



Exploring patterns of alcohol misuse in treatment-seeking UK veterans: A cross-sectional study

Dominic Murphy^{a,b}, David Turgoose^{a,*}

^a Combat Stress, Leatherhead, UK

^b King's Centre for Military Health Research, King's College London, UK



HIGHLIGHTS

- Veterans seeking help for mental health difficulties report high levels of hazardous alcohol misuse.
- Veterans had different patterns of alcohol misuse from the general Armed Forces population, reporting more dependence and alcohol-related harm.
- They also reported higher levels of overall alcohol misuse than the general public.
- Being younger, single, in employment and having mental health difficulties was associated with greater alcohol misuse.
- Being older and not in work were related to reduced alcohol misuse.

ARTICLE INFO

Keywords:

Veterans
Alcohol
Military
Alcohol misuse
Mental health

ABSTRACT

Aims: To explore patterns of alcohol misuse in a sample of treatment-seeking veterans compared to the UK Armed Forces personnel population and the general public. Furthermore, the present study investigated which variables were associated with alcohol misuse in this sample, and in particular what factors were associated with increased or decreased severity of alcohol misuse.

Method: The present study investigated alcohol misuse in treatment-seeking veterans and compared it with the UK Armed Forces and the general public. In addition, it explored associations between sociodemographic, physical health and mental health variables and alcohol misuse.

Results: Results suggested that treatment-seeking veterans report different patterns of alcohol misuse compared to the UK Armed Forces and the general public. This group was more likely to report alcohol dependence and alcohol-related harm. They also reported higher levels of overall alcohol misuse than the general public. Mental health problems including PTSD, anxiety and depression, as well as anger, functional impairment and being single were all related to greater alcohol misuse. Being older and not in work were related to reduced alcohol misuse.

Conclusions: These findings add further weight to the importance of ensuring appropriate support is provided to personnel leaving the Armed Forces. Treatment-seeking veterans have specific patterns of alcohol-related needs that should be addressed. Knowing more about the common alcohol-related problems in this group can help inform and improve mental health interventions. Findings on related variables will help in identifying those individuals who may be at most risk of alcohol-related problems.

1. Introduction

Harmful alcohol consumption has been linked to a range of health and social difficulties, with excessive alcohol intake being a leading cause of disability in the UK (World Health Organisation; WHO, 2010). Alcohol misuse is often associated with a range of common mental health disorders (Grant, Stinson, Dawson, et al., 2004). Evidence also

suggests that alcohol is linked to antisocial behaviour (Office for National Statistics; ONS, 2015) and fatal road traffic accidents (Department of Transport, 2015).

Rates of alcohol misuse in the UK Armed Forces are higher than the general public (Henderson, Langston, & Greenberg, 2009; Hooper et al., 2008). In a cohort study of nearly 10,000 military personnel, 13% reported alcohol misuse (Head et al., 2016). The same study reported that

* Corresponding author.

E-mail addresses: dominic.murphy@combatstress.org.uk (D. Murphy), david.turgoose@combatstress.org.uk (D. Turgoose).

<https://doi.org/10.1016/j.addbeh.2018.11.044>

Received 4 July 2018; Received in revised form 5 November 2018; Accepted 28 November 2018

Available online 29 November 2018

0306-4603/ © 2018 Elsevier Ltd. All rights reserved.

45% of military personnel with probable Post-Traumatic Stress Disorder (PTSD) had a co-occurring problem with alcohol misuse. The connection between alcohol misuse and PTSD and other common mental health disorders is well established (Murphy, Ashwick, Palmer, & Busuttill, 2017; Thandi, Sundin, Knight, et al., 2015). Further evidence suggests that alcohol misuse persists beyond military service, with prevalence rates for alcohol misuse higher in military veterans than the general public (Craig, Fuller, & Mindell, 2015; Fear, Iversen, Meltzer, et al., 2007).

A similar picture is emerging in veterans who are seeking support for mental health problems, with one recent study of treatment-seeking UK veterans observing that 43% reported problems with alcohol misuse, and that alcohol misuse was commonly reported to be comorbid alongside PTSD, common mental health difficulties like anxiety and depression, and problems with anger (Murphy et al., 2017). Research also suggests high rates of comorbidity between mental health problems like PTSD and alcohol misuse in treatment-seeking US veterans (Jakupcak et al., 2010; Smith, Goldstein, Bridget, & Grant, 2016).

Evidence suggests that having problems with alcohol is associated with poorer long-term PTSD treatment response (Murphy, Palmer, Westwood, Busuttill, & Greenberg, 2016). Alcohol misuse can also have an impact on treatment utilisation, with treatment-seeking veterans with alcohol problems attending fewer mental health visits and being more likely to have a negative perception of mental health treatment when alcohol misuse is comorbid with depression or PTSD (Elbogen, Wagner, Johnson, et al., 2013). It is therefore important to further our understanding of alcohol misuse in veterans who are accessing support for mental health difficulties.

