

DRINKING SETTINGS AND PROBLEMS OF INTOXICATION

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A random household survey was used as a basis for exploring drinkers' reports regarding their alcohol consumption and experiences of alcohol-related harm at different drinking settings. Licensed drinking settings were chosen because previous research has shown that high risk drinking and resulting harm are more likely to occur there. A total of 321 drinkers who reported their recent heaviest drinking occasion took place on licensed premises were identified from a sample of 1160 adults in Perth, Western Australia. Univariate analyses showed that both high risk consumption and harmful outcomes were more probable for drinkers who were under 25, male, single and had not eaten, and who had been drinking at premises which were either hotels or nightclubs with a predominantly male clientele, where music was the main entertainment and where customers were dancing. Following logistic regression analyses it was found that premises where customers were dancing (and/or listening to music), were predominantly male, and where drunk customers were continued to be served, were significantly associated with high risk consumption. Logistic regression found that being under 25, male and drinking at premises where there was dancing and where drunk people continued to be served was a significant risk factor for alcohol-related harm. Taken together these findings support to the view that preventing alcohol-related harm will involve strategies which aim to reduce levels of consumption and intoxication on licensed premises.

Keywords: Alcohol use, adverse effects, patterns of use, drinking environment, prevention, surveys, Western Australia.

INTRODUCTION

There is increasing interest in research into the licensed drinking environment as evidenced by the small but growing body of literature in this area (Fisher, 1985; Single, 1985; Stockwell, Lang & Rydon, 1991). This interest is due, in part, to the fact licensed premises such as hotels, taverns and night clubs have been shown to be settings where more heavy drinking occasions and more instances of problems with drunkenness occur than, for example, drinking at restaurants or at private residences (Health Department of Western Australia, 1988; O'Donnell, 1985; Stockwell, Lang & Rydon, 1993). A number of stud-

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ies have found that various physical features and contextual factors in licensed premises are associated with drunkenness and aggression (Graham *et al.*, 1980; Graham, 1985; Homel, Tomsen & Thommeny, 1992).

In an earlier paper (Stockwell, Lang & Rydon, 1993) we focused on the type of settings, licensed and unlicensed, to discover the association between demographic characteristics and policies and practices (e.g., serving obviously drunk persons, discounting drinks, and permitting overcrowding) with high risk consumption and self-reported incidences of harm. We found that practices such as serving drunken persons were significantly associated with high risk drinking and harm, and consumption of 6 or more standard drinks on one occasion was shown to be associated with over 70% of problems of intoxication. Of the eight percent of drinkers who had experienced at least one of six varieties of alcohol related harm over the previous 3 months, 72% had been drinking at licensed premises prior to the harm.

In the present paper we extend our analyses to other setting variables such as the type of premises, the size and composition of the drinking group, the type of entertainment, the type of activities drinkers were involved in, and what, if anything, people had eaten at the time. We also included the variable 'continuing service to obviously intoxicated persons' which was found to be highly significant in our previous report (Stockwell, Lang & Rydon, 1993).

A recent occasion of heaviest consumption was chosen for the analyses because this provided us with a 'window' through which to examine how types of drinking setting, or contexts, are related to high risk levels of consumption and alcohol related problems. 'High risk' consumption is defined as more than six standard drinks for men and more than four for women, corresponding to the National Health and Medical Research Council's definition of drinking which is 'harmful' if conducted on a regular basis (Pols & Hawks, 1991). Preliminary analyses indicated that this cut-off was highly predictive of acute alcohol related harm and was therefore justifiable both on a priori and a posteriori grounds. Licensed premises were chosen because they have been shown to be settings where more heavy drinking occasions and more instances of problems with drunkenness occur (Health Department of Western Australia, 1988; Lang & Stockwell, 1991; Stockwell, Lang & Rydon, 1993).

It should be noted that we are not in any way inferring causality between types of drinking setting, heavy drinking and harm. Nor was it our intent to address the issue of causality which is both complex and controversial and, as such, necessitates a different methodological approach to that used in the research reported here. The purpose of the present paper, then, is to examine the characteristics of licensed drinking settings to determine which are most often associated with harmful outcomes. For the purposes of prevention, the identification of high risk drinking settings may be of more value than the identification of high risk drinkers since, of the two, they may be more readily influenced. We felt it important, therefore, to focus on a high consumption occasion in order to identify the characteristics of high risk drinking settings so that prevention strategies may be developed and targeted more effectively.

