Addictive Behaviors 164 (2025) 108269

Contents lists available at ScienceDirect

Addictive Behaviors

journal homepage: www.elsevier.com/locate/addictbeh

Illegal drug use amongst male UK military personnel who sustained physical combat injuries: The ADVANCE cohort study

Daniel Dyball [a,*], Susie Schofield [b], Alexander N. Bennett [c], Christopher J. Boos [d], Anthony M.J. Bull [e], Nicola T. Fear [a,f], on behalf of the ADVANCE Study

[a] King's Centre for Military Health Research, King's College London, SE5 9RJ, UK
[b] National Heart and Lung Institute, Faculty of Medicine, Imperial College London, SW3 6LR, UK
[c] Academic Department of Military Rehabilitation, Defence Medical Rehabilitation Centre, Stanford Hall Estate, Near Loughborough, Nottinghamshire LE12 5BL, UK
[d] Faculty of Health & Social Sciences, Bournemouth University, Bournemouth BH1 3LT, UK
[e] Centre for Injury Studies, Department of Bioengineering, Imperial College London, SW7 2AZ, UK
[f] Academic Department of Military Mental Health, King's College London, SE5 9RJ, UK

ARTICLE INFO

Keywords:
Military Personnel
Veterans
Illegal Drugs
ADVANCE cohort
United Kingdom

ABSTRACT

Illegal drug use may be a consequence of sustaining a serious physical combat injury, though no known research has investigated this in a UK setting. This analysis utilises the baseline data from a longitudinal cohort (ADVANCE), to assess whether 577 UK military personnel who sustained serious physical combat injuries reported more illegal drug use compared to 565 frequency-matched personnel without such injuries.

Most personnel reported no illegal drug use in the past year (88.7%). Cocaine was the most common drug reported in the past year, followed by cannabis. Injured personnel had greater odds of reporting illegal drug use in the past year compared to the comparison group (injured group: 16.3%, comparison group: 5.4%; Odds Ratio (OR) 3.09 (95% CI 2.03, 5.31)), however, no differences were observed amongst veterans in each group (OR 0.67 (95% CI 0.40, 1.27)). Higher prevalence of illegal drug use was observed amongst those of white ethnic background, lower rank, those who were single, younger, veterans, and those who reported a probable mental illness, suicidal ideation or heavy alcohol use/tobacco use. Veterans who left service at a younger age and with a shorter length of service were also identified as having higher prevalence of illegal drug use.

UK Armed Forces personnel who sustained serious physical combat injuries in Afghanistan report more illegal drug use in the past year compared to demographically similar personnel without serious physical injury. Greater prevalence of illegal drug use was evident in those that left service, with >20 % of veterans reporting illegal drug use in the past year.

1. Introduction

Consistently over the past decade, just under 10 % of adults in England and Wales aged 16–59 years report having used an illegal drug within the last year (defined as amphetamines, anabolic steroids, cannabis, cocaine, ecstasy, heroin, ketamine, LSD, magic mushrooms, mephedrone, methadone, methamphetamine, or tranquilisers) (UK Office of National Statistics, 2022a). Whilst illegal drug use is not always an indicator of drug dependence or problematic use (i.e. an inability to stop using, or considerable negative effects on physical, economic, social or interpersonal well-being), there is risk associated with use, such as accidental drug-related deaths, infections including blood borne viruses, and other adverse mental and physical health sequelae (Armoon et al., 2021; Advisory Council on the Misuse of Drugs, 2019; Hu et al., 2021).

The average age of enlistment to the Army in the UK is 20 years, with current statistics stating that over a quarter of all Armed Forces personnel in 2023 were under the age of 25 years (UK Ministry of Defence, 2014; UK Commons Library, 2024). The age period between the late teens through to the late-twenties have been suggested as a period with distinct developmental characteristics. This theoretical framework, called 'emerging adulthood theory', suggests that this period of life is the peak age period for many risky behaviours, including

Abbreviations: AOR, Adjusted Odds Ratio; CDT, Compulsory Drug Tests; CI, Confidence Intervals; IQR, Interquartile Range; OR, Odds Ratio; PTSD, Post-Traumatic Stress Disorder; UK, United Kingdom.

* Corresponding author.
E-mail address: daniel.dyball@kcl.ac.uk (D. Dyball).

https://doi.org/10.1016/j.addbeh.2025.108269
Received 19 August 2024; Received in revised form 11 January 2025; Accepted 25 January 2025
Available online 27 January 2025

illegal drug use (Arnett, 2005; Arnett et al., 2014). Individuals in the military have a unique experience in relation to emerging adulthood, due to dichotomous experiences of both restriction (e.g. working in a hierarchical rank system) and financial independence compared to many of their civilian peers at that age (Clary et al., 2022). If individuals leave service in this period, they may experience a great deal of instability which can lead to the use of substances to cope (Bray et al., 2010; Clary et al., 2022).

UK Armed Forces personnel are subject to random Compulsory Drug Tests (CDT), the failure of which usually results in discharge from service (UK Ministry of Defence, 2013). Cocaine has previously been reported to be the most commonly detected drug from a CDT that resulted in discharge amongst UK Armed Forces personnel (Bradley et al., 2021). Over 500 serving personnel failed a CDT each year between 2001–2006 (positive rate per 1000 personnel tested 5.9–8.9) (Bird, 2007); in 2017 this increased to 720 (UK Ministry of Defence, 2018). In the US, is has been observed that younger veterans report greater illegal drug misuse and alcohol misuse compared to age-matched civilians (Agaku et al., 2020; Bray et al., 2010; Hoggatt et al., 2017). Limited research is available from the UK regarding veterans and illegal drug use, with one paper indicating that post-national service veterans did not differ from civilians in prevalence of drug-dependence (Woodhead et al., 2011) and another indicating that UK veterans who are discharged due to a failed CDT increase their illegal drug use once they return to civilian life (Bradley et al., 2021).

Military personnel who deployed to campaigns in Iraq and Afghanistan have been shown to be at higher risk of alcohol and substance use disorder compared to military personnel who were not deployed to those conflict areas (Kelsall et al., 2015). Military personnel who sustained a physical combat injury whilst on deployment may experience negative changes to their mental and physical well-being as well as their quality of life (Dyball et al., 2022; Stevelink et al., 2015; Woodruff et al., 2018) that may increase their risk of illegal drug use (Armoon et al., 2023; Silver et al., 2023). No current research exists regarding the risk of using illegal drugs following experiencing a serious physical combat injury in the UK context.

In this analysis, we aim to assess whether there are differences in illegal drug use amongst UK Armed Forces personnel who deployed to Afghanistan and sustained a serious physical combat injury compared to a frequency-matched comparison group who did not sustain a serious physical injury. We also report the military, demographic and health-related factors associated with illegal drug use.

2. Method

2.1. Participants

The ADVANCE study is comprised of male UK military personnel who sustained a serious physical combat injury while on deployment to Afghanistan which required them to be aeromedically evacuated to a UK hospital and a frequency-matched comparison group who were deployed to Afghanistan but did not sustain a serious physical combat injury. Groups were frequency-matched on age, rank, role on deployment, regiment, and deployment era (Bennett et al., 2020). The study sample was provided by the UK Ministry of Defence (Defence Statistics). This analysis is based on data from the baseline assessment of the ADVANCE cohort (2015–2020) (n = 1145).

2.2. Procedure

Participants attended the Defence Medical Rehabilitation Centre at either Headley Court (2015–2018) or Stanford Hall (2018–2020) and took part in a comprehensive suite of investigations, which included a clinical interview with a research nurse as well as completion of a confidential self-report questionnaire.

