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UK Veterans' mental health and wellbeing before and during the COVID-19 pandemic.

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ABSTRACT

Objectives: To investigate the impact of the COVID-19 pandemic on the health and wellbeing of UK ex-service personnel (veterans) before and during the pandemic, and to assess associations of COVID-19 experiences and stressors with mental health, alcohol use and loneliness.

Design: An additional wave of data was collected from a longitudinal cohort study of the UK Armed Forces.

Setting: Online survey June-September 2020

Participants: Cohort members were included if they had completed a questionnaire at phase three of the KCMHR health and wellbeing study (2014-2016), had left the Armed Forces after Regular service, were living in the UK, had consented to follow up, and provided a valid email address. Invitation emails were sent to N=3547 with a 44% response rate (n=1562).

Primary outcome measures: Common mental health disorders (CMD) (measured using the General Health Questionnaire, 12 items – cut off ≥ 4), hazardous alcohol use (measured using the AUDIT, 10 items – cut off ≥ 8) and loneliness (UCLA-3 loneliness scale – cut off ≥ 6).

Results: Veterans reported a statistically significant decrease in hazardous drinking of 48.5% to 27.6%, whilst CMD remained stable (non-statistically significant increase of 24.5% to 26.1%). 27.4% of veterans reported feelings of loneliness. The COVID-19 stressors of reporting difficulties with family or social relationships, boredom, and difficulties with health, were statistically significantly associated with CMD, hazardous drinking and loneliness, even after adjustment for previous mental health/hazardous alcohol use.

Conclusions: Our study suggests a COVID-19 impact on veterans' mental health, alcohol use and loneliness, particularly for those experiencing difficulties with family relationships. Veterans experienced the pandemic in similar ways to the general population and in some cases may have responded in resilient ways. Whilst stable levels of CMD and reduction in alcohol use are positive, there remains a group of veterans that may need mental health and alcohol treatment services.

Strengths and Limitations of this Study

- Recruitment from a longitudinal cohort study where underlying characteristics are known.
- Rapid roll-out and use of validated measures for mental health and wellbeing outcomes aligned with our previous health and wellbeing study and other UK general population studies' measures.
- Only generalisable to veterans who were in military service during the Iraq/Afghanistan era.
- The study is limited to the context of the COVID-19 pandemic in the UK, June-September 2020.

INTRODUCTION

The COVID-19 pandemic has led to large-scale societal changes all over the world, with governments implementing strict controls on movement and substantial restrictions to people's personal and work lives [1]. Despite the benefits to public health of containment strategies such as 'lockdown', self-isolation and social distancing (e.g., slower spread of infection), the social, economic, wellbeing and health consequences are likely to be profound [2, 3] and felt in the short, medium and long term.

The uncertainty and unpredictable nature of the COVID-19 pandemic has had a general negative impact on psychological and mental health [4]. The impact of COVID-19 is not uniform. Vulnerable groups, such as the elderly, young, females, people with mental or physical ill health or on low income are at greater risk of social isolation and worse health outcomes [2]. The analysis of longitudinal data from the 'Understanding Society' study indicated that mental health in the UK worsened substantially with increased GHQ scores of 8.1% on average, and worse scores for individuals with pre-existing mental health difficulties [5]. Longitudinal data from the Office for National Statistics (ONS) also reports that there has been a deterioration in mental health of the general population in Great Britain with 19.2% of adults reporting depression in June 2020 compared to 9.7% before the pandemic July 2019-March 2020 [6].

In Great Britain, there are an estimated 2.4 million ex-Service personnel (veterans) making up 5% of household residents aged 16 years and over [7]. It is currently unknown how UK veterans may experience the pandemic and the consequent effect on their health and wellbeing. Individuals with anxiety related disorders (e.g., anxiety or post-traumatic stress disorder (PTSD) appear to be at higher risk of experiencing psychological distress during the ongoing pandemic [8]. A proportion of the veteran population show increased risk of mental and physical health issues and barriers to help-seeking [9, 10], and there has been some evidence of an increase in the number of wounded veterans who have struggled with their mental and physical health since the start of lockdown in the UK [11]. Loneliness and social isolation are recognised problems for society in general, but ex-Service personnel present with unique experiences of loneliness and social isolation, closely linked to their poor re-integration into civilian life and the community [12, 13]. A study exploring how New Zealand veterans conceptualised loneliness during COVID-19 lockdown indicated that both social and physical isolation and health-related factors were significant drivers of loneliness [14]. However, in contrast to the general population (excluding emergency responders), military personnel are trained to demonstrate readiness and resilience in the face of warfare operations and stressful environments [15]. Therefore, it is unknown whether veteran's military training may also create resilient responses in the face of COVID-19 uncertainties compared to the general population.

The circumstances created by the COVID-19 pandemic may require a reconsideration of how healthcare and systems of support should be adapted to effectively accommodate the needs of the ex-Service population, especially the most vulnerable within this population [16]. The current study (Veterans-CHECK) aims to investigate the impact of the COVID-19 pandemic on the health and wellbeing of UK veterans, assessing mental health and alcohol use before and during the pandemic. It will measure veterans reports of loneliness during the pandemic and it will also assess the impact of COVID-19 experiences and stressors on mental health, hazardous alcohol use and loneliness

outcomes. Understanding this impact will be important to the Government, Armed Forces charities, and other stakeholders.

METHOD

Study design and participants

Participants were recruited from the Kings Centre for Military Health Research (KCMHR) health and wellbeing survey. This is a large-scale ongoing investigation of the physical and mental health and wellbeing of UK Armed Forces personnel from all three services (regulars and reservists) and includes personnel who were first surveyed before the recent conflicts in Iraq [17], as well as during and after the conflicts in Iraq and Afghanistan. There have been three phases of data collection, Phase 1: 2004 - 2006, Phase 2: 2007 - 2009 and Phase 3: 2014 - 2016 [9, 18, 19]. Approximately 18,000 have taken part in the survey since it began. Individuals were invited to take part in the Veterans-CHECK study if: they had completed a questionnaire at Phase 3 of the health and wellbeing study, had left the UK Armed Forces, had regular service, were living in the UK, had consented to follow up and provided a valid email address. Invitation emails were sent to N=3547 of individuals who met this eligibility criteria.

Procedure

Data collection was conducted online. Participants were asked to complete a questionnaire in their personal settings through REDCap, a secure web application for building and managing online surveys and databases [20]. Consents were completed online on the REDCap platform. The questionnaire had sections including (a) socio-demographics (b) COVID-19 experiences and stressors (c) current mental health and wellbeing measures. A full description of the study protocol is available on line Sharp, Serfioti [21].

The COVID-19 experiences and stressors section included self-report of having COVID-19, experiencing isolation, bereavement, changes in employment and other challenges, such as childcare arrangements during the pandemic. Individuals were asked whether they had experienced COVID-19 stressors in the past month, followed by a list of stressors they could endorse pertaining to finances, health and other difficulties. Education and military background information were taken from Phase 3 of the cohort study [9] (rank, service branch, length of service). A variable of 'financial difficulties' was constructed using three items from the list of COVID-19 stressors. Experiencing at least one of 'Another bill-payer in your household lost their job or was unable to earn money', 'Unable to pay bills', 'other financial difficulties' was categorised as experiencing 'financial difficulties'. Symptoms of common mental health disorders (CMD) were measured using the 12-item General Health Questionnaire (GHQ-12), cut-off scores for case status used were 4 or more (scores range from 0 to 12) [22]; 10-item Alcohol Use Disorder Identification Test (AUDIT) was used to measure alcohol use, cut off scores of 8 or more were used for hazardous drinking (scores range from 0 to 40), and 16 or more defined as alcohol misuse (which is likely to be harmful to health) [23], AUDIT-C score of 5 or more indicating risky drinking [24]; and the 3-item UCLA Loneliness Scale to measure feelings of loneliness with a cut off of 6 or more (scores range from 3 to 9 [25]).

Data Collection

One invitation email was sent to participants in June 2020 with up to three email reminders sent in June, July and August 2020, with data collection closing at the end of September 2020.

Analyses

Response weights were generated to account for non-response and defined as the inverse probability of responding once sampled, driven by covariates shown empirically to predict response. The sociodemographic and military characteristics of the sample were described. Mental health and alcohol use during COVID-19 were compared with previous mental health and alcohol use from phase three of our health and wellbeing survey [9]. Logistic regression analyses were conducted to assess the associations between the outcomes of interest (CMD, hazardous drinking and loneliness) and COVID-19 experiences and stressors. Logistic regression analyses were adjusted for sex, age, education, marital status, rank and service. Further analyses were adjusted additionally for previous CMD or hazardous drinking status at phase three of our health and wellbeing study. All statistical analyses were performed using the statistical package, Stata (version 16.0 [26]), with survey commands used to account for weighting. Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.

Ethical Approval

Full ethical approval was obtained from the King's College London Research Ethics Committee (Ref: HR-19/20-18626).

Patient and public involvement

Veterans who sit on our research board provided feedback on the content and flow of the questionnaire; the questionnaire was amended and refined accordingly. Findings from the study will be disseminated to study participants through a newsletter, social media outlets and our stakeholders that represent veteran communities.

RESULTS

The response rate was 44% (1562/3547). Responders were more likely to be older, officers, of higher educational status, have served in the RAF, were less likely to have reported alcohol misuse, but more likely to have reported multiple physical symptoms, and poor/fair health at phase 3 of the cohort (Supplemental Information Table 1). Table 1 describes the socio-demographic and military characteristics of those who participated in the study. The majority of participants were male, Non-Commissioned Officers (NCO), had served in the Army, were educated to A-Level or degree level and in a relationship. Over half the sample had left service 10 or more years ago and the majority were in employment before the pandemic. The majority of respondents lived in England (85.8%, n=1334).

Table 1 – Socio-demographic and military characteristics of sample (N=1562)
*percentages are weighted with unweighted cell counts

Characteristic	n (%) *
Sex	
male	1383 (89.26%)
female	179 (10.74%)
Age band (years at completion of Veterans-CHECK survey)	
25-34	46 (6.65%)
35-44	272 (22.97%)
45-54	554 (35.93%)
55-64	514 (26.95%)
65 and over	176 (7.50%)
Rank (when in service)	
Officer	478 (26.11%)
NCO	954 (61.45%)
Other rank	130 (12.44%)
Service (when in service)	
Royal Navy	290 (19.27%)
Army	873 (58.26%)
RAF	399 (22.47%)
Length of time since leaving service	
Within last year	20 (1.28%)
One year up to five years	166 (12.62%)
Five years up to 10 years	506 (33.86%)
More than 10 years	870 (52.24%)
Education level (reported at Phase 3 of the cohort study)	
No qual or O level	385 (27.23%)
A level	506 (33.91%)
degree	671 (38.86%)
Relationship status (current)	
In a relationship	1361 (86.76%)
Single	72 (5.67%)
Ex relationship	127 (7.57%)
Employment status (before the COVID-19 pandemic)	
Employed	1246 (83.41%)
Retired	232 (11.18%)
Economically inactive	78 (5.41%)

Before and during COVID-19 pandemic - mental health and alcohol use

Overall, the percentage of participants meeting the threshold for CMD remained stable from pre-pandemic levels, increasing only slightly from 24.5% (n=354) to 26.1% (n=376), where this increase was not statistically significant (Table 2). All measures of alcohol use were statistically significant reductions from pre-pandemic levels. Veterans reported hazardous drinking reductions from 48.5% (n=642) to 27.6% (n=367), alcohol misuse reductions of 9.2% (n=119) to 3.7% (n=50) and high-risk consumption reductions of 73.0% (n=987) to 49.2% (n=649).