METHOD

Sample

Data were collected between September and December 1990 by means of a household survey of 1160 persons aged 16 and over in Perth, Western Australia. Respondents were categorised as 'drinkers' if they had consumed even one drink of alcohol over the past 3 months ($n = 873$). Details were obtained on demographics; self-reported patterns of consumption on the four most recent drinking days in the past three months; the drinking setting on the occasion of heaviest consumption in the previous month; and, where applicable, the drinking setting which preceded a harmful outcome or event.

The sample frame was designed by the Australian Bureau of Statistics (ABS) to be representative by age, sex and socio-economic status of people residing in the Perth Metropolitan area. The sample was obtained from a total of 64 Census Collectors Districts (CCD) drawn from the 1986 National CCD's designated for the Perth Statistical Division. Twenty private dwellings were randomly selected within each CCD, and respondents were selected on the basis of the person whose birthday fell closest to the day of interview. Three call-backs were allowed before the selected dwelling was substituted. Calculated from a base of all in-scope respondents actually contacted, a response rate of 68.4% was achieved. A 6.3% validation of completed questionnaires was undertaken which involved re-interviewing at dwellings where some discrepancies were found in respondents answers, as well as a random selection of dwellings. Full details of the survey methodology have been reported previously (Hawks *et al.*, 1993)

Data Analysis

The focus of the analyses is on setting variables associated with high risk consumption and alcohol-related harm. The heaviest consumption occasion at a licensed location within the past month was selected for a detailed inquiry of the drinking setting. Where consumption levels were identical for separate occasions, the most recent occasion was selected. Those respondents identified as experiencing "harm" following a drinking occasion in the past three months were asked the same questions relating to the drinking setting preceding the harmful outcome. In this setting, "harm" refers to at least one of six common forms of drinking-related harm drawn from the work of Chick, Lloyd and Crombie (1986) and Stockwell *et al.* (1990). These were: sustaining an injury, being charged with drink-driving, being charged with another offence, being involved in a violent argument or fight, being involved in an accident resulting in damage, and, taking time off work.

Initial analyses were conducted on the 873 respondents (74.2% of the sample) identified as 'drinkers' and, subsequently, on a sub-set of 321 persons whose occasion of heaviest consumption and/or alcohol-related harm were related to drinking on licensed premises.

Following an examination of the data on frequency of responses continuous and multiple response variables were collapsed into the following categorical variables for the analyses. Thus 'consumption' was defined as high risk vs low risk, 'age' as less than 25 years vs over 25 years, and 'marital status' as single vs married or cohabiting. The setting variables were re-defined as follows: 'size of group', one to five persons vs six or more; 'composition of group', mostly male vs relatively equal numbers of male and female or mostly female; 'other people present', mostly male vs relatively equal numbers of male and female or mostly female; 'type of group', friends vs family and/or business colleagues; 'involved 1', actively involved (i.e., dancing, playing games) vs passively involved (i.e., watching TV, listening to music, talking); 'involved 2', whether or not persons were listening to music and/or dancing vs all other activities such as playing games, watching TV etc; 'entertainment', whether or not some form of music was the principle form of entertainment; 'ate', whether or not any food was eaten; and, 'type of location', hotels, taverns and night clubs vs all other types of licensed premises.

Our a priori interest is expressed in the choice of variables in that each independent variable represents a research hypothesis. We then examined each hypothesis by means of a univariate hypothesis test employing the chi-squared statistic to identify setting variables significantly (at the $p < 0.05$ level of significance) associated with high risk consumption and/or alcohol-related harm. Significant variables were then analysed by stepwise logistic regression to protect from confounding generating spurious positive findings in the univariate analysis. In one model the dependent variable was 'consumption' (high risk vs low risk), and in the other model, 'harm' (harm vs no harm). In this way we could examine interactions in the most parsimonious logistic model because this allows the detection of 'effect modification' which is the real world epidemiological equivalent of statistical interaction. Those variables found to be significant were then subjected to further analyses employing the SAS CATMOD (SAS Inst. Inc., 1989) procedure because this allows for logistic regression with interaction terms. We did this to determine, (a) the relationship between the nominal dependent variables ('consumption' and 'harm') and the independent variables using maximum likelihood estimation; and (b) to discover if there was any significant interaction effects between the variables using analysis of variance. The foregoing approach to analysis is that recommended by Schlesselman (1982; see also Miettinen, 1974) in case-control studies of this type.