3. Materials

3.1. Outcomes of interest

3.1.1. Illegal drug use

The self-report questionnaire included a section on drug history (Freeman et al., 2012). Participants were asked "Have you ever taken any 'recreational' drugs including legal highs?", and then specifically asked about the use of cocaine, ecstasy, cannabis, mephedrone, methamphetamines (e.g. speed), ketamine, heroin or 'other' recreational drugs (response options 'yes' 'no'). Participants were also asked 'when did you last use it?' (free text, option to give in years, months or days). This information was then coded into 'ever used' and 'used within the last year'. An additional question "how many days per month do you use it?" was asked (free text). Frequent use was defined as reporting using a drug on more than one day per month (UK Office of National Statistics, 2022b) and was only assessed in those that reported using an illegal drug in the past year.

3.2. Independent variables

3.2.1. Age at sampling/assessment

Age at sampling was recorded in years. For personnel who sustained serious physical combat injuries, this is the age they sustained their index injury. For personnel who did not sustain serious physical injuries, this is the age plus 0.5 years from the year of their deployment, to reflect their average age during that year.

Age at assessment was recorded in years and categorised into tertiles to investigate possible non-linear associations between age and illegal drug use; the three groups were ages 23–31, 32–36 and 37–59.

3.2.2. Age left service/years since left service (veterans only)

The date participant left service was self-reported during the clinical interview. This date was subtracted from the date of assessment to generate the number of years that had passed since leaving service. This variable was coded into two equal groups: left service $<$ five years ago and $\geq$ five years ago.

The number of years since leaving service was subtracted from age at assessment to generate the age a participant left service. Age the participant left service was then tertiled based on generated values into three categories: 19–26 years old, 27–31 years old and 32–54 years old.

3.2.3. Combat injury

Combat injury was established from information provided by the UK Ministry of Defence: Defence Statistics department and electronic medical records and supplemented with details provided by the participant during the clinical interview.

3.2.4. Combat role

Role at sampled deployment to Afghanistan was collected via the clinical interview. Roles were coded as "combat role" (e.g. infantry) or "combat support/combat service support/other" (e.g. Royal Engineers or medics).

3.2.5. Employment (veteran only)

Paid employment status was self-reported during the clinical interview and supplemented by data provided in an employment history section of the self-report questionnaire. Participants who were in paid employment were categorised as 'Economically active' whereas all other participants (e.g. not working due to ill health, not working due to personal choice, unpaid volunteering, currently seeking work, homemaker, in full/part-time education only) were categorised as 'Not economically active'.

3.2.6. Length of service (veterans only)

Length of service was self-reported during the clinical interview.

Length of service was tertiled based on reported values into three categories: 1–7 years, 8–11 years, and 12–32 years.

3.2.7. Mental illness

The self-report questionnaire had separate measures for anxiety, depression and Post-Traumatic Stress Disorder (PTSD). Anxiety was measured using the Generalised Anxiety Disorder-7 (GAD) (seven items, total score range 0–21, Cronbach's Alpha (α) 0.93) (Spitzer et al., 2006), depression using the Patient Health Questionnaire-9 (PHQ) (nine items, total score range 0–27, α 0.92)) (Kroenke et al., 2001), and PTSD using the PTSD-CheckList-Civilian version (PCL-C) (17 items, total score range 17–85, α 0.96)) (Blanchard et al., 1996). A binary variable was constructed as "no mental illness" and "probable mental illness", which considered caseness for probable anxiety (GAD $\geq$ 10), depression (PHQ9 $\geq$ 10) or PTSD (PCL-C $\geq$ 50).

3.2.8. Suicidal ideation (SI)

SI was measured using responses to the PHQ9 item: "Over the last two weeks, how often have you been bothered by thoughts that you would be better off dead or of hurting yourself in some way?" (Kroenke et al., 2001). Responses were 0 "not at all", 1 "several days", 2 "more than half the days" and "3 "nearly every day". Scores were binary coded to indicate "no SI in the past two weeks" (score 0) and "any SI in the past two weeks" (score 1–3).

3.2.9. Pain

Participants completed the EQ5D5L, a measure of health-related quality of life across five domains, as experienced on the day of assessment (Herdman et al., 2011). The 'pain/discomfort' item was used as an indication of pain, which had responses ranging from "I have no pain or discomfort", to "I have extreme pain/discomfort". A binary variable was constructed as "no/slight pain/discomfort" and "moderate-extreme pain/discomfort". This subscale has been established to have a moderate-strong correlation with other pain measures (Feng et al., 2021).

3.2.10. Perceived overall health

Participants completed the EQ-Visual Analogue Scale, a measure of perceived overall health (0–100) (Herdman et al., 2011). Scores were tertiled based on the reported values into low (0–75), mid (76–87) and high (88–100).

3.2.11. Legal drug misuse

Legal drug misuse was defined as reporting heavy alcohol or heavy tobacco use.

3.3. Alcohol use

The AUDIT, a validated measure of alcohol misuse and dependence, formed part of the self-report questionnaire (10 items) (Babor et al., 2001). Scores were coded using item three "How often do you have six or more drinks on one occasion?" and item four "During the past year, how often have you found that you were not able to stop drinking once you had started?" (response options range from 'never' (0) to 'daily or almost daily' (4)). Scores of six or greater were defined as heavy alcohol use in the past year (Wardell et al., 2020).

3.4. Tobacco use

Participants were asked during the clinical interview "Do you currently smoke or have you ever smoked?" and if yes, "how many cigarettes per day". Heavy tobacco use was defined as current smoking of $\geq$ 20 cigarettes per day (UK Office of National Statistics, 2013).

3.4.1. Relationship status

Relationship status was established during the clinical interview. Participants who reported being married or in civil partnership, in a long-term relationship or co-habiting were coded as "in a relationship". Participants who reported being single, divorced or widowed were coded as "not in a relationship".

3.4.2. Socioeconomic status

Rank at sampled deployment to Afghanistan was used as a proxy for socioeconomic status: junior non-commissioned officer or other rank (NATO OR2-OR4), senior non-commissioned officer rank (NATO OR5-OR9) and commissioned officer rank (NATO OF1-OF6) (Yoong et al., 1999).

3.4.3. Veteran status

Veteran status (defined as having left military service and no longer serving in a regular or reservist capacity) was established during the clinical interview. A binary variable was constructed ("Serving" versus "Veteran").

3.5. Data analysis

Data analysis was undertaken using the statistical software STATA version 18.0. Sampling weights, accounting for the under-sampling of less seriously injured groups, were multiplied by response weights, which accounted for officers, royal marines and slightly older participants being more represented in those that took part in ADVANCE (14), were calculated and applied to demographic tables. Weighted percentages alongside 95 % Confidence Intervals (CI) are presented alongside unweighted cell counts. For continuous variables, means or medians are presented based on visual inspection of histograms. Some data are suppressed in line with the Ministry of Defence disclosure control and rounding policy (UK Ministry of Defence, 2024).

Logistic regression was employed to assess the odds of reporting illegal drug use between the comparison and injured groups. Models were controlled for rank (as a proxy for socioeconomic status) and age based on a-priori reasoning (UK Office of National Statistics, 2022b). Regression diagnostics were conducted investigating residual outliers, leverage and variance inflation factor. Due to small numbers of in-service reported illegal drug use, an adjusted model restricted to veterans only was also completed. Bias-corrected CIs reported based on bootstrapped models with 1000 replications.

An UpSet plot, a method of visualising multiple intersections in data, was derived based on the top three categories of reported illegal drug use (cocaine use, cannabis use and legal drug use) (Conway et al., 2017) using the statistical software package R 4.3.2.

Ketamine, mephedrone and speed/amphetamines and 'other' drug use were combined due to low numbers of reported use. No heroin use was reported within the past year and so no data are presented. Not all participants who reported ever using an illegal drug reported when they last used or how many days per month they used the drug. These participants were coded as 'not having used in the past year' (n = 74) or 'not frequent users' (n = 11), respectively. A sensitivity analysis was conducted to assess whether a meaningful difference was apparent when coding these individuals as such by excluding them from regression models as missing data. The results of these models and adjusted frequent use proportions can be found in supplementary materials 1. Two participants (<1%) did not complete any item on the drug history questionnaire and were excluded from these analyses; an additional participant was excluded due to experiencing considerable injuries outside of military service. Missing data was handled using casewise deletion.

