Factors Associated with Heavy Alcohol Consumption in the U.K. Armed Forces: Data from a Health Survey of Gulf, Bosnia, and Era Veterans

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Background: Little is known about the patterns of alcohol use in the U.K. Armed Forces or the factors associated with heavy drinking. Methods: Analysis of existing data from the King's Military Cohort was conducted of a large, randomly selected cohort of service personnel. The original sample consisted of 8,195 service personnel who served in the U.K. Armed Forces in 1991: a third deployed to the Gulf (1990–1991), a third deployed to Bosnia (1992–1997), and the final third, an "Era" comparison group, in the Armed Forces in 1991 but not deployed. For the purposes of this study, female serving personnel were excluded. The study used a "case-control" study design nested within the above cohort; "heavy drinkers" (those who drank >30 units/week) were compared with "light drinkers" (those who drank <21 units a week). Results: Heavy drinking was associated with current military service and being unmarried or separated/divorced. Heavy drinking was more common in younger personnel who had deployed to Bosnia. Those who drank heavily were also more likely to smoke; heavy drinking was associated with poorer subjective physical and mental health. Conclusions: Certain subgroups of the Armed Forces appear to be more at risk and it may be possible to target resources to such individuals to improve detection and allow prompt treatment.

Introduction

The consumption of alcohol has historically been an important part of military life. In the 19th to 20th century, both in the United Kingdom and Europe, motivation to join the military was often driven by the availability of free liquor, food, a regular wage, and a need to escape poverty.[1,2] A prevalent view in the 19th century among military men, and some doctors, was that alcohol gave a degree of protection against the various lethal diseases that affected the Army.[3] An experienced inspector of hospitals wrote to the commander of forces in the West Indies, "It seems to be an article of our national creed that ardent spirits communicate strength and vigour to the human frame, even in the Torrid Zone [tropics]; and I regret to say, that this unworthy prejudice is not confined altogether to the vulgar."[4] The local rum was alleged to have antiscorbutic properties and was also considered by the troops to be an effective prophylactic against yellow fever. An author of a contemporary medical publication at the time is quoted as saying that the beneficial effects of wine included raising the pulse, promoting perspiration, warming the habit, and exhilarating the spirits. The role of alcohol in treatment was reflected in the large volumes shipped abroad on behalf of medical departments.[3]

Ultimately, the virtues of alcohol for military purposes were gradually discredited. Data collected in the West Indies were analyzed in the 1830s by a retired inspector of hospitals, the famous statistician, Henry Marshall. Marshall's subsequent report concluded that the traditional "miasmic" theories did not account for the patterns of disease. He instead invoked more mundane factors such as sanitation, diet, and alcohol consumption. Recommendations included reduced liquor rations and regular reports by medical officers on the effects of intemperance on the soldier's health.[5,6]

Historically, Dunbar-Miller[7] describes the attitude of service authorities to alcohol as "ambivalent." In the United States, for example, on the one hand, there was a general acceptance of high basic consumption of alcohol in military society and its endorsement in a variety of social contexts. On the other hand, a diagnosis of "alcoholism" in the 1970s meant compulsory discharge without honor with no provision for treatment. This combination of unofficial tolerance with strongly punitive official policies encouraged personnel to conceal their drinking problems.[8] In the United Kingdom, the Royal Navy continued to issue the naval rum ration—one-eighth of a pint of 95.5% proof Jamaica rum—to all trained seamen over the age of 20, until 1970. Although in the Royal Navy, a daily ration of rum is now history, medical officers are still able to "prescribe" a routine ration of rum to personnel operating in an "arduous environment."

Few contemporary studies have examined the relationship between military service/deployment, individual factors, and alcohol use. Although since 1980 U.S. literature suggest that use of alcohol, drugs, and tobacco by active duty personnel has declined, the percentage of "heavy drinkers" has remained unchanged.[9] In the U.S. studies, heavy drinking is twice as common in the military than in a matched sample of the civilian population,[10] with the greatest risks being for young, single men

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who have not completed their education past high school and who are junior ranks.[11] In the United States, only one in seven personnel who admitted to heavy drinking has ever received counseling or treatment.[9]

In this article, the King's military cohort was used; a large random sample of the Armed Forces.[12,13] We have recently published the results of our follow-up of the cohort,[14] focusing on the health outcomes of those serving in the Persian Gulf. The present study has a different focus and aims to examine which factors are associated with heavy drinking.