Table 2 – Pre and during pandemic mental health and alcohol use outcomes
*percentages are weighted

	Before COVID-19 Phase 3 (2014-2016) N (%)*	**During COVID-19** Vet-CHECK (June-Sept 2020) N (%)	P value**
Common Mental Disorders (GHQ-12 ≥ 4)	354 /1539 (24.50%)	373/1539 (26.10%)	0.276
Hazardous Drinking (AUDIT Case 8 ≥)	642/1387 (48.48%)	360/1387 (27.61%)	<0.0001
Alcohol Misuse (AUDIT Case 16 ≥)	119/1387 (9.19%)	48/1387 (3.71%)	<0.0001
Alcohol Consumption AUDIT-C (≥ 5)	987/1366 (73.01%)	649/1366 (49.24%)	<0.0001

**Adjusted Wald test

Loneliness, COVID-19 experiences and stressors

27.4% (n=395) of the sample reported feelings of loneliness. Tables 3 and 4 describe COVID-19 experiences and stressors. 14.8% (n=226) of the sample reported definitely or probably having COVID-19, with 16.5% (n=249) of the sample having to self-isolate. 18.5% (n=286) of the sample knew someone who died from COVID-19. The large majority of the sample had no change in employment or were furloughed (91.6%, n=1425). Just under half of the sample reported being key workers (46.2%, n=674), with 19% (n=131) of these key workers being health and social care key workers.

The large majority of the sample lived with their spouse/partner (84.6%, n=1328). Just under a quarter of the sample were responsible for two or more children under the age of 18 years old (24.2%, n=320). Just under half of those who had children they were responsible for had to change childcare arrangements because of the pandemic (47.6%, n=214) and 44.7% (n=94) reported the change in childcare arrangements had a negative impact on their life. 17.9% (n=271) reported extra or new caring responsibilities because of the pandemic. The most frequently reported COVID-19 stressors were boredom (24.9%, n=352), having to change or delay major plans (23.7%, n=364) and difficulties with family/other social relationships (19.5%, n=278).

Association of mental health outcomes and COVID-19 experiences and stressors

Table 3 and 4 presents odds ratios (AOR) for the association between CMD symptoms, hazardous drinking and loneliness adjusted for sex, age, education, marital status, rank and Service.

Common Mental Disorders

Increased odds of reporting symptoms of CMD was associated with self-report of definitely or probably having COVID-19, knowing someone who died from COVID-19, reporting a change for worse in employment during the pandemic (compared to no change/furlough), not being a key

worker, living alone, being responsible for two or more children under 18 years of age (compared to no children), having to change childcare arrangements because of the pandemic, having usual caring responsibilities (compared to none) or extra/new caring responsibilities because of the pandemic (Table 3). Increased odds of reporting CMD were associated with all COVID-19 stressors (Table 4). The stressors with the largest effect sizes included having difficulties with health, difficulties with family/other social relationships, work difficulties, and having financial problems.

Hazardous Drinking

Increased likelihood of reporting drinking at hazardous levels was associated with having difficulties with health, difficulties with family/other social relationships, and experiencing boredom.

Loneliness

Increased reporting of loneliness was associated with knowing someone who died from COVID-19, being a health and social care key worker (compared to other key workers), living alone, being responsible for one or two or more children (compared to none), and having usual caring responsibilities (compared to none) (Table 3). Increased reporting of loneliness was associated with several COVID-19 stressors (Table 4), the largest effect sizes were reporting difficulties with family/other social relationships, difficulties with health, and experiencing boredom.

Table 3 – Association between CMD, Hazardous drinking and Loneliness and COVID-19 experiences
(Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.)
* Adjusted for sex, age, education, marital status, rank, service

COVID-19 Experiences	n (%)	Common Mental Disorders (CMD) (AOR 95% CI) * N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Loneliness (AOR 95% CI) * N = 395 (27.42%)
Had or have COVID-19				
No	866 (53.80%)	1.00	1.00	1.00
Yes (definitely/probably)	226 (14.83%)	1.55 (1.08-2.22)	0.80 (0.55-1.16)	1.36 (0.96-1.95)
Don't know	470 (31.37%)	1.06 (0.79-1.43)	0.78 (0.58-1.05)	1.24 (0.93-1.66)
Had to isolate				
No	1310 (83.51%)	1.00	1.00	
Yes	249 (16.49%)	1.33 (0.96-1.85)	0.89 (0.63-1.26)	1.29 (0.93-1.79)
Know someone who died from COVID-19?				
No	1276 (81.52%)	1.00	1.00	1.00
Yes	286 (18.48%)	1.76 (1.29-2.40)	0.95 (0.68-1.33)	1.54 (1.13-2.12)
Change in employment				
no change or furlough	1425 (91.60%)	1.00	1.00	1.00
change for worse	134 (8.40%)	3.14 (2.15-4.60)	1.26 (0.82-1.93)	1.49 (0.98-2.29)
Key Worker				

Not a key worker	880 (53.72%)	1.42 (1.06-1.89)	1.09 (0.81-1.45)	1.23 (0.92-1.65)
Key worker – Health and social care	131 (8.79%)	1.40 (0.85-2.31)	0.81 (0.47-1.38)	1.69 (1.05-2.70)
Key workers - All other roles	543 (37.48%)	1.00	1.00	1.00
Who usually live with				
Live alone	170 (11.04%)	2.11 (1.07-4.16)	1.56 (0.82-2.96)	2.49 (1.36-4.57)
Live with spouse/partner	1328 (84.55%)	1.00	1.00	1.00
Live with others	59 (4.41%)	1.59 (0.55-4.60)	0.95 (0.35-2.59)	1.60 (0.71-3.61)
Children				
Have no children	357 (24.50%)	1.00	1.00	1.00
Have children but not responsible for them	666 (36.04%)	1.14 (0.78-1.67)	0.93 (0.64-1.36)	1.17 (0.79-1.73)
Responsible for one child under 18 years old	214 (15.23%)	0.87 (0.53-1.41)	0.92 (0.59-1.44)	1.62 (1.03-2.55)
Responsible for two or more children under 18 years of age	320 (24.23%)	1.56 (1.03-2.37)	0.87 (0.57-1.33)	1.94 (1.26-3.00)
Changed childcare arrangements				
No	243 (52.40%)	1.00	1.00	1.00
Yes	214 (47.60%)	2.31 (1.47-3.64)	1.15 (0.73-1.84)	1.00 (0.63-1.57)
Impact of changed childcare arrangements				
Positive impact	33 (14.08%)	0.60 (0.21-1.67)	1.16 (0.45-3.00)	0.59 (0.18-1.93)
Negative impact	94 (44.73%)	1.96 (0.99-3.89)	1.39 (0.68-2.85)	1.66 (0.78-3.52)
Neutral impact	87 (41.19%)	1.00	1.00	1.00
Usual caring responsibilities (pre pandemic)				
No	1361 (87.55%)	1.00	1.00	1.00
yes	195 (12.45%)	1.74 (1.20-2.53)	0.79 (0.52-1.21)	1.63 (1.11-2.40)
Extra or new caring responsibilities during pandemic				
No	1285 (82.10%)	1.00	1.00	1.00
yes	271 (17.90%)	1.77 (1.29-2.43)	1.01 (0.71-1.42)	1.35 (0.97-1.87)

Table 4 – Association between CMD, Hazardous drinking and Loneliness and COVID-19 stressors
(Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.)
* Adjusted for sex, age, education, marital status, rank, service

COVID-19 Stressors	n (%)	Common Mental Disorders (CMD) (AOR 95% CI) *	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) *	Loneliness (AOR 95% CI) * N = 395 (27.42%)

		N = 376 (25.97%)	N = 367 (27.82%)	
Financial problems				
No	1379 (86.96%)	1.00	1.00	1.00
yes	183 (13.04%)	2.93 (2.06-4.15)	1.04 (0.69-1.57)	1.75 (1.20-2.56)
Had difficulty accessing enough food				
No	1533 (97.91%)	1.00	1.00	1.00
Yes	29 (2.09%)	3.10 (1.35-7.16)	1.64 (0.70-3.82)	3.91 (1.57-9.73)
Had difficulty accessing medication				
No	1490 (94.86%)	1.00	1.00	1.00
Yes	72 (5.14%)	2.32 (1.34-4.02)	1.01 (0.52-1.95)	3.48 (1.90-6.38)
Had difficulty with health				
No	1374 (87.49%)	1.00	1.00	1.00
Yes	188 (12.51%)	6.94 (4.91-9.83)	1.73 (1.19-2.51)	2.96 (2.07-4.22)
Had somebody close in hospital				
No	1460 (93.24%)	1.00	1.00	1.00
Yes	102 (6.76%)	2.40 (1.51-3.81)	1.25 (0.76-2.07)	1.33 (0.81-2.18)
Lost somebody close				
No	1489 (94.90%)	1.00	1.00	1.00
Yes	73 (5.10%)	1.85 (1.06-3.22)	0.63 (0.32-1.26)	1.13 (0.64-2.01)
Had to change delay or major plan				
No	1198 (76.26%)	1.00	1.00	1.00
Yes	364 (23.74%)	2.50 (1.89-3.32)	1.16 (0.85-1.57)	1.88 (1.40-2.51)
Difficulties with family/other social relationships				
No	1284 (80.53%)	1.00	1.00	1.00
Yes	278 (19.47%)	5.29 (3.85-7.27)	1.70 (1.22-2.36)	4.01 (2.91-5.55)
Difficulties with internet access				
No	1455 (92.95%)	1.00	1.00	1.00
Yes	107 (7.05%)	1.84 (1.17-2.88)	1.06 (0.65-1.72)	2.28 (1.43-3.63)
Work difficulties				
No	1293 (81.03%)	1.00	1.00	1.00
Yes	269 (18.97%)	4.12 (3.01-5.65)	1.39 (1.00-1.94)	2.35 (1.70-3.25)
Difficulties with pets				
No	1522 (97.46%)	1.00	1.00	1.00
Yes	40 (2.54%)	2.79 (1.44-5.41)	0.90 (0.40-2.05)	1.28 (0.63-2.59)
Boredom				
No	1210 (75.06%)	1.00	1.00	1.00
Yes	352 (24.94%)	2.88 (2.15-3.85)	1.75 (1.28-2.39)	2.96 (2.21-3.96)

Adjusting for previous CMD and hazardous drinking

Adjusting for previous CMD or hazardous drinking case status reported at phase three of our health and wellbeing study attenuated the association of CMD and of hazardous drinking with COVID-19 experiences and stressors, but it did not change the direction of association, and the majority of associations remained significant at the 95% level (supplemental information Table 2). For four COVID-19 experiences or stressors, the associations become non-significant, yet their effect size remained large. These included the association of reporting CMD symptoms and living alone, difficulty access enough food, difficulty accessing medication, and losing someone close to you (supplemental information Table 2).