3.6. Ethics

All procedures were undertaken in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975,

as revised in 2000. The UK Ministry of Defence Research Ethics Committee approved the study (ref: MODREC protocol No:357/PPE/12). All participants provided written informed consent. Results of this paper were presented to the ADVANCE study's participant panel, a group of study participants from both the injured and comparison groups. This discourse influenced some of the variables explored in this analysis as well as the discussion section, specifically regarding the generation of veterans-specific variables/experiences.

4. Results

4.1. Demographic results

In these analyses, 577 participants comprised the injured group and 565 participants the comparison group, creating a total sample of 1142 (99.7 % of the total ADVANCE cohort). Table 1 describes the military/socio-demographics of the two groups. The median age of the sample was 33 years (interquartile range 30, 37 years). The total sample consisted of predominantly Army personnel (86.4 %), those of junior non-commissioned officers/other rank (72.0 %), those who deployed to Afghanistan in combat roles (83.0 %) and personnel who identified as White in ethnic origin (90.3 %). Overall, 52.3 % of the cohort were still serving and 47.7 % had left service. Of those that left service, the median age at leaving was 28 years (interquartile range 25, 33 years), and they left a mean average of 4.7 years (95 % CI 4.5, 4.9).

Table 1
Cohort sociodemographic and military characteristics, stratified by physical combat injury status.

	Comparison group with no serious physical combat injury n = 565	***Serious physical combat injury group n = 577***
Median age at sampling in years (IQR)	27 (24, 30)	25 (22, 29)
Median age at assessment in years (IQR)	34 (30, 37)	33 (30, 37)
Ethnicity % (n)		
Asian	3.0 % (16)	4.7 % (25)
Black	4.9 % (28)	2.9 % (18)
Mixed	1.7 % (9)	2.1 % (12)
White	90.4 % (512)	90.2 % (522)
In a relationship % (n)		
No	22.4 % (113)	24.5 % (132)
Yes	77.6 % (444)	75.5 % (429)
Service at time of sampled deployment % (n)		
Royal Marines/Navy	11.4 % (84)	10.6 % (77)
Army	85.8 % (462)	86.8 % (482)
Royal Air Force	2.7 % (19)	2.6 % (18)
Rank at time of sampled deployment % (n)		
Junior Non-Commissioned Officer/Other Rank	66.4 % (339)	76.6 % (413)
Senior Non-Commissioned Officer	24.7 % (147)	17.1 % (105)
Officer	8.9 % (79)	6.3 % (59)
Role on sampled deployment % (n)		
Combat support/Combat service support	19.3 % (115)	15.2 % (90)
Combat	80.7 % (450)	84.8 % (487)
Any Mental Illness* % (n)		
No	78.7 % (453)	69.8 % (411)
Yes	21.3 % (111)	30.2 % (165)
Any suicidal ideation in the past two weeks		
No	502 (87.8 %)	492 (84.3 %)
Yes	63 (12.2 %)	85 (15.7 %)
Serving status % (n)		
Still serving	82.2 % (466)	26.8 % (156)
Veteran	17.8 % (99)	73.2 % (421)
Median time since left service in years (veterans only) (IQR)	5 (2, 6)	5 (3, 6)
Median age when left service in years (veterans only) IQR	29 (26, 33)	28 (25, 32)
Median length of time served in Armed Forces in years (veterans only) (IQR)	13 (10, 18)	10 (7, 14)

Weighted percentages are presented alongside unweighted cell counts.
*Anxiety, Depression or Post-Traumatic Stress Disorder.

4.2. Illegal drug use

Overall, 394 participants (35.6 %, 95 % CI 32.7, 38.5) reported illegal drug use within their lifetime (Table 1). Cannabis was the most commonly reported drug, with almost one third of the cohort reporting having ever used it (n = 330; 30.7 %, 95 % CI 27.9, 33.6), followed by cocaine (n = 229; 22.6 %, 95 % CI 20.1, 25.3). The most common illegal drugs reported via the 'other' drugs question were psychedelics (e.g. magic mushrooms, LSD) (n = 20; 1.5 %, 95 % CI 1.0, 2.4). 115 participants (11.3 %, 95 % CI 9.5 13.4) reported using an illegal drug within the last year, and 29 participants (2.9 %, 95 % CI 2.0, 4.2)) reported using an illegal drug within the last month. The most common reported drug used in the last year was cocaine (n = 73; 7.6 % (95 %CI 6.1, 9.5) followed by cannabis (n = 66; 6.8 %, 95 % CI 5.3, 8.6). Of those that reported illegal drug use in the past year (n = 115) 56 reported frequent use (using a drug on more than one day per month) (49.2 %, 95 % CI 39.9, 58.7).

No differences were observed in lifetime use between the injured group (prevalence estimate 38.0 %, 95 %CI 34.0, 42.2) and comparison group (32.7 %, 95 %CI 28.8, 36.9) (Odds ratio (OR) 1.24, 95 %CI 0.97, 1.62) (Tables 2 and 3). Injured personnel had greater odds of reporting illegal drug use in the past year (prevalence estimate 16.3 %, 95 %CI 13.3, 19.8) (OR 3.10, 95 %CI 2.02, 4.93) compared to the comparison group (prevalence estimate 5.4 %, 95 %CI 3.7, 7.8). However, when restricted to only veterans, injured veterans had significantly lower odds of reporting illegal drug use in their lifetime compared to veterans in the comparison group (Table 3). No significant differences were observed in the odds of reporting illegal drug use in the past year between the injured and comparison groups. Models where individuals with any missing data were excluded were broadly similar to those presented in the results (supplementary materials 1). Amongst injured veterans, prevalence of cocaine use (n = 48; 13.3 % (95 %CI 10.1, 17.3)) and cannabis use (n = 51 13.5 %, 10.4, 17.5) in the past year was similar. Amongst veterans in the comparison group, prevalence of cocaine use (n = 21; 24.6 %, 95 %CI 16.4, 35.1) in the past year was higher, but confidence intervals crossed compared to cannabis use (n = 13; 15.4 %, 95 %CI 9.1, 25.1).

Fig. 1 describes the number of participants who did/did not report cocaine use, cannabis use or legal drug misuse within the past year, and the rates at which they reported using multiple drugs. Heavy alcohol or tobacco use in the absence of any illegal drug use were the most commonly reported substances, and cocaine use in the absence of any other substance the next most common. The reported use of multiple different drugs within the past year was low. When reported, the most common combination were cocaine and cannabis.

4.3. Factors associated with illegal drug use

Table 4 describes the prevalence of illegal drug use in the past year amongst sociodemographic groups stratified by injury status. In the total sample, differences in the prevalence of illegal drug use were observed in the following factors, whereby the highest prevalence was observed in those of White ethnic background, those of a younger age, those holding lower ranks, those not in a relationship, those who reported a probable mental illness, those who reported any suicidal ideation in the past two weeks, those who reported legal drug misuse and veterans. Prevalence of illegal drug use was similar for those that deployed in a combat role compared to a combat service/-support role, those that reported low,

Table 2
Prevalence of illegal and legal drug use, stratified by physical combat injury.

