

A Review of Military Research into Alcohol Consumption

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Abstract

Alcohol consumption is a part of military history. The impacts in terms of both short-term and long-term consequences require modern militaries to develop and instigate a duty of care for its personnel, which informs the military's 'cradle to the grave' approach in addressing alcohol consumption and other risky health behaviours (e.g. smoking, driving, sex, drugs, obesity, etc.). Thus, in recent years there have been numerous studies that have either focused on, or included, measures of alcohol consumption among various military populations. Therefore, a synthesis of this research is warranted in order to provide a contemporary understanding of this topic. This review addresses the military research regarding alcohol consumption. It reviews the methodological issues associated with the breadth of research, as well as commenting on a range of factors that need to be considered when interpreting and comparing the different research studies; for example, (1) when comparing findings across military to civilian and pan-military populations, (2) deployment-related research, (3) military groups at risk, and (4) the impact on readiness, operational effectiveness and force sustainability.

Introduction

The military has a historical relationship with alcohol, as anyone who has read military history or the vast number of military autobiographies will testify. The modern military is concerned with excessive alcohol consumption because it not only affects the long-term health of its personnel, but also because the short-term impacts contribute toward accidents, injuries and the premature death of service personnel, which ultimately affects military performance and capability; for example, it has been suggested that behavioural pathways underpinning risky drinking behaviour contribute to the increased rate of injury deaths of US Persian Gulf War veterans [1]. Also, it was found that consuming more than five drinks per week contributed to the risk factors associated with premature deaths from unintentional injuries among US army personnel between 1990 and 1998 [2]. Excessive, heavy and persistent alcohol use and abuse also affects personal relationships, contributes to domestic violence, the breakdown of families and anti-social behaviour [3]. This review article addresses some of the important issues associated with the military research into, and involving, alcohol consumption.

Civilian-military comparisons

There is a general assumption that the military consume more alcohol than comparable civilian populations. Numerous publications have compared military samples against civilian drinking rates and the findings suggest that this general assumption can be supported [4–10]. However, some have cautioned against some of these findings due to methodological problems in comparing these populations [11]. Limitations include cross-sectional designs, comparing non-equivalent surveys [4,10], differing definitions of alcohol consumption, e.g. the level of

consumption that defines binge drinking or heavy drinking [4,6], and inappropriate statistical procedures [6].

An historical analysis of alcohol-related hospitalisation trends between the US army and US civilian populations (1980-95) found valid and reliable differences between military and civilian populations. Thus there were variations among abuse trends according to the abuse type; for example, the army sample possessed higher rates for dependent alcohol-related disorders, whereas civilians possessed higher rates of polydrug use (drugs and alcohol). However, overall hospitalisation rates for alcohol-related trends were similar for both populations [11]. A further US study compared military veterans with civilians in terms of historical alcohol treatment rates and exposure episodes. The results suggested similar patterns among the younger age groups, but military veterans possessed higher drinking rates among the older age groups, suggesting persistent engagement in a risky health behaviour that possesses implications for long-term negative health effects, both physical and mental [12].

Two UK studies found that excessive alcohol consumption is more common in the armed forces than in the general population [7,8]. It was found that the tri-service (Army, Navy, Air Force) military samples had higher rates for hazardous drinking, severe drinking, alcohol dependence, alcohol-related harm and heavy episodic drinking (HED) ('binge drinking'). Not only that, but military females had higher rates of HED than civilian males. Furthermore, when compared to age-matched civilian samples, a sample from the British Royal Navy was found to display excessive alcohol consumption, especially HED [8]. This is supported by another study, which found that a UK military sample had higher rates of HED compared to civilian rates, and that this difference persisted over a three-year follow-up period [9].

