Drug and Alcohol Review (1996) 15, 7–15

Unravelling the preventive paradox for acute alcohol problems

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Abstract

Kreitman's discussion of the preventive paradox in relation to the prevention of alcohol problems has had profound implications for alcohol policy and has generated considerable controversy [1]. It is argued here that although Kreitman should be credited with the important observation that alcohol-related harm is not confined to a few dependent drinkers, none the less an apparent paradox is not an ideal platform from which to recommend policy. Furthermore, Kreitman's own data and data from an Australian survey of drinking are used to demonstrate that a commonplace truth underlies his apparently paradoxical findings. It is shown that the preventive paradox disappears when consideration is given to the amount of alcohol consumed on either (i) the day of highest alcohol intake out of the last four, or (ii) the day on which acute alcohol-related harm occurred. Episodic heavy consumption by people whose average alcohol intake can be classified as 'low' or 'medium' risk contributes to the bulk of such experiences of harm. It is suggested that the importance of intoxication as a public health and safety issue has been neglected. This neglect is compounded when public education campaigns and prevention policy are only based on average rates of alcohol consumption. Advice regarding the low risk levels of consumption for different types of harm should form one component of a comprehensive harm reduction policy. Other elements of such a policy should include a variety of other measures of proven effectiveness in relation to reducing levels of intoxication and related problems. [Stockwell T, Hawks D, Lang E, Rydon P. Unravelling the preventive paradox for acute alcohol problems. *Drug Alcohol Rev* 1996; 1: 7–15]

Key words: Preventive paradox; alcohol problems.

Introduction

When Kreitman introduced the alcohol field to the concept of the preventive paradox [2] in 1986 he sparked a lively debate about the nature of alcohol-related problems and their prevention. The supposed 'paradox' concerns the finding that most people who have experienced some adverse consequence relating to their recent drinking typically consume only small or moderate amounts of alcohol per week. This observation has profound implications for alcohol policy. For example, Kreitman and others have argued for shifting the emphasis of prevention efforts away from the relatively few 'heavy' or excessive

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Received 20 February 1995; revised version 8 September 1995; accepted for publication 28 September 1995.

drinkers towards the more numerous moderate drinkers. Saunders took this one step further to suggest that fewer resources should be devoted to the treatment of severe alcoholism [3] and more to community-wide prevention efforts. Given such radical and important conclusions it should not be surprising that both the data and the thinking underlying the Preventive Paradox have been subjected to spirited criticism [4,5].

In this paper we will argue that paradoxical findings provide a shaky platform on which to build prevention policies. We will also present some new data from a community survey of an urban Australian population which provide a far more straightforward explanation of Kreitman's findings and, we believe, a sounder and less paradoxical basis for the promotion of alcohol control policies. We do not, however, wish to dispute Kreitman's important observation that the largest number of people in the community who experience some form of alcohol-related harm (regardless of the severity of that harm) can be found among the great majority of drinkers whose average consumption is moderate.

In identifying the paradox, Kreitman's starting point was the question: what is the best advice to give the public at large regarding low risk levels of alcohol consumption? The 1980s in the UK saw the promulgation of a variety of recommended levels both for public health campaigns [6] and for controlled drinking programmes [7]. The fact that these limits were mostly expressed as amounts consumed per week, rather than per day, indicates a preoccupation with problems of regular consumption and dependence rather than with those of intoxication, to use Thorley's classification [8].

Kreitman's method was to examine data from surveys of alcohol consumption and of alcohol-related problems in the domains of physical health, work, relationships and 'public order'. He examined the rates of these problems among people categorized as low risk drinkers according to various criteria: number of drinks per week, number of drinking days per week and maximum daily consumption in past week. He then examined the savings in terms of numbers of drinkers with problems if the whole population drank at low risk levels as defined by each of these criteria in turn. For most datasets, the Preventive Paradox held for two of the criteria for low risk drinking—number of drinks per week and number of drinking days per week. In other words only a minority of people with problems are 'removed' if all drinkers become low risk drinkers according to these criteria. However, for most datasets examined and for most types of problems, a majority of people with problems are removed when the third criteria for *low risk* drinking is employed (no days with more than six drinks). Kreitman suggested, however, that such a definition is unsatisfactory because it resulted in more than half of one his samples of Scottish drinkers being defined as high risk. He then argued that if one is to try to change that many people's drinking habits one may as well take on the whole population and get *everyone* to drink less rather than advocate 'safe limits'.