	Combat injury status ***Comparison group with no serious physical combat injuries*** ***n = 565***	***Serious Physical combat injury group*** ***n = 577***
Illegal drug use % (95 %CI)) (n)		
Illegal drug use		
None (ever)	67.3 % (63.1, 71.1) (386)	62.0 % (57.8, 66.0) (362)
In their lifetime	32.7 % (28.8, 36.9) (179)	38.0 % (34.0, 42.2) (215)
In the past year	5.4 % (3.7, 7.8) (28)	16.3 % (13.3, 19.8) (87)
Frequent illegal drug use	2.9 % (1.8, 4.8) (15)	7.8 % (5.8, 10.5) (41)
Illegal drugs used in the past year* % (95 %CI)) (n)		
Cocaine	4.7 % (3.1, 7.0) (23)	10.2 % (7.8, 13.3) (50)
Cannabis	2.9 % (1.7, 4.9) (14)	10.1 % (7.7, 13.1) (52)
Ecstasy, Ketamine, Speed/Amphetamine, Mephedrone or other	NR (n < 5 ~)	3.7 % (2.3, 5.9) (18)
Legal drug misuse % (95 %CI)) (n)		
Legal drug misuse		
No	91.5 % (88.7, 93.7) (522)	91.8 % (89.1, 93.9) (532)
Yes	8.5 % (6.3, 11.3) (43)	8.2 % (6.1, 10.9) (45)
Type of legal drug misuse % (95 %CI)) (n)		
Heavy alcohol use		
No	96.2 % (94.1, 97.6) (544)	96.0 % (93.9, 97.4) (550)
Yes	3.8 % (2.4, 5.9) (19)	4.0 % (2.6, 6.1) (23)
Tobacco use		
Non-smoker	76.0 % (72.1, 79.5) (439)	78.1 % (74.3, 81.4) (458)
Low-moderate tobacco use (<20 cigarettes per day/did not report cigarettes per day)	19.0 % (15.8, 22.6) (100)	17.4 % (14.4, 20.9) (95)
Heavy tobacco use (20 + cigarettes per day)	5.0 % (3.4, 7.4) (26)	4.5 % (3.0, 6.7) (24)

Weighted percentages and confidence intervals are presented.CI Confidence Interval
*Participants can feature in multiple categories.
~ Some data suppressed to allow for confidentiality in line with Defence Statistics rounding policy (https://www.gov.uk/government/publications/defence-statistics-policies/ministry-of-defence-disclosure-control-and-rounding-policy).

mid and high overall perceived health and those that reported no-slight pain/discomfort compared to moderate-extreme pain/discomfort. The top three groups with the highest prevalence of illegal drug use in the comparison group were veterans (26.0 %, 95 %CI 17.9, 36.2) those who reported any suicidal ideation in the past two weeks (18.9 %, 95 %CI 10.3, 31.9) and those that reported heavy alcohol or tobacco use (18.1 %, 95 %CI 8.6, 34.2). The top three groups with the highest prevalence of illegal drug use in the injured group were those that reported heavy alcohol or tobacco use (41.1 %, 95 %CI 26.9, 57.0), those who reported suicidal ideation in the past two weeks (28.8 %, 95 %CI 19.5, 40.3) and those with a probable mental illness (24.0 %, 95 %CI 17.8, 31.5). Additional demographic details of those that used illegal drugs in the past year can be found in supplementary materials 2.

Analyses of prevalence of illegal drug use in the past year were completed for factors associated with having left service (Table 4). In the total sample, differences in the prevalence of illegal drug use were observed in the following factors, whereby the highest prevalence was observed in those that left service at a younger age and those with a shorter total length of time served in the Armed Forces. Prevalence of illegal drug use was similar for veterans who were economically active compared to those that were not and those that left service < 5 years ago compared to those that left ≥ 5 years ago. The top three groups with the highest prevalence of illegal drug use in the comparison group were those that left service at 27–31 years old (37.7 %, 95 %CI 22.5, 55.8), those with 1–7 years of service at time of leaving (34.6 %, 95 %CI 23.3, 47.9) and those that left ≥ 5 years prior to their ADVANCE assessment (26.8 %, 95 %CI 15.9, 41.5). The top three groups with the highest prevalence of illegal drug use in the injured group were those that left service at 19–26 years old (32.8 %, 95 %CI 25.6, 40.9), those with 1–7 years of service at time of leaving (27.3 %, 95 %CI 22.1, 33.3) and those who left service ≥ 5 years prior to their ADVANCE assessment (26.4 %, 95 %CI 20.5, 33.2).

Table 3
Logistic regression investigating any illegal drug use in the past year.

	AOR (95 %bias-corrected CI)	**AOR (95 %bias-corrected CI) (veterans only)**
Any illegal drug use-in lifetime		
Comparison group	*Ref*	*Ref*
Injured group	1.24 (0.97, 1.58)	0.59 (0.36, 0.96)
Any illegal drug use in the past year		
Comparison group	*Ref*	*Ref*
Injured group	3.09 (2.03, 5.31)	0.67 (0.40, 1.27)

AOR Adjusted Odds Ratio CI Confidence Interval
Adjusted for rank (as a proxy for socioeconomic status) and age at assessment. Models bootstrapped utilising 1000 replications.

5. Discussion

In this analysis, we described the prevalence of self-reported illegal drug use amongst a cohort of UK military personnel who sustained a serious physical combat injury during deployment to Afghanistan and a comparison group who sustained no serious physical combat injuries. UK Armed Forces personnel who sustained serious physical combat injuries in Afghanistan reported a greater prevalence of illegal drug use in the past year (16.3 %) compared to demographically similar personnel who did not sustain such injuries (5.4 %). However, when restricted to only veterans, no differences were observed between the injured and comparison groups in the odds of reporting illegal drug use in the past year. A higher prevalence of illegal drug use in the past year was noted in this cohort amongst those of younger age, lower rank, those not in a relationship, veterans, those with probable mental illness, those who reported suicidal ideation and those who reported legal drug misuse. Veteran specific factors included having left service at a younger age or with a shorter total length of service.

