^g	↓●(All ♀)			
Staff factors	Poor staff control/practice	↑● ^h	↑●▲ ⁱ	↑● ^{j,k}	↑■ ^l		
	Staff intervention	↑● ^m ↓■ ^m	↑● ⁿ ↓● ^m		● ^o		
	Ineffective security staff	↑●	↑●	↑●			↑● ^a
	Presence of security staff	↑↓●	↑●	↑●	↑● ^p		
	Low staff : patron ratio		↑●				
	References	[54–62]	[27–37,48,49,63–65]	[19–26]	[66–70]	[74]	[73]

Key to symbols: ●: aggression, violence, assaults; ■: crime, police complaints/call-outs; ◆: drink driving; +: staff injury; ▲: alcohol-related harm (injury, drink driving, crime, violent argument or fight, accident, time off work); ↑: indicates an increase associated with the environmental factor; ↓: indicates a decrease associated with the environmental factor. ^aLinked through qualitative/ethnographic research without statistical analysis. ^bLack of seating, low comfort. ^cSeating in rows. ^dFor example, low decorum expectancies, rowdiness, swearing, sexual contact, underage patrons. ^eBoredom associated with aggression; entertainment (e.g. game machines, quizzes, stage shows) reduced boredom. ^fHigher drug use. ^gFriendlier security staff. ^hStaff drinking. ⁱContinuing to serve drunk people. ^jAbility to identify and handle problems. ^kCustomers having 2+ drinks/hanging around at closing time. ^lPresence of underage customers. ^mID checks. ⁿStaff intervention with drunk customers. ^oPhysical staff intervention (cf. non-physical) with disorderly customers increased perceptions of violence in a venue. ^pBased on perceptions of violence in venues with or without security staff. Only findings that have been associated with increases or reductions in alcohol-related harm are shown. Thus findings where associations were absent, mixed or unclear are not included in the table.

Social factors associated with higher levels of alcohol use and harms

A permissive environment (e.g. ‘anything goes’ atmosphere, rowdiness, permitting underage patrons; see Tables 1 and 2), drinks promotions and a focus on music and dancing in bars have been associated with higher levels of alcohol use, intoxication and aggression across a range of studies and countries (Tables 1 and 2). In Australia, visiting venues where entertainment focused on music and dancing was linked to increases in a combined ‘alcohol-related harm’ category covering injury, drink driving, crime, argument or fight, accident or time off

work. The type of music being played (e.g. pop, hip-hop, house music) has also been highlighted as a contributor to drinking behaviours and alcohol-related harm in several studies [31,50,70], although this was not explored in detail in this review. In qualitative research in Bulgaria, discounted drinks promotions were linked to underage drinking. Despite the relatively consistent link between permissive environments and aggression across studies and countries, in Sweden venues in which overall order was under control showed higher levels of over-serving.

The presence of games (e.g. pool tables) in drinking venues has been linked to increased aggression in a

range of countries. However, in Australia higher levels of aggression have been related to boredom in bars, with entertainment including game machines, stage shows and quizzes found to relieve boredom. Illegal activities such as drug use, drug dealing and prostitution in drinking venues have been associated with aggression in the United States, Australia and Canada. In UK nightclubs, however, higher aggression has been found in venues with *less* illicit drug use. Sales of beer, spirits and high alcohol content drinks have been associated with increased aggression and drink driving, and sales of non-alcoholic drinks with reduced police complaints. The availability of food has also been linked to lower levels of police complaints, as well as to lower intoxication and aggression. The presence of high proportions of drunk customers in bars and nightclubs has been associated with increased aggression across a range of countries.

Staffing factors associated with higher levels of alcohol use and harms

No European studies were identified that linked staffing factors to levels and patterns of alcohol use (Table 1). Elsewhere, venues with friendly or all-female staff have been associated with lower levels of patron intoxication, while younger members of staff have been found to be more likely to serve pseudo-drunk customers. A low staff to patron ratio has been associated with increased aggression in Australia. In Canada [24], the staff to patron ratio was not found to be related to incidence of aggression, but a high staff to patron ratio was associated with increased severity of staff aggression (factors that were associated with *severity* of aggression are not included in Table 2).