Methods

The Data Set

Our analyses were conducted on a subset of the King's U.K. military cohort who completed the Phase 1 Health Survey of Military Personnel (N = 8,195) in 1997.[12] The initial survey in 1997 consisted of a cross-sectional postal survey of three groups: those personnel who served in the Gulf region between September 1, 1990 and June 30, 1991 (Gulf cohort); personnel who had served in Bosnia between April 1, 1992 and February 6, 1997 (Bosnia cohort); and personnel who were serving in the Armed Forces on January 1, 1991 but who were not deployed to the Gulf conflict ("Era" cohort). Special Forces were excluded for security reasons. The final sample was a random stratified sample of 4,250 who served in the Gulf. For comparison cohorts, 4,250 service personnel deployed in Bosnia and 4,246 nondeployed but "Era" service personnel were selected. Full details of the questionnaire, the methods of data collection, efforts made to trace, and the detailed analysis of responders and nonresponders are contained in the full report of the phase 1 study.[12] To summarize, taking into account undelivered questionnaires, the Phase 1 survey had an effective response rate of 70.6%. The most common reason for nonresponse was failure to identify a final valid address for participants. Full details of all outcome measures are contained in the final study reports.[12,13]

Statistical Analysis

For the purposes of our analysis, we generated the following variables from the original data set. A composite variable labeled "post-traumatic stress reaction" (PTSR) was created for questions asked at phase 1. This consisted of seven symptoms of post-traumatic stress disorder (PTSD) taken from the Mississippi Scale[15] shown in Table I. A cutoff of 3 or more was used to decree "psychiatric caseness" on the 12-item General Health Questionnaire (GHQ).[16] Odds ratios along with their 95% confidence intervals are reported both unadjusted and after adjusting for potential confounders with logistic regression.

For the purposes of case-control comparisons, heavy drinkers were classified as those who reported to be drinking >30 units a week and light drinkers were classified as those who drank <21 units. We chose the cutoff of >30 units as a proxy measure of heavy drinking, since it is unambiguously in excess of the recommended limits for men. Females were excluded from the study because the small numbers in the above samples precluded meaningful analysis. We report a cross-sectional analysis of the factors associated with heavy drinking at stage 1 of the above survey.

TABLE I

DIAGNOSIS OF THE PTSR

	Symptom
1) Intrusive thoughts:	Distressing dreams
2) Avoidance: at least one of:	Feeling distant or cut off from others.
3) Arousal: at least one of:	Avoiding doing things/situations.
	Feeling jumpy/easily startled.
	Sleeping difficulties.
	Increased sensitivity to noise.
4) Irritability:	Irritability/outbursts of anger.
5) Associated behaviors (two or more required)	Feeling unrefreshed after sleep.
	Fatigue.
	Intolerance to alcohol.
	Forgetfulness.
	Loss of concentration.
	Loss or decrease in appetite.
	Loss of interest in sex.

Subjects had to endorse at least one symptom in each of the first four groups, plus two of the associated symptoms listed in 5).

Analysis was undertaken using the statistical software program (STATA version 8.2). Statistical significance was defined at the $p < 0.05$ level. For categorical variables, χ^2 tests were used to determine statistical significance. Odds ratios are recorded with 95% confidence intervals. For continuous variables, an independent t test was used to compare means. Those variables deemed a priori to have an effect on drinking were controlled for in a logistic regression analysis.

Characteristics of Heavy Drinkers

Heavy drinkers were more likely than light drinkers to have never been married or to be separated, divorced, or widowed (Table II). Current smoking was strongly associated with heavy drinking, as was a previous history of smoking. Heavy drinkers were less likely to have left the military at the time of interview. Those in the Army were more likely to be heavy drinkers than those in the other armed services, although adjustment for confounders rendered this finding nonsignificant. Those who served in Bosnia were more likely to be cases than those who served in the Gulf or who were not deployed (Era), although this difference may be partly accounted for by the fact that the Bosnia group was on average younger, as the effect reduces when adjusted for other factors. Those of higher ranks were less likely to be heavy drinkers, although this difference was not sustained after adjusting for confounders, again suggesting that it might be a function of increased age in officers. Employment status (after leaving), regular or reservist, and educational level before enlistment did not emerge as statistically significant factors in this analysis.

In terms of mental health, heavy drinkers appeared to have slightly poorer psychological health as measured by the GHQ, slightly higher scores on the PTSR scale, and were more likely to be a PTSR case. Their health perception was also slightly lower and they reported more physical symptoms although these did not reach statistical significance (Table III).