In order to investigate alcohol misuse in treatment-seeking veterans, the present study used a comprehensive survey to investigate alcohol misuse in a sample of veterans who were receiving treatment from a specialist UK veterans mental health charity. Participants completed questionnaires exploring harmful alcohol use, as well as a range of physical health, mental health and sociodemographic variables. The aim was to explore patterns of alcohol use in a sample of treatment-seeking veterans compared to the UK Armed Forces personnel population and the general public. Furthermore, the present study investigated which variables were associated with alcohol misuse in this sample, and in particular what factors were associated with increased or decreased severity of alcohol misuse.

2. Method

2.1. Setting

Participants were recruited from Combat Stress (CS), a national charity providing specialist mental health services to military veterans, which receives referrals from a variety of sources (e.g. GPs, NHS, charities, self-referrals). Veterans from across the UK receive treatment from CS. CS receives approximately 2500 new referrals per annum (Murphy, Weijers, Palmer, & Busuttill, 2015).

2.2. Participants

Data for the present study was taken from a study investigating the wider needs of help-seeking veterans (Murphy et al., 2017). Participants were randomly sampled from a population of veterans who had sought support from CS over a 12-month period, between 31st January 2015 and 1st February 2016. The sample was drawn from the total number of veterans who had attended an initial assessment and at least one further appointment during this period ($N = 3335$). The randomisation process involved assigning a randomly generated number to the entire population of CS veterans, then placing them in chronological order. From this group, the top 20% was taken ($N = 667$), 67 of whom were removed prior to data collection either due to participant death or

not having sufficient contact information. The final sample size was 600. Of these, 403 (67%) were recruited into the study and completed the measures. Demographic factors associated with responding were assessed. After adjustment, the only factor associated with responding was age, with participants over 45 years being more likely to respond than younger veterans (Murphy et al., 2017).

2.3. Primary outcomes

Data on alcohol use was collected using the Alcohol Use Disorders Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). This ten-item measure gives an overall score to assess alcohol-related risk. Scores of 0–7 indicate no harmful consumption. Hazardous drinking is indicated by a score of 8–15, while harmful drinking/mild dependence by scores of 16+ (Babor et al., 2001).

AUDIT scores are further broken down into three domains: *Hazardous Consumption* (score of 4+ for women and 5+ for men), comprising three items, e.g. 'How often do you have six or more drinks on one occasion?'; *Alcohol Dependence* (score of 4+), comprising three items, e.g. 'How often during the last year have you found that you were not able to stop drinking once you had started?'; and *Alcohol-related Harm* (score of 4+), comprising four items, e.g. 'Have you or someone else been injured because of your drinking?'. The AUDIT has been used previously in military samples (Rona et al., 2010).

2.3.1. Demographics

Participants were given an eight-page questionnaire which, as well as the AUDIT, included questionnaires relating to sociodemographic variables (e.g. age, sex, relationship and employment status); childhood adversity, physical health, PTSD and common mental health difficulties. Childhood adversity was examined using items taken from an epidemiological study of health and well-being in the UK military (Iversen, Fear, Simonoff, et al., 2007), whereby participants rated 16 true or false statements relating to events from childhood, e.g. 'I regularly used to see or hear physical fighting or verbal abuse between my parents'.

2.3.2. Physical health

Physical health difficulties assessed included Body Mass Index (BMI), defined using national standards of healthy (18–24.9), overweight (25–29.9) and obese (30+). Participants were also asked whether they were smokers or used other substances. Traumatic brain injury (TBI) was measured using the Brain Injury Screening Index (Pitman, Haddlesey, Ramos, Oddy, & Fortescue, 2014), whereby participants rated a series of questions related to head injuries to assess for mild to severe TBI. A checklist of fourteen common physical health difficulties was taken from a National Health Service screening tool.

2.3.3. Mental health

A number of mental health outcomes were used. PTSD was measured using the PTSD Checklist (PCL-5; Weathers et al., 2013); a validated, 20-item measure assessing all domains of PTSD. Common mental health difficulties were assessed using the 12-item General Health Questionnaire (GHQ-12; Goldberg & Williams, 1998), and difficulties with anger using the five-item Dimensions of Anger Reactions measure (DAR-5; Forbes, Alkemade, Mitchell, et al., 2014). Additionally, the Work and Social Adjustment Scale (WSAS; Mundt, Marks, Shear, & Greist, 2002) was used as a basic measure of functional impairment.