Poor staff control and practice (e.g. ability to handle problems, continuing to serve drunk customers, drinking while working) has been associated with increased alcohol consumption, aggression, crime and other harms in several non-European studies. Although staff practice has been explored in observational studies in the United Kingdom, no clear relationships between staffing, aggression and crime have been identified [69,70]. However, in one UK study that involved participants viewing scenarios of staff intervention practices in bars, levels of violence in bars were perceived to be higher when staff used physical rather than non-physical intervention with disorderly customers. Staff intervention with drunk customers has been associated with increased aggression in observational research in Australia. However, identity (ID) checking has been associated with reduced aggression. In US studies, ID checking has been linked to both increased aggression and reduced crime. Several studies have found the presence of security staff (e.g. door supervisors, 'bouncers') to increase aggression, although in

the United States findings have been mixed. However, ineffective security staff (e.g. aggressive, permissive) have been linked consistently to aggression in several countries, and observed to be involved in many incidents of violence in Bulgaria. Over-serving has been found to be less likely in venues that have warning signs against the service of alcohol to drunk customers. Over-serving has itself been associated with higher levels of patron alcohol consumption.

DISCUSSION

This systematic literature review aimed to identify published studies that had explored associations between environmental factors in drinking venues and measures of alcohol use and related harm. A broad inclusion criterion was adopted, which identified 34 studies reported in 53 papers. The studies had used a variety of quantitative and qualitative methods which examined different measures of bar environments and behaviours associated with them. Further, results and conclusions had been drawn from qualitative, bivariate and multivariate analyses, allowing different levels of correction for confounding effects. However, the purpose of the review was not to assess in depth the strength of associations between environmental factors and alcohol-related outcomes, but rather to gain a better understanding of existing literature and study methods to inform new European research (AMPHORA). The review found that the majority of existing literature on drinking environments stemmed from non-European countries. More than two-thirds of studies ($n = 23$; 37 papers) had been conducted in the United States, Australia or Canada. Just 12 had been conducted in European countries, and five of these had been implemented in the United Kingdom. However, the majority of both European and non-European studies identified in the review had incorporated some form of observational research and several had used similar research tools, developed originally in Canada. Thus the review identified a need for additional European research in drinking environments, and provided valuable methodological support for such research.

The studies identified through the review had associated numerous physical, social and staffing factors in drinking environments with higher or lower alcohol consumption, alcohol access and alcohol-related problems (Tables 1 and 2). Factors that appeared particularly important in contributing to alcohol-related problems included a permissive environment, discounted drinks promotions, poor cleanliness, crowding, loud music and poor staff practice. However, study findings were not always consistent. For example, while several studies had found associations between crowding and aggression [27,29,30,32,58,62], one Australian study that had

evaluated an intervention to reduce harm in drinking environments reported that reduced aggression had occurred alongside increased crowding [35,36]. Further, while crowding was linked to increased intoxication in a Canadian study [20], it has also been associated with reduced over-serving to pseudo-drunk customers (United States [44], Sweden [40]). Crowding is thought to contribute to increased aggression by increasing agitators such as discomfort, frustration, bumping and shoving [17]. In Australia, the effects of crowding on aggression were thought to have been offset by improvements in other factors, such as reduced permissiveness, reduced drinks promotions and improved staff practices [35]. In Sweden, researchers suggested that higher over-serving in less crowded venues may have been due to financial reasons, with venues that have fewer patrons being less likely to turn customers away [40].