Kreitman outlines some theoretical advantages of such an approach: (i) the reduction in numbers of people with problems is at least as large as with a weekly safe limits approach (ii) the more numerous moderate drinkers may be more amenable to reducing their intake than would the smaller group of hard-core heavy drinkers. Kreitman notes the counter-argument that moderate drinkers may be less motivated to reduce consumption but suggests this is not certain. He also quotes examples of other public health campaigns in which general reductions of intake are advised rather than specific limits being set, namely reducing fat and cholesterol intake.

Kreitman's discussion of the preventive paradox has undoubtedly had more influence on the wider issue of alcohol control policies than it has on the messages used in public alcohol education campaigns. In fact, we are unaware of any campaign which has used a 'drink less alcohol' as opposed to a 'drink less than x' message. Kreitman's paper is, however, frequently cited as a justification for alcohol control policies which impact upon all drinkers and not just upon 'problem drinkers'. The preventive paradox is a convenient platform from which to advocate restrictions on alcohol availability and increases in price since it appears to help such control policies to escape the charge that they 'punish the many for the sins of the few' [9]. As a platform from which to advocate alcohol control policies, however, the preventive paradox has the major disadvantage of implying that even moderate consumption can be bad for you. Such an implication can be successfully dismissed by proponents of the alcohol industry as 'neo-prohibitionism', is unlikely to be credible to those outside the alcohol and public health arenas and is probably not scientifically valid [10]. We will argue that alcohol control policies can be advanced on a far more secure

basis if reducing *episodes* of intoxication becomes the main policy objective. This is not to say that reducing overall consumption is not a desirable public health objective, only that it is a very hard one to sell to the uninitiated as well as to defend from those who favour, for whatever reason, deregulation of the market place.

The most straightforward explanation of Kreitman's paradox is that it results from using measures of regular consumption on the one hand and of problems of intoxication on the other. We would argue that while the paradox may hold when *both* measures *and* problems of regular consumption are employed (e.g. drinks per week and incidence of liver cirrhosis) it vanishes when measures and problems of intoxication are matched. In other words if liver cirrhosis and alcohol dependence to be prevented then regular heavy consumption must be discouraged. If fights (public or private), time off work from hangover and alcohol-related injuries are to be prevented then intoxication must be discouraged. Most of the alcohol-related problems investigated by Kreitman are those associate associated, at least partially, with intoxication. It should not be surprising, therefore, that the most efficient method for reducing the number of people in a population who experience such problems is by having them never get intoxicated—in this case never drink more than six drinks per day. The requirement that they drink less than 35 or so drinks per week clearly allows for several episodes of intoxication and is, therefore, less efficient.

We will now briefly present some data collected during the course of a survey of patterns of alcohol use and of problematic consequences in an urban Australian sample of drinkers which confirms the above interpretation of Kreitman's data. The methodology we employed allowed us to determine how much was consumed on the day of the occurrence of any one of seven problems of intoxication. This is the closest possible match between measures of intoxication on the one hand and of problems of intoxication on the other. The relative efficiency of such a measure of consumption as a predictor of such problems will be contrasted with three other measures: (i) the average amount of alcohol consumed per day (ii) the average amount of alcohol consumed on a recent *drinking* day and (iii) the highest amount consumed on a recent drinking day. The steps and methodology employed exactly replicate those reported by Kreitman in his 1986 paper [2] except that Australian rather than British guidelines for low risk drinking are used as a benchmark.