DISCUSSION

Compared to pre-pandemic levels taken in 2014-2016, levels of CMDs in UK veterans remained stable. Veterans reported statistically significant reductions in levels of hazardous drinking during the pandemic compared to pre-pandemic levels. 27.4% reported feelings of loneliness. Just under 15% of people in the study self-reported definitely or probably having COVID-19. Half of individuals with children who they were responsible for reported that changes in childcare negatively affected their life and nearly a fifth of individuals had new or extra caring responsibilities because of the pandemic. The most common COVID-19 stressors reported were boredom, having to change major life plans, and difficulties with family or other social relationships. The COVID-19 stressors of difficulties with family or other social relationships, boredom and difficulties with health were all associated with veterans reporting CMD, hazardous drinking and loneliness. Adjustment for previous CMD or hazardous alcohol use did not change the direction of association and the majority of associations remained statistically significant. Our study identifies there may be a specific impact of COVID-19 experiences and stressors on veterans' CMD, alcohol use and loneliness outcomes.

CMD levels have remained stable with a small, statistically non-significant increase. This should be compared to population data showing significant increases in CMD in the general population. For example, ONS figures found a 9.5% increase in depression from the period July 2019-March 2020 to June 2020 [6]; The UKHLS reported a 7.6% increase in CMD between 2017-2019 and April 2020 [4]. Veterans' pre-pandemic CMD levels were higher than the general population levels (Vet-CHECK Phase three 2014-2016: 24.5% v UKHLS 2018-2019: 18.9% [4]) but were similar during the pandemic (UK studies ranging from 26.0% to 30.6% [4, 27, 28]). The absence of a similarly large increase in CMD caseness in the veteran group may indicate resilient responses in this group who have been previously trained in readiness for deployments, resilience and coping strategies [15, 29, 30]

From further analyses of the veteran sample (available upon request), of the 373 CMD cases, 214 (56.6%) of these were new cases since 2014-2016 (with a similar number of remitting cases). Hence whilst numbers potentially needing clinical treatment remain similar, there may be new individuals that need to engage with services. Additionally, as a majority of the COVID-19 experiences and stressors (particularly difficulties with health, work, or family/other social relationships) were associated with CMD symptoms, it may be this veteran group with CMD particularly impacted by COVID-19 pressures. Similar COVID-19 pressures on families and negative associations with mental health outcomes are reported in US samples [31]. As found in our study, the UKHLS finds negative mental health impacts for parents with childcare responsibilities and home schooling requirements

during the pandemic [32]. One fifth of our sample had extra or new caring responsibilities during the pandemic which may have added to family stress levels. Previous research has shown how important social connection is for carers' mental health outcomes [33] and lockdown and social distancing needs may have disrupted support for carers in this sample.

Compared to veterans drinking behaviours pre-pandemic in 2014-2016, levels of hazardous drinking and alcohol misuse reduced (hazardous drinking: 48.5% v 27.6% and alcohol misuse: 9.2% v 3.7% respectively). However, we found the Veterans-CHECK sample to be consuming alcohol, as measured by the AUDIT-C, at higher levels than the general population in England during the pandemic (Veterans-CHECK 49.2% v 38.3% [34]). Hence despite reductions in hazardous drinking and alcohol misuse for veterans in this sample, and increases in general population high-risk drinking, a higher proportion of veterans are still in high risk drinking categories. This finding continues to mirror previous studies that find veterans drinking at higher levels than the general population [35].

There may be several explanations for the reduction in hazardous drinking. Alcohol has often been using as a social bonding tool in Armed Forces community [36, 37], therefore the closing or restrictions placed on the hospitality business may explain the reduction in alcohol consumption. Alternatively, this may represent a general population trend observed in the UK population where high risk drinkers have reduced their alcohol consumption [28, 34]. The Covid-19 Social Study reports that drinking less during the pandemic was associated with being male [38], and our sample is predominantly male. Few COVID-19 stressors were associated with hazardous drinking and therefore we could surmise that alcohol was not being used as a coping mechanism in this community during the pandemic.

Our veteran sample reported lower levels of loneliness compared to a UK general population sample from the COVID-19 Social Study (26% v 39%) [39] and similar levels to another study (27%) [40]. An explanation could be that our study collected data during June to September when lockdown restrictions were less than in March to May when the other studies collected their data. Additionally, the veteran sample may have a level of protection against loneliness due to a majority being in a relationship. Of note are the findings that individuals with children under 18 years of age, and those with caring responsibilities, were more likely to report feelings of loneliness. We, therefore, see a pattern of extra pressures on those with family responsibilities, who would not have had the usual social support networks due to restrictions. The finding that key workers in health and social care were more likely to report feeling lonely compared to other key workers, highlights the extra support that healthcare key workers may need in the pandemic [41].

As elsewhere, boredom was common in veterans during the pandemic and was strongly associated with CMD, hazardous alcohol use and loneliness [42], and has been associated with psychological distress for individuals who reported high meaning in life [43]. With restrictions reintroduced in the Winter of 2020 and into 2021, the long-term effect of boredom on veterans' wellbeing, identity and meaning in life remains to be seen [3].

Whilst CMD levels in our veteran group has not risen from pre-pandemic levels, there are still a significant minority of veterans that may need mental health treatment and support. Due to the nature of COVID-19 lockdowns and restrictions in the UK, the National Health Service and charitable

providers should particularly focus on the benefits of telemedicine for veterans into the future [16, 44, 45]. Our study demonstrates an impact of the pandemic on veteran families increasing their stress, relationship/caring difficulties and responsibilities. There has been success in the US promoting parenting skills for veteran families under COVID-19 pressures [46], while in the UK, resources created by King's College London and partners offer practical support for families ('Families Under Pressure') which could be utilised by veteran groups [47]. As with the general population, innovative ways are needed to tackle loneliness and improve social networks and support during the pandemic, particularly focused on those with mental health needs [48, 49].

The study strengths include recruitment from a cohort whose previous mental health status is known, rapid roll-out, and use of validated measures for mental health and wellbeing outcomes aligned with our previous study and other UK general population studies' measures. Study limitations include recruitment from a specific veteran cohort serving during the Iraq/Afghanistan era and therefore we cannot comment on the experiences of veterans outside of this era. The study is limited by the majority of responses arising from veterans living in England and limited to the context of the pandemic in the UK, June-September 2020.

CONCLUSIONS

Our study suggests a COVID-19 impact on veterans' mental health, alcohol use and loneliness, particularly for those experiencing difficulties with family or social relationships. Veterans experienced the pandemic in similar ways to the general population and in some cases may have responded in resilient ways. Whilst stable levels of CMD and reduction in alcohol use are positive, there remains a group of veterans that may need mental health and alcohol treatment services. There is a need to continue to follow up the health and wellbeing of this veteran group to assess developments longer term over the pandemic.

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Competing Interests

SW is Honorary Civilian Consultant Advisor in Psychiatry for the British Army (unpaid). S.W. is affiliated to the National Institute for Health Research Health Protection Research Unit (NIHR HPRU) in Emergency Preparedness and Response at King's College London in partnership with Public Health England, in collaboration with the University of East Anglia and Newcastle University.

NTF is a trustee (unpaid) of The Warrior Programme, an independent advisor to the Independent Group Advising on the Release of Data (IGARD), a member of Independent Scientific Pandemic Insights Group on Behaviours (SPI-B) and their salary is part grant funded by the MoD.

DM is a trustee of the Forces in Mind Trust (unpaid) and is employed as the Head of Research for Combat Stress, a UK Veterans Mental Health Charity.

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Authors' Contributions

MLS, DS, MJ, HB, DP, LH, DP, DM, SW, NTF were involved in the original concept and design of the study. NTF and SW have overseen the conduct of all aspects of the study. MLS led on the formulation of the questionnaire and associated measures, with substantial contributions from all authors in shaping the final questionnaire. DP led on online survey design, format and flow. DS led on the ethics submission with substantial contributions from all authors. MJ, HB and LH led on the design of participant materials including the participant invite and information sheet with input from all authors. MJ led on the data analysis plan and conducted the data analysis with input from all authors. MLS and DS led the writing of the research paper, with drafting and revision input from all authors. MLS, DS, MJ, HB, DP, LH, DP, DM, SW, NTF have all seen and approved the final version of this paper and accept accountability for all aspects of the work. SW and NTF secured the funding from OVA for this work.

Data Sharing Statement

Data will be processed in accordance with the General Data Protection Regulation (GDPR) and the Data Protection Act 2018. We will not make any record-level data publicly accessible because we need to protect the confidentiality and security of the individual cohort members. You are welcome to contact us with proposals for collaborative research, which the investigators will consider on a case-by-case basis, and which will only occur as part of a legal collaborative agreement and after the collaborator has put in place the relevant research ethics, data protection, and data access approvals.