2.4. Procedure

A cross-sectional design was used, with questionnaire responses collected between April and August 2016. The questionnaire contained instructions informing participants that participation was not compulsory, and that the research was being conducted independently from clinical services at CS, so would not affect their treatment in any way.

Questionnaires were sent to participants in the post using a three-wave mail out strategy. Individuals from whom a response was not received were followed up by telephone, provided they had not opted out. A research assistant made three attempts to contact these individuals by telephone.

2.5. Analysis

Analyses relating to alcohol use were restricted to male veterans only, as there was only a modest number of females in the sample ($N = 17$), and previous data has shown marked differences in drinking habits between female and male military personnel (Fear et al., 2007). Differences in rates of alcohol use between females and males have been found in treatment-seeking veterans (Murphy et al., 2017). However, there was not a sufficient number female participants in the current sample to conduct stratified analyses.

AUDIT scores from the current sample were compared with military sample data from Fear et al. (2007) and the general population using data from the Adult Psychiatric Morbidity Survey (McManus, Bebbington, Jenkins, & Brugha, 2016). Chi-square analyses were performed to examine differences in alcohol use according to AUDIT subscales between the veteran and military samples. Participant-level data for the general public sample was not available for this analysis. Logistical regression models were fitted to explore associations between AUDIT scores of 16+ and sociodemographic, physical health and mental health variables. All analyses were conducted using STATA 13.0 (College Station, TX).

3. Results

Of the sample of 600 veterans who were sent the questionnaire, 403 (67.2%) responded. Of these, 17 were female and removed from analyses of alcohol use. Most participants were over 45 years old. Participants had served in a mix of military services (army, naval services and RAF), although the majority were in the army (86%). Just over two-thirds of participants were unemployed. More were currently in a relationship (60.8%) than not (39.2%). From height and weight measurements given, around a quarter of participants were within the average, healthy weight category, with the remaining either overweight (38.9%) or obese (36.9%). A significant minority of the sample were smokers (38.5%).

Table 1 describes levels of alcohol misuse as indicated by AUDIT scores of 8+ and 16+, as well as the number of participants reaching the threshold for hazardous consumption, alcohol dependence and

Table 1

Percentages of male treatment-seeking veterans (current study), UK Armed Forces personnel and general population personnel who scored positively for medium or high-risk drinking, hazardous consumption, alcohol dependence, alcohol related-harm, and binge drinking.

	Treatment-seeking veterans (n = 386)	Military	General public	Chi-square statistic
AUDIT scores, %				
8+	42	67	38	102.57*
16+	22	17	6	6.52*
Hazardous consumption, %				
Positive	45	86	58	461.14*
Alcohol dependence, %				
Positive	16	6	3	61.67*
Alcohol-related harm, %				
Positive	37	24	15	33.77*

Note. Military sample data taken from Fear et al., 2007. General Public data from 2007/2014 Adult Psychiatric Morbidity Survey (McManus et al., 2016).

* $p \leq .05$.

alcohol-related harm. The Chi-Square analysis suggests there were different patterns of alcohol misuse between treatment-seeking veterans and the UK Armed Forces.

More than half of treatment-seeking veterans reported levels of hazardous (AUDIT score of 8+; 42%) or harmful (AUDIT score of 16+; 22%) alcohol misuse. Both military samples reported higher levels of alcohol misuse than the general public. However, treatment-seeking veterans were more likely to report alcohol dependence and alcohol-related harm than the two comparison groups. This suggests that veterans have different patterns of alcohol use that are worth investigating further.

Table 2 describes associations between AUDIT scores of 16+, the three AUDIT sub-domains (hazardous drinking, alcohol dependence and alcohol-related harm), and sociodemographic factors for the treatment-seeking veteran sample from the present study. Of all these variables, only relationship status predicted alcohol misuse, with being single associated with a higher overall AUDIT score, hazardous consumption and alcohol dependence. Being comparatively older (in the 45–54 and 55+ years categories) was associated with lower levels of alcohol misuse. Being unemployed was related to lower levels of hazardous consumption.

Table 3 describes associations between AUDIT scores of 16+, the three AUDIT subdomains and variables relating to mental health. Meeting the diagnostic criteria for PTSD was associated with higher levels of alcohol misuse, as well as hazardous consumption and alcohol-related harm. Similarly, having problems with anger was associated with greater overall alcohol misuse, alcohol dependence and alcohol-related harm. Having a common mental health disorder such as depression or anxiety was also associated with more severe alcohol dependence. Participants showing severe levels of functional impairment were more likely to report alcohol-related harm.

Table 4 reports associations between AUDIT scores of 16+, the three AUDIT subdomains and physical health variables. Being a smoker was associated with having a higher level of alcohol misuse, as well as higher severity on all three subdomains. Being a drug user was also associated with higher overall alcohol misuse and alcohol dependence. Having a brain injury was also associated with higher overall alcohol misuse.