Method

Sample

Data were collected in 1990 by means of a random household survey of residents in Perth, Western Australia. Two samples were taken: one of 1021 people aged over 16 years and one of 251 people aged 16–29 years. The latter sample was added to compensate for the usual under-representation of younger people in household surveys. The following analyses were conducted on 951 people (504 women and 447 men) drawn from both samples who admitted to having had at least one drink containing alcohol in the previous 3 months. In particular, the subgroup who reported experiencing at least one 'problem of intoxication' ($n = 67$) was contrasted with those who reported no such problems. This sub-sample was mostly male ($n = 9$) and aged under 25 years ($n = 44$).

Full details of data collection procedures are reported by Hawks *et al.* [11] and Lang *et al.* [12]. The complete sample is broadly representative of the adult Perth population, although with an over-representation of women (55.6% versus 50.0%) and slightly more people aged 16–29 years (41.6% versus 37.5%) compared with Australian Bureau of Statistics population estimates for June 1990. As was the case in Kreitman's study, the data were not weighted.

Measures of problems of intoxication

In the context of a 40-minute interview concerning a variety of alcohol-related issues, respondents were asked whether in the previous 3 months they had experienced: (i) an injury that was partly due to drinking; (ii) being charged with drink-driving; (iii) being charged with any other offence after drinking alcohol; (iv) a violent argument or fight while under the influence of alcohol; (v) being requested to leave a licensed drinking setting; (vi) an accident while under the influence of alcohol resulting in damage costing more than AUS$100 to repair; and (vii) time off work to recover from the effects of drinking alcohol.

Table 1. *Problems and average daily alcohol intake according to NH&MRC guidelines*

Ave consumption by risk level	1 + problems			No problems		
	n	%	(95% CI)	*n*	%	(95%CI)
Low risk	40	59.7%	(± 11.7)	821	93.0%	(± 1.7)
Medium risk	10	14.9%	(± 7.1)	35	4.0%	(± 1.3)
High risk	17	25.4%	(± 10.4)	27	3.1%	(± 1.1)
Total	67	100%		883	100%	

Measures of alcohol consumption

All respondents were asked about alcohol consumption on their last 4 reported drinking days following a method described in detail elsewhere [12]. The three methods subsequently used for calculating consumption were as follows:

(i) Average alcohol consumption per day. The numerator consisted of total estimated alcohol consumption and the denominator the total number of days since the first reported drinking day whether or not alcohol was consumed on those days.
(ii) Average alcohol consumption per *drinking* day, i.e. the denominator was the number of drinking days.
(iii) Amount consumed on the day of heaviest consumption of last 4 drinking days.

Additional information about alcohol consumption was also collected from those respondents who reported one or more of the problems of intoxication listed above. These respondents were asked about their alcohol consumption during the day on which the incident occurred.

In each case consumption was calculated in terms of Australian 'standard drinks'—defined as each containing 10 g of alcohol. Special efforts were made in the interview to determine precise beverage strength and serving size or container size as appropriate. For each of the above measures, consumption was classified into risk categories according to national Australian guidelines for safe drinking [13] set by the National Health and Medical Research Council (NH&MRC) as follows:

Low risk: four or fewer drinks per day for men and two or fewer for women.
Medium risk: five or six drinks per day for men and three or four drinks for women.
High risk: more than six drinks per day for men and more than four drinks per day for women.

It should be noted that these guidelines are intended as advice as to the maximum amounts of alcohol to be consumed on any drinking day as well as to upper limits for average daily consumption.

Results

Problems and average daily alcohol intake

As illustrated in Table 1, when average daily consumption is used as the measure of alcohol intake then Kreitman's paradoxical findings are replicated in that 40 of 67 (59.7%) of people reporting problems were in the low risk category.

Problems and average alcohol intake per drinking day

This measure results in larger numbers of people in the medium and high risk bands since the effect of any abstinent days is removed. Despite a doubling of the number of people classified as high risk drinkers, just over half of all people reporting problems are low or medium risk drinkers, i.e. a slightly weaker variant of the Paradox (see Table 2).

