



Short communication

Cigarette and alcohol use in the UK Armed Forces, and their association with combat exposures: A prospective study

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ABSTRACT

Retrospective studies of military personnel and survivors of community disasters suggest a link between traumatic exposure and substance use. This is the first study to investigate this association prospectively in a military population. A representative cohort of members of the UK Armed Forces was recruited into a longitudinal study, with 1382 people surveyed at baseline, and 941 followed up around three years later. Alcohol and cigarette use were assessed on both occasions, and combat exposures during this time were assessed at follow-up. Alcohol consumption and the prevalence of binge-drinking increased over the course of the study. The increase in alcohol consumption was greater in those subjects who had been deployed, in particular in those who thought they might be killed ($p=.010$), or who experienced hostility from civilians while on deployment ($p=.010$). The effects of these combat exposures were strongest in those most recently deployed. In contrast, cigarette smoking declined during the three years of the study.

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1. Introduction

Studies of community disasters have documented increases in alcohol consumption and smoking (e.g. Vlahov et al., 2004). In military populations combat and deployment have been found to be associated with alcohol dependence and heavy drinking (Bray et al., 2006), but not smoking (Beckham et al., 1995). Military studies have tended to rely on assessment at one point in time following exposure (Vlahov et al., 2004; Beckham et al., 1995; Bray et al., 2006), though members of the Armed Forces are at a high risk of exposure to hazardous environments, making a prospective study particularly appealing.

In 2002 we surveyed alcohol and cigarette use in the UK Armed Forces (Rona et al., 2004). Roughly three years later a second survey of the same cohort was carried out. In the interim a proportion of the participants went on deployments, many of them to Iraq. Here we look at how alcohol and cigarette use changed over time in this cohort, and their relation to combat exposures. We hypothesised that traumatic experiences in combat or on deployment would be associated with increases in alcohol consumption and cigarette smoking.

2. Method

2.1. Subjects

For the initial survey in 2002, a random sample was selected from each Service of the UK Armed Forces (Rona et al., 2004). 2246 subjects were given a questionnaire which included an assessment of alcohol and cigarette use, and 1382 (61.5%) responded. For

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Table 1
Deployments and combat exposures between baseline and follow-up

	Deployment group							
	Era-not deployed		Era deployed		TELIC 1		TELIC 2	
	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)	<i>n</i>	(%)
Total	505	(100)	106	(100)	171	(100)	159	(100)
<i>Combat exposures:</i>								
Did you –								
Discharge your weapon in combat?			5	(4.7)	19	(11.1)	13	(8.2)
Ever think you might be killed?			30	(28.3)	75	(43.9)	72	(45.3)
See personnel wounded or killed?			23	(21.7)	54	(31.6)	44	(27.7)
Handle bodies?			7	(6.6)	17	(9.9)	9	(5.7)
Give aid to wounded?			11	(10.4)	22	(12.9)	18	(11.3)
Come under small arms fire?			14	(13.2)	43	(25.1)	39	(24.5)
Come under mortar fire?			5	(4.7)	69	(40.4)	57	(35.8)
Experience a landmine strike?			4	(3.8)	4	(2.3)	5	(3.1)
Experience hostility from civilians?			38	(35.8)	59	(34.5)	74	(46.5)

the follow-up survey we approached all responders at baseline for whom contact details were available ($n = 1359$). Participants had at least three opportunities to complete the questionnaire. Ethical approval for the initial survey was obtained from the Defence Medical Services ethics committee, and for the follow follow-up survey from the Ministry of Defence (Navy) and King's College Hospital ethics committees.

2.2. Alcohol and cigarette use

Alcohol intake was reported in categories of frequency of consumption and units of alcohol consumed on each occasion. From this we calculated a conservative value for the number of units consumed per week by each subject. We defined binge-drinking as drinking on at least 2 days per week and consuming at least 7 units per drinking day. With regard to smoking, subjects were asked whether they smoked now, and if yes, how many on average.