Of the European studies identified, six had used some form of observational research and two had used the Canadian research tools. These studies, conducted by Forsyth *et al.* in Glasgow, used naturalistic observation first in pubs [69] and then in nightclubs [70]. The pub study findings were largely consistent with international research (Table 2); venues that had more environmental risk factors (as identified in international studies) were found to have higher levels of aggression/police-reported crime. However, findings from the nightclub study showed some differences. For instance, while illicit drug use was associated with increased aggression in international studies, in the UK study higher aggression was associated with *lower* illicit drug use. Some of these effects may be related to the types of drugs being used in different environments. For example, in the United Kingdom ecstasy use is associated closely with nightclubs focused around dance music [75]; the drug is valued by users for its empathetic and socializing functions, and has been associated with lower levels of alcohol use and aggression [70,74]. Conversely, cocaine, with shorter-term stimulant effects, is used in a wider range of licensed premises [75], often in combination with alcohol, and has been associated with increased aggression [74]. Contrary to other research, the Scottish nightclub study also found higher police-reported crime in venues that did *not* have an 'unhealthy ambience' (a combined variable covering physical factors such as poor ventilation, noise and crowding). Here, authors noted that the type of music played in a venue could override consideration for decor, with the overall risk of disorder in nightclubs largely being related to clientele and music style [70].

Despite the smaller literature base in Europe, most European studies had been conducted within the last decade, while the majority of non-European studies had taken place more than a decade prior to the review. This suggests a growing awareness and interest in preventing

alcohol-related harm in pubs, bars and nightclubs in Europe, but also a general need for further research in modern drinking venues. Drinking behaviours, nightlife environments and their management change over time, and can vary widely between countries. Further, some European countries (e.g. United Kingdom) have strict regulations governing the operation of bars and nightclubs, whereas elsewhere legislation and its enforcement can be more relaxed (e.g. Slovenia has no formal alcohol licensing system). Such factors can affect both the findings of studies in these countries and their relevance in different nightlife settings. For example, several non-European studies and one early UK study have associated the presence of door supervisors in bars and nightclubs with increased aggression, and stressed the need for such security staff to be trained. Currently in the United Kingdom, however, the employment of door supervisors in late night drinking establishments is typically mandatory, and a national registration scheme requires all individuals working as door supervisors to have undertaken a recognized training course. Consequently, the presence of door supervisors may no longer be considered as a risk factor in late-night drinking environments in the United Kingdom, yet their behaviour and attitudes are likely to remain influential. Also in the United Kingdom, licensing regulation permits local authorities to apply conditions to individual drinking environments based on their experience of crime and disorder. This can include, for example, a requirement to check age identification, use safer (e.g. non-glass) drinking vessels, install closed-circuit television cameras (CCTV) and monitor crowding. Thus, while in some drinking environments these practices may be signs of social responsibility, in others they may be reactive measures introduced to address existing alcohol-related problems.

Findings from this review demonstrate the complexities that can be involved in studying and understanding drinking environments and their impacts on alcohol-related harm across different social, economic, cultural and legislative environments. Developing understanding of the impact of environmental factors in modern bars and nightclubs requires a multi-centre study that incorporates intelligence on both micro-level (i.e. environmental factors in bars and nightclubs) and macro-level (e.g. national legislation) aspects of drinking environments. Europe provides a diverse environment for implementing such a study, with nightlife behaviours, management of drinking environments and environmental factors in bars and nightclubs varying widely [76]. Using the experience gained through research identified in this review, AMPHORA will undertake such a study in the Netherlands, Slovenia, Spain and the United Kingdom. The study will build upon existing knowledge and experience, and utilize internationally developed and tested research

methods and tools, amended as appropriate to meet the needs of modern drinking environments. The study methodology will consist of nationalistic observation using an environmental assessment tool that rates environmental factors in drinking venues and provides a method of systematically recording incidents of alcohol-related harm. Details of these methods, their implementation in various settings and their limitations have been published widely [19–25, 32–37, 58, 69, 70]. The AMPHORA study will be the first attempt to conduct such a study in multiple countries, and consequently implementation of the study will involve some additional challenges. For example, the bar selection process must ensure that a valid sample is achieved across research sites, targeting a similar age group and representing both low- and high-risk bars to ensure variance among environmental factors and alcohol-related harms. Particular attention will need to be provided to researcher training in order to address cultural differences in identifying drunkenness and measuring environmental factors, and to encourage consistent recording of data. To increase understanding of levels and patterns of alcohol use and harm in the participating nightlife environments, additional research methods will be used. These will include a short survey and breathalyser test implemented among nightlife users in streets surrounding the research bars [77] and interviews with key stakeholders in the four research sites.