The distribution across risk levels for 'problem' drinkers as defined here also differs significantly from that obtained when defining risk on the basis of average daily intake as in Table 1 ($\chi^2 = 13.59$, $p < 0.001$) with significantly more high risk drinkers reporting problems ($\chi^2 = 2.86$, $p < 0.01$) and fewer low risk drinkers ($\chi^2 = 3.65$, $p < 0.001$) using this second criterion.

Problems and alcohol intake on heaviest recent drinking day

The use of this measure results in the bulk of drinkers reporting problems being classified as 'high

Table 2. *Problems and average alcohol intake on a drinking day according to NH&MRC guidelines*

Ave consumption by risk level	1 + problems			No problems		
	n	%	(95%CI)	*n*	%	(95%CI)
Low risk	19	28.4%	(± 10.8)	632	71.5%	(± 3.0)
Medium risk	15	22.4%	(± 10.0)	154	17.4%	(± 2.5)
High risk	33	49.3%	(± 12.0)	98	11.1%	(± 2.1)
Total	67	100%		884	100%	

risk' drinkers. The preventive paradox does not apply at all when this definition of high risk is employed (see Table 3).

The distribution across risk levels for 'problem' drinkers as defined here also differs significantly from that obtained when defining risk on the basis of average intake on a drinking day as in Table 2 ($\chi^2 = 139.71$, $p < 0.001$) with significantly more high risk drinkers reporting problems ($\chi^2 = 4.21$, $p < 0.001$) and fewer low risk drinkers ($\chi^2 = 3.73$, $p < 0.001$) when using this last criterion.

Reductions in problems if all drinkers follow guidelines

Table 4 makes a direct comparison between the three definitions of 'high risk' drinking in terms of the percentage reduction in people with various problems if it is assumed that all high risk drinkers become low or medium risk drinkers and experience problems at the lower rates of these last two groups. In every instance, average intake per day results in the least reduction of people reporting problems, average per drinking day provides a slightly greater reduction and the requirement of never drinking more than six drinks (or four for women) on any recent drinking day provides substantially greater reductions across all varieties of problem considered. As in Kreitman's analysis, the time 'window' for experiencing a problem is considerably greater (3 months here, 12 months for Kreitman) than that over which recent alcohol consumption is reported (7 days in both).

Amount consumed on day harm was experienced

When the total amount consumed on the day of harm is examined this amount predicts the occurrence of harm more closely than any of the other measures. Most problems (86.6%, or 58 of 67) occurred after the consumption of more than six drinks for men or four drinks for women on that day. The remainder of people reporting problems had consumed either a 'low risk' ($n = 4$) or 'medium risk' amount ($n = 5$). Thus Kreitman's paradox also disappears when this measure is used. For purposes of comparison, inspection of Table 3 shows that only 27.9% of the drinkers with no problems consumed more than the 'six and four' amounts on their highest consumption day of the last four.

Discussion

The main conclusion that we wish to draw from the preceding analyses is that Kreitman's 'preventive paradox' disappears in relation to problems of intoxication when alcohol consumption measures are employed which are sensitive to episodes of intoxication. This far from paradoxical finding arises because the great majority of such problems occur for men during or immediately after drinking more than six standard drinks and for women after drinking more than four. However, the significant finding in relation to the formulation of prevention strategies is that the majority of people who experience such acute alcohol-related problems drink an amount which, *on average*, is not thought to put them at risk of long-term health problems. It would appear, therefore, that different messages are required for the prevention of different alcohol-related problems.

It should be noted that our methods, analyses and results replicate those reported by Kreitman despite our employing drinking risk categories recommended by Australian rather than British authorities. We were also able to add data regarding how much was consumed immediately prior to the experience of harm which, we believe, strengthens the case for separating out different patterns of high risk

Table 3. *Problems and alcohol intake on heaviest recent drinking day according to NH&MRC guidelines*

Ave consumption by risk level	1+ problems			No problems		
	n	%	(95%CI)	*n*	%	(95%CI)
Low risk	3	4.5%	(±5.0)	428	48.4%	(±3.3)
Medium risk	8	11.9%	(±7.8)	209	23.6%	(±2.8)
High risk	56	83.6%	(±8.9)	247	27.9%	(±3.0)
Total	67	100%		884	100%	

alcohol consumption when formulating prevention policies. Equivalent findings have also been reported recently from analyses of Canadian national survey data [14].