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Supplemental Information

Table 1 - Comparison of social and military demographic characteristics of responders and non-responders. Column percentages. N = 3547

	Responder N = 1562	Non responder N = 1985	OR (95%CI)	AOR (95% CI)*
Sex				
male	1,383(88.54%)	1,794(90.38%)	1.00	1.00
female	179(11.46%)	191(9.62%)	1.22 (0.98-1.51)	1.51 (1.21-1.90)
Age band				
25-34	46(2.94%)	190(9.57%)	0.31 (0.22-0.44)	0.34 (0.23-0.49)
35-44	272(17.41%)	552(27.81%)	0.63 (0.53-0.76)	0.63 (0.52-0.77)
45-54	554(35.47%)	710(35.77%)	1.00	1.00
55-64	514(32.91%)	444(22.37%)	1.48 (1.25-1.76)	1.51 (1.27-1.79)
65 and over	176(11.27%)	89(4.48%)	2.53 (1.92-3.35)	2.56 (1.91-3.43)
Rank				
Officer	478(30.60%)	462(23.27%)	1.31 (1.12-1.53)	1.02 (0.85-1.22)
NCO	954(61.08%)	1,209(60.91%)	1.00	1.00
Other rank	130(8.32%)	314(15.82)	0.52 (0.42-0.66)	0.92 (0.71-1.19)
Service				
Royal Navy	290(18.57%)	393(19.80%)	1.02 (0.85-1.21)	0.88 (0.74-1.06)
Army	873(55.89%)	1,201(60.50%)	1.00	1.00
RAF	399(25.54%)	391(19.70%)	1.40 (1.19-1.65)	1.18 (0.99-1.40)
Education level				
No qual or O level	385(24.65%)	577(29.10%)	0.72 (0.61-0.85)	0.83 (0.69-1.00)
A level	506(32.39%)	682(34.39%)	0.80 (0.69 0.94)	0.93 (0.78-1.10)
degree	671(42.96%)	724(36.51%)	1.00	1.00
Relationship status				
In a relationship	1,337(86.82%)	1,679(86.24%)	1.00	1.00
Single	90(5.84%)	145(7.45%)	0.78 (0.59-1.02)	1.03 (0.77-1.37)
Ex relationship	113(7.34%)	123(6.32%)	1.15 (0.88-1.50)	1.06 (0.80-1.39)

*adjusted for sex, age, education, service and rank

Table 2 – Association between CMD, Hazardous alcohol consumption and Loneliness and COVID19 experiences and stressors

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Had or have COVID-19					
No	866 (53.80%)	1.00	1.00	1.00	1.00
Yes	226 (14.83%)	1.55 (1.08-2.22)	1.49 (1.02-2.16)	0.80 (0.55-1.16)	0.68 (0.45-1.05)
Don't know	470 (31.37%)	1.06 (0.79-1.43)	1.03 (0.76-1.40)	0.78 (0.58-1.05)	0.70 (0.50-0.98)
Had to isolate					
No	1310 (83.51%)	1.00	1.00	1.00	
Yes	249 (16.49%)	1.33 (0.96-1.85)	1.24 (0.88-1.74)	0.89 (0.63-1.26)	0.69 (0.47-1.02)
Know someone who died from COVID-19					
No	1276 (81.52%)	1.00		1.00	
Yes	286 (18.48%)	1.76 (1.29-2.40)	1.73 (1.26-2.38))	0.95 (0.68-1.33)	0.97 (0.66-1.43)
Change in employment					
no change or furlough	1425 (91.60%)	1.00		1.00	
change for worse	134 (8.40%)	3.14 (2.15-4.60)	3.07 (2.03-4.65)	1.26 (0.82-1.93)	1.04 (0.64-1.71)
Key Worker					
Not a key worker	880 (53.72%)	1.42 (1.06-1.89)	1.43 (1.06-1.93)	1.09 (0.81-1.45)	0.87 (0.63-1.22)
Key worker – Health and social care	131 (8.79%)	1.40 (0.85-2.31)	1.33 (0.77-2.30)	0.81 (0.47-1.38)	0.70 (0.40-1.21)
Key workers - All other roles	543 (37.48%)	1.00		1.00	1.00
Who usually live with					
Live alone	170 (11.04%)	2.11 (1.07-4.16)	1.82 (0.91-3.66)	1.56 (0.82-2.96)	1.81 (0.88-3.71)
Live with spouse/partner	1328 (84.55%)	1.00	1.00	1.00	1.00
Live with others	59 (4.41%)	1.59 (0.55-4.60)	1.40 (0.51-3.86)	0.95 (0.35-2.59)	1.11 (0.36-3.45)
Children					
Have no children	357 (24.50%)	1.00	1.00	1.00	1.00
Have children but not responsible for	666 (36.04%)	1.14 (0.78-1.67)	1.09 (0.74-1.59)	0.93 (0.64-1.36)	1.05 (0.68-1.62)

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Responsible for one child under 18 years old	214 (15.23%)	0.87 (0.53-1.41)	0.88 (0.54-1.46)	0.92 (0.59-1.44)	1.08 (0.64-1.82)
Responsible for two or more children under 18 years of age	320 (24.23%)	1.56 (1.03-2.37)	1.62 (1.07-2.47)	0.87 (0.57-1.33)	1.18 (0.72-1.94)
Changed childcare arrangements					
No	243 (52.40%)	1.00	1.00	1.00	
Yes	214 (47.60%)	2.31 (1.47-3.64)	2.24 (1.41-3.54)	1.15 (0.73-1.84)	1.11 (0.65-1.90)
Impact of changed childcare arrangements					
Positive impact	33 (14.08%)	0.60 (0.21-1.67)	0.72 (0.26-1.98)	1.16 (0.45-3.00)	0.99 (0.30-3.26)
Negative impact	94 (44.73%)	1.96 (0.99-3.89)	1.91 (0.94-3.88)	1.39 (0.68-2.85)	1.27 (0.56-2.87)
Neutral impact	87 (41.19%)	1.00	1.00	1.00	1.00
Usual caring responsibilities (pre pandemic)					
No	1361 (87.55%)	1.00	1.00	1.00	
yes	195 (12.45%)	1.74 (1.20-2.53)	1.73 (1.19-2.51)	0.79 (0.52-1.21)	0.90 (0.55-1.48)
Extra or new caring responsibilities during pandemic					
No	1285 (82.10%)	1.00		1.00	
yes	271 (17.90%)	1.77 (1.29-2.43)	1.77 (1.27-2.48)	1.01 (0.71-1.42)	1.07 (0.71-1.60)
Financial problems					
No	1379 (86.96%)	1.00	1.00	1.00	
yes	183 (13.04%)	2.93 (2.06-4.15)	2.67 (1.89-3.78)	1.04 (0.69-1.57)	0.96 (0.59-1.58)
Had difficulty accessing enough food					
No	1533 (97.9%)	1.00	1.00	1.00	1.00
Yes	29 (2.09%)	3.10 (1.35-7.16)	2.27 (0.91-5.67	1.64 (0.70-3.82)	1.28 (0.51-3.21)
Had difficulty accessing medication					

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
No	1490 (94.86%)	1.00	1.00	1.00	1.00
Yes	72 (5.14%)	2.32 (1.34-4.02)	1.57 (0.89-2.76-)	1.01 (0.52-1.95)	0.82 (0.36-1.86)
Had difficulty with health					
No	1374 (87.49%)	1.00	1.00	1.00	1.00
Yes	188 (12.51%)	6.94 (4.91-9.83)	5.47 (3.83-7.81)	1.73 (1.19-2.51)	1.67 (1.07-2.61)
Had somebody close in hospital					
No	1460 (93.24%)	1.00	1.00	1.00	1.00
Yes	102 (6.76%)	2.40 (1.51-3.81)	2.50 (1.54-4.05)	1.25 (0.76-2.07)	1.10 (0.60-2.01)
Lost somebody close					
No	1489 (94.90%)	1.00		1.00	1.00
Yes	73 (5.10%)	1.85 (1.06-3.22)	1.55 (0.86-2.79)	0.63 (0.32-1.26)	0.51 (0.22-1.17)
Had to change delay or major plan					
No	1198 (76.26%)	1.00	1.00	1.00	1.00
Yes	364 (23.74%)	2.50 (1.89-3.32)	2.27 (1.69-3.06)	1.16 (0.85-1.57)	0.97 (0.68-1.38)
Difficulties with family/other social relationships					
No	1284 (80.53%)	1.00	1.00	1.00	1.00
Yes	278 (19.47%)	5.29 (3.85-7.27)	4.64 (3.33-6.46)	1.70 (1.22-2.36)	1.56 (1.05-2.30)
Difficulties with internet access					
No	1455 (92.95%)	1.00	1.00	1.00	1.00
Yes	107 (7.05%)	1.84 (1.17-2.88)	1.88 (1.18-3.00)	1.06 (0.65-1.72)	1.31 (0.75-2.26)
Work difficulties					
No	1293 (81.03%)	1.00	1.00	1.00	1.00

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Yes	269 (18.97%)	4.12 (3.01-5.65)	3.68 (2.64-5.14)	1.39 (1.00-1.94)	1.40 (0.94-2.09)
Difficulties with pets					
No	1522 (97.46%)	1.00	1.00	1.00	1.00
Yes	40 (2.54%)	2.79 (1.44-5.41)	2.52 (1.25-5.06)	0.90 (0.40-2.05)	0.88 (0.36-2.17)
Boredom					
No	1210 (75.06%)	1.00	1.00	1.00	1.00
Yes	352 (24.94%)	2.88 (2.15-3.85)	2.69 (1.98-3.65-)	1.75 (1.28-2.39)	1.55 (1.09-2.20)

* Adjusted for sex, age, education, marital status, rank, service

** Adjusted for sex, age, education, marital status, rank, service and phase 3 GHQ or AUDIT-8 as appropriate

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4-5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (*b*) For matched studies, give matching criteria and number of exposed and unexposed	4-5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4-5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4-5
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding (*b*) Describe any methods used to examine subgroups and interactions (*c*) Explain how missing data were addressed (*d*) If applicable, explain how loss to follow-up was addressed (*e*) Describe any sensitivity analyses	5
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	5
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Summarise follow-up time (eg, average and total amount)	5-6
Outcome data	15*	Report numbers of outcome events or summary measures over time	6-7

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6-10
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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UK Veterans' mental health and wellbeing before and during the COVID-19 pandemic: A longitudinal cohort study

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UK Veterans' mental health and wellbeing before and during the COVID-19 pandemic: A longitudinal cohort study

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ABSTRACT

Objectives: To investigate the impact of the COVID-19 pandemic on the health and wellbeing of UK ex-service personnel (veterans) before and during the pandemic, and to assess associations of COVID-19 experiences and stressors with mental health, alcohol use and loneliness.

Design: An additional wave of data was collected from a longitudinal cohort study of the UK Armed Forces.

Setting: Online survey June-September 2020

Participants: Cohort members were included if they had completed a questionnaire at phase three of the KCMHR health and wellbeing study (2014-2016), had left the Armed Forces after Regular service, were living in the UK, had consented to follow up, and provided a valid email address. Invitation emails were sent to N=3547 with a 44% response rate (n=1562).

Primary outcome measures: Common mental health disorders (CMD) (measured using the General Health Questionnaire, 12 items – cut off ≥ 4), hazardous alcohol use (measured using the AUDIT, 10 items – cut off ≥ 8) and loneliness (UCLA-3 loneliness scale – cut off ≥ 6).

Results: Veterans reported a statistically significant decrease in hazardous drinking of 48.5% to 27.6%, whilst CMD remained stable (non-statistically significant increase of 24.5% to 26.1%). 27.4% of veterans reported feelings of loneliness. The COVID-19 stressors of reporting difficulties with family/social relationships, boredom, and difficulties with health, were statistically significantly associated with CMD, hazardous drinking and loneliness, even after adjustment for previous mental health/hazardous alcohol use.

Conclusions: Our study suggests a COVID-19 impact on veterans' mental health, alcohol use and loneliness, particularly for those experiencing difficulties with family relationships. Veterans experienced the pandemic in similar ways to the general population and in some cases may have responded in resilient ways. Whilst stable levels of CMD and reduction in alcohol use are positive, there remains a group of veterans that may need mental health and alcohol treatment services.