The study findings will seek to inform alcohol policy regarding the development and management of drinking environments in Europe. A well-developed and -managed nightlife can play an important role in the relaxation of individuals, the socialization of communities and the economic regeneration of towns and city centres. However, when poorly managed, pubs, bars and nightclubs can become a focus for drunkenness, public disorder, violence, injury and crime. This study will contribute to the growing body of evidence that relates the structure and management of bars to the health and safety of their staff and patrons and provide intelligence specific to European settings. Such evidence should be utilized to ensure that future nightlife development is not dictated solely by economic drivers, but includes health, crime and social inclusion as critical criteria.

Declarations of interest

None declared.

Acknowledgements

The research leading to these results has received funding from the European Community's Seventh Framework Programme (FP7/2007-13) under grant agreement no. 223 059—Alcohol Measures for Public Health Research

Alliance (AMPHORA). Partners in AMPHORA are: (1) coordination: Hospital Clínic de Barcelona (HCB), Spain; (2) Agenzia Regionale di Sanità della Toscana (ARS), Italy; (3) Alcohol & Health Research Unit, University of the West of England, UK; (4) Anderson, Consultant in Public Health, Spain; (5) Anton Proksch Institut (API), Austria; (6) Azienda Sanitaria Locale della Città di Milano (ASL Milano), Italy; (7) Budapesti Corvinus Egyetem (BCE), Hungary; (8) Central Institute of Mental Health (CIMH), Germany; (9) Centre for Applied Psychology, Social and Environmental Research (ZEUS), Germany; (10) Chemisches und Veterinäruntersuchungsamt Karlsruhe Technische Universität (CVUAKA), Germany; (11) Dutch Institute for Alcohol Policy (STAP), the Netherlands; (12) Eclectica snc di Amici Silvia Ines, Beccaria Franca & C. (Eclectica), Italy; (13) European Centre for Social Welfare Policy and Research (ECV), Austria; (14) Generalitat de Catalunya (Gencat), Spain; (15) Institute of Psychiatry and Neurology (IPIN), Poland; (16) Institute of Psychiatry, King's College London (KCL), UK; (17) Istituto Superiore di Sanità (ISS), Rome, Italy; (18) Inštitut za raziskave in razvoj (UTRIP), Slovenia; (19) IREFREA, Spain; (20) Liverpool John Moores University (LJMU), UK; (21) National Institute for Health and Welfare (THL), Finland; (22) Nordiskt välfärdscenter (NVC), Finland; (23) Norwegian Institute for Alcohol and Drug Research (SIRUS), Norway; (24) State Agency for Prevention of Alcohol-Related Problems (PARPA), Poland; (25) Stockholms Universitet (SU), Sweden; (26) Swiss Institute for the Prevention of Alcohol and Drug Problems (SIPA), Switzerland; (27) Technische Universität Dresden (TUD), Germany; (28) Trimbos-instituut (Trimbos), the Netherlands; (29) University of Bergen (UiB), Norway; (30) Universiteit Twente (UT), the Netherlands; (31) University Maastricht (UM), the Netherlands; (32) University of York (UoY), UK.