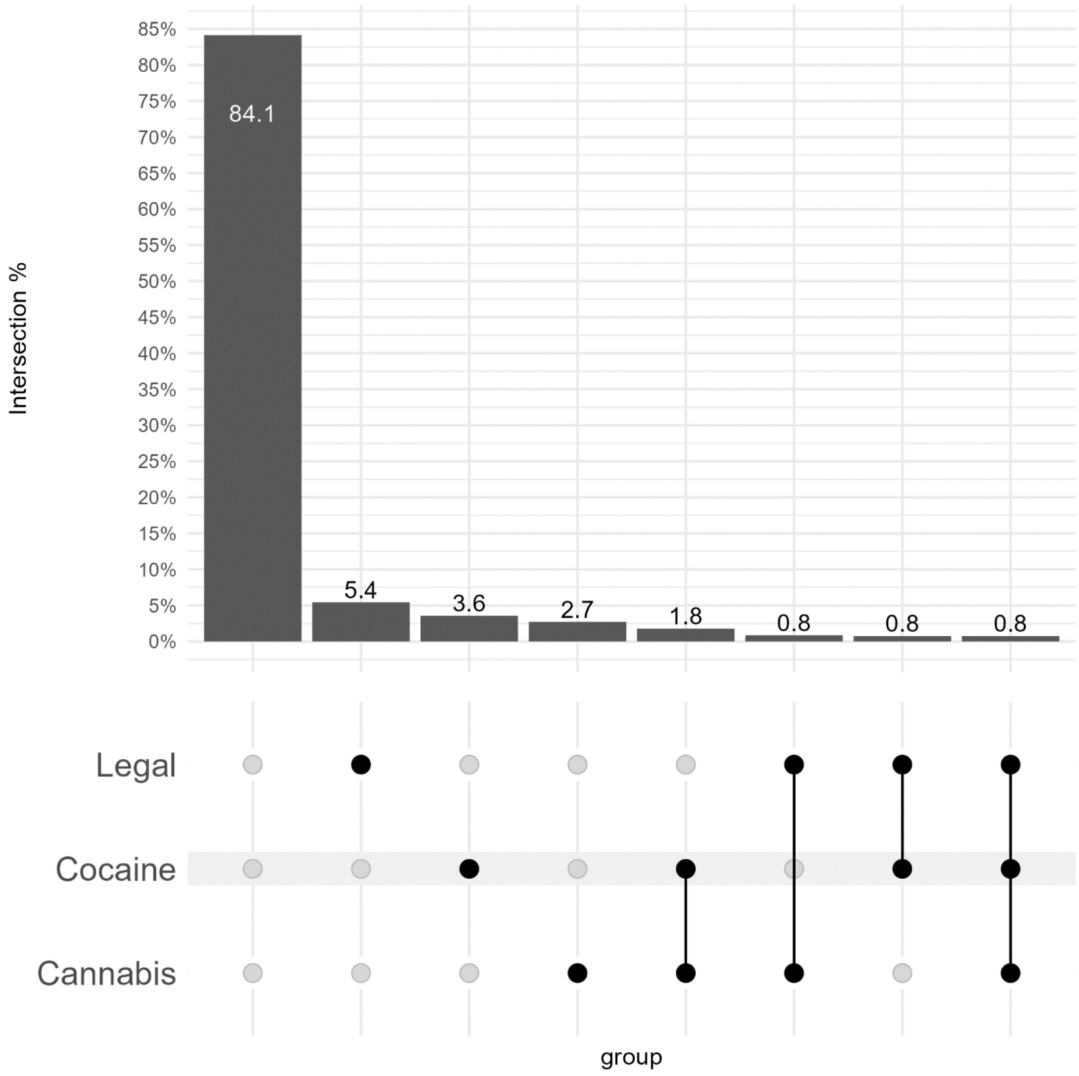

Fig. 1. UpSet plot of combinations of cocaine, cannabis or legal drug misuse (heavy alcohol/tobacco use), Grey circles refer to no use of the drug in that row (e.g. legal drug use, cocaine or cannabis). Single black circles refer to use in the past year of only the drug in that row. Multiple black circles in a column refer to use of both/multiple drugs referenced in that row.

5.1. Comparisons to the UK general population

The Crime Survey for England and Wales uses a sample representative of individuals living in households across England and Wales and reports on self-report data regarding illegal drug use in the past year. Between April 2019-March 2020, 8.9 % of males aged 25–59 years in England and Wales reported any illegal drug use in the past year, with cannabis use being more common (7.0 %) than powder cocaine use (2.7 %) (UK Office of National Statistics, 2022b). Cocaine use has been rising and cannabis use has been falling in the UK general population since 1995 (UK Office of National Statistics, 2022b). Illegal drug use in the ADVANCE cohort was slightly higher in comparison (11.3 %), though very rare amongst those still serving. One potential explanation is that serving personnel are subject to random CDT, and fear of being caught and discharged may discourage personnel from using illegal drugs. However, it is also possible that serving participants are using illegal drugs and are not willing to divulge this information, despite the confidential nature of the questionnaire. Illegal drug use was not rare amongst veterans. Veterans in our cohort reported double the prevalence of illegal drug use within the past year (21.7 %), higher prevalence of cannabis use in the injured group (13.5 %) and considerably higher prevalence of cocaine use in both the injured and comparison group (13.3–24.6 % respectively) compared with general population estimates from the Crime Survey for England and Wales (UK Office of National Statistics, 2022b). It is possible that being in-service acts as a protective factor against regular drug use due to CDT, though it is noted that a culture of cocaine use 'tactically' post-deployment and at the beginning of leave periods to minimise risk of detection has previously been reported in UK serving personnel (Bradley et al., 2021). It is impossible to say whether the prevalence of illegal drug use in our cohort, which is representative of the demographics associated with personnel who sustained serious physical injuries during the conflict in Afghanistan, differs from other UK veterans or similar occupational groups due to no similar cohort data being available. Future research is strongly encouraged on this topic.

5.2. Veteran status

Whilst those who sustained serious physical combat injuries had greater odds of reporting illegal drug use in the past year compared to the comparison group, these differences no longer existed when the analysis was restricted to veterans. 31.8 % of veterans who left between the ages of 19–26 reported illegal drug use, lending support to the emerging adulthood theory that individuals in this age bracket may be more likely to engage in risky behaviours such as illegal drug use. Previous research has observed that early service leavers, those that leave

Table 4
Prevalence of illegal drug use in the past year amongst sociodemographic groups, stratified by physical combat injury.

	Total Sample	Comparison group with no serious physical combat injuries	Serious Physical combat injury group
Ethnicity % (95 %CI)			
White	12.3 % (10.3, 14.7)	5.6 % (3.8, 8.1)	18.1 % (14.8, 21.8)
All other ethnic groups combined	NR (~)	NR (n < 5 ~)	0 %
Age at assessment in years (tertiles) % (95 %CI)			
23–31 years old	16.0 % (12.6, 20.1)	6.2 % (3.5, 10.7)	24.3 % (18.8, 30.7)
32–36 years old	10.4 % (7.7, 14.0)	7.3 % (4.3, 12.1)	13.2 % (9.0, 18.8)
37–59 years old	NR (~)	NR (n < 5 ~)	6.7 % (3.7, 11.8)
Rank % (95 %CI)			
Junior Non-Commissioned Officer/Other Rank	15.0 % (12.5, 17.8)	7.7 % (5.3, 11.2)	20.3 % (16.6, 24.7)
Senior Non-Commissioned Officer/Officer~	NR (~)	NR (n < 5 ~)	3.1 % (1.4, 6.8)
Relationship status % (95 %CI)			
Not in a relationship	18.2 % (13.7, 23.9)	12.2 % (7.1, 20.1)	23.0 % (16.3, 31.4)
In a relationship	9.1 % (7.2, 11.4)	3.6 % (2.1, 5.9)	14.0 % (10.8, 17.9)
Combat role % (95 %CI)			
Deployed in a combat service support role/combat support role	NR (~)	NR (n < 5 ~)	14.8 % (8.6, 24.4)
Deployed in a combat role	11.9 % (9.8, 14.3)	6.1 % (4.1, 8.9)	16.6 % (13.3, 20.4)
Any mental illness* % (95 %CI)			
No	8.4 % (6.6, 10.7)	3.6 % (2.2, 5.9)	13.0 % (9.9, 16.9)
Yes	19.5 % (15.0, 24.9)	12.0 % (6.9, 20.1)	24.0 % (17.8, 31.5)
Suicidal ideation in the past two weeks % (95 %CI)			
No	9.2 % (7.4, 11.3)	3.6 % (2.3, 5.7)	14.2 % (11.2, 17.7)
Yes	24.8 % (18.0, 33.1)	18.9 % (10.3, 31.9)	28.8 % (19.5, 40.3)
Pain/discomfort % (95 %CI)			
Reported no-slight pain/discomfort	10.1 % (8.2, 12.4)	5.2 % (3.5, 7.6)	15.1 % (11.8, 19.1)
Reported moderate-extreme pain/discomfort	15.6 % (11.0, 21.5)	5.8 % (1.8, 16.9)	19.5 % (13.6, 27.1)
Self-reported overall health (tertiles) % (95 %CI)			
Low (5–75)	14.8 (11.6, 18.6)	6.5 % (3.6, 11.3)	20.6 % (15.8, 26.3)
Mid (76–87)	10.3 (7.0, 14.7)	6.2 % (3.2, 11.6)	14.2 % (9.0, 21.8)
High (88–100)	7.4 (5.1, 10.8)	3.3 % (1.6, 7.0)	11.5 % (7.3, 17.5)
Legal drug misuse % (95 %CI)			
No	9.6 % (7.8, 11.7)	4.2 % (2.8, 6.4)	14.1 % (11.2, 17.5)
Yes	30.4 % (21.2, 41.5)	18.1 % (8.6, 34.2)	41.1 % (26.9, 57.0)
Veteran status % (95 %CI)			
Still serving	NR (~)	NR (n < 5 ~)	NR (n < 5 ~)
Veteran	22.4 % (18.9, 26.4)	26.0 % (17.9, 36.2)	21.7 % (17.8, 26.1)
Not economically active (veterans only) % (95 %CI)			
Economically active	22.1 % (18.1, 26.7)	26.6 % (17.8, 37.8)	21.0 % (16.7, 26.2)
Not economically active	NR (~)	NR (n < 5 ~)	26.3 % (17.5, 37.5)
Time since left service (veterans only) % (95 %CI)			
<5 years	17.6 % (13.0, 23.2)	24.2 % (13.2, 40.1)	16.2 % (11.4, 22.4)
≥5 years	26.4 % (21.1, 32.5)	26.5 % (15.3, 41.8)	26.4 % (20.5, 33.2)
Age left service (veterans only) % (95 %CI)			
19–26	31.8 % (25.2, 39.2)	26.2 % (12.2, 47.7)	32.8 % (25.6, 40.9)
27–31	19.1 % (14.0, 25.6)	37.7 % (22.5, 55.8)	14.4 % (9.6, 21.2)
32–54	NR (~)	NR (n < 5 ~)	9.2 % (4.9, 16.6)
Length of time served in Armed Forces (veterans only) % (95 %CI)			
1–7 years	28.6 % (23.8, 33.9)	34.6 % (23.3, 47.9)	27.3 % (22.1, 33.3)
8–11 years	NR (~)	NR (n < 5 ~)	11.0 % (5.9, 19.7)
12–32 years	6.5 % (2.7, 15.0)	0 %	8.3 % (3.4, 18.9)