So what do these studies suggest about civilian-military comparisons of alcohol use? The assumption that the military tend to engage in higher rates of alcohol consumption than comparable civilian populations can still be supported. This is particularly the case for heavy drinking and HED groups [5,7,8,13]. Numerous

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studies have found that demographic risk factors for higher rates of alcohol use include being young, single or unmarried, male, lower educational attainment, white, a smoker, and from among the non-commissioned (enlisted) ranks [7,8,13]. These broader demographics suggest an underlying 'at risk' group, irrelevant of being in the military or a civilian. If there is something unique about the military as an organisation and a culture then it may require further investigation. Specifically, the military could be compared to other, more relevant, civilian samples and sub-cultures, e.g. the uniformed emergency services, university student populations, and amateur sports teams. Until then, there remain unanswered questions about the phenomenology of military drinking; which drives further research but is also limited by the aforementioned methodological limitations that hinder such advancement [7,11,13]. Therefore, there is a requirement for large-scale, longitudinal studies that use valid, reliable and consistent measures to gather prospective data between matched and representative samples (and sub-samples) among military and civilian populations.

Military-military comparisons

When considering the previous evidence regarding civilian-military comparisons, it would be prudent to review the military samples used in this research and also the military-centric studies. There are four core issues that need to be considered:

1. Inter-service sub-cultures (between the Army, Navy, Air Force)
2. Inter-cultural differences (multinational and coalition)
3. Professional versus conscript forces
4. The applied context in which the study was conducted (e.g. operational, training).

Firstly, inter-service sub-culture refers to the assumed differences between the individual components of the Army, Navy and Air Force. Individual force differences between the respective land, air and maritime components are often assumed and accepted (i.e. 'received wisdom'), but often lacks the empirical basis for such assumptions. In terms of alcohol use, the Army has been found to have higher rates of alcohol consumption than the Navy and Air Force [13], whereas others have found statistically higher consumption rates for the Navy and Army compared to the Air Force [7]. In one US study, alcohol consumption was measured on different forces (i.e. Army, Navy, Air Force, Marines) but no comparison findings were reported [14]. Furthermore, intra-component differences have been found. That is, any observed difference found within one force (e.g. within-army). For example, within the Army it has been found that the more frontline and combat-related trades (e.g. infantry) have been found to be a high-risk drinking group and have higher rates of alcohol use [15]. A UK study found mixed results [16]. At pre-deployment, there were no differences found between the combat arms (CA) (e.g. infantry, cavalry), combat service (CS) arms (e.g. engineers, artillery) and combat service support (CSS) arms (e.g. admin, signals, logistics) on measures of alcohol frequency and HED; however, there was a significant difference for the amount of alcohol consumed, with the CA consuming more than the CSS. At post-deployment, the CA engaged in more HED than the CSS, but there were no further differences between CA, CS and CSS for either frequency or amount of alcohol consumed.

Secondly, as well as inter- and intra-component differences, the issue of cultural differences among multinational forces and

coalition partners also requires consideration. For example, to what extent does alcohol intake (also smoking, drug, sex and driving behaviour) differ between various nations' militaries? It has been anecdotally suggested that similar international components may have more in common than intra-national components. That is to say, it is hypothesised that international armies (or navies) may engage in more risky alcohol consumption than international air forces. There appears to be an absence of published military studies that have directly investigated this issue; therefore, it is a suggestion for future military health research. An attempt was made to compare the results from different nations' studies referenced within this report, however, it became impossible to do because of the methodological problems suggested previously, for example, (a) different survey tools were used to measure alcohol consumption, (b) if similar tools were used then there were differences in the statistical tests used and the results reported, (c) differing amounts were used to define categories such as HED, heavy drinking, risky drinking, etc. Previously, a NATO report was produced on the topic of '*Multinational Military Operations and Intercultural Factors*'. The report discusses broad cultural factors, including health and well-being, and is worth consulting for an appreciation of cultural military differences [17].