References

1. Commission of the European Communities. *An EU Strategy to Support Member States in Reducing Alcohol Related Harm*. 2006. Available at: http://ec.europa.eu/health/ph_determinants/life_style/alcohol/documents/alcohol_com_625_eh.pdf Archived by WebCite® at http://www.webcitation.org/5v154bEKb_16 (accessed 12 July 2009).
2. Mäkelä P., Gmel G., Grittner U., Kuendig H., Kuntsche S., Bloomfield K. *et al.* Drinking patterns and their gender differences in Europe. *Alcohol Alcohol* 2006; **41**: 18–18.
3. Andersson B., Hibell B., Beck F., Choquet M., Kokkevi A., Fotiou A. *et al.* *Alcohol and Drug Use Among European 17–18 Year Old Students: Data from the ESPAD Project*. Stockholm: The Swedish Council for Information on Alcohol and Other Drugs; 2007.
4. Bellis M. A., Hughes K., Calafat A., Juan M., Ramon A., Rodriguez J. A. *et al.* Sexual uses of alcohol and drugs and the associated health risks: a cross sectional study of young

- people in nine European cities. *BMC Public Health* 2008; **8**: 155.
5. Anderson P., Baumberg B. *Alcohol in Europe: A Public Health Perspective*. London: Institute of Alcohol Studies; 2006.
 6. Hibell B., Guttormsson U., Ahlström S., Balakireva O., Bjarnason T., Kokkevi A. *et al. The 2007 ESPAD Report: Substance Use Among Students in 35 European Countries*. Stockholm: The Swedish Council for Information on Alcohol and Other Drugs; 2009.
 7. Järvinen M., Room R., editors. *Youth Drinking Cultures: European Experiences*. Aldershot: Ashgate Publishing Limited; 2007.
 8. Leifman H. A comparative analysis of drinking patterns in 6 EU countries in the year 2000. *Contemp Drug Probl* 2002; **29**: 501–48.
 9. Calafat A., Blay N., Juan M., Adrover D., Bellis M. A., Hughes K. *et al.* Traffic risk behaviors at nightlife: drinking, taking drugs, driving, and use of public transport by young people. *Traffic Inj Prev* 2009; **10**: 162–69.
 10. Schnitzer S., Bellis M. A., Anderson Z., Hughes K., Calafat A., Juan M. *et al.* Nightlife violence—a gender specific view on risk factors for violence in nightlife settings; a cross sectional study in nine European countries. *J Interpers Violence* 2010; **25**: 1094–112. doi:10.1177/0886260509340549.
 11. Kershaw C., Nicholas S., Walker A. *Crime in England and Wales 2007/08: Findings from the British Crime Survey*. London: Home Office; 2008.
 12. Hughes K., Anderson Z. A., Morleo M., Bellis M. A. Alcohol, nightlife and violence: the relative contributions of drinking before and during nights out to negative health and criminal justice outcomes. *Addiction* 2008; **103**: 60–5.
 13. Steen K., Hunskaar S. Violence in an urban community from the perspective of an accident and emergency department: a two-year prospective study. *Med Sci Monit* 2004; **10**: CR75–9.
 14. Ricci G., Majori S., Mantovani W., Zappaterra A., Rocca G., Buonocore F. Prevalence of alcohol and drugs in urine of patients involved in road accidents. *J Prev Med Hyg* 2008; **49**: 89–95.
 15. Briscoe S., Donnelly N. Problematic licensed premises for assault in inner Sydney, Newcastle and Wollongong. *Aust NZ J Criminol* 2003; **36**: 18–33.
 16. Newton A., Hirschfield A. Measuring violence in and around licensed premises: the need for a better evidence base. *Crime Prev Comm Saf* 2009; **11**: 153–70.
 17. Graham K., Homel R. *Raising the Bar: Preventing Aggression in and Around Bars, Pubs and Clubs*. Cullompton: Willan Publishing; 2008.
 18. Green J., Plant M. A. Bad bars: a review of risk factors. *J Subst Abuse* 2007; **12**: 157–89.
 19. Graham K., La Rocque L., Yetman R., Ross T. J., Guistra E. Aggression and barroom environments. *J Stud Alcohol* 1980; **41**: 277–92.
 20. Graham K. Determinants of heavy drinking and drinking problems: the contribution of the bar environment. In: Single E., Storm T., editors. *Public Drinking and Public Policy*. Toronto: Addiction Research Foundation; 1985, p. 71–84.