Weighted row percentages and confidence intervals are presented in this table.
***Anxiety, Depression or Post-Traumatic Stress Disorder.**
****Heavy alcohol or tobacco use.**
~ Some data suppressed/groups merged to allow for medical confidentiality in line with Defence Statistics rounding policy (https://www.gov.uk/government/publications/defence-statistics-policies/ministry-of-defence-disclosure-control-and-rounding-policy).
CI Confidence Interval; IQR Interquartile Range

service prior to completing basic training or leave within the first three years of service (though definitions of early service leavers vary in the literature), are at increased risk of poor mental and physical health outcomes (Bergman et al., 2019; Buckman et al., 2012). In our study, a greater prevalence of illegal drug use was noted amongst those who left the Armed Forces at a younger age and amongst those who had served in the military for a shorter length of time, regardless of whether they'd sustained a serious physical combat injury. Whilst these do not represent early service leaves in the traditional sense, it is possible that those who leave service unexpectedly might represent a group similar to early service leavers. Several mechanisms might explain why these individuals experience poor outcomes. Individuals who leave service early may come from disadvantaged backgrounds which increase their risk of illegal drug use (Daniel et al., 2009; UK Office of National Statistics, 2022b), which may explain why the odds of reporting illegal drug use in their lifetime was significantly greater amongst veterans without injury (Table 3). Unplanned discharge from the Armed Forces might leave individuals at increased risk of unemployment (Burdett et al., 2019), which has been shown to have a bidirectional association with substance use disorder (Nolte-Troha et al., 2023). Those who leave service may do so due to mental health problems (Bergman et al., 2016), which is associated with illegal drug use (Degenhardt & Hall, 2012).

5.3. *Nature of drug use*

Frequent drug use, defined as reporting illegal drug use more than once a month, was reported by 30 % of 16–59-year-olds in the Crime Survey for England and Wales who reported having used an illegal drug

within the last year (UK Office of National Statistics, 2022b). In the ADVANCE cohort, this was higher, at 49.2 %. It is important to note that frequent use does not automatically infer dependence or addiction (e.g. problem drug use), and that patterns of drug use in individuals may be episodic or transient (Schlag, 2020). Based on the information gathered as part of the ADVANCE assessment, it is currently impossible to identify experimental drug use from habitual or dependent drug use. Further research on this cohort over time may help us understand whether the drug use reported currently is transient, reflecting multiple flashpoints pertinent at the initial ADVANCE assessment but perhaps not at future assessments, such as recent leaving of the Armed Forces or young age (Schlag, 2020). However, the combination of fairly high cocaine-use along with reported frequent use in this cohort, with the current noted increases in cocaine-related deaths (n = 857 deaths registered in 2022, over seven times greater than the reported deaths in 2011 (n = 112)) (UK Office of National Statistics, 2022a), is worth considering, especially in relation to clinical recommendations, which are discussed below. Continued observation is essential to understanding the nature of the illegal drug use reported in this cohort.

5.4. Clinical implications

Previous research into UK military illegal drug use and the process of leaving the Armed Forces due to failed CDT has recommended a review of the support given to transitioning service personnel and the development of a joint protocol between the Ministry of Defence and NHS for managing positive tests (Bradley et al., 2021). Smoking cessation, alcohol cessation, and integrated treatment for both illegal drug use and mental health problems is effective at not only lowering illegal drug misuse, but also increasing mental well-being and physical health (Charlet & Heinz, 2017; Taylor et al., 2014). Evaluation of Op COURAGE, the veteran's mental health and well-being services in England, has identified a need for drug and alcohol specific expertise within high intensity services (Finnegan et al., 2023). This research provides support for this recommendation. We continue to encourage civilian general practitioners and military medical officers to routinely enquire about the mental health of individuals who served in Afghanistan (Dyball et al., 2022), especially those who have left service, with the understanding that stigma may influence a patient's decision to come forward with a mental health or substance abuse problem (Luoma et al., 2007; Stevelink et al., 2019).

5.5. Strengths/limitations

Strengths of this study include utilising a matched cohort injured UK Armed Forces personnel and a comparison group who deployed to Afghanistan and investigation of a wide range of illegal drugs. However, there are several limitations. Several of the investigated demographic, military or health-related factors investigated may be confounders or mediators of the relationship between sustaining a physical combat injury and illegal drug use. Although participants were aware the questionnaire is confidential, serving personnel may not have been willing to divulge sensitive information regarding illegal drug use due to perceived threat of discharge from the military. The prevalence of drug use within the past year or frequent use in particular might be higher, as some participants did not report when they last used an illegal drug. Whilst alcohol and illegal drug use history was collected via questionnaire, tobacco use was collected via clinical interview and may have an associated reporting bias as a result. Prescribed medication misuse was not investigated and warrants further independent inquiry. Veterans in the comparison group do not represent all uninjured veterans, but rather reflect the demographics of those who sustained injuries in Afghanistan. Therefore, these results should be interpreted cautiously. Due to the cross-sectional nature of the data and analyses undertaken, causality, either from sustaining a serious physical combat injury or leaving service, cannot be inferred. Mediation analysis was considered to assess the mediating effect of leaving service between combat injury and illegal drug use but could not be implemented due to very small numbers of in-service reported drug use, leading to biased estimates.

6. Conclusions

UK Armed Forces personnel who sustained serious physical combat injuries whilst on deployment to Afghanistan have greater odds of reporting illegal drug use in the past year compared to a comparison group consisting of demographically similar individuals who did not sustain serious physical combat injuries. Greater prevalence of illegal drug use was identified in those who were younger, lower rank, single, veterans, those who reported probable mental illness or suicidal ideation and those that reported heavy alcohol or tobacco use in this cohort. Amongst veterans specifically, greater prevalence of illegal drug use was observed in those who left service at a younger age and with a shorter length of service.

Author Contributions

A. Bennett, C. Boos, A. Bull, and N.T. Fear all contributed to study conception, design and securing funding. The first draft of the manuscript was written by D. Dyball, with statistical methodology input from S. Schofield. D. Dyball, S. Schofield, A. Bennett, C. Boos, A. Bull, and N. Fear commented on previous versions of the manuscript and approved the final manuscript.

CRediT authorship contribution statement

Daniel Dyball: Writing – original draft, Methodology, Formal analysis. **Susie Schofield:** Writing – review & editing, Methodology, Formal analysis, Conceptualization. **Alexander N. Bennett:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Christopher J. Boos:** Writing – review & editing, Conceptualization. **Anthony M.J. Bull:** . **Nicola T. Fear:** .