2.3. Deployment and combat exposures

On the follow-up questionnaire, subjects were asked about major deployments since 2000 and combat exposures (see Table 1). Exposures were counted only if they occurred after the date we received the baseline questionnaire. If a subject did not respond to a question on exposure he/she was assumed not to have been exposed. For those who were deployed we calculated the time between exiting theatre and completing the follow-up questionnaire.

We knew the most common deployment would be to Iraq, code-named Operation TELIC in United Kingdom. Those deployed between 18 January and 28 April 2003 belonged to TELIC 1; those deployed afterwards to TELIC 2 or later. Those not deployed to Iraq formed the "Era" group which was subdivided into those who were deployed elsewhere ("Era deployed") and those who were not ("Era not deployed").

2.4. Data analysis

We looked at changes in prevalence of binge-drinking and current smoking using McNemar tests, and changes in alcohol consumption in units per week and number of cigarettes or cigars smoked per day using paired *t*-tests. To test whether exposures affected these changes, adjusting for confounding variables, we used fixed effects logistic and linear regression analyses to look for interactions between time and exposure. As combat exposures were closely associated with each other, we looked at the effect of each without adjusting for the others. Where there was evidence of an effect of a combat exposure we looked for an interaction with deployment group, or with time since exiting theatre adjusting for deployment group. Analyses were done using Stata 9 (Stata Corporation, College Station, Texas USA).

3. Results

941 (69.2%) subjects responded at baseline and follow-up. Those who were followed up had a similar distribution of sex, rank and Service to those who were not, and to the Armed Forces as a whole, but those who were followed up were slightly older at baseline. Table 1 shows percentages of subjects by deployment group and combat exposures. Exposures were generally less common in the Era-deployed group than in those deployed to Iraq.

3.1. Changes in alcohol consumption and cigarette use

Subjects at baseline ($n = 1382$) reported drinking 14.6 units of alcohol a week on average; 42.5% of them were classified as binge drinkers; 28.1% were smokers; and the mean number of cigarettes smoked per day was 4.3. Among those who were followed up,

Table 2

Changes in alcohol consumption and smoking from baseline to follow-up (figures are for those subjects with data both at baseline and at follow-up)

	Baseline	Follow-up	Change	(95% CI)	<i>p</i>	No. (%) with data on both occasions
Binge-drinking (%)	41.4	45.9	4.6	(1.1 to 8.0)	.009 ^a	921 (97.9)
Alcohol consumption in units per week (mean)	13.6	15.2	1.6	(.6 to 2.6)	<.001 ^b	921 (97.9)
Current smoking (%)	27.8	23.1	-4.6	(-6.9 to -2.4)	<.001 ^a	929 (98.7)
<i>Number of cigarettes</i>						
Smoked per day (mean):						
Smokers only	15.1	15.0				
Full sample	4.2	3.4	-.7	(-1.1 to -.4)	<.001 ^b	927 (98.5)

^a McNemar test.^b From paired *t*-test.

average alcohol intake and cigarette use at baseline were slightly lower (Table 2). Alcohol consumption and binge-drinking increased over time, but smoking declined (Table 2).

3.2. Effects of deployment and combat exposures

Confidence intervals for effects of exposures on changes in prevalence of current smoking and binge-drinking were generally wide, and did not show evidence of any association (results not shown). There was no evidence that deployment and combat exposures were associated with a change in number of cigarettes smoked (Table 3). The increase in alcohol consumption was greater in those who were deployed ($p=.043$), though there were not significant differences between the four deployment groups (Table 3). The increase in alcohol consumption was greater in those who thought they might be killed ($p=.010$) or who experienced hostility from civilians ($p=.010$). There was an interaction between experiencing hostility from civilians and the time since exiting theatre ($p=.039$) which was still significant after adjusting for the effect of thinking you might be killed ($p=.049$; Table 4). Experiencing hostility from civilians added an average of 6.1 units a week to alcohol consumption on exiting theatre, but with each year that passed this was reduced by 2.8 units a week (Table 4).