 21. Wells S., Graham K., West P. The good, the bad, and the ugly: responses by security staff to aggressive incidents in public drinking settings. *J Drug Issues* 1998; **28**: 817–36.
 22. Graham K., West P., Wells S. Evaluating theories of alcohol-related aggression using observations of young adults in bars. *Addiction* 2000; **95**: 847–63.
 23. Graham K., Wells S. Aggression among young adults in the social context of the bar. *Addict Res Theory* 2001; **9**: 193–219.
 24. Graham K., Bernards S., Osgood D. W., Wells S. Bad nights or bad bars? Multi-level analysis of environmental predictors of aggression in late-night large-capacity bars and clubs. *Addiction* 2006; **101**: 1569–80.
 25. Graham K., Osgood D. W., Wells S., Stockwell T. To what extent is intoxication associated with aggression in bars? A multilevel analysis. *J Stud Alcohol* 2006; **67**: 382–90.
 26. Graham K., Wells S. 'Somebody's gonna get their head kicked in tonight!': aggression among young males in bars—a question of values? *Br J Criminol* 2003; **43**: 546–66.
 27. Homel R., Tomsen S. Pubs and violence: violence, public drinking and public policy. *Curr Aff Bull* 1991; **68**: 20–7.
 28. Tomsen S., Homel R., Thommeny J. The causes of public violence: situational 'versus' other factors in drinking related assaults. In: Chappell D., Grabosky P., Strang H., editors. *Australian Violence: Contemporary Perspectives*. Sydney: Australian Institute of Criminology; 1991, p. 176–93.
 29. Homel R., Tomsen S., Thommeny J. Public drinking and violence: not just an alcohol problem. *J Drug Issues* 1992; **22**: 679–97.
 30. Macintyre S., Homel R. Danger on the dancefloor: a study of interior design, crowding and aggression in nightclubs. In: Homel R., editor. *Policing for Prevention: Reducing Crime, Public Intoxication and Injury*, vol. 7. Monsey: Criminal Justice Press; 1997, p. 91–113.
 31. Homel R., Hauritz M., Wortley R., McIlwain G., Carvolth R. Preventing alcohol-related crime through community action: the surfers paradise safety action project. In: Homel R., editor. *Policing for Prevention: Reducing Crime, Public Intoxication and Injury*. Monsey: Criminal Justice Press; 1997, p. 35–90.
 32. Homel R., Clark J. *The Prediction and Prevention of Violence in Pubs and Clubs*. *Crime Prevention Studies*, vol. 3. New York: Criminal Justice Press; 1994.
 33. Homel R., Hauritz M., McIlwain G., Wortley R., Carvolth R. Preventing drunkenness and violence around nightclubs in a tourist resort. In: Clark R. V. G., editor. *Situational Crime Prevention: Successful Case Studies*. Guildford: Harrow and Heston; 1997, p. 263–82.
 34. Hauritz M., Homel R., McIlwain G., Burrows T., Townsley M. Reducing violence in licensed venues through community safety action projects: the Queensland experience. *Contemp Drug Probl* 1998; **25**: 511–51.
 35. Hauritz M., Homel R., McIlwain G., Burrows T., Townsley M. *Reducing Violence in Licensed Venues: Community Safety Action Projects*. Canberra: Australian Institute of Criminology; 1998.
 36. Hauritz M., Homel R., Townsley M., Burrows T., McIlwain G. *An Evaluation of the Local Government Safety Action Projects in Cairns, Townsville and Mackay*. Brisbane: Griffith University; 1998.
 37. Homel R., Carvolth R., Hauritz M., McIlwain G., Teague R. Making licensed venues safer for patrons: what environmental factors should be the focus of interventions? *Drug Alcohol Rev* 2004; **23**: 19–29.
 38. Wallin E., Norström T., Andréasson S. Alcohol prevention targeting licensed premises: a study of effects on violence. *J Stud Alcohol* 2003; **64**: 270–77.
 39. Andréasson S., Lindewald B., Rehman C. Over-serving patrons in licensed premises in Stockholm. *Addiction* 2000; **95**: 359–63.