Funding

The ADVANCE study is funded through the ADVANCE Charity. Key contributors to this charity are the Headley Court Charity (principal funder); HM Treasury (LIBOR grant); Help for Heroes; Nuffield Trust for the Forces of the Crown; Forces in Mind Trust; National Lottery Community Fund; Blesma, The Limbless Veterans; and the UK Ministry of Defence.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Acknowledgements

We wish to thank all of the research staff at both Headley Court and Stanford Hall who helped with the ADVANCE study, including Maria-Benedicta Edwards, Helen Blackman, Melanie Chesnokov, Emma Coady, Paul Cullinan, Sarah Evans, Guy Fraser, Meliha Kaya-Barge, Maija Maskuniitty, David Pernet, Helen Prentice, Urszula Pucilowska, Lajli Varsani, Anna Verey, Molly Waldron, Danny Weston, Tass White, Seamus Wilson, and Louise Young. We would also like to thank the ADVANCE participant panel, who provided valuable insight in interpreting our data.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.

org/10.1016/j.addbeh.2025.108269.

Data availability

Given the sensitive nature of the data and potential risk of disclosure, the data have not been widely available. Requests for data will be considered on a case-by-case basis and subject to UK Ministry of Defence clearance.

References

Advisory Council on the Misuse of Drugs. (2019). Annual_report. Retrieved 10/05/2023 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1043155/ACMD_Annual_report_2017-19.pdf.

Agaku, I., Odani, S., & Nelson, J. R. (2020). U.S. Military Veteran Versus Nonveteran Use of Licit and Illicit Substances. *American Journal of Preventive Medicine, 59*(5), 733–741. https://doi.org/10.1016/j.amepre.2020.04.027

Armoon, B., Higgs, P., & Mohammadi, R. (2023). Mental health status, health service utilization, drug use behaviors associated with non-fatal overdose among people who use illicit drugs: A meta-analysis. *Journal of Substance Use, 28*(2), 154–165. https://doi.org/10.1080/14659891.2021.2019331

Armoon, B., SoleimanvandiAzar, N., Fleury, M.-J., Noroozi, A., Bayat, A.-H., Mohammadi, R., Ahounbar, E., & Fattah Moghaddam, L. (2021). Prevalence, sociodemographic variables, mental health condition, and type of drug use associated with suicide behaviors among people with substance use disorders: A systematic review and meta-analysis. *Journal of Addictive Diseases, 39*(4), 550–569. https://doi.org/10.1080/10550887.2021.1912572

Arnett, J. J. (2005). The Developmental Context of Substance use in Emerging Adulthood. *Journal of Drug Issues, 35*(2), 235–254. https://doi.org/10.1177/002204260503500202

Arnett, J. J., Žukauskienė, R., & Sugimura, K. (2014). The new life stage of emerging adulthood at ages 18-29 years: Implications for mental health. *Lancet Psychiatry, 1*(7), 569–576. https://doi.org/10.1016/s2215-0366(14)00080-7

Babor, T. F., Higgins-Biddle, J. C., Saunders, J. B., Monteiro, M. G., & Organization, W. H. (2001). *AUDIT: the alcohol use disorders identification test: guidelines for use in primary health care*.

Bennett, A. N., Dyball, D. M., Boos, C. J., Fear, N. T., Schofield, S., Bull, A. M. J., et al. (2020). Study protocol for a prospective, longitudinal cohort study investigating the medical and psychosocial outcomes of UK combat casualties from the Afghanistan war: the ADVANCE Study. *BMJ Open., 10*(10), Article e037850.

Bergman, B. P., Macdonald, E. B., Mackay, D. F., & Pell, J. P. (2019). Healthy workers or less healthy leavers? *Mortality in military veterans. Occupational Medicine, 69*(8–9), 570–576. https://doi.org/10.1093/occmed/kqz023

Bergman, B. P., Mackay, D. F., Smith, D. J., & Pell, J. P. (2016). Long-term mental health outcomes of military service: National linkage study of 57,000 veterans and 173,000 matched nonveterans. *The Journal of Clinical Psychiatry, 77*(6), 10710.

Bird, S. M. (2007). Compulsory Drugs Testing in the British Army. *The RUSI Journal, 152*(6), 54–59. https://doi.org/10.1080/03071840701863125

Blanchard, E. B., Jones-Alexander, J., Buckley, T. C., & Forneris, C. A. (1996). Psychometric properties of the PTSD Checklist (PCL). *Behaviour research and therapy, 34*(8), 669–673.

Bradley, S., Khan, L., Fossey, M., Fox, A., Caddick, N., & Godier-McBard, L. (2021). *"Fall Out": Substance misuse and service leavers: A qualitative investigation into the impact of a Compulsory Drug Test (CDT) discharge. Retrieved from*. https://www.fim-trust.org/project/substance-misuse-and-service-leavers-an-investigation-into-the-impact-of-a-cdt-drug-discharge-on-drug-misuse-and-mental-health/.

Bray, R. M., Pemberton, M. R., Lane, M. E., Hourani, L. L., Mattiko, M. J., & Babeu, L. A. (2010). Substance Use and Mental Health Trends Among U.S. Military Active Duty Personnel: Key Findings From the 2008 DoD Health Behavior Survey. *Military Medicine, 175*(6), 390–399. https://doi.org/10.7205/milmed-d-09-00132

Buckman, J. E. J., Forbes, H. J., Clayton, T., Jones, M., Jones, N., Greenberg, N., Sundin, J., Hull, L., Wessely, S., & Fear, N. T. (2012). Early Service leavers: A study of the factors associated with premature separation from the UK Armed Forces and the mental health of those that leave early. *European Journal of Public Health, 23*(3), 410–415. https://doi.org/10.1093/eurpub/cks042

Burdett, H., Fear, N. T., MacManus, D., Wessely, S., Rona, R. J., & Greenberg, N. (2019). Unemployment and benefit claims by UK veterans in the new millennium: Results from a record linkage study. *Occupational and Environmental Medicine, 76*(10), 726–732. https://doi.org/10.1136/oemed-2019-105737

Charlet, K., & Heinz, A. (2017). Harm reduction—a systematic review on effects of alcohol reduction on physical and mental symptoms. *Addiction Biology, 22*(5), 1119–1159. https://doi.org/10.1111/adb.12414

Conway, J. R., Lex, A., & Gehlenborg, N. (2017). UpSetR: An R package for the visualization of intersecting sets and their properties. *Bioinformatics, 33*(18), 2938–2940. https://doi.org/10.1093/bioinformatics/btx364

Daniel, J. Z., Hickman, M., Macleod, J., Wiles, N., Lingford-Hughes, A., Farrell, M., et al. (2009). Is socioeconomic status in early life associated with drug use? A systematic review of the evidence. *Drug and Alcohol Review., 28*(2), 142–153.

Degenhardt, L., & Hall, W. (2012). Extent of illicit drug use and dependence, and their contribution to the global burden of disease. *The Lancet, 379*(9810), 55–70.

Dyball, D., Bennett, A. N., Schofield, S., Cullinan, P., Boos, C. J., Bull, A. M., et al. (2022). Mental health outcomes of male UK military personnel deployed to Afghanistan and the role of combat injury: analysis of baseline data from the ADVANCE cohort study. *The Lancet Psychiatry, 9*(7), 547–554.

Feng, Y.-S., Kohlmann, T., Janssen, M. F., & Buchholz, I. (2021). Psychometric properties of the EQ-5D-5L: A systematic review of the literature. *Quality of Life Research, 30*, 647–673.