TABLE II

DEMOGRAPHICS OF HEAVY AND LIGHT DRINKERS IN THE MILITARY

Variable	Heavy Drinkers at Stage 1 (defined as those drinking >30 units/week) $n = 404$[a] No.	%[c]	Light Drinkers at Stage 1 (defined as those drinking <21 units/week) $n = 6{,}972$[a] No.	%[c]	Odds Ratio (95% confidence interval)	Adjusted Odds Ratio (95% confidence interval)[b]
Marital status						
Married or cohabiting	141	35.9	4,844	76.6		
Never married	195	49.6	967	15.3	6.9 (5.5–8.7)[d]	5.8 (4.4–7.5)[d]
Separated, divorced, or widowed	57	14.5	513	8.1	3.8 (2.8–5.2)[d]	3.9 (2.8–5.4)[d]
Rank						
Private soldiers	127	33.3	1,268	20.9		
Noncommissioned officers	226	59.2	4047	66.8	0.6 (0.4–0.7)[d]	1.0 (0.7–1.3)
Officers	29	7.6	748	12.3	0.4 (0.3–0.6)[d]	1.0 (0.6–1.5)
Regular or Reservist						
Regular	391	97.8	6,233	97.7		
Reservist	9	2.3	149	2.3	1.0 (0.5–1.9)	
Serving group						
Gulf	112	28.0	2,377	37.2		
Bosnia	193	76.3	1,883	29.5	2.2 (1.7–2.8)[d]	1.3 (1.0–1.8)[e]
Era	95	23.8	2,132	33.4	1.0 (0.7–1.3)	1.1 (0.8–1.5)
Service arm						
Army	359	89.8	5,050	79.0		
Navy	17	4.3	494	7.7	0.5 (0.3–0.8)[e]	0.7 (0.4–1.2)
RAF	24	6.0	847	13.3	0.4 (0.3–0.6)[d]	0.8 (0.5–1.2)
Educational level						
Up to O level	51	20.3	1,417	22.2		
O level	251	62.8	3,708	58.0	1.2 (0.9–1.5)	
A level	51	12.8	822	12.9	1.1 (0.8–1.6)	
Degree and beyond	17	4.3	444	7.0	0.7 (0.4–1.1)	
Age	30.1 (SD 7.2) $n = 400$		33.8 (7.2) $n = 6{,}392$			
	$df = 6790$, $t = 10$[d]					
Still in the military						
Yes	280	72.2	3,976	63.2		
No	108	27.8	2,317	36.8	0.7 (0.5–0.8)[d]	0.7 (0.6–1.0)[e]
Employment Status						
Employed	370	94.9	5,986	95.6		
Unemployed	20	5.1	277	4.4	1.2 (0.7–1.9)	
Smoking status						
Nonsmoker	108	27.1	2,665	42.1		
Smoker	210	52.8	2,146	33.9	2.4 (1.9–3.1)[d]	2.5 (1.9–3.3)[d]
Ex-smoker	80	20.1	1,524	24.1	1.3 (1.0–1.7)	1.6 (1.2–2.3)[f]

[a] Column totals may not add up to 404 and 6,972 due to missing data.
[b] Adjusted for rank, marital status, service arm, smoking status, age, military status, and serving cohort (i.e., Gulf, Bosnia, Era).
[c] Column totals may be >100% because of rounding up percentages to one decimal place.
[d] $p \leq 0.0001$.
[e] $p < 0.05$.
[f] $p \leq 0.001$.

Discussion

Marital Status

A strong relationship emerged between marital status and drinking, even after controlling for other variables, including age. This finding is not unique to the military.[17] Our study, in common with the civilian literature,[18] suggests that marriage appears to protect against heavy drinking and also against increases in drinking. A change in marital status (from being married to divorced, separated, or widowed) appears also to be a risk factor for the commencement of heavy drinking.[18] This knowledge may allow targeting of appropriate psychoeducation