4. Discussion

Alcohol consumption and binge-drinking in the UK Armed Forces both increased during the study period. Baseline levels of drinking in the UK Armed Forces were higher than in the general population (Office for National Statistics, 2007) (Fig. 1), as also shown in cross-sectional analyses in the UK and the US (Fear et al., 2007; Bray et al., 2006). The increase in alcohol consumption was greater in those who had been deployed, especially in those who thought they might be killed and those who experienced hostility from civilians, but overall cigarette smoking declined. Results from a larger cross-sectional study carried out alongside our follow-up also showed associations between aspects of deployment and alcohol consumption (Browne et al., 2008).

Table 3

Effects of combat exposures on the change in alcohol consumption and cigarette smoking from baseline to follow-up: results of multiple regression analysis

	Alcohol (units/week)			Cigarettes smoked per day		
	Regression coefficient ^a	(95% CI)	<i>p</i>	Regression coefficient ^a	(95% CI)	<i>p</i>
Deployment group:			.19			.76
Era – not deployed	.0			.0		
Era – deployed	2.4	(-1.4 to 5.6)		.3	(-.9 to 1.6)	
TELIC 1	1.4	(-1.9 to 4.1)		-.3	(-1.4 to .8)	
TELIC 2 or later	2.8	(-.1 to 6.0)		-.4	(-1.5 to .7)	
Any deployment	2.2	(.1 to 4.3)	.043	-.2	(-1.0 to .6)	.70
<i>Combat exposures:</i>						
Did you –						
Discharge your weapon in combat?	.5	(-4.7 to 5.8)	.85	.5	(-1.5 to 2.5)	.62
Ever think you might be killed?	3.4	(.8 to 6.0)	.010	.4	(-.6 to 1.4)	.44
See personnel wounded or killed?	2.4	(-.7 to 5.4)	.13	.7	(-.4 to 1.9)	.22
Handle bodies?	-.9	(-6.3 to 4.5)	.75	-1.2	(-3.3 to .9)	.26
Give aid to wounded	1.5	(-3.0 to 5.9)	.52	.4	(-1.3 to 2.1)	.67
Come under small arms fire?	.6	(-2.7 to 4.0)	.71	1.2	(-.1 to 2.5)	.076
Come under mortar fire?	1.6	(-1.3 to 4.6)	.28	.1	(-1.0 to 1.3)	.83
Experience a landmine strike?	1.7	(-6.8 to 10.2)	.70	2.1	(-1.1 to 5.4)	.20
Experience hostility from civilians?	3.5	(.8 to 6.2)	.010	.3	(-.8 to 1.3)	.63

^a Effects are adjusted for age, sex, Service and rank, but not for other variables in the table.

Table 4

Effects of deployment category, experiencing hostility from civilians, thinking you might be killed, time since exiting theatre and demographic variables on the change in alcohol consumption from baseline to follow-up (in units per week): results of multiple regression analysis

	Regression coefficient ^a	(95% CI)	p
Constant ^b	-.9	(-3.9 to 2.2)	.58
Deployment group: Era – not deployed	.0	.94	
Era – deployed	.5	(-3.7 to 4.6)	
TELIC 1	-.8	(-4.6 to 3.0)	
TELIC 2 or later	-.1	(-3.7 to 3.6)	
Experienced hostility from civilians	6.1	(.7 to 11.4)	.026
Time since exiting theatre (years) ^c – Effect according to exposure:			-.049 ^d
Experienced hostility	-2.8	(-5.8 to .3)	
Did not experience hostility	.6	(-1.0 to 2.1)	
Thought he/she might be killed	2.0	(-1.4 to 5.3)	.25
Service: Naval Services	.0		.37
Army	-1.5	(-4.1 to 1.2)	
RAF	-2.0	(-4.9 to .9)	
Female sex	-.3	(-4.1 to 3.6)	.89
Officer	1.7	(-1.0 to 4.4)	.22
Age (per 1 yr age difference)	.2	(.1 to .3)	.010

^a Effects are adjusted for all other variables in the table.