Strengths and Limitations of this Study

- Recruitment from a longitudinal cohort study where underlying characteristics are known.
- Rapid roll-out and use of validated measures for mental health and wellbeing outcomes aligned with our previous health and wellbeing study and other UK general population studies' measures.
- Only generalisable to veterans who were in military service during the Iraq/Afghanistan era.
- The study is limited to the context of the COVID-19 pandemic in the UK, June-September 2020.

INTRODUCTION

The COVID-19 pandemic has led to large-scale societal changes all over the world, with governments implementing strict controls on movement and substantial restrictions to people's personal and work lives [1]. Despite the benefits to public health of containment strategies such as 'lockdown', self-isolation and social distancing (e.g., slower spread of infection), the social, economic, wellbeing and health consequences are likely to be profound [2, 3] and felt in the short, medium and long term.

The uncertainty and unpredictable nature of the COVID-19 pandemic has had a general negative impact on psychological and mental health [4]. The impact of COVID-19 is not uniform. Vulnerable groups, such as the elderly, young, females, people with mental or physical ill health or on low income are at greater risk of social isolation and worse health outcomes [2]. The analysis of longitudinal data from the UK Household Longitudinal Study (UKHLS), also known as 'Understanding Society' study indicated that mental health in the UK worsened substantially from prior wave 9 data collected January 2017-May 2019 with increased GHQ scores of 10.8% on average in April 2020, and worse scores in wave 9 data for individuals with pre-existing mental health difficulties [5]. Longitudinal data from the Office for National Statistics (ONS) also reports that there has been a deterioration in mental health of the general population in Great Britain with 19.2% of adults reporting depression in June 2020 compared to 9.7% before the pandemic July 2019-March 2020 [6].

In Great Britain, there are an estimated 2.4 million ex-Service personnel (veterans) making up 5% of household residents aged 16 years and over [7]. It is currently unknown how UK veterans may experience the pandemic and the consequent effect on their health and wellbeing. Individuals with anxiety related disorders (e.g., anxiety or post-traumatic stress disorder (PTSD)) appear to be at higher risk of experiencing psychological distress during the ongoing pandemic [8]. A proportion of the veteran population show increased risk of mental and physical health issues and barriers to help-seeking [9, 10], and there has been some evidence of an increase in the number of wounded veterans who have struggled with their mental and physical health since the start of lockdown in the UK [11]. Loneliness and social isolation are recognised problems for society in general, but ex-Service personnel present with unique experiences of loneliness and social isolation, which for some can be linked to their poor re-integration into civilian life and the community [12, 13]. A study exploring how New Zealand veterans conceptualised loneliness during COVID-19 lockdown indicated that both social and physical isolation and health-related factors were significant drivers of loneliness [14]. However, in contrast to the general population (excluding emergency responders), military personnel are trained to demonstrate readiness and resilience in the face of warfare operations and stressful environments [15]. Therefore, it is unknown whether veteran's military training may also create resilient responses in the face of COVID-19 uncertainties compared to the general population.

The circumstances created by the COVID-19 pandemic may require a reconsideration of how healthcare and systems of support should be adapted to effectively accommodate the needs of the ex-Service population, especially the most vulnerable within this population [16]. The current study (Veterans-CHECK) aims to investigate the impact of the COVID-19 pandemic on the health and wellbeing of UK veterans, assessing mental health and alcohol use before and during the pandemic.

It will measure veterans reports of loneliness during the pandemic and it will also assess the impact of COVID-19 experiences and stressors on mental health, hazardous alcohol use and loneliness outcomes. Understanding this impact will be important to the Government, Armed Forces charities, and other stakeholders to target services and support and ensure current policy initiatives are fit for purpose in the context of the pandemic.

METHOD

Study design and participants

Participants were recruited from the Kings Centre for Military Health Research (KCMHR) health and wellbeing survey. This is a large-scale ongoing investigation of the physical and mental health and wellbeing of UK Armed Forces personnel from all three services (regulars and reservists) and includes personnel who were first surveyed before the recent conflicts in Iraq [17], as well as during and after the conflicts in Iraq and Afghanistan. There have been three phases of data collection, Phase 1: 2004 - 2006, Phase 2: 2007 - 2009 and Phase 3: 2014 - 2016 [9, 18, 19]. Approximately 18,000 have taken part in the survey since it began. Individuals were invited to take part in the Veterans-CHECK study if: they had completed a questionnaire at Phase 3 of the health and wellbeing study, had left the UK Armed Forces, had regular service, were living in the UK, had consented to follow up and provided a valid email address. Invitation emails were sent to N=3547 of individuals who met this eligibility criteria.

Procedure

Data collection was conducted online. Participants were asked to complete a questionnaire in their personal settings through REDCap, a secure web application for building and managing online surveys and databases [20]. Consents were completed online on the REDCap platform. The questionnaire had sections including (a) socio-demographics (b) COVID-19 experiences and stressors (c) current mental health and wellbeing measures. A full description of the study protocol is available on line Sharp, Serfioti [21].

The COVID-19 experiences and stressors section included self-report of having COVID-19 (those who indicated a positive PCR test or reported they had 'probably' had COVID-19 were counted as having COVID-19 for analysis purposes), experiencing isolation, bereavement and other challenges, such as childcare arrangements and caring responsibilities during the pandemic. Participants were asked about employment changes since the start of the pandemic with two categories created of 'no change/furlough' and 'change for worse' which included those that reported unemployment, redundancy or reductions in salary. Individuals were asked whether they had experienced COVID-19 stressors in the past month, followed by a list of stressors they could endorse pertaining to finances, health and other difficulties. Education and military background information were taken from Phase 3 of the cohort study [9] (rank, service branch, length of service). A variable of 'financial difficulties' was constructed using three items from the list of COVID-19 stressors. Experiencing at least one of 'Another bill-payer in your household lost their job or was unable to earn money', 'Unable to pay bills', 'other financial difficulties' was categorised as experiencing 'financial difficulties'. Symptoms of common mental health disorders (CMD) were measured using the 12-item General Health Questionnaire (GHQ-12), cut-off scores for case status used were 4 or more (scores range from 0 to

12) [22]; 10-item Alcohol Use Disorder Identification Test (AUDIT) was used to measure alcohol use, cut off scores of 8 or more were used for hazardous drinking (scores range from 0 to 40), and 16 or more defined as alcohol misuse (which is likely to be harmful to health) [23], AUDIT-C score of 5 or more indicating risky drinking [24]; and the 3-item UCLA Loneliness Scale to measure feelings of loneliness with a cut off of 6 or more (scores range from 3 to 9 [25]).

Data Collection

One invitation email was sent to participants in June 2020 with up to three email reminders sent in June, July and August 2020, with data collection closing at the end of September 2020.

Analyses

Response weights were generated to account for non-response and defined as the inverse probability of responding once sampled, driven by covariates shown empirically to predict response. The sociodemographic and military characteristics of the sample were described. Mental health and alcohol use during COVID-19 were compared with previous mental health and alcohol use from phase three of our health and wellbeing survey [9]. Logistic regression analyses were conducted to assess the associations between the outcomes of interest (CMD, hazardous drinking and loneliness) and COVID-19 experiences and stressors. Logistic regression analyses were adjusted for sex, age, education, marital status, rank and service. Further analyses were adjusted additionally for previous CMD or hazardous drinking status at phase three of our health and wellbeing study. All statistical analyses were performed using the statistical package, Stata (version 16.0 [26]), with survey commands used to account for weighting. Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.

Ethical Approval

Full ethical approval was obtained from the King's College London Research Ethics Committee (Ref: HR-19/20-18626).

Patient and public involvement

Veterans who sit on our research board provided feedback on the content and flow of the questionnaire; the questionnaire was amended and refined accordingly. Findings from the study will be disseminated to study participants through a newsletter, social media outlets and our stakeholders that represent veteran communities.

RESULTS

The response rate was 44% (1562/3547). Responders were more likely to be older, officers, of higher educational status, have served in the RAF, were less likely to have reported alcohol misuse, but more likely to have reported multiple physical symptoms, and poor/fair health at phase 3 of the cohort (Supplemental Information Table 1). Table 1 describes the socio-demographic and military characteristics of those who participated in the study. The majority of participants were male, Non-Commissioned Officers (NCO), had served in the Army, were educated to A-Level or degree level and

in a relationship. Over half the sample had left service 10 or more years ago and the majority were in employment before the pandemic. The majority of respondents lived in England (85.8%, n=1334).

Table 1 – Socio-demographic and military characteristics of sample (N=1562)
*percentages are weighted with unweighted cell counts

Characteristic	n (%) *
Sex	
male	1383 (89.26%)
female	179 (10.74%)
Age band (years at completion of Veterans-CHECK survey)	
25-34	46 (6.65%)
35-44	272 (22.97%)
45-54	554 (35.93%)
55-64	514 (26.95%)
65 and over	176 (7.50%)
Rank (when in service)	
Officer	478 (26.11%)
NCO	954 (61.45%)
Other rank	130 (12.44%)
Service (when in service)	
Royal Navy	290 (19.27%)
Army	873 (58.26%)
RAF	399 (22.47%)
Length of time since leaving service	
Within last year	20 (1.28%)
One year up to five years	166 (12.62%)
Five years up to 10 years	506 (33.86%)
More than 10 years	870 (52.24%)
Education level (reported at Phase 3 of the cohort study)	
No qualifications/O-levels/GCSEs	385 (27.23%)
A-level	506 (33.91%)
Degree	671 (38.86%)
Relationship status (current)	
In a relationship	1361 (86.76%)
Single	72 (5.67%)
Ex-relationship (separated, divorced, widowed)	127 (7.57%)
Employment status (before the COVID-19 pandemic)	
Employed	1246 (83.41%)
Retired	232 (11.18%)
Economically inactive	78 (5.41%)

Before and during COVID-19 pandemic - mental health and alcohol use

Overall, the percentage of participants meeting the threshold for CMD remained stable from pre-pandemic levels, increasing only slightly from 24.5% (n=354) to 26.1% (n=376), where this increase was not statistically significant (Table 2). All measures of alcohol use were statistically significant reductions from pre-pandemic levels. Veterans reported hazardous drinking reductions from 48.5% (n=642) to 27.6% (n=367), alcohol misuse reductions of 9.2% (n=119) to 3.7% (n=50) and high-risk consumption reductions of 73.0% (n=987) to 49.2% (n=649). In further analysis (available upon request) women veterans in the sample reported similar trends as male veterans mirroring the stability in CMD levels and statistically significant reductions in alcohol use.