Thirdly, the issue of professional versus conscript forces refers to the inherent differences between national forces that are made up solely of volunteers (i.e. professional), or a predominantly conscript force. This rationale suggests that because conscript forces are largely composed of individuals who must undergo a period of compulsory military service, their population will largely reflect their own civilian population, once age and gender are taken into consideration. Therefore, it could be assumed that any observed behavioural differences (e.g. alcohol consumption) may not be as pronounced between military conscripts and civilian samples. Such a study could help improve knowledge regarding the issue of military culture and the socialisation processes involved in military drinking behaviour; for example, pre- and post-conscript drinking behaviour compared against that nation's civilian drinking patterns and behaviours. Published studies addressing alcohol use and conscript forces are sparse; however, this review identified one published report that addressed alcohol use and abuse among Greek navy conscript recruits [18], but a comparison to civilian drinking rates could not be established.

Finally, consideration of the context in which the study was conducted is essential. The majority of military health studies tend to be for health surveillance purposes, and as such, are either cross-sectional and/or retrospective. Examples of studies addressing alcohol consumption in military samples include: recruits [18–20], the trained strength [7,8,21], deployments [14,16,22,23,] and veterans [24,12]. Contexts such as these require careful consideration because their inherent nuances provide potential confounding factors that could affect subsequent interpretations and comparisons.

Military deployments

In terms of deployment-related research, the military can be deployed for a number of reasons, e.g. direct intervention (warfighting), peace enforcement, peacekeeping, humanitarian assistance, as well as for training and exercises. Therefore, this will influence the types (and levels) of stress, workload, length of deployment and environment that the military force will experience. These factors will inherently influence the types of health behaviours engaged in, including the provision,

consumption or abstinence of alcohol. There are a number of deployment-related studies that include measures on alcohol consumption, however, there is a dearth of prospective and longitudinal studies on military health behaviour across the deployment cycle (pre-, during, post-) when compared to the number of epidemiological, cross-sectional, and retrospective research that is primarily used for informing general health surveillance. In fact, it has been suggested that ‘many aspects of the deployment experience have not been well studied, including its effects on substance use’ [14]. The following sub-sections will address the research conducted around the deployment cycle.

Pre-deployment

Pre-deployment alcohol use was used as a predictor in a sample of US National Guard soldiers [25], which found that negative mental health variables, younger age and being unmarried predicted greater total drinking and higher frequency of HED. Another US study looked at alcohol use and alcohol-related problems at pre- and post-deployment [23], although the data was based on baseline and follow-up data from the US Millennium Cohort Study. It was found that individuals who deployed and reported combat exposure were at increased risk of new-onset heavy weekly drinking, HED and alcohol-related problems. However, others have found that only certain types of combat exposure were associated with changes in alcohol consumption and deployment experience across a three-year period [9].

A recent UK study [16] collected quantitative and qualitative data in a longitudinal, prospective study of risky health behaviours (alcohol, sex, driving, smoking), risk-taking personality (impulsive sensation seeking – ImpSS), psychological well-being and risk perceptions across the deployment cycle (pre-, during, post-). The sample was taken from a UK battalion deployed to Iraq in 2007 (Op TELIC 10) and found that self-reported alcohol consumption only significantly reduced at post-deployment (compared to pre-deployment) for the amount of alcohol consumed on a typical day when drinking, but there were no significant differences for frequency of drinking or for HED between pre- and post-deployment. Additionally, the numbers for ‘current drinkers’ (i.e. ~95%) did not change across pre- and post-deployment.

During deployment

There appears to be a dearth of published, prospective research that has collected measures of alcohol consumption during a deployment or operation. Within the aforementioned UK study [16], alcohol intake significantly reduced during deployment, which was to be expected as most nations operate a no alcohol (i.e. ‘dry’) policy on operations. However, as illustrated in Table 1, investigation of the mid-deployment sample (N=889) found that 2.9% perceived their alcohol intake had increased on deployment, whereas 5.8% perceived that their alcohol intake was about the same since being on deployment (compared to pre-deployment). Further analysis of mid-deployment alcohol consumption showed that the high-ImpSS group reported statistically higher levels of consumption for frequency and HED, but not for the amount for alcohol consumed. This highlights the issue of ‘black market’ access to contraband alcohol on military deployments or the abuse of restricted access, e.g. the ‘two-can rule’. This is supported by qualitative responses for deployed personnel [16], whereby a small minority of individuals can still gain access to alcohol, either through the postal system or via logistic supply, which differs across multinational partners. This highlights the disparity

between prohibitive alcohol policies by some military nations and the small minority who gain access to alcohol on deployments.