Kreitman raised the issue of the preventive paradox in order to suggest that all drinkers should be advised to 'drink less' without specifying 'safe' drinking levels. The question of what is the best advice to give drinkers for health and safety purposes is a vexed one for many reasons. For example, it is questionable whether most people are able to follow the advice of public health campaigns based on safe limits messages in the absence of appropriate labelling of alcohol containers [15]. There is also now greater acceptance of there being a beneficial effect of moderate alcohol consumption on rates of heart disease for some sub-populations which, according to some sources, holds for up to 50 g of ethanol per day for men [10]. While this view is quite consistent with a safe limits approach to alcohol education [1], the essential dilemma is posed by the fact that there are many different types of problematic consequences from alcohol consumption, each of which has its own gradient of risk in relation to quantity, frequency and pattern of alcohol consumption. Public health campaigns, however, have to select a straightforward message which is both readily comprehended and has a degree of credibility with the target audience.

Our analyses show that the majority of drinkers who experience problems of intoxication also drink, on average, well within the NH&MRC guidelines [13]. This finding supports the advisability of the NH&MRC strategy [13] of providing advice about how much it is advisable to drink both on a single occasion as well as on average across several days. However, our own and others' data [14, 17] suggest that higher limits may be permissible in relation to problems associated with intoxication (e.g. accidents, injuries, getting involved in violent arguments or having to take time off work) than those associated with regular use (e.g. liver cirrhosis, breast cancer, cognitive impairment). Different advice again is needed for drivers who wish to remain below the legal limit for driving. An alternative strategy for problems of intoxication is to depict intoxication *per se* as undesirable. The latter has been attempted by the Western Australian Health Department in their campaign 'Respect Yourself' which features a series of television commercials with young people engaged in embarrassing and/or risky behaviour while obviously intoxicated.

Public health campaigns should not, of course, be restricted to public education. The effectiveness of media campaigns may be at best marginal since they do little to change the cultural and economic structures in our society which support and promote excessive alcohol use [16]. Rational and comprehensive policies for the reduction of harm associated with alcohol use need to be informed by the now commonplace finding that it is the occasional or weekend binge drinker who poses the greatest risk in relation to alcohol-related violence, accidents and injuries [14, 17, 18]. While Kreitman used a very similar dataset to ours to argue that prevention campaigns should target drinkers designated as low or medium risk, we suggest that a more plausible and appropriate course of action is to target *episodes* of high risk drinking by whoever and whenever they occur. If we employ the definition of more than six drinks for males or four for females then more than 50% of people in our sample aged under 30 years reported having drunk such an amount on a recent occasion [19]. In another study involving interviewing and breath-testing drinkers leaving licensed premises in Western Australia on Friday and Saturday nights, it was found that the average consumption of those interviewed was 7.6 standard drinks for

Table 4. *Percentage reduction in people with different alcohol problems if adherence assumed to three definitions of safe drinking**

Definition of safe drinking (m/f)	Any one of seven problems ($n = 67$)	Injury ($n = 25$)	Fight ($n = 29$)	Off work ($n = 26$)	Other ($n = 29$)
Ave intake per day > 6/ > 4 (%)	21.7	41.2	31.2	11.2	34.9
Ave intake on drinking day > 6/ > 4 (%)	41.1	53.6	44.0	16.4	46.1
Max. daily intake > 6/ > 4 (%)	75.9	100.0	84.8	49.2	84.8

*More than one type of harm was experienced by several respondents.

males and 4.9 for females [20]. In other words, drinking to intoxication is a highly prevalent risk behaviour and is worthy of the close attention of policy makers and public health advocates.