Table 2 – Pre and during pandemic mental health and alcohol use outcomes

*percentages are weighted

	Before COVID-19 Phase 3 (2014-2016) N (%)*	**During COVID-19** Vet-CHECK (June-Sept 2020) N (%)	P value**
Common Mental Disorders (GHQ-12 ≥ 4)	354 /1539 (24.50%)	373/1539 (26.10%)	0.276
Hazardous Drinking (AUDIT Case 8 ≥)	642/1387 (48.48%)	360/1387 (27.61%)	<0.0001
Alcohol Misuse (AUDIT Case 16 ≥)	119/1387 (9.19%)	48/1387 (3.71%)	<0.0001
Alcohol Consumption AUDIT-C (≥ 5)	987/1366 (73.01%)	649/1366 (49.24%)	<0.0001

**Adjusted Wald test

Loneliness, COVID-19 experiences and stressors

27.4% (n=395) of the sample reported feelings of loneliness. Tables 3 and 4 describe COVID-19 experiences and stressors. 14.8% (n=226) of the sample reported definitely or probably having COVID-19, with 16.5% (n=249) of the sample having to self-isolate. 18.5% (n=286) of the sample knew someone who died from COVID-19. The large majority of the sample had no change in employment or were furloughed (91.6%, n=1425). Just under half of the sample reported being key workers (46.2%, n=674), with 19% (n=131) of these key workers being health and social care key workers.

The large majority of the sample lived with their spouse/partner (84.6%, n=1328). Just under a quarter of the sample were responsible for two or more children under the age of 18 years old (24.2%, n=320). Just under half of those who had children they were responsible for had to change childcare arrangements because of the pandemic (47.6%, n=214) and 44.7% (n=94) reported the change in childcare arrangements had a negative impact on their life. 17.9% (n=271) reported extra or new caring responsibilities because of the pandemic. The most frequently reported COVID-19 stressors were boredom (24.9%, n=352), having to change or delay major plans (23.7%, n=364) and difficulties with family/other social relationships (19.5%, n=278).

Association of mental health outcomes and COVID-19 experiences and stressors

Table 3 and 4 presents odds ratios (AOR) for the association between CMD symptoms, hazardous drinking and loneliness adjusted for sex, age, education, marital status, rank and Service.

Common Mental Disorders

Increased odds of reporting symptoms of CMD was associated with self-report of definitely or probably having COVID-19, knowing someone who died from COVID-19, reporting a change for worse in employment during the pandemic (compared to no change/furlough), not being a key worker, living alone, being responsible for two or more children under 18 years of age (compared to no children), having to change childcare arrangements because of the pandemic, having usual caring responsibilities (compared to none) or extra/new caring responsibilities because of the pandemic (Table 3). Increased odds of reporting CMD were associated with all COVID-19 stressors (Table 4). The stressors with the largest effect sizes included having difficulties with health, difficulties with family/other social relationships, work difficulties, and having financial problems.

Hazardous Drinking

Increased likelihood of reporting drinking at hazardous levels was associated with having difficulties with health, difficulties with family/other social relationships, and experiencing boredom.

Loneliness

Increased reporting of loneliness was associated with knowing someone who died from COVID-19, being a health and social care key worker (compared to other key workers), living alone, being responsible for one or two or more children (compared to none), and having usual caring responsibilities (compared to none) (Table 3). Increased reporting of loneliness was associated with several COVID-19 stressors (Table 4), the largest effect sizes were reporting difficulties with family/other social relationships, difficulties with health, and experiencing boredom.

Table 3 – Association between CMD, Hazardous drinking and Loneliness and COVID-19 experiences
(Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.)
* Adjusted for sex, age, education, marital status, rank, service

COVID-19 Experiences	n (%)	Common Mental Disorders (CMD) (AOR 95% CI) * N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Loneliness (AOR 95% CI) * N = 395 (27.42%)
Had or have COVID-19				
No	866 (53.80%)	1.00	1.00	1.00
Yes (definitely/probably)	226 (14.83%)	1.55 (1.08-2.22)	0.80 (0.55-1.16)	1.36 (0.96-1.95)

Don't know	470 (31.37%)	1.06 (0.79-1.43)	0.78 (0.58-1.05)	1.24 (0.93-1.66)
Had to isolate				
No	1310 (83.51%)	1.00	1.00	
Yes	249 (16.49%)	1.33 (0.96-1.85)	0.89 (0.63-1.26)	1.29 (0.93-1.79)
Know someone who died from COVID-19?				
No	1276 (81.52%)	1.00	1.00	1.00
Yes	286 (18.48%)	1.76 (1.29-2.40)	0.95 (0.68-1.33)	1.54 (1.13-2.12)
Change in employment				
no change or furlough	1425 (91.60%)	1.00	1.00	1.00
change for worse	134 (8.40%)	3.14 (2.15-4.60)	1.26 (0.82-1.93)	1.49 (0.98-2.29)
Key Worker				
Not a key worker	880 (53.72%)	1.42 (1.06-1.89)	1.09 (0.81-1.45)	1.23 (0.92-1.65)
Key worker – Health and social care	131 (8.79%)	1.40 (0.85-2.31)	0.81 (0.47-1.38)	1.69 (1.05-2.70)
Key workers - All other roles	543 (37.48%)	1.00	1.00	1.00
Who usually live with				
Live alone	170 (11.04%)	2.11 (1.07-4.16)	1.56 (0.82-2.96)	2.49 (1.36-4.57)
Live with spouse/partner	1328 (84.55%)	1.00	1.00	1.00
Live with others	59 (4.41%)	1.59 (0.55-4.60)	0.95 (0.35-2.59)	1.60 (0.71-3.61)
Children				
Have no children	357 (24.50%)	1.00	1.00	1.00
Have children but not responsible for them	666 (36.04%)	1.14 (0.78-1.67)	0.93 (0.64-1.36)	1.17 (0.79-1.73)
Responsible for one child under 18 years old	214 (15.23%)	0.87 (0.53-1.41)	0.92 (0.59-1.44)	1.62 (1.03-2.55)
Responsible for two or more children under 18 years of age	320 (24.23%)	1.56 (1.03-2.37)	0.87 (0.57-1.33)	1.94 (1.26-3.00)
Changed childcare arrangements				
No	243 (52.40%)	1.00	1.00	1.00
Yes	214 (47.60%)	2.31 (1.47-3.64)	1.15 (0.73-1.84)	1.00 (0.63-1.57)
Impact of changed childcare arrangements				
Positive impact	33 (14.08%)	0.60 (0.21-1.67)	1.16 (0.45-3.00)	0.59 (0.18-1.93)
Negative impact	94 (44.73%)	1.96 (0.99-3.89)	1.39 (0.68-2.85)	1.66 (0.78-3.52)
Neutral impact	87 (41.19%)	1.00	1.00	1.00
Usual caring responsibilities (pre pandemic)				
No	1361 (87.55%)	1.00	1.00	1.00
yes	195 (12.45%)	1.74 (1.20-2.53)	0.79 (0.52-1.21)	1.63 (1.11-2.40)
Extra or new caring responsibilities during pandemic				
No	1285 (82.10%)	1.00	1.00	1.00
yes	271 (17.90%)	1.77 (1.29-2.43)	1.01 (0.71-1.42)	1.35 (0.97-1.87)

Table 4 – Association between CMD, Hazardous drinking and Loneliness and COVID-19 stressors
(Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.)
* Adjusted for sex, age, education, marital status, rank, service

COVID-19 Stressors	n (%)	Common Mental Disorders (CMD) (AOR 95% CI) * N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Loneliness (AOR 95% CI) * N = 395 (27.42%)
Financial problems				
No	1379 (86.96%)	1.00	1.00	1.00
yes	183 (13.04%)	2.93 (2.06-4.15)	1.04 (0.69-1.57)	1.75 (1.20-2.56)
Had difficulty accessing enough food				
No	1533 (97.91%)	1.00	1.00	1.00
Yes	29 (2.09%)	3.10 (1.35-7.16)	1.64 (0.70-3.82)	3.91 (1.57-9.73)
Had difficulty accessing medication				
No	1490 (94.86%)	1.00	1.00	1.00
Yes	72 (5.14%)	2.32 (1.34-4.02)	1.01 (0.52-1.95)	3.48 (1.90-6.38)
Had difficulty with health				
No	1374 (87.49%)	1.00	1.00	1.00
Yes	188 (12.51%)	6.94 (4.91-9.83)	1.73 (1.19-2.51)	2.96 (2.07-4.22)
Had somebody close in hospital				
No	1460 (93.24%)	1.00	1.00	1.00
Yes	102 (6.76%)	2.40 (1.51-3.81)	1.25 (0.76-2.07)	1.33 (0.81-2.18)
Lost somebody close				
No	1489 (94.90%)	1.00	1.00	1.00
Yes	73 (5.10%)	1.85 (1.06-3.22)	0.63 (0.32-1.26)	1.13 (0.64-2.01)
Had to change delay or major plan				
No	1198 (76.26%)	1.00	1.00	1.00
Yes	364 (23.74%)	2.50 (1.89-3.32)	1.16 (0.85-1.57)	1.88 (1.40-2.51)
Difficulties with family/other social relationships				
No	1284 (80.53%)	1.00	1.00	1.00
Yes	278 (19.47%)	5.29 (3.85-7.27)	1.70 (1.22-2.36)	4.01 (2.91-5.55)
Difficulties with internet access				
No	1455 (92.95%)	1.00	1.00	1.00
Yes	107 (7.05%)	1.84 (1.17-2.88)	1.06 (0.65-1.72)	2.28 (1.43-3.63)
Work difficulties				
No	1293 (81.03%)	1.00	1.00	1.00

Yes	269 (18.97%)	4.12 (3.01-5.65)	1.39 (1.00-1.94)	2.35 (1.70-3.25)
Difficulties with pets				
No	1522 (97.46%)	1.00	1.00	1.00
Yes	40 (2.54%)	2.79 (1.44-5.41)	0.90 (0.40-2.05)	1.28 (0.63-2.59)
Boredom				
No	1210 (75.06%)	1.00	1.00	1.00
Yes	352 (24.94%)	2.88 (2.15-3.85)	1.75 (1.28-2.39)	2.96 (2.21-3.96)

Adjusting for previous CMD and hazardous drinking

Adjusting for previous CMD or hazardous drinking case status reported at phase three of our health and wellbeing study attenuated the association of CMD and of hazardous drinking with COVID-19 experiences and stressors, but it did not change the direction of association, and the majority of associations remained significant at the 95% level (supplemental information Table 2). For four COVID-19 experiences or stressors, the associations become non-significant, yet their effect size remained large. These included the association of reporting CMD symptoms and living alone, difficulty access enough food, difficulty accessing medication, and losing someone close to you (supplemental information Table 2).

DISCUSSION

Compared to pre-pandemic levels taken in 2014-2016, levels of CMDs in UK veterans remained stable. Veterans reported statistically significant reductions in levels of hazardous drinking during the pandemic compared to pre-pandemic levels. 27.4% reported feelings of loneliness. Just under 15% of people in the study self-reported definitely or probably having COVID-19. Half of individuals with children who they were responsible for reported that changes in childcare negatively affected their life and nearly a fifth of individuals had new or extra caring responsibilities because of the pandemic. The most common COVID-19 stressors reported were boredom, having to change major life plans, and difficulties with family or other social relationships. The COVID-19 stressors of difficulties with family or other social relationships, boredom and difficulties with health were all associated with veterans reporting CMD, hazardous drinking and loneliness. Adjustment for previous CMD or hazardous alcohol use did not change the direction of association and the majority of associations remained statistically significant. Our study identifies there may be a specific impact of COVID-19 experiences and stressors on veterans' CMD, alcohol use and loneliness outcomes.