4. Discussion

This study investigated patterns of alcohol misuse in a sample of treatment-seeking military veterans in the UK, compared to the UK Armed Forces population and the general public. Results showed that treatment-seeking veterans and the UK Armed Forces have higher rates of alcohol misuse than the general public. However, different patterns of alcohol misuse were evident between treatment-seeking veterans and the wider UK Armed Forces population, with treatment-seeking veterans being less likely to report hazardous levels of alcohol use (e.g. binge drinking), and more likely to report having alcohol dependence and alcohol-related harm. This suggests that harmful drinking patterns are different in treatment-seeking veterans compared wider military populations as well as the general public.

A number of variables were associated with alcohol misuse, such as being single, which was associated with higher overall alcohol misuse, hazardous consumption and alcohol dependence. Being older appears to be protective, with older participants having lower levels of alcohol misuse. Similarly, being unemployed was related to lower alcohol misuse. Mental health difficulties such as PTSD, anger, depression and anxiety were all associated either with higher levels of overall alcohol misuse, or AUDIT subdomains. Furthermore, some physical health variables predicted greater alcohol misuse, such as smoking, drug use and having a brain injury.

The evidence demonstrates that there are high levels of alcohol misuse in military populations (Fear et al., 2007; Jacobson, Ryan, Hooper, et al., 2008; Pinder, Greenberg, Boyko, et al., 2012; Rona et al.,

Table 2

Sociodemographic factors associated with 16+ AUDIT scores, hazardous consumption, alcohol dependence and alcohol-related harm.

	Audit score 16+		Hazardous consumption		Alcohol dependence		Alcohol-related harm	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Age group								
< 35	13 (27.7)	1.00	25 (53.2)	1.00	10 (21.3)	1.00	25 (53.2)	1.00
35–44	25 (27.2)	1.01 (0.44 to 2.27)	55 (59.8)	1.28 (0.62 to 2.68)	18 (19.6)	0.90 (0.36 to 2.22)	44 (47.8)	0.85 (0.41 to 1.75)
45–54	20 (18.9)	0.66 (0.28 to 1.52)	46 (43.6)	0.62 (0.30 to 1.29)	13 (12.3)	0.56 (0.22 to 1.45)	38 (35.9)	0.48 (0.23 to 0.99)*
55+	25 (17.7)	0.73 (0.31 to 1.72)	46 (32.6)	0.57 (0.27 to 1.20)	19 (13.5)	0.83 (0.32 to 2.15)	37 (26.2)	0.34 (0.16 to 0.73)*
Relationship status								
In relationship	43 (16.1)	1.00	104 (39.0)	1.00	28 (10.5)	1.00	89 (33.3)	1.00
Single	40 (33.6)	2.53 (1.51 to 4.24)*	58 (57.1)	2.16 (1.36 to 3.45)*	32 (26.9)	3.20 (1.79 to 5.71)*	55 (46.2)	1.56 (0.98 to 2.47)
Employment status								
Working	30 (24.4)	1.00	70 (56.9)	1.00	20 (16.3)	1.00	50 (40.1)	1.00
Not working	16 (16.5)	0.63 (0.29 to 1.37)	27 (27.8)	0.33 (0.17 to 0.63)*	11 (11.3)	0.68 (0.27 to 1.66)	25 (25.8)	0.64 (0.33 to 1.24)
Ill not work	37 (22.3)	0.85 (0.48 to 1.51)	75 (45.2)	0.61 (0.38 to 1.00)*	29 (17.5)	1.09 (0.57 to 2.12)	69 (41.6)	1.05 (0.64 to 1.73)
Years to seek help								
< 5 years	46 (23.0)	1.00	94 (47.0)	1.00	37 (18.5)	1.00	75 (37.5)	1.00
5 years >	37 (19.9)	1.02 (0.60 to 1.75)	78 (41.2)	1.19 (0.76 to 1.88)	23 (12.4)	0.69 (0.37 to 1.28)	69 (37.1)	1.47 (0.92 to 2.34)
Early service leaver								
No	71 (20.6)	1.00	153 (44.5)	1.00	54 (15.7)	1.00	123 (35.8)	1.00
Yes	12 (28.6)	1.17 (0.55 to 2.50)	19 (45.2)	0.81 (0.40 to 1.39)	6 (14.3)	0.58 (0.22 to 1.53)	21 (50.0)	1.52 (0.76 to 3.02)

Note. OR = Odds Ratio. 95% CI = 95% Confidence Intervals. Odds Ratios adjusted for all other variables in table.

* $p \leq .05$.