Finnegan, A., Salem, K., Green, N., Ainsworth-Moore, L., & Ghomi, M. (2023). Evaluation of the NHS England 'Op COURAGE' High Intensity Service for military veterans with significant mental health problems. *BMJ Military Health, e002385*. https://doi.org/10.1136/military-2023-002385

Freeman, T. P., Morgan, C. J. A., Vaughn-Jones, J., Hussain, N., Karimi, K., & Curran, H. V. (2012). Cognitive and subjective effects of mephedrone and factors influencing use of a 'new legal high'. *Addiction, 107*(4), 792–800. https://doi.org/10.1111/j.1360-0443.2011.03719.x

Herdman, M., Gudex, C., Lloyd, A., Janssen, M., Kind, P., Parkin, D., Bonsel, G., & Badia, X. (2011). Development and preliminary testing of the new five-level version of EQ-5D (EQ-5D-5L). *Quality of Life Research, 20*, 1727–1736.

Hoggatt, K. J., Lehavot, K., Krenek, M., Schweizer, C. A., & Simpson, T. (2017). Prevalence of substance misuse among US veterans in the general population. *The American Journal on Addictions, 26*(4), 357–365. https://doi.org/10.1111/ajad.12534

Hu, N., Wang, C., Liao, Y., Dai, Q., & Cao, S. (2021). Smoking and incidence of insomnia: A systematic review and meta-analysis of cohort studies. *Public Health, 198*, 324–331. https://doi.org/10.1016/j.puhe.2021.07.012

Kelsall, H. L., Wijesinghe, M. S. D., Creamer, M. C., McKenzie, D. P., Forbes, A. B., Page, M. J., & Sim, M. R. (2015). Alcohol Use and Substance Use Disorders in Gulf War, Afghanistan, and Iraq War Veterans Compared With Nondeployed Military Personnel. *Epidemiologic Reviews, 37*(1), 38–54. https://doi.org/10.1093/epirev/mxu014

Kroenke, K., Spitzer, R. L., & Williams, J. B. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of general internal medicine, 16*(9), 606–613.

Clary, K. L., Lavi, T., Smith, D. C., & Saban, J. (2022). Exploring the Utility of the Emerging Adulthood Theory Among Military Members and Veterans with Risky Substance Use. *Emerging Adulthood, 10*(3), 639–644. https://doi.org/10.1177/21676968211058517

Luoma, J. B., Twohig, M. P., Waltz, T., Hayes, S. C., Roget, N., Padilla, M., & Fisher, G. (2007). An investigation of stigma in individuals receiving treatment for substance abuse. *Addictive behaviors, 32*(7), 1331–1346.

Nolte-Troha, C., Roser, P., Henkel, D., Scherbaum, N., Koller, G., & Franke, A. G. (2023). Unemployment and Substance Use: An Updated Review of Studies from North America and Europe. *Healthcare, 11*(8), 1182. https://www.mdpi.com/2227-9032/11/8/1182.

Schlag, A. K. (2020). Percentages of problem drug use and their implications for policy making: A review of the literature. *Drug Science, Policy and Law, 6*, Article 2050324520904540. https://doi.org/10.1177/2050324520904540

Silver, I. A., Kelsay, J. D., & Lonergan, H. (2023). Illegal Drug Use, Depressive Symptoms, and General Health: Exploring Co-occurrence across 11 Years in a National Sample. *Journal of Psychoactive Drugs, 55*(2), 180–202. https://doi.org/10.1080/02791072.2022.2053003

Spitzer, R. L., Kroenke, K., Williams, J. B., & Löwe, B. (2006). A brief measure for assessing generalized anxiety disorder: The GAD-7. *Archives of Internal Medicine, 166*(10), 1092–1097.

Stevelink, S. A., Jones, N., Jones, M., Dyball, D., Khera, C. K., Pernet, D., MacCrimmon, S., Murphy, D., Hull, L., & Greenberg, N. (2019). Do serving and ex-serving personnel of the UK armed forces seek help for perceived stress, emotional or mental health problems? *European Journal of Psychotraumatology, 10*(1), Article 1556552.

Stevelink, S. A. M., Malcolm, E. M., Mason, C., Jenkins, S., Sundin, J., & Fear, N. T. (2015). The prevalence of mental health disorders in (ex-)military personnel with a physical impairment: A systematic review. *Occupational and Environmental Medicine, 72*(4), 243–251. https://doi.org/10.1136/oemed-2014-102207

Taylor, G., McNeill, A., Girling, A., Farley, A., Lindson-Hawley, N., & Aveyard, P. (2014). Change in mental health after smoking cessation: Systematic review and meta-analysis. *BMJ : British Medical Journal, 348*, Article g1151. https://doi.org/10.1136/bmj.g1151

UK Commons Library. (2024). *Commons Library Research Briefing: UK defence personnel statistics*. Retrieved 24/09/2024 from https://researchbriefings.files.parliament.uk/documents/CBP-7930/CBP-7930.pdf.

UK Ministry of Defence. (2013). *Joint Service Provision 835: Alcohol and Substance Misuse and Testing*. Retrieved 14/06/2023 from https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/425401/20131101-JSP_835-V2_0-U.pdf.

UK Ministry of Defence (2014). *FOI2014/04003*. https://assets.publishing.service.gov.uk/media/5a7ed378ed915d74e6226b2e/PUBLIC_1409307582_attachment.pdf.

UK Ministry of Defence (2018). *FOI2018/03436*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/757911/03436.pdf.

UK Ministry of Defence. (2024). *Ministry of Defence: Disclosure control and rounding policy*. Retrieved 02/05/2024 from https://www.gov.uk/government/publications/defence-statistics-policies/ministry-of-defence-disclosure-control-and-rounding-policy.

UK Office of National Statistics (2013). *Smoking (General Lifestyle Survey Overview-a report on the 2011 General Lifestyle Survey)*. https://www.ons.gov.uk/peoplepopulationandcommunity/personalandhouseholdfinances/incomeandwealth/compendium/generallifestylesurvey/2013-03-07/chapter1smokinggenerallifestylesurveyoverviewareportonthe2011generallifestylesurvey.

UK Office of National Statistics. (2022a). *Drug misuse in England and Wales: Year ending June 2022*. Retrieved from https://www.ons.gov.uk/peoplepopulationandcommuni

ty/crimeandjustice/articles/drugmisuseinenglandandwales/yearendingjune2022#cite-this-article.

UK Office of National Statistics. (2022b). *Drug misuse in England and Wales: Year ending June 2022*. Retrieved 14/06/2023 from https://www.ons.gov.uk/peoplepopulationandcommunity/crimeandjustice/articles/drugmisuseinenglandandwales/yearendingjune2022.

Wardell, J. D., Cunningham, J. A., Quilty, L. C., Carter, S., & Hendershot, C. S. (2020). Can the AUDIT consumption items distinguish lower severity from high severity patients seeking treatment for alcohol use disorder? *Journal of Substance Abuse Treatment, 114*, Article 108001. https://doi.org/10.1016/j.jsat.2020.108001

Woodhead, C., Rona, R. J., Iversen, A., MacManus, D., Hotopf, M., Dean, K., McManus, S., Meltzer, H., Brugha, T., Jenkins, R., Wessely, S., & Fear, N. T. (2011). Mental health and health service use among post-national service veterans: Results from the 2007 Adult Psychiatric Morbidity Survey of England. *Psychological Medicine, 41*(2), 363–372. https://doi.org/10.1017/S0033291710000759

Woodruff, S. I., Galarneau, M. R., McCabe, C. T., Sack, D. I., & Clouser, M. C. (2018). Health-related quality of life among US military personnel injured in combat: Findings from the Wounded Warrior Recovery Project. *Quality of Life Research, 27*(5), 1393–1402. https://doi.org/10.1007/s11136-018-1806-7

Yoong, S., Miles, D., McKinney, P., Smith, I., & Spencer, N. (1999). A method of assigning socio-economic status classification to British Armed Forces personnel. *Journal of the Royal Army Medical Corps, 145*(3), 140–142.