An appeal to support a reduction in episodes of intoxication has a number of advantages over an approach which advises everyone to drink less. A message which is based on the argument that a reduction in episodes of intoxication will reduce alcohol-related harm has strong face validity and may provide greater leverage for policy advocacy and change. In comparison to the 'drink less' message, a focus on episodes of intoxication has greater credibility; represents a simple, common-sense message supported by intuition; and its defence does not rely on a subtle theoretical explanation. Prevention strategies which focus on the prevention of intoxication on licensed premises enjoy strong public support [21] and these prevention strategies are capable of being highly effective [22–26]. Given the above context, the alcohol industry and politicians sympathetic to their interests would find it harder to maintain credibility while publicly opposing effective measures designed to limit high risk drinking. However, even for the alcohol industry this approach should be more palatable than one which calls for an across-the-board reduction in per capita consumption by encouraging everyone to drink less.

While an advantage of Kreitman's 'everyone drink less' approach is that it avoids the perception of scapegoating a few supposedly deviant regular excessive drinkers, this advantage is also shared by one which focuses on reducing the frequency of episodes of intoxication: occasional excessive drinking is something most people do at some time in their lives and is clearly not a minority pursuit. Also, since there is evidence that raising the price of alcohol can reduce problems of intoxication [27], it is plausible to advocate measures to achieve higher prices (e.g. by raising taxes) in order to reduce the frequency of both episodes and problems of intoxication. Similarly, the issue of the optimum hour for closing licensed premises can be judged according to evidence regarding actual intoxication levels attained at different hours (e.g. [20]) and restrictions advocated as a means of reducing intoxication. Even increases in alcohol taxes have been shown to be popular in surveys of public opinion—in the latter case provided that the extra revenue generated is used to fund prevention and treatment programmes and the rationale of reducing total consumption is not employed [28].

In conclusion, we suggest that the preventive paradox, as it has been applied to acute alcohol-related harm, is an artefact of, on the one hand, categorizing drinkers according to their average alcohol consumption, and of examining the incidence of alcohol-related problems primarily associated with excessive episodic drinking on the other. Furthermore, the implication that all drinkers should be encouraged to drink less alcohol is both hard to

defend and likely to weaken public and political support for safe drinking campaigns and policies.

It may not be necessary to give standard advice about sensible low risk drinking designed to prevent all problems at once. Advice to drivers to stay below the legal limit is usually expressed in terms of the number of drinks per hour and advice to avoid long-term health problems is often in terms of average consumption per week. Similarly, advice to drinkers who wish to avoid problems of intoxication should be in terms of limiting the amount drunk on any drinking occasion. The data presented here (and elsewhere [17]) suggest that this latter limit could be higher than the current Australian NH&MRC guidelines of four a day for men and two for women provided that the drinker is not about to drive or operate machinery. It should be noted that the epidemiological data regarding levels of consumption associated with long-term physical health consequences tend to be based on aggregate consumption data and do not indicate reliable upper limits for consumption on a particular occasion. A sensible compromise may be that adopted by the first major safe limits campaign in the UK 'That's the Limit!': men were advised to drink no more than 21 units of alcohol per week and no more than six on any one occasion, women 14 per week and no more than four on any one occasion [6]. This would at least be consistent with the evidence presented in this paper regarding levels which pose an increased risk for problems of intoxication.

Advice regarding low risk levels of drinking should, however, comprise but one strategy in a comprehensive range of approaches designed to limit violence, accident and injury related to alcohol intoxication. Other strategies which have shown promise to date include community policing [21], undercover monitoring of licensed premises [22], a combination of training of bar staff in responsible alcohol service and law enforcement approaches [23], and the provision of plastic glasses at high risk drinking venues [24].

Acknowledgements

This work was conducted with the assistance of a grant from the Criminology Research Council, Australia. The National Centre for Research into the Prevention of Drug Abuse is funded by the National Drug Strategy of the Commonwealth Department of Human Services and Health.

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