2010). However, there have been comparatively few studies looking at alcohol use in veterans seeking support for mental health difficulties. This study demonstrates that not only are levels of alcohol misuse in this population higher than the general public, but are quite different from both the general public and the general UK Armed Forces population.

The association between alcohol misuse, mental health, mood disorders and PTSD has been found previously in military populations (Corrigan & Cole, 2008). Alcohol misuse is also linked to violent offending in military personnel post-deployment (MacManus, Dean, Iversen, et al., 2012), providing further support for the role of anger. Past findings in a serving military population has suggested that alcohol dependence and high AUDIT scores are associated with functional impairment (Rona et al., 2010), as was the case in the present study.

Findings in the present study that alcohol misuse is related to mental health difficulties, relationship status and smoking are supported by past research which suggested that UK military personnel were more likely to reduce alcohol misuse over time if they had a remission in psychological distress, stopped smoking, and had started a

new relationship (Thandi et al., 2015). Jointly these findings indicate a possible role for such factors in helping to identify individuals with harmful or problematic alcohol use.

5. Implications

These findings show that veterans who are seeking support for mental health difficulties are reporting potentially harmful levels of alcohol misuse, as well as specific alcohol problems such as dependence, compared to the wider UK military. This has clear implications for the aftercare of veterans when they leave the Armed Forces. Alcohol use is a common feature of military culture, but this may be contained within the military's systems. Care should be taken to ensure that any personnel with alcohol difficulties on leaving the service are given appropriate support. Awareness should be raised about the higher chances of a veteran developing or maintaining alcohol misuse problems in order to identify those in need of support.

The fact that alcohol misuse is associated with various mental health, physical health and sociodemographic factors also has

Table 3

Mental health and functioning outcomes associated with 16+ AUDIT scores, hazardous consumption, alcohol dependence and alcohol-related harm.

	Audit score 16+		Hazardous consumption		Alcohol dependence		Alcohol-related harm	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
PTSD (PCL-5)								
Not a case	8 (11.8)	1.00	23 (33.8)	1.00	5 (7.4)	1.00	13 (19.1)	1.00
Case (38+)	75 (23.6)	2.29 (1.02 to 5.15)*	149 (46.9)	1.85 (1.05 to 3.26)*	55 (17.3)	2.54 (0.95 to 6.78)	131 (41.2)	2.86 (1.46 to 5.63)*
CMD (GHQ-12)								
Not a case	18 (16.7)	1.00	45 (41.7)	1.00	8 (7.4)	1.00	34 (31.5)	1.00
Case (4+)	64 (23.3)	1.68 (0.92 to 3.08)	125 (45.5)	1.41 (0.87 to 2.31)	52 (18.9)	3.20 (1.43 to 7.16)*	109 (39.6)	1.56 (0.93 to 2.62)
Anger (DAR-5)								
Not a case	12 (12.6)	1.00	35 (36.8)	1.00	8 (8.4)	1.00	24 (25.3)	1.00
Case (12+)	69 (24.1)	2.29 (1.16 to 4.51)*	134 (46.9)	1.57 (0.95 to 2.58)	51 (17.8)	2.44 (1.09 to 5.43)*	118 (41.3)	2.02 (1.17 to 3.49)*
Functional impairment (WSAS)								
Mild / moderate	21 (16.4)	1.00	53 (41.4)	1.00	14 (10.9)	1.00	36 (28.1)	1.00
Severe (20+)	62 (24.0)	1.72 (0.94 to 3.16)	119 (46.1)	1.27 (0.79 to 2.03)	46 (17.8)	1.69 (0.81 to 5.52)	108 (41.9)	1.71 (1.03 to 2.82)*

Note. CMD = Common Mental Health Disorders. OR = Odds Ratio. 95% CI = 95% Confidence Intervals. Odds Ratios adjusted for age, relationship & employment.

* $p \leq .05$.

Table 4

Physical health and substance use factors associated with 16+ AUDIT scores, hazardous consumption, alcohol dependence and alcohol-related harm.