RESULTS

Univariate Analyses

A number of variables were found to be significantly associated with high risk consumption. Individual characteristics of drinkers so associated were being single, male and aged under 25 years. High risk consumption was also more probable for drinkers who were actively involved in an activity (e.g dancing, pool) and who did not also eat food at the venue. Characteristics of drinking settings significantly associated with high risk consumption were: the venue being a hotel or nightclub; the clientele being mostly male; music being the main form of entertainment; drinkers dancing and/or listening to music;

being actively involved in the various activities; and not having eaten any food. Except where there were more males than females at the venue, and being actively involved in the various activities, these same variables were also significantly associated with alcohol-related harm.

The size, gender mix and composition of the drinking group had no significant relationship with either high risk consumption or actual harm.

Logistic Regression Analyses

Stepwise logistic regression analysis employing 'consumption' and 'harm' as the dependent variables were conducted with those variables found to be significant by univariate analyses. Also included in both models was an additional variable—'drunk persons being served' at the venue which had been shown to be highly significant in a previous analysis of these data (Stockwell, Lang & Rydon, 1993).

Initially, each dependent variable was included in the opposite model as an independent variable. Both were found to be highly significant predictors. However, because further analyses showed these variables to be highly correlated they were then dropped as independent variables for these regression analyses.

Only three setting variables proved to be significant risk factors for high risk consumption in the regression model derived: dancing or listening to music, whether mostly males were present, and continuing service to intoxicated customers (Table 1). While the significance levels attached to each of these variables is high the wide confidence intervals, reflecting the small number of cases available for analysis, demand caution regarding the size of the demonstrated relationships. The odds ratios obtained do indicate an

Table 1 Regression analysis of drinker characteristics and the drinking setting as risk factors for high risk consumption. (n = 321)

Variable	Beta	SE	P	OR	95% CI	
					Lower	Upper
<i>Dependent variable: Consumption</i>						
<i>Low risk = 0 (n = 191)*</i>						
<i>High risk = 1 (n = 104)</i>						
Involved in Activities 0 = other 1 = music/dance	0.94	0.29	0.00	2.58	1.45	4.60
Gender Mix at the Venue 0 = equal m/f 1 = mostly male	0.67	0.27	0.01	2.00	1.15	3.34
Drunk Persons Being Served 0 = no 1 = yes	0.69	0.27	0.01	2.00	1.17	3.44

*26 observations were deleted due to missing values.

increased risk of high risk consumption of the order of 2 or 3 times for the independent variables retained in the model.

The regression model obtained with 'harm' as the dependent variable retained the socio-demographic variables of age (< 25 years) and sex (male) as well as the setting variables dancing or listening to music, and continued service to intoxicated customers (Table 2). Once more the small number of cases available for analysis mean that it is not possible to be precise about the size of the odds ratios. In the main, these indicate an increased risk of alcohol-related harm of the order of 2 or 3 times.

In order to determine if there were any significant interactions between the independent variables further analyses were carried out involving maximum likelihood estimation and analysis of variance using SAS CATMOD. Except in the case of the two dependent variables no significant interactions were found. These analyses showed that the independent variables are separate and independent risk factors for both high risk consumption, and of alcohol-related harm.

DISCUSSION

This paper reports on analyses of the characteristics of both drinkers and drinking settings associated with episodes of consumption deemed to be potentially high risk and also with the experience of actual alcohol-related harm. A feature of this study was the availability

Table 2 Regression analysis of drinker characteristics and the drinking setting as risk factors for alcohol-related harm. (n = 321)

Variable	Beta	SE	P	OR	95% CI	
					Lower	Upper
<i>Dependent variable: Harm</i>						
<i>No harm = 0 (n = 252)*</i>						
<i>Hasharm = 1 (n = 43)</i>						
Gender						
0 = female						
1 = male	1.01	0.38	0.00	2.75	1.30	5.92
Age						
0 = > 25 yrs						
1 = < 25 yrs	1.01	0.38	0.00	2.80	1.30	5.93
Involved in Activities						
0 = other						
1 = listen music/dance	1.15	0.48	0.01	3.20	1.21	8.30
Drunk Persons Being Served						
0 = no						
1 = yes	0.81	0.38	0.03	2.30	1.10	4.80

*26 observations were deleted due to missing values.

of data regarding the setting characteristics of licensed drinking venues which were used prior to actual harm occurring.