40. Wallin E., Gripenberg J., Andreasson S. Too drunk for a beer? A study of overserving in Stockholm. *Addiction* 2002; **97**: 901–07.
41. Wallin E., Gripenberg J., Andreasson S. Overserving at licensed premises in Stockholm: effects of a community action program. *J Stud Alcohol* 2005; **66**: 806–14.
42. Hughes K., Jones L., Bellis M. A. *Reducing Harm in Drinking Environments*. Liverpool: Centre for Public Health, Liverpool John Moores University; 2009.
43. Calafat A., Juan M. Health and safety problems in recreational nightlife in the island of Mallorca. *Int J Drug Policy* 2004; **15**: 157–62.
44. Lenk K. M., Toomey T. L., Erickson D. J. Propensity of alcohol establishments to sell to obviously intoxicated patrons. *Alcohol Clin Exp Res* 2006; **30**: 1194–99.
45. Van de Goor L. A. M. *Situational Aspects of Adolescent Drinking Behaviors*. Maastricht: Datawyse; 1990.
46. Knibbe R. A., Van de Goor L., Drop M. J. Contextual influences on young people's drinking rates in public drinking places: an observational study. *Addict Res* 1993; **1**: 269–78.
47. Van de Goor L. A., Knibbe R. A., Drop M. J. Adolescent drinking behavior: an observational study of the influence of situational factors on adolescent drinking rates. *J Stud Alcohol* 1990; **51**: 548–55.
48. Chikritzhs T., Stockwell T. The impact of later trading hours for hotels on levels of impaired driver road crashes and driver breath alcohol levels. *Addiction* 2006; **101**: 1254–64.
49. Chikritzhs T., Stockwell T. The impact of later trading hours for Australian public houses (hotels) on levels of violence. *J Stud Alcohol* 2002; **63**: 591–99.
50. Schaefer J. M. The physical setting: behaviour and policy. In: Single E., Storm T., editors. *Public Drinking and Public Policy*. Toronto: Addiction Research Foundation; 1984, p. 71–84.
51. Babor T. F., Mendelson J. H., Uhly B., Souza E. Drinking patterns in experimental and barroom settings. *J Stud Alcohol* 1980; **41**: 635–51.
52. Kuo M., Wechsler H., Greenber P., Lee H. The marketing of alcohol to college students: the role of low prices and special promotions. *Am J Prev Med* 2003; **25**: 204–11.
53. Thombs D. L., Dodd V., Porkorny S. B., Omlil M. R., O'Mara R., Webb M. C. *et al.* Drink specials and the intoxication levels of patrons exiting college bars. *Am J Health Behav* 2008; **32**: 411–19.
54. Toomey T. L., Wagenaar A. C., Erickson D. J., Fletcher L. A., Patrek W., Lenk K. M. Illegal alcohol sales to obviously intoxicated patrons at licensed establishments. *Alcohol Clin Exp Res* 2004; **28**: 769–74.
55. Buddie A. M., Parks K. A. The role of the bar context and social behaviors on women's risk for aggression. *J Interpers Violence* 2003; **18**: 1378–93.
56. Fox J. G., Sobol J. J. Drinking patterns, social interaction, and barroom behavior: a routine activities approach. *Deviant Behav* 2000; **21**: 429–50.
57. Johannessen K., Glider P., Collins C., Hueston H., Dejong W. Preventing alcohol-related problems at the University of Arizona's homecoming: an environmental management case study. *Am J Drug Alcohol Abuse* 2001; **27**: 587–97.
58. Roberts J. C. Barroom aggression in Hoboken, New Jersey: don't blame the bouncers! *J Drug Educ* 2007; **37**: 429–45.
59. Collins R. L., Quigley B., Leonard K. E. Women's physical aggression in bars: an event-based examination of precipitants and predictors of severity. *Aggress Behav* 2007; **33**: 304–13.