	Audit score 16 +		Hazardous consumption		Alcohol dependence		Alcohol-related harm	
	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)	n (%)	OR (95% CI)
Body mass index								
Normal	24 (27.9)	1.00	38 (44.2)	1.00	21 (24.4)	1.00	36 (41.9)	1.00
Overweight	24 (16.7)	0.60 (0.31 to 1.17)	66 (46.8)	1.23 (0.69 to 2.18)	17 (11.8)	0.51 (0.24 to 1.07)	48 (33.3)	0.85 (0.47 to 1.53)
Obese	31 (22.6)	0.80 (0.42 to 1.53)	59 (43.1)	1.16 (0.65 to 2.07)	21 (15.3)	0.62 (0.30 to 1.24)	55 (40.2)	1.12 (0.62 to 2.02)
Current smoker								
No	64 (19.6)	1.00	134 (40.1)	1.00	45 (13.8)	1.00	111 (33.9)	1.00
Yes	19 (32.2)	1.89 (1.00 to 3.59)*	38 (64.4)	2.54 (1.40 to 4.62)*	15 (25.4)	2.22 (1.12 to 4.40)*	33 (55.9)	2.42 (1.34 to 4.37)*
Drug use								
No	67 (19.3)	1.00	153 (44.1)	1.00	47 (13.5)	1.00	125 (36.0)	1.00
Yes	16 (41.0)	2.72 (1.31 to 5.66)*	19 (48.7)	1.10 (0.54 to 2.22)	13 (33.3)	2.87 (1.33 to 6.20)*	19 (48.7)	1.34 (0.65 to 2.74)
Brain Injury								
No	33 (16.4)	1.00	85 (42.3)	1.00	25 (12.4)	1.00	65 (32.3)	1.00
Yes	50 (27.0)	1.85 (1.12 to 3.09)*	87 (47.0)	1.24 (0.81 to 1.90)	35 (18.9)	1.62 (0.92 to 2.87)	79 (42.7)	1.46 (0.94 to 2.26)
Physical health complaints								
Low group	62 (22.6)	1.00	136 (49.5)	1.00	47 (17.1)	1.00	113 (41.1)	1.00
High group	21 (18.9)	0.98 (0.54 to 1.81)	36 (32.4)	0.66 (0.41 to 1.08)	13 (11.7)	0.77 (0.38 to 1.54)	31 (27.9)	0.72 (0.42 to 1.18)

Note. OR = Odds Ratio. 95% CI = 95% Confidence Intervals. Odds Ratios adjusted for age, relationship & employment.

* $p \leq .05$.

implications for identifying and supporting veterans in need of help. In particular, mental health interventions for veterans may benefit from being multi-faceted and able to provide alcohol misuse support alongside such interventions. Some research has suggested that treating comorbidities would improve overall outcomes for treatment-seeking veterans (Murphy et al., 2015; Richardson et al., 2014). There is also evidence for the benefits of combining psychological therapies with alcohol and smoking interventions (Cooney et al., 2017).

The fact that there is an association between being in employment and alcohol misuse is difficult to interpret, with the causality of this relationship unknown. One possible explanation is that drinking alcohol is more affordable to those in work, and can be part of a working culture that is not available to those who are unemployed. Alternatively, misuse of alcohol as a coping strategy might be more likely to occur in those who are in work but having difficulties with work-related stress. Either way, this association warrants further investigation. Similarly, the finding that not being in a relationship was associated with higher alcohol use should be investigated further, as increased alcohol misuse could be either a cause or result of relationship breakdown.

The present findings raise questions about how best to ensure that veterans with alcohol misuse problems gain access to appropriate support. Findings from the US have suggested that more veterans are able to access effective alcohol interventions if they are based in primary care settings (Oslin, Lynch, Maisto, et al., 2014). There is also evidence to suggest that brief, online interventions can be effective in reducing alcohol intake and intention to drink in young veterans (Pedersen, Parast, Marshall, Schell, & Neighbors, 2017). Having PTSD alongside alcohol misuse has been shown to not effect veterans' receptivity to treatment (Chen, Owens, Browne, & Williams, 2018), suggesting that alcohol misuse comorbidity need not be a barrier to receiving interventions.

6. Limitations

The current sample was taken from a population of veterans who were actively seeking treatment from a national veterans mental health charity. CS receives approximately 2500 new referrals per year (Murphy et al., 2015), so the current sample represents a significant number of treatment-seekers but not all. The decision was taken to remove female veterans from the analyses because only a modest

number of female veterans ($N = 17$) were recruited into the study, preventing the use of separate analyses. Furthermore, male and female veterans have been shown to have distinct patterns of alcohol use. However, this limits the representation of the present finding to male veterans only, and it is possible that women were under-represented in this sample. The use of a cross-sectional limits the scope of interpretations that can be drawn from the findings as conclusions about causality cannot be drawn.

The military sample against which comparisons are made in the present study was published in 2007 and as such may not be the most representative of current alcohol use in the military. It was however the most appropriate comparative sample available at the time of writing. The questionnaires used in this study were not separately validated, meaning there is a possibility that external factors such as respondent fatigue may have affected the validity of responses.

7. Conclusion

This was an investigation of patterns of alcohol misuse among treatment-seeking military veterans in the UK. Results suggest that these veterans have different patterns of alcohol misuse compared to the UK Armed Forces and general public. In particular, this group is more likely to have high levels of alcohol dependence and alcohol-related harm. Alcohol misuse was associated with the prevalence of common mental health disorders, PTSD and anger, as well as some physical health variables such as smoking, drug use and brain injury. Some sociodemographic factors were related to alcohol misuse, such as being single. Veterans who were older and not working, were shown to have lower levels of alcohol misuse.