^b Increase in alcohol consumption from baseline to follow-up for a 20-year-old male serviceman in the Naval Services, ranked below officer, who was not deployed.

^c Time set to zero for the Era not deployed group.

^d *p*-value for interaction between experiencing hostility from civilians and time since exiting theatre.

Problem use of alcohol has been found to be associated with PTSD (Brown & Wolfe, 1994); however, our cohort had relatively few people with PTSD symptoms, and excluding them made no qualitative difference to our results, showing that they were not PTSD mediated.

Smoking was less prevalent in the UK Armed Forces than in the general population (Fig. 1), and after three years the people we followed up were smoking less. This is unexpected, as lower ranks are recruited from lower socioeconomic groups, and a military environment has been thought to encourage smoking (Schei & Sogaard, 1994; Joseph et al., 2005), though the harmful effects of smoking on cardio-respiratory fitness are probably well appreciated in a profession where fitness is important. People who smoked more at follow-up may have been more likely to drop out of the study, of course. Certainly, in common with other prospective studies, the main limitation of our study was attrition. This is expected from a young, mainly male, highly mobile population in which a large proportion serves for a short period of time.

In conclusion, we have shown prospectively that alcohol use in the UK military increased following traumatic exposures, though this increase was not maintained over time. Overall, alcohol use increased over time but cigarette use fell. Heavy drinking persists in the Services, but the experiences of deployment may make some contribution to this.

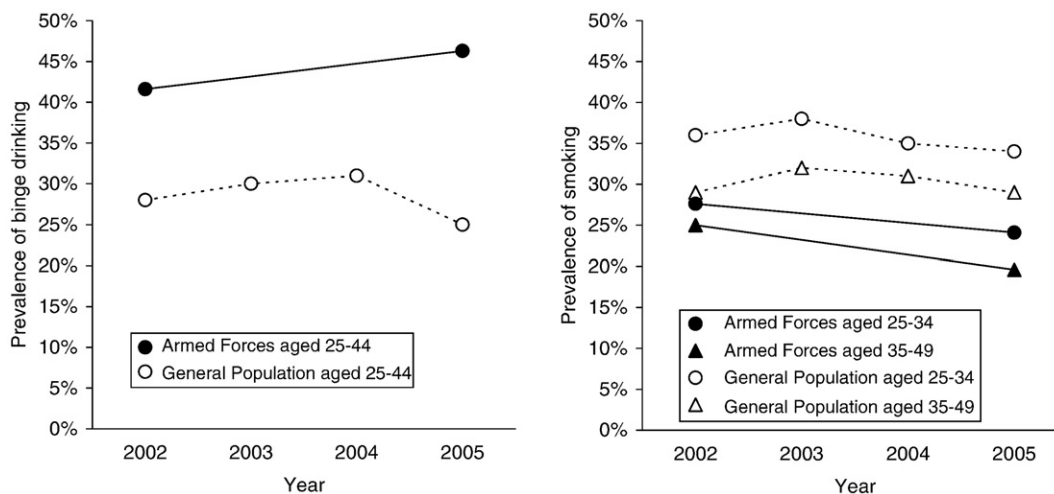


Fig. 1. Prevalence of binge-drinking and smoking in male military personnel and in the male general population over time. (Age groupings are those used to report national statistics. Binge-drinking was defined as drinking seven or more units of alcohol a day on at least two days a week for servicemen, or drinking more than eight units on at least one day a week for the general population. Note that the follow-up results for servicemen are plotted at 2005, but follow-up surveys were actually conducted between June 2004 and March 2006.)

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