CMD levels have remained stable with a small, statistically non-significant increase. This should be compared to population data showing significant increases in CMD in the general population. For example, ONS figures found a 9.5% increase in depression from the period July 2019-March 2020 to June 2020 [6]; The UKHLS reported a 7.6% increase in CMD between 2017-2019 and April 2020 [4]. Veterans' pre-pandemic CMD levels were higher than the general population levels (Vet-CHECK Phase three 2014-2016: 24.5% v UKHLS 2018-2019: 18.9% [4]) but were similar during the pandemic (UK studies ranging from 26.0% to 30.6% [4, 27, 28]). The absence of a similarly large increase in CMD caseness in the veteran group may indicate resilient responses in this group who have been previously trained in readiness for deployments, resilience and coping strategies [15, 29, 30]

From further analyses of the veteran sample (available upon request), of the 373 CMD cases, 214 (56.6%) of these were new cases since 2014-2016 (with a similar number of remitting cases). Hence whilst numbers potentially needing clinical treatment remain similar, there may be new individuals that need to engage with services. Additionally, as a majority of the COVID-19 experiences and stressors (particularly difficulties with health, work, or family/other social relationships) were associated with CMD symptoms, it may be this veteran group with CMD particularly impacted by COVID-19 pressures. Similar COVID-19 pressures on families and negative associations with mental health outcomes are reported in US samples [31]. As found in our study, the UKHLS finds negative mental health impacts for parents with childcare responsibilities and home schooling requirements during the pandemic [32]. One fifth of our sample had extra or new caring responsibilities during the pandemic which may have added to family stress levels. Previous research has shown how important social connection is for carers' mental health outcomes [33] and lockdown and social distancing needs may have disrupted support for carers in this sample.

Compared to veterans drinking behaviours pre-pandemic in 2014-2016, levels of hazardous drinking and alcohol misuse reduced (hazardous drinking: 48.5% v 27.6% and alcohol misuse: 9.2% v 3.7% respectively). However, we found the Veterans-CHECK sample to be consuming alcohol, as measured by the AUDIT-C, at higher levels than the general population in England during the pandemic (Veterans-CHECK 49.2% v 38.3% [34]). Hence despite reductions in hazardous drinking and alcohol misuse for veterans in this sample, and increases in general population high-risk drinking, a higher proportion of veterans are still in high risk drinking categories. This finding continues to mirror previous studies that find veterans drinking at higher levels than the general population [35].

There may be several explanations for the reduction in hazardous drinking. Alcohol has often been using as a social bonding tool in Armed Forces community [36, 37], therefore the closing or restrictions placed on the hospitality business may explain the reduction in alcohol consumption. Alternatively, this may represent a general population trend observed in the UK population where high risk drinkers have reduced their alcohol consumption [28, 34]. The Covid-19 Social Study reports that drinking less during the pandemic was associated with being male [38], and our sample is predominantly male. The study identified that responders were less likely to have reported alcohol misuse before the pandemic, however differences in reported alcohol use between responders and non-responders were minimal. Non-responders may have mirrored general population trends of male and high risk drinkers reduction efforts [28, 34, 38] and therefore also followed this reduction trend. Few COVID-19 stressors were associated with hazardous drinking and therefore we could surmise that alcohol was not being used as a coping mechanism in this community during the pandemic.

Our veteran sample reported lower levels of loneliness compared to a UK general population sample from the COVID-19 Social Study (26% v 39%) [39] and similar levels to another study (27%) [40]. An explanation could be that our study collected data during June to September when lockdown restrictions were less than in March to May when the other studies collected their data. Additionally, the veteran sample may have a level of protection against loneliness due to a majority being in a relationship. Of note are the findings that individuals with children under 18 years of age, and those with caring responsibilities, were more likely to report feelings of loneliness. We, therefore, see a pattern of extra pressures on those with family responsibilities, who would not have

had the usual social support networks due to restrictions. The finding that key workers in health and social care were more likely to report feeling lonely compared to other key workers, highlights the extra support that healthcare key workers may need in the pandemic [41].

As seen elsewhere, boredom was common in veterans during the pandemic and was strongly associated with CMD, hazardous alcohol use and loneliness [42], and has been associated with psychological distress for individuals who reported 'high meaning in life', as defined as stable sense of purpose and fulfilment in life[43]. With restrictions reintroduced in the Winter of 2020 and into 2021, the long-term effect of boredom on veterans' wellbeing, identity, purpose and fulfilment remains to be seen [3].

Whilst CMD levels in our veteran group has not risen from pre-pandemic levels, there are still a significant minority of veterans that may need mental health treatment and support. Due to the nature of COVID-19 lockdowns and restrictions in the UK, the National Health Service and charitable providers should particularly focus on the benefits of telemedicine for veterans into the future [16, 44, 45]. Our study demonstrates an impact of the pandemic on veteran families increasing their stress, relationship/caring difficulties and responsibilities. There has been success in the US promoting parenting skills for veteran families under COVID-19 pressures [46], while in the UK, resources created by King's College London and partners offer practical support for families ('Families Under Pressure') which could be utilised by veteran groups [47]. As with the general population, innovative ways are needed to tackle loneliness and improve social networks and support during the pandemic, particularly focused on those with mental health needs [48, 49].

The study strengths include recruitment from a cohort whose previous mental health status is known, rapid roll-out, and use of validated measures for mental health and wellbeing outcomes aligned with our previous study and other UK general population studies' measures. Study limitations include recruitment from a specific veteran cohort serving during the Iraq/Afghanistan era and therefore we cannot comment on the experiences of veterans outside of this era. Only a minority of veterans in this sample were newly transitioned to civilian life and therefore this study may not capture the experiences of those who have recently left service, some of whom may be negatively impacted by this pressure point [50]. There were only a small number of younger 'other ranks' in this sample who may be more likely to experience financial issues [51] and therefore the extent of negative associations between COVID-19 stressors and outcomes may not be fully represented. The study identified that responders were less likely to have reported alcohol misuse before the pandemic and therefore the direction of alcohol use of non-responders is unknown which may underestimate reductions in alcohol use during the pandemic. Whilst we were able to identify similar trends in women veterans for CMD and drinking compared to male veterans in this sample, the number of women in the sample was insufficient to robustly examine associations of COVID-19 stressors and outcomes. Whilst the study captures data from veterans regarding their family experiences, such as relationship, childcare and caring pressures, the study was not able to collect data from veterans' partners/spouses and children themselves. The study is limited by the majority of responses arising from veterans living in England and limited to the context of the pandemic in the UK, June-September 2020.

CONCLUSIONS

Our study suggests a COVID-19 impact on veterans' mental health, alcohol use and loneliness, particularly for those experiencing difficulties with family or social relationships. Veterans experienced the pandemic in similar ways to the general population and in some cases may have responded in resilient ways. Whilst stable levels of CMD and reduction in alcohol use are positive, there remains a group of veterans that may need mental health and alcohol treatment services. There is a need to continue to follow up the health and wellbeing of this veteran group to assess developments longer term over the pandemic.

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Competing Interests

SW is Honorary Civilian Consultant Advisor in Psychiatry for the British Army (unpaid). S.W. is affiliated to the National Institute for Health Research Health Protection Research Unit (NIHR HPRU) in Emergency Preparedness and Response at King's College London in partnership with Public Health England, in collaboration with the University of East Anglia and Newcastle University.

NTF is a trustee (unpaid) of The Warrior Programme, an independent advisor to the Independent Group Advising on the Release of Data (IGARD), a member of Independent Scientific Pandemic Insights Group on Behaviours (SPI-B) and their salary is part grant funded by the MoD.

DM is a trustee of the Forces in Mind Trust (unpaid) and is employed as the Head of Research for Combat Stress, a UK Veterans Mental Health Charity.

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Authors' Contributions

MLS, DS, MJ, HB, DP, LH, DP, DM, SW, NTF were involved in the original concept and design of the study. NTF and SW have overseen the conduct of all aspects of the study. MLS led on the formulation of the questionnaire and associated measures, with substantial contributions from all authors in shaping the final questionnaire. DP led on online survey design, format and flow. DS led on the ethics submission with substantial contributions from all authors. MJ, HB and LH led on the design of participant materials including the participant invite and information sheet with input from all authors. MJ led on the data analysis plan and conducted the data analysis with input from all authors. MLS and DS led the writing of the research paper, with drafting and revision input from all authors. MLS, DS, MJ, HB, DP, LH, DP, DM, SW, NTF have all seen and approved the final version of this paper and accept accountability for all aspects of the work. SW and NTF secured the funding from OVA for this work.

Data Sharing Statement

Data will be processed in accordance with the General Data Protection Regulation (GDPR) and the Data Protection Act 2018. We will not make any record-level data publicly accessible because we need to protect the confidentiality and security of the individual cohort members. You are welcome to contact us with proposals for collaborative research, which the investigators will consider on a case-by-case basis, and which will only occur as part of a legal collaborative agreement and after the collaborator has put in place the relevant research ethics, data protection, and data access approvals.