Despite reported limitations, this study provides a useful insight into the patterns of alcohol misuse in a veteran population that is at higher risk of alcohol-related difficulties than other populations. These findings can be used to inform healthcare interventions for veterans and to raise awareness in veterans and services about the factors commonly associated with alcohol misuse, in order to ensure that veterans in need of support for alcohol misuse are able to access it.

Competing interest

The authors have no competing interests to declare.

Declarations of interest

None.

References

- Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., & Monteiro, M. G. (2001). *AUDIT. The alcohol use disorders identification test*. Geneva: Department of Mental Health and Substance Dependence, World Health Organization.
- Chen, J. A., Owens, M. D., Browne, K. C., & Williams, E. C. (2018). Alcohol-related and mental health care for patients with unhealthy alcohol use and posttraumatic stress disorder in a National Veterans Affairs cohort. *Journal of Substance Abuse Treatment*, 85.
- Cooney, L., Cooper, S., Grant, C., Sevarino, K., Krishnan-Sarin, S., Gutierrez, I. A., & Cooney, N. L. (2017). A randomized trial of contingency management for smoking cessation during intensive outpatient alcohol treatment. *Journal of Substance Abuse Treatment*, 72, 89–96.
- Corrigan, J. D., & Cole, T. B. (2008). Substance use disorders and clinical management of traumatic brain injury and posttraumatic stress disorder. *JAMA*, 300(6), 720–721.
- Craig, R., Fuller, E., & Mindell, J. (2015). *The health survey for England 2014*. London: The Health and Social Care Information Centre.
- Department of Transport (2015). Reported road casualties in Great Britain: Estimates for accidents involving illegal alcohol levels: 2013 (final) and 2014 (provisional). www.gov.uk/government/uploads/system/uploads/attachment_data/file/451402/rrcgb-drink-drive-2013-final.pdf.
- Elbogen, E. B., Wagner, H. R., Johnson, S. C., Kinner, P., Kang, H., Vasterlin, J. J., ... Beckham, J. C. (2013). Are Iraq and Afghanistan veterans using mental health services? New data from a national random-sample survey. *Psychiatric Services*, 64(2), 134–141.
- Fear, N. T., Iversen, A., Meltzer, H., Workman, L., Hull, L., Greenberg, N., ... Wessely, S. (2007). Patterns of drinking in the UK Armed Forces. *Addiction*, 102, 1749–1759.
- Forbes, D., Alkemade, N., Mitchell, D., Elhai, J. D., McHugh, T., Bates, G., ... Lewis, V. (2014). Utility of the Dimensions of Anger Reactions-5 (DAR-5) scale as a brief anger measure. *Depression and Anxiety*, 31, 166–173.
- Goldberg, D., & William, P. (1998). *A users' guide to the General Health Questionnaire*. Windsor: NFER-Nelson.
- Grant, B. F., Stinson, F. S., Dawson, D. A., Chou, P., Dufour, M. C., Compton, W., ... Kaplan, K. (2004). Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: Results from the national epidemiologic survey on alcohol and related conditions. *Archives of General Psychiatry*, 61(8), 807–816.
- Head, M., Goodwin, L., Debell, F., Greenberg, N., Wessely, S., & Fear, N. T. (2016). Post-traumatic stress disorder and alcohol misuse: Comorbidity in UK military personnel. *Social Psychiatry and Psychiatric Epidemiology*, 51(8), 1171–1180.
- Henderson, A., Langston, V., & Greenberg, N. (2009). Alcohol misuse in the Royal Navy. *Occupational Medicine*, 59, 25–31.
- Hooper, R., Rona, R. J., Jones, M., Fear, N. T., Hull, L., & Wessely, S. (2008). Cigarette and alcohol use in the UK Armed Forces, and their association with combat exposures: A prospective study. *Addictive Behaviors*, 33, 1067–1071.
- Iversen, A., Fear, N. T., Simonoff, E., Hull, L., Horn, O., Greenberg, N., ... Wessely, S. (2007). Influence of childhood adversity on health among male UK military personnel. *The British Journal of Psychiatry*, 191, 506–511.
- Jacobson, I. G., Ryan, M. K., Hooper, T. I., Smith, T. C., Amoroso, P. J., Boyko, E. J., ... Bell, N. S. (2008). Alcohol use and alcohol-related problems before and after military combat deployment. *JAMA*, 300(6), 663–675.