Three of the nine setting variables found to be significant by univariate analysis were significantly associated with high risk consumption following regression analysis. These were: obviously drunk persons being served, mostly males at the venue, and being involved in listening to music and/or dancing (Table 1). Variables significantly associated with high risk consumption by univariate analysis but subsequently found not to be significant by regression analysis were age, sex, marital status, type of location, music as the main entertainment, being actively involved in activities at the venue, and not having eaten.

Of the variables found to be significantly associated with alcohol-related harm by univariate analysis, four remained significant following regression analysis: age (< 25 yrs), sex (male), being involved in listening to music and/or dancing, and obviously drunk persons being served (Table 2). Those variables found to be significant in the univariate analysis but not so by regression analysis were: marital status; type of location, music as the main form of entertainment, and not having eaten.

These results point to where and to whom prevention strategies and policies need to be targeted, viz predominantly young single men drinking heavily at entertainment venues and where they are permitted to continue drinking when 'obviously drunk'. There are a number of ways in which such strategies and policies might be developed and implemented. In Australia, a good starting point would be to utilise the national guidelines for the responsible service of alcohol in licensed premises (NABIC, 1990) and the hospitality industry code of practice (Stewart, 1992), in conjunction with a stricter enforcement of existing liquor laws (Lang, 1991).

Responsible beverage service programs (RBS) based on the national guidelines have been developed and trialed in Victoria and Western Australia (South, Delaporte & Nolan, 1991; Stockwell *et al.*, 1993). Evaluations of these trial programs identified the need to incorporate a skills component on strategies for dealing with intoxicated customers and for management to adopt responsible 'house policies' based on a risk assessment. Also identified was the need for some form of training for licensees and managers and not just for bar staff as is presently the case. This could be in the form of mandatory training for licensees as a condition of holding a licence, and as a condition of employment in the case of managers and supervisory staff.

A broad-brush approach incorporating training with risk assessments and the adoption of house policies in keeping with the hospitality industries own code of practice would ensure the risk of persons becoming intoxicated, or such persons being served more alcohol, is minimised. In this regard the enforcement of liquor laws has been shown to be the most effective way of increasing the incidence of refusal of service to drunken patrons (McKnight & Streff, 1992), and is something which enjoys community-wide support (Lang *et al.*, 1992; Hawks *et al.*, 1993).

These findings also indicate the need to further develop methods whereby we can better assess which licensed premises have a higher "risk" of contributing to high risk consumption and alcohol-related harm. We have already gone some way towards developing such additional methodologies. In an earlier study we reported the methods used in deter-

mining "high risk" establishments (Stockwell, Somerford & Lang, 1992), and we have recently evaluated the effectiveness of a series of other measures for assessing the level of risk of licensed premises (Stockwell *et al.*, 1993). These include the existing management policies and the extent to which "responsible" policies are practiced. Taken together with existing indicators such as level of sales, alcohol-related traffic accidents, drink driving offences and assaults, we anticipate developing a more comprehensive method for assessing the relative risk which various types of licensed premises might contribute toward alcohol-related harm and high risk consumption.

Finally, it needs to be acknowledged that it may well be the case that the type of premise and the various drinking contexts reported here are significantly associated with harm simply because a particular type of patron chooses to drink at such premises. For example, do heavy drinkers choose to drink alcohol at premises where drunks are routinely served, or do they become heavy drinkers as a consequence of drinking in such environments? This raises the vexed issue of causality, where there is clearly a need for further research to determine the extent to which the individual drinker contributes to harmful outcomes when controlling for factors such as the type and character of the premises, and the various policies and practices.

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References

- Chick, J., Lloyd, G. & Crombie, E. (1985) Counselling problem drinkers in medical wards: a controlled study. *British Medical Journal*, **290**, 965-967.
- Fisher, H. R. (1985) *Studies of Drinking in Public Places. An Annotated Bibliography*. Toronto: Addiction Research Foundation.
- Graham, K. (1985) Determinants of heavy drinking and drinking problems: the contribution of the bar environment. Typescript, 71-84.
- Graham, K., La Roque, L., Yetman, R., Ross, T. J. & Guistra, E. (1980) Aggression and barroom environments. *Journal of Studies on Alcohol*, **41**, 277-292.
- Hawks, D. V., Lang, E., Stockwell, T., Rydon, P. & Lockwood, A. (1993) Public support for the prevention of alcohol-related problems. *Drug and Alcohol Review*, **12**, (3), 243-250.
- Health Department of Western Australia. (1988) *Alcohol and Health in Western Australia*. Perth: Health Department of Western Australia.
- Hemel, R., Tomsen, S. & Thommeny, J. (1992) Public drinking and violence: not just an alcohol problem. *Journal of Drug Issues*, **22**, (3), 679-697.
- Lang, E. (1991) Server intervention: what chance in Australia? *Drug and Alcohol Review* **10**, (4), 381-393.
- Lang, E., Stockwell, T. (1991) Drinking locations of drink drivers: an analysis of accident and non-accident cases. *Accident, Analysis and Prevention* **23**, (6), 573-584.