60. Leonard K. E., Collins R., Quigley B. M. Alcohol consumption and the occurrence and severity of aggression: an event-based analysis of male to male barroom violence. *Aggress Behav* 2003; **29**: 346–65.
61. Leonard K. E., Quigley B. M., Collins R. L. Drinking, personality, and bar environmental characteristics as predictors of involvement in barroom aggression. *Addict Behav* 2003; **28**: 1681–700.
62. Quigley B. M., Leonard K. E., Collins R. L. Characteristics of violent bars and bar patrons. *J Stud Alcohol* 2003; **64**: 765–72.
63. Stockwell T., Lang E., Rydon P. High risk drinking settings: the association of serving and promotional practices with harmful drinking. *Addiction* 1993; **88**: 1519–26.
64. Lang E., Stockwell T., Rydon P., Lockwood A. Drinking settings and problems of intoxication. *Addict Res* 1995; **3**: 141–49.
65. Gruenewald P. J., Stockwell T., Beel A., Dyskin E. V. Beverage sales and drinking and driving: the role of on-premise drinking places. *J Stud Alcohol* 1999; **60**: 47–53.
66. Leather P., Lawrence C. Perceiving pub violence: the symbolic influence of social and environmental factors. *Br J Soc Psychol* 1995; **34**: 395–407.
67. Marsh P., Kibby K. F. *Drinking and Public Disorder*. London: Portland Group; 1992.
68. Warburton A. L., Shepherd J. P. Effectiveness of toughened glassware in terms of reducing injury in bars: a randomised controlled trial. *Inj Prev* 2000; **6**: 36–40.
69. Forsyth A. J. M., Cloonan M., Barr J. *Factors Associated with Alcohol-Related Problems within Licensed Premises*. Glasgow: Greater Glasgow NHS Board; 2005.
70. Forsyth A. J. M. *Assessing the Relationships Between Late Night Drinks Marketing and Alcohol-Related Disorder in Public Space*. Glasgow: Glasgow Caledonian University; 2006.
71. Gueguen N., Le Guellec H., Jacob C. Sound level of background music and alcohol consumption: an empirical evaluation. *Percept Mot Skills* 2004; **99**: 34–8.
72. Gueguen N., Jacob C., Le Guellec H., Morineau T., Lourel M. Sound level of environmental music and drinking behaviour: a field experiment with beer drinkers. *Alcohol Clin Exp Res* 2008; **32**: 1795–98.
73. Tutenges S. Safety problems among heavy-drinking youth at a Bulgarian nightlife resort. *Int J Drug Policy* 2009; **20**: 444–46.
74. Hughes K., Bellis M. A., Calafat A., Juan M., Schnitzer S., Anderson Z. Predictors of violence in young tourists: a comparative study of British, German and Spanish holidaymakers. *Eur J Public Health* 2008; **18**: 569–74.
75. Measham F. Play space: historical and socio-cultural reflections on drugs, licensed leisure locations, commercialisation and control. *Int J Drug Policy* 2004; **15**: 337–45.
76. Institut de Recherche Européenne sur les Facteurs de Risque chez l'Enfant et l'Adolescent (IREFREA). *Recreational Culture as a Tool to Prevent Risk Behaviours: Ethnography Reports*. Available at: <http://www.irefrea.org/Index.asp?idcontenido=3797> Archived by WebCite® at <http://www.webcitation.org/5v14ppqYL> (accessed 24 July 2009).
77. Hughes K., Quigg Z., Bellis M. A., Morleo M., Jarman I., Lisboa P. *Blood Alcohol Levels and Drunkenness Amongst People Visiting Nightlife in the North West*. Liverpool: Centre for Public Health, Liverpool John Moores University; 2009.