TABLE III

THE HEALTH OF HEAVY AND LIGHT DRINKERS IN THE MILITARY

Variable	Heavy Drinkers at Stage 1 (defined as those drinking >30 units/week) $n = 404$[a] No.	%[c]	Light Drinkers at Stage 1 (defined as those drinking <21 units/week) $n = 6{,}972$[a] No.	%[c]	Odds Ratio (95% confidence interval)	Adjusted Odds Ratio (95% confidence interval)[b]
GHQ case						
Non-case	265	69.9	4,264	68.9		
Case	114	30.1	1,926	31.1	1.0 (0.76–1.2)	
GHQ score	2.5 (SD 3.5) $N = 379$		2.3 (3.3) $N = 6{,}190$			
	$df = 6{,}752$, $t = -0.1$					
PTSR case						
Non-case	354	88.9	5,849	92.0		
Case	44	11.1	507	8.0	1.4 (1.0–2.0)[d]	1.2 (0.9–1.7)
PTSR score	1.8 (SD 1.8) $n = 398$		1.7 (1.7) $n = 6{,}356$			
	$df = 6{,}752$, $t = -1.7$					
Believes he has Gulf War Syndrome						
No	128	78.1	2,379	78.1		
Yes	27	16.5	427	14.0	1.2 (0.8–1.8)	
Don't know	9	5.5	241	7.9	0.7 (0.4–1.4)	
Sum score for fatigue	2.7 (SD 3.4) $n = 376$		2.9 (3.6) $n = 6{,}154$			
	$df = 6{,}528$, $t = 0.9$					
Health perception (SF-36)	70.00 (SD 24.2) $n = 397$		71.24 (SD 23.8) $n = 6{,}352$			
	$df = 6{,}747$, $t = 1.0$					
Symptom score	8.4 (SD 7.0) $n = 376$		7.7 (SD 8.4) $n = 6{,}146$			
	$df = 6{,}520$, $t = -1.39$					

[a] Column totals may not add up to 404 and 6,972 due to missing data.
[b] Adjusted for rank, marital status, service arm, smoking, age, pt military status, and serving cohort (i.e. Gulf, Bosnia, Era).
[c] Column totals may be >100% because of rounding up percentages to one decimal place.
[d] Value of $p < 0.05$.

and monitoring for personnel in the Armed Forces, as those most at risk can be identified. Recent media reports have claimed that rates of divorce in the U.K. Armed Forces have risen dramatically in the past decade, particularly in the Navy,[19] and a recent report suggests that relationship difficulties are particularly a problem in those returning from service in Iraq.[20]

Staying in the Military

It is also interesting to note that staying in the military is associated with a risk of increased heavy drinking compared to those who leave, given that those who are still serving are more likely to underreport their consumption than those who have left for the reasons described above—this is a significant finding. Aside from the cultural reasons described above, it may also be that those who choose to drink heavily while in service differ from light drinkers, and are more likely to stay in the military because they are more institutionalized within military culture. We have shown in previous studies that the risk of heavy drinking extends in postservice life for vulnerable leavers. Alcohol dependence was one of the most common diagnoses in a recent study of U.K. veterans.[21]

Peacekeeping

It is interesting to note that those who had served in Bosnia were more at risk of heavy drinking at the time that the questionnaire was completed than those who had served in the Gulf or those who were in the Era group. Others have noted the special stressors associated with tours aimed at maintaining security in Northern Ireland.[22] Specifically, peacekeeping has been shown to be associated with increases in alcohol consumption; the authors of the study argue that this may be because they are exposed to dangerous, provoking, or humiliating experiences and have limited possibilities to express the resulting anger and frustrations.[23] It is well known that there were par-

ticular stressors of peacekeeping in Bosnia which were unique to that deployment. Although there was less direct combat, peacekeepers were exposed to the consequences of the civil war for prolonged periods. Many reported seeing injured, violated, and killed civilian women and children. Bosnia is also "closer to home" in that it is part of Europe; it may have been harder for service personnel to distance themselves from what they were witnessing than in other deployments outside Europe.

Mental Health

It is perhaps surprising that few health variables emerged as statistically significant in their association with heavy alcohol use, although there was general trend for heavy drinkers to have poorer psychological health. The U.S. literature suggest that in civilian samples, and in the military, the links between alcohol misuse and neurotic illness are clear. People who return from combat with depression, and particularly PTSD, are more likely to misuse alcohol than those who are psychologically well—a finding demonstrated in both Vietnam[24] and Gulf[25] veterans. In Vietnam veterans, there is also evidence of links between PTSD symptoms such as hyperarousal, heavy drinking, and marital abuse and violence.[26] It may be that the numbers were too small in our study to find these associations.

Limitations

This study is a cohort study of those who were serving in the U.K. Armed Forces at one point of time (1991) when the cohort was recruited. Although within the cohort there were individual groups which undertook different deployments, as such, it captures a "snapshot" of the military over one period of time. The research findings may not be applicable to earlier or later military cohorts. As with all studies that use retrospective data, there will be recall bias. In addition, the measures of alcohol are based entirely on self-report; we have no means of independent corroboration of people's drinking history.