Post-deployment

Post-deployment alcohol consumption is of interest because it possesses important readjustment and mental health implications associated with the experiences gained on deployments and operations (e.g. reactions to combat exposure, traumatic experiences, separation, stress, etc.). Post-deployment alcohol consumption has been prospectively investigated within the UK army, as previously mentioned [16]. Table 1 presents self-report measures of alcohol intake at each stage of the deployment.

	Frequency (%) of perceived alcohol change		
	Pre-deployment	During deployment	Post-deployment
Increased alcohol intake	28.2	2.9	21.1
Intake about the same	53.4	5.8	55.1
Reduced alcohol intake	18.4	91.3	23.8

Table 1. Self-report measures of alcohol intake of UK army sample deployed to Iraq [16].

These findings challenge some of the generalised assumptions which suggest that alcohol intake increases at post-deployment. However, a different UK study [9], which was a prospective, longitudinal study over a three-year period, found that the increased levels of alcohol consumption at follow-up were greater for those that had been deployed since the baseline measure three years previously. However, there was a statistically significant increase in alcohol consumption across the sample, irrespective of whether they had been deployed or not.

Within the US studies, alcohol use has been investigated in terms of combat exposure and post-combat invincibility [26]. Combat experience factors were found to be predictive of post-deployment risk-related behaviours, including frequency and amount of alcohol use; although the combat experience of seeing a buddy killed/injured was protective against post-deployment driving under the influence of alcohol or riding with a driver who had been drinking. Findings such as these illustrate the complexity of alcohol consumption following military deployment (including other risky health behaviours) and highlight an important issue of when measures of health and behaviour are collected at post-deployment, e.g. upon immediate return, after one month, six months, etc.

Persistence of alcohol use behaviour

The persistence of health behaviours, directly related to deployments, has not yet been reliably established, due mainly to the methodological issues previously mentioned and a lack of repeated measures, prospective research in the area. Furthermore, measures of post-deployment health behaviours tend to be cross-sectional and taken at one point in time, as opposed to repeated measures across post-deployment timelines (e.g. 1, 6, 12-months after returning). Therefore, it is not currently known if changes in post-deployment alcohol consumption are consistent over

time, or a product of temporal and situational factors, such as immediate post-deployment celebrations, enduring mental health issues after combat exposure, or current contextual factors (e.g. relationship problems) or whether they are directly related to those who have been deployed compared to the non-deployed, as found by many military health surveys and epidemiological studies [2,7,13,14,23,24,27].

Aspects of research have attempted to address the issue of persistent alcohol use. In a sample of UK military personnel who were deployed to Iraq in 2003, it was found that the subsequent prevalence of severe alcohol problems (post-deployment) increased with the duration of deployment [28]. It was also found that greater alcohol misuse was higher in men who had deployed, as compared to those who had not deployed or compared to female groups [29]. However, they also suggest a general increase in risky alcohol use in the military (deployed or not) compared to national survey data, which has been supported by others [7,13]. Additionally, longitudinal tracking of alcohol consumption increased over a three-year period in a sample of UK armed forces personnel, as previously mentioned [9].

Finally, a more considered understanding regarding post-deployment and persistent alcohol use is required. It is expected that short-term levels of alcohol consumption will increase at post-deployment, as personnel have been away from alcohol for many months, and they may wish to celebrate their return with friends, family and colleagues. However, what is less known is how long the persistent use of alcohol continues, and at what levels (e.g. amount, frequency and HED). This knowledge is important for future health outcomes, as well as identifying which groups are at increased susceptibility to this risky health behaviour. Additionally, as health behaviours tend to co-exist then this also has implications for other risky health behaviours (i.e. smoking, sex, drugs and driving).