- Jakupcak, M., Tull, M. T., McDermott, M. J., Kaysen, D., Hunt, S., & Simpson, T. (2010). PTSD symptom clusters in relationship to alcohol misuse among Iraq and Afghanistan war veterans seeking post-deployment VA health care. *Addictive Behaviors*, 35(9), 840–843.
- MacManus, D., Dean, K., Iversen, A. C., Hull, L., Jones, N., Fahy, T., ... Fear, N. T. (2012). Impact of pre-enlistment antisocial behaviour on behavioural outcomes among UK military personnel. *Social Psychiatry and Psychiatric Epidemiology*, 47(8), 1353–1358.
- McManus, S., Bebbington, P., Jenkins, R., & Brugha, T. (Eds.). (2016). *Mental health and wellbeing in England: Adult Psychiatric Morbidity Survey 2014*. Leeds: NHS Digital.
- Mundt, J. C., Marks, I. M., Shear, M. K., & Greist, J. H. (2002). The Work and Social Adjustment Scale: A simple measure of impairment in functioning. *The British Journal of Psychiatry*, 180(5), 461–464.
- Murphy, D., Ashwick, R., Palmer, E., & Busuttill, W. (2017). Describing the profile of a population of UK veterans seeking support for mental health difficulties. *Journal of Mental Health* published online 06 Oct 2017.
- Murphy, D., Palmer, E., Westwood, G., Busuttill, W., & Greenberg, N. (2016). Do alcohol misuse, service utilisation, and demographic characteristics differ between UK veterans and members of the general public attending an NHS general hospital? *Journal of Clinical Medicine*, 5, 95–102.
- Murphy, D., Weijers, B., Palmer, E., & Busuttill, W. (2015). Exploring patterns in referrals to combat stress for UK veterans with mental health difficulties between 1994 and 2014. *International Journal of Emergency Mental Health*, 17(3), 652–658.
- Office for National Statistics (2015). Focus on violent crime and sexual offences 2012/13. www.ons.gov.uk/ons/dcp171776_394470.pdf.
- Oslin, D. W., Lynch, K. G., Maisto, S. A., Lantinga, L. J., McKay, J. R., Possemato, K., ... Wierzbicki, M. (2014). A randomized clinical trial of alcohol care management delivered in Department of Veterans Affairs primary care clinics versus specialty addiction treatment. *Journal of General Internal Medicine*, 29(1), 162–168.
- Pedersen, E. R., Parast, L., Marshall, G. N., Schell, T. L., & Neighbors, C. (2017). A randomized controlled trial of a web-based, personalized normative feedback alcohol intervention for young-adult veterans. *Journal of Consulting and Clinical Psychology*, 85(5), 459–470.
- Pinder, R., Greenberg, N., Boyko, E. J., Gackstetter, G. D., Hooper, T. I., Murphy, D., ... Wessely, S. (2012). Profile of two cohorts: UK and US prospective studies of military health. *International Journal of Epidemiology*, 41(5), 1272–1282.
- Pitman, I., Haddlesley, C., Ramos, S. D. S., Oddy, M., & Fortescue, D. (2014). The association between neuropsychological performance and self-reported traumatic brain injury in a sample of adult male prisoners in the UK. *Neuropsychological Rehabilitation*, 25(5), 763–779.
- Richardson, J. D., Contractor, A. A., Armour, C., St Cyr, K., Elhai, J. D., & Sareen, J. (2014). Predictors of long-term treatment outcome in combat and peacekeeping veterans with military-related PTSD. *The Journal of Clinical Psychiatry*, 75(11), 1299–1305.
- Rona, R. J., Jones, M., Fear, N. T., Hull, L., Hotopf, M., & Wessely, S. (2010). Alcohol misuse and functional impairment in the UK Armed forces: A population-based study. *Drug and Alcohol Dependence*, 108, 37–42.
- Smith, S. M., Goldstein, R. B., Bridget, F., & Grant, B. F. (2016). The association between post-traumatic stress disorder and lifetime DSM-5 psychiatric disorders among veterans: Data from the National Epidemiologic Survey on Alcohol and Related Conditions-III (NESARC-III). *Journal of Psychiatric Research*, 82, 16–22.
- Thandi, G., Sundin, J., Knight, T., Jones, M., Hull, L., Jones, N., ... Fear, N. T. (2015). Alcohol misuse in the United Kingdom armed forces: A longitudinal study. *Drug and Alcohol Dependence*, 156, 78–83.
- Weathers, F. W., Litz, B. T., Keane, T. M., Palmieri, P. A., Marx, B. P., & Schnurr, P. P. (2013). *The PTSD Checklist for DSM-5 (PCL-5)*. Scale available from the National Center for PTSD. Available from: www.ptsd.va.gov.
- World Health Organisation (WHO) (2010). Global strategy to reduce the harmful use of alcohol. www.who.int/substance_abuse/msbalestrategy.pdf.