It is well known that both civilian and military samples routinely underreport alcohol use in self-report questionnaires. We freely acknowledge that this bias is likely to be operating, especially in our survey, which some participants may have seen as being linked to "officialdom" such as the Ministry of Defence. Although the response rates were good for the study, it is possible that the severely socially excluded members (e.g., homeless) of the cohort have been missed.

Conclusions

Many questions remain unanswered about the use of alcohol in the military. Of particular interest in the future will be the crucial question of whether there is anything unique about the use of alcohol in the military in comparison to other occupational cohorts of young men, a question which is difficult to answer at this time because the data we have are limited. These analyses have been useful for the research team in hypothesis generating and the results have helped us shape key questions in our subsequent studies of more recent deployments (currently under way). Future studies currently being planned and undertaken by our team include more detailed questions about patterns of alcohol use (The Alcohol Use Disorders Identification Test[27]) seated within a much larger prospective survey of military personnel; this data will allow us to model which factors are associated with changes in drinking over time (including deployments), as well as allowing us to make direct comparisons with age-matched civilian groups.

For the moment, where does this leave us? The U.K. Armed Forces of today are well aware of the effect of alcohol misuse on operational effectiveness and personnel well-being and they are also aware that, as with civilian society, rates of heavy and binge drinking are likely to be increasing among its personnel. Indeed, alcohol research and policy change is a priority for the U.K. military at the present time, as it is for civilian government and civilian employers.

The real problem for both civilian agencies and the military is what, if anything, can be done to mitigate the high levels of alcohol consumption in young men, and if resources are to be targeted, how to target these to those most at risk. To date, there is no convincing evidence for any intervention aimed at an occupational group to reduce harmful drinking; the only trial reported in the literature to date did not influence consumption in the Australian police force.[28]

An additional concern for the military as an employer with a duty of care is whether specific aspects of military culture might unwittingly encourage heavy drinking. The military acknowledge at times the special culture of their organization can sometimes confuse occasion, friendship, and celebrating with excess drinking. They also recognize that "the military family" plays an important role in loco parentis for younger soldiers, and hence senior members of the chain of command are potent role models.

The British Army has policies and clear guidance for the chain of command on the use of alcohol. As well as official policy guidance, a number of unofficial policies have grown up as ways of helping commanders to moderate alcohol consumption: for example, the "two can" rule (two cans of beer per night) used at times by commanders during peacekeeping operations in Bosnia. Important cultural shifts have also occurred in the past decade; alcohol is no longer offered at lunchtime during working days, happy hours in bars are discouraged, and alcohol is no longer given as a prize or reward. A recent review has also highlighted the importance of the effect of "hangover" on performance; and the health and occupational consequences of impaired functioning "the morning after."[29]

What does this article add? This analysis suggests that certain groups appear to be particularly vulnerable to heavy drinking and this knowledge may help in targeting resources. Current U.K. Armed Forces policy focuses on alcohol use from a disciplinary perspective and where an alcohol problem is admitted there is a duty of care to intervene; it does not cover the causes of heavy drinking or flag up those most at risk.

Our previous studies suggest that stigma is a major reason for service personnel with alcohol and other mental health problems not seeking help in service; therefore, a culture of openness and unambiguous guidance for the chain of command which encourages people to come forward if they are experiencing difficulties is to be encouraged. It is also important to acknowledge the importance of senior members of the chain of command as role models for junior staff and recruits; visibility of senior staff and modeling of sensible drinking at social events may be important in this respect. Other inter-

ventions which may be important are increasing the price of alcohol, and the provision of alternative evening activities such as sport or (dry) Internet cafes to enable personnel to socialize in an alcohol-free environment.

In any debate about alcohol and occupational groups, the question of screening is inevitably raised.[30] Might it be possible to screen for a propensity to alcohol problems in new recruits and if so would this be useful? Evidence suggests that it is difficult to predict who will prove to be an effective member of a fighting force. A recent U.S. study from the 1991 Persian Gulf War demonstrated that soldiers who had previous alcohol problems and had undertaken a treatment program who were then deployed did very well; over half of them were recommended for awards, and few in this group were recommended for discharge afterward.[31] Thus, removal of such individuals from a deployable role would be a waste of valuable manpower.

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