Military sub-groups at risk

'At risk' sub-groups exist within the military organisation; for example, risk-takers and individuals who are high in sensation seeking tendencies are considered to be an at-risk group for risky alcohol behaviour [30,31]. Therefore, if the levels of drinking behaviour reported in military studies are to be believed, and the nature of sensation seeking in the military is considered [16,30,31] then the military will contain a significant proportion of personnel who could be considered at increased risk. As previously mentioned, levels of ImpSS and risky health behaviours have been investigated [16] and it was found that the high-ImpSS group tended to drink more than the low-ImpSS group on all items of alcohol consumption (amount, frequency and HED) and across all phases of an operational deployment. This high-ImpSS group also tended to drive faster, wear seatbelts less, tended to be smokers (and smoke more) and engage in risky sex when compared to the low-ImpSS group. Alcohol consumption has also found to be predictive of both recreational gamblers and individuals with some gambling-related problems in a large sample of US Air Force recruits [32].

The most obvious 'at risk' sub-group within the military is that which is young, single or unmarried, male, lower educational achievement, white, a smoker, and from among the non-commissioned (enlisted) ranks. Such demographics would also account for findings showing that more frontline combat units have higher rates of alcohol use than some support and rear echelon units, which tend to contain more females and have an

older age profile [15,16]. Furthermore, it has been found that staying in the military and moving relationship status (from married to either divorced, separated or widowed) were also significant risk factors for increased heavy drinking [13]. Also, it was found that alcohol dependence was one of the most common diagnoses in military veterans and that heavy drinking behaviour extends into post-service life for vulnerable individuals who leave the forces [33], which is supported by others [12].

In terms of mental health issues, heavy drinking has been consistently found to be related to poor subjective physical and psychological health. There is also a consistent body of evidence reporting the association between increased and/or heavy use of alcohol and combat exposure, leading to post-traumatic stress disorder (PTSD) and depression [34–36]. High rates of alcohol and drug abuse have been found in traumatised adults; whereby alcohol is one of the oldest forms of self-medication for individuals with PTSD, and can be an effective short-term medication for sleep disturbances, nightmares and other intrusive PTSD symptoms [37].

Impact upon operational readiness, effectiveness and force sustainability

Readiness

It is often reported that risky health behaviours, including risky alcohol consumption, can affect pre-deployment preparation and military readiness [14,25]. However, there appears to be a dearth of evidence supporting a direct, causal pathway. In fact, in anticipation of impending combat exposure on future operational deployments, anecdotal evidence suggests that alcohol consumption can be conspicuously tolerated, or even encouraged, e.g. pre-deployment parties and social activities with friends, family and colleagues. The qualitative data collected in one UK study also supports this [16].

A US study reported that 13% of soldiers felt they needed to cut down their alcohol consumption prior to deployment, and that 17% of soldiers were using alcohol more than they intended [38]. In support of this, a UK study found that 28% of a UK army sample preparing to go to Iraq perceived that they had increased their alcohol intake in their pre-deployment phase. This is compared to 18% who perceived they had reduced their alcohol intake (Table 1) [16].

Operational effectiveness

It is an intuitive assumption that risky health behaviours, especially alcohol use and abuse, possess serious consequences for performance and effectiveness on deployed operations; this has been reinforced in various papers [7,39]. However, as with 'readiness', the direct impact is difficult to assess when one considers the context within which 'effectiveness' is measured, i.e. how is 'operational effectiveness' defined, and are the measures used to assess it valid and reliable? Therefore, without applied research that is conducted in the operational environment it is only possible to assume that alcohol impairment *could* have detrimental effects upon operational performance and effectiveness. Furthermore, the role of moderate alcohol for social cohesion is an important factor. This has been found in qualitative data provided by UK army personnel at pre- and post-deployment [16] and has been alluded to by others [7,39]. The important factor in terms of this issue is low-moderate alcohol consumption (within national guidelines) and not the heavy, binge or abusive use of alcohol.