- Lang, E., Stockwell, T., Rydon P. & Gamble C. (1992) *Drinking Settings, Alcohol Related Harm, and Support for Prevention Policies. Results of a Survey of People Residing in the Perth Metropolitan Area*. Bentley, WA: National Centre for Research into the Prevention of Drug Abuse, Curtin University of Technology.
- Lang, E., Stockwell, T., Rydon, P. & Lockwood, A. (1993) Public perceptions of responsibility and liability in the licensed drinking environment. *Drug and Alcohol Review*, **12**, (1), 13-21.
- McKnight, A. J. & Streff, F. M. (1992) *The Effect of Enforcement Upon Service of Alcohol to Intoxicated Patrons of Bars and Restaurants*. Landover MY: National Public Services Research Institute.
- Miettinen, O. S. (1974) Confounding and effect modification. *American Journal of Epidemiology*, **100**, 350-353.
- National Alcohol Beverage Industries Council. (1990) *National Guidelines for the Responsible Serving of Alcohol*. Canberra: Paragon Printers.
- O'Donnell, M. A. (1985) Research on drinking location of alcohol-impaired drivers: implications for prevention policies. *Journal of Public Health Policy*, **6**, 510-525.
- Pols, R., Hawks, D. V. (1991) *Is There a Safe Level of Daily Consumption of Alcohol for Men and Women? Recommendation Regarding Responsible Drinking Behaviour*. Canberra: Australian Government Printing Services.
- SAS Institute Inc. (1989) *SAS/STAT® User's Guide, Version 6, Fourth Edition*. Cary, NC: SAS Institute Inc.
- Schlesselman, J. J. (1982) *Case-Control Studies* (Ch 8). New York: OUP.
- Single, E. (1985) Studies of public drinking: an overview. In, Single E. and Storm T. Editors. *Public Drinking and Public Policy*. Toronto: Addiction Research Foundation.
- South, D., Delaporte, H. & Nolan, C. (1991) *The Development and Evaluation of Training Programs in the Responsible Service of Alcohol in Victoria*. Report No. GR 91/26, Hawthorn Vic: VicRoads.
- Stewart, C. J. (1992) *Hotel Industry Action on Responsible Hospitality*. Paper presented at the 'Winter School in the Sun' conference, Brisbane, July 1992.
- Stockwell, T., Bolte, E. W., Milner, I., Young, I. & Pugh, P. (1990) Home detoxification for problem drinkers: outcome at 60 days and acceptability to charts, relatives and GP's. *British Journal of Addiction*, **85**, 61-70.
- Stockwell, T., Lang, E. & Rydon, P. (1993) High risk drinking settings: the association of serving and promotional practices with harmful drinking. *Addiction*, **88**, (11) 1519-1526.
- Stockwell, T., Lang, E. & Rydon, P. Editors. (1991) *The Licensed Drinking Environment: Current Research In Australia And New Zealand*. Bentley, WA: National Centre for Research into the Prevention of Drug Abuse, Curtin University of Technology.
- Stockwell, T., Lang, E., Rydon, P. & Beel, A. (1993) *An Evaluation of the "Freo Respects You" Responsible Alcohol Service Project*. Technical Report. Bentley WA: National Centre for Research into the Prevention of Drug Abuse, Curtin University of Technology.
- Stockwell, T., Rydon, P., Gianatti, S., Jenkins, E., Ovenden, C. & Syed, D. (1992) Levels of drunkenness of customers leaving licensed premises in Perth, Western Australia: a comparison of high and low 'risk' premises. *British Journal of Addiction*, **87**, 873-881.
- Stockwell, T., Somerford, P. & Lang, E. (1992) The relationship between licence type and alcohol related problems attributed to licensed premises in Perth, Western Australia. *Journal of Studies on Alcohol*, **53**, (5), 495-98.