Force sustainability

Modern professional forces possess smaller numbers of personnel than they have historically. This is evident within certain NATO forces, whereby previously large conscript forces have since professionalised and had to reduce personnel numbers in order to become an efficient and sustainable force. Likewise, even established professional forces have reduced manpower over the years to meet future strategic transformation. Therefore, it is imperative that such forces maximise their available manpower for long-term sustainability and capability, as well as operational performance and effectiveness.

In a US study on operational tempo and well-being among US soldiers it was found that low alcohol use moderated the impact of work hours on physical symptoms, but only when work hours were short [40]. If the work hours were few and the soldiers drank more then physical symptoms increased. The researchers rightly conclude, as was suggested earlier, that the use of alcohol by military personnel is complex and multidimensional. That is to say that many factors, e.g. predispositions, contexts, environments and perceptions, interact at a particular time in space to affect the desire to approach or withdraw from alcohol use. A further example includes the attitudes to heavy alcohol consumption in the Netherlands armed forces personnel [41]. Female Dutch personnel who were asked if too much alcohol was used in their unit responded 'yes' at a higher rate (42%) compared to Dutch males (25%), and those that had never deployed responded 'yes' to a greater extent (35%) compared to those with previous deployment experience (25%).

In 2002 the British army reported that 80% of violent crime within the army was alcohol related [7]. Also, heavy alcohol consumption was found to be an independent risk factor for the perpetration of spouse abuse among male, enlisted US army soldiers [3]. This is not only a welfare and duty of care issue for service personnel and their dependents, but also possesses disciplinary consequences for anti-social behaviour that could impact personnel in both the short-term (e.g. fines, loss of privileges, or military incarceration) and long-term (e.g. discharge from the armed forces). A study into the transition back to civilian life for military personnel who were discharged from the UK armed forces after spending time in a corrective military training establishment found that alcohol abuse/dependence was a marker for poorer outcomes and disadvantage at follow-up [42]. Furthermore, as previously cited, alcohol impairment contributes to accidents, injuries and the premature death of military personnel [1,2,43]. Finally, alcohol consumption co-varies with other risk-taking and risk-related health behaviours, and has been investigated in military samples, e.g. gambling [32], smoking [13,18,44], driving [22], sexual behaviour [45] and illicit drug use [18,46].

Although the impact on manpower numbers for individual alcohol-related risk factors (e.g. violence, accidents, injuries, poor health) may appear minimal, their cumulative impact may be potentially larger, which reinforces the need to maximise personnel who are fit for task. Furthermore, during deployments, reductions in manpower brought about by battlefield casualties/fatalities and disease and non-battle injuries (DNBI) will reduce operational manpower further [47]. Therefore, when one considers current levels of operational tempo and the numbers of personnel unfit to deploy, then the relationship between operational and non-operational health and force sustainability becomes increasingly apparent.

Summary

In summary, risky alcohol consumption has been shown to exist across most aspects of military life. Although it is generally comparable to certain civilian populations for age and gender (i.e. predominantly seen in young, single males) the military appear to 'push the envelope' further than their civilian peers, especially for HED and heavy alcohol consumption. This supports the case for generalised high levels of risky alcohol use within the military, and has been specifically reported in the UK armed forces. However, methodological issues, such as sample populations, different survey measurements, differing definitions of heavy alcohol use and HED, and the reporting of statistical data, confuse the accurate comparison between pan-military and military-civilian populations. Additionally, the risky use of alcohol plays a part in the mental, physical and psychological health outcomes associated with combat exposure and the deployment experience; but also in non-deployed samples. Despite the lack of longitudinal, prospective research across the deployment cycle (pre-, during, post-), there is research to support the concerns and implications of risky alcohol use for pre-deployment readiness, post-deployment readjustment, and its persistent use for long-term health and force sustainability; finally, future alcohol-related research in the military needs to consider a range of demographic, contextual and behavioural factors, which would benefit from the use of both quantitative and qualitative collection methods.

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