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Supplemental Information

Table 1 - Comparison of social and military demographic characteristics of responders and non-responders. Column percentages. N = 3547

	Responder N = 1562	Non responder N = 1985	OR (95%CI)	AOR (95% CI)*
Sex				
male	1,383(88.54%)	1,794(90.38%)	1.00	1.00
female	179(11.46%)	191(9.62%)	1.22 (0.98-1.51)	1.51 (1.21-1.90)
Age band				
25-34	46(2.94%)	190(9.57%)	0.31 (0.22-0.44)	0.34 (0.23-0.49)
35-44	272(17.41%)	552(27.81%)	0.63 (0.53-0.76)	0.63 (0.52-0.77)
45-54	554(35.47%)	710(35.77%)	1.00	1.00
55-64	514(32.91%)	444(22.37%)	1.48 (1.25-1.76)	1.51 (1.27-1.79)
65 and over	176(11.27%)	89(4.48%)	2.53 (1.92-3.35)	2.56 (1.91-3.43)
Rank				
Officer	478(30.60%)	462(23.27%)	1.31 (1.12-1.53)	1.02 (0.85-1.22)
NCO	954(61.08%)	1,209(60.91%)	1.00	1.00
Other rank	130(8.32%)	314(15.82)	0.52 (0.42-0.66)	0.92 (0.71-1.19)
Service				
Royal Navy	290(18.57%)	393(19.80%)	1.02 (0.85-1.21)	0.88 (0.74-1.06)
Army	873(55.89%)	1,201(60.50%)	1.00	1.00
RAF	399(25.54%)	391(19.70%)	1.40 (1.19-1.65)	1.18 (0.99-1.40)
Education level				
No qualifications/O-levels/GCSEs	385(24.65%)	577(29.10%)	0.72 (0.61-0.85)	0.83 (0.69-1.00)
A-level	506(32.39%)	682(34.39%)	0.80 (0.69 0.94)	0.93 (0.78-1.10)
Degree	671(42.96%)	724(36.51%)	1.00	1.00
Relationship status				
In a relationship	1,337(86.82%)	1,679(86.24%)	1.00	1.00
Single	90(5.84%)	145(7.45%)	0.78 (0.59-1.02)	1.03 (0.77-1.37)
Ex-relationship	113(7.34%)	123(6.32%)	1.15 (0.88-1.50)	1.06 (0.80-1.39)

*adjusted for sex, age, education, service and rank

Table 2 – Association between CMD, Hazardous alcohol consumption and Loneliness and COVID19 experiences and stressors

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Had or have COVID-19					
No	866 (53.80%)	1.00	1.00	1.00	1.00
Yes (definitely/probably)	226 (14.83%)	1.55 (1.08-2.22)	1.49 (1.02-2.16)	0.80 (0.55-1.16)	0.68 (0.45-1.05)
Don't know	470 (31.37%)	1.06 (0.79-1.43)	1.03 (0.76-1.40)	0.78 (0.58-1.05)	0.70 (0.50-0.98)
Had to isolate					
No	1310 (83.51%)	1.00	1.00	1.00	
Yes	249 (16.49%)	1.33 (0.96-1.85)	1.24 (0.88-1.74)	0.89 (0.63-1.26)	0.69 (0.47-1.02)
Know someone who died from COVID-19					
No	1276 (81.52%)	1.00		1.00	
Yes	286 (18.48%)	1.76 (1.29-2.40)	1.73 (1.26-2.38))	0.95 (0.68-1.33)	0.97 (0.66-1.43)
Change in employment					
no change or furlough	1425 (91.60%)	1.00		1.00	
change for worse	134 (8.40%)	3.14 (2.15-4.60)	3.07 (2.03-4.65)	1.26 (0.82-1.93)	1.04 (0.64-1.71)
Key Worker					
Not a key worker	880 (53.72%)	1.42 (1.06-1.89)	1.43 (1.06-1.93)	1.09 (0.81-1.45)	0.87 (0.63-1.22)
Key worker – Health and social care	131 (8.79%)	1.40 (0.85-2.31)	1.33 (0.77-2.30)	0.81 (0.47-1.38)	0.70 (0.40-1.21)
Key workers - All other roles	543 (37.48%)	1.00		1.00	1.00
Who usually live with					
Live alone	170 (11.04%)	2.11 (1.07-4.16)	1.82 (0.91-3.66)	1.56 (0.82-2.96)	1.81 (0.88-3.71)
Live with spouse/partner	1328 (84.55%)	1.00	1.00	1.00	1.00
Live with others	59 (4.41%)	1.59 (0.55-4.60)	1.40 (0.51-3.86)	0.95 (0.35-2.59)	1.11 (0.36-3.45)
Children					
Have no children	357 (24.50%)	1.00	1.00	1.00	1.00
Have children but not responsible for	666 (36.04%)	1.14 (0.78-1.67)	1.09 (0.74-1.59)	0.93 (0.64-1.36)	1.05 (0.68-1.62)

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Responsible for one child under 18 years old	214 (15.23%)	0.87 (0.53-1.41)	0.88 (0.54-1.46)	0.92 (0.59-1.44)	1.08 (0.64-1.82)
Responsible for two or more children under 18 years of age	320 (24.23%)	1.56 (1.03-2.37)	1.62 (1.07-2.47)	0.87 (0.57-1.33)	1.18 (0.72-1.94)
Changed childcare arrangements					
No	243 (52.40%)	1.00	1.00	1.00	
Yes	214 (47.60%)	2.31 (1.47-3.64)	2.24 (1.41-3.54)	1.15 (0.73-1.84)	1.11 (0.65-1.90)
Impact of changed childcare arrangements					
Positive impact	33 (14.08%)	0.60 (0.21-1.67)	0.72 (0.26-1.98)	1.16 (0.45-3.00)	0.99 (0.30-3.26)
Negative impact	94 (44.73%)	1.96 (0.99-3.89)	1.91 (0.94-3.88)	1.39 (0.68-2.85)	1.27 (0.56-2.87)
Neutral impact	87 (41.19%)	1.00	1.00	1.00	1.00
Usual caring responsibilities (pre pandemic)					
No	1361 (87.55%)	1.00	1.00	1.00	
yes	195 (12.45%)	1.74 (1.20-2.53)	1.73 (1.19-2.51)	0.79 (0.52-1.21)	0.90 (0.55-1.48)
Extra or new caring responsibilities during pandemic					
No	1285 (82.10%)	1.00		1.00	
yes	271 (17.90%)	1.77 (1.29-2.43)	1.77 (1.27-2.48)	1.01 (0.71-1.42)	1.07 (0.71-1.60)
Financial problems					
No	1379 (86.96%)	1.00	1.00	1.00	
yes	183 (13.04%)	2.93 (2.06-4.15)	2.67 (1.89-3.78)	1.04 (0.69-1.57)	0.96 (0.59-1.58)
Had difficulty accessing enough food					
No	1533 (97.9%)	1.00	1.00	1.00	1.00
Yes	29 (2.09%)	3.10 (1.35-7.16)	2.27 (0.91-5.67	1.64 (0.70-3.82)	1.28 (0.51-3.21)
Had difficulty accessing medication					

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
No	1490 (94.86%)	1.00	1.00	1.00	1.00
Yes	72 (5.14%)	2.32 (1.34-4.02)	1.57 (0.89-2.76-)	1.01 (0.52-1.95)	0.82 (0.36-1.86)
Had difficulty with health					
No	1374 (87.49%)	1.00	1.00	1.00	1.00
Yes	188 (12.51%)	6.94 (4.91-9.83)	5.47 (3.83-7.81)	1.73 (1.19-2.51)	1.67 (1.07-2.61)
Had somebody close in hospital					
No	1460 (93.24%)	1.00	1.00	1.00	1.00
Yes	102 (6.76%)	2.40 (1.51-3.81)	2.50 (1.54-4.05)	1.25 (0.76-2.07)	1.10 (0.60-2.01)
Lost somebody close					
No	1489 (94.90%)	1.00		1.00	1.00
Yes	73 (5.10%)	1.85 (1.06-3.22)	1.55 (0.86-2.79)	0.63 (0.32-1.26)	0.51 (0.22-1.17)
Had to change delay or major plan					
No	1198 (76.26%)	1.00	1.00	1.00	1.00
Yes	364 (23.74%)	2.50 (1.89-3.32)	2.27 (1.69-3.06)	1.16 (0.85-1.57)	0.97 (0.68-1.38)
Difficulties with family/other social relationships					
No	1284 (80.53%)	1.00	1.00	1.00	1.00
Yes	278 (19.47%)	5.29 (3.85-7.27)	4.64 (3.33-6.46)	1.70 (1.22-2.36)	1.56 (1.05-2.30)
Difficulties with internet access					
No	1455 (92.95%)	1.00	1.00	1.00	1.00
Yes	107 (7.05%)	1.84 (1.17-2.88)	1.88 (1.18-3.00)	1.06 (0.65-1.72)	1.31 (0.75-2.26)
Work difficulties					
No	1293 (81.03%)	1.00	1.00	1.00	1.00

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Yes	269 (18.97%)	4.12 (3.01-5.65)	3.68 (2.64-5.14)	1.39 (1.00-1.94)	1.40 (0.94-2.09)
Difficulties with pets					
No	1522 (97.46%)	1.00	1.00	1.00	1.00
Yes	40 (2.54%)	2.79 (1.44-5.41)	2.52 (1.25-5.06)	0.90 (0.40-2.05)	0.88 (0.36-2.17)
Boredom					
No	1210 (75.06%)	1.00	1.00	1.00	1.00
Yes	352 (24.94%)	2.88 (2.15-3.85)	2.69 (1.98-3.65-)	1.75 (1.28-2.39)	1.55 (1.09-2.20)

* Adjusted for sex, age, education, marital status, rank, service

** Adjusted for sex, age, education, marital status, rank, service and phase 3 GHQ or AUDIT-8 as appropriate

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4-5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (*b*) For matched studies, give matching criteria and number of exposed and unexposed	4-5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4-5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4-5
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding (*b*) Describe any methods used to examine subgroups and interactions (*c*) Explain how missing data were addressed (*d*) If applicable, explain how loss to follow-up was addressed (*e*) Describe any sensitivity analyses	5
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	5
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Summarise follow-up time (eg, average and total amount)	5-6
Outcome data	15*	Report numbers of outcome events or summary measures over time	6-7

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6-10
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.

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UK Veterans' mental health and wellbeing before and during the COVID-19 pandemic: A longitudinal cohort study

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UK Veterans' mental health and wellbeing before and during the COVID-19 pandemic: A longitudinal cohort study

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ABSTRACT

Objectives: To investigate the impact of the COVID-19 pandemic on the health and wellbeing of UK ex-service personnel (veterans) before and during the pandemic, and to assess associations of COVID-19 experiences and stressors with mental health, alcohol use and loneliness.

Design: An additional wave of data was collected from a longitudinal cohort study of the UK Armed Forces.

Setting: Online survey June-September 2020

Participants: Cohort members were included if they had completed a questionnaire at phase three of the KCMHR health and wellbeing study (2014-2016), had left the Armed Forces after Regular service, were living in the UK, had consented to follow up, and provided a valid email address. Invitation emails were sent to N=3547 with a 44% response rate (n=1562).

Primary outcome measures: Common mental health disorders (CMD) (measured using the General Health Questionnaire, 12 items – cut off ≥ 4), hazardous alcohol use (measured using the AUDIT, 10 items – cut off ≥ 8) and loneliness (UCLA-3 loneliness scale – cut off ≥ 6).

Results: Veterans reported a statistically significant decrease in hazardous drinking of 48.5% to 27.6%, whilst CMD remained stable (non-statistically significant increase of 24.5% to 26.1%). 27.4% of veterans reported feelings of loneliness. The COVID-19 stressors of reporting difficulties with family/social relationships, boredom, and difficulties with health, were statistically significantly associated with CMD, hazardous drinking and loneliness, even after adjustment for previous mental health/hazardous alcohol use.

Conclusions: Our study suggests a COVID-19 impact on veterans' mental health, alcohol use and loneliness, particularly for those experiencing difficulties with family relationships. Veterans experienced the pandemic in similar ways to the general population and in some cases may have responded in resilient ways. Whilst stable levels of CMD and reduction in alcohol use are positive, there remains a group of veterans that may need mental health and alcohol treatment services.

Strengths and Limitations of this Study

- Recruitment from a longitudinal cohort study where underlying characteristics are known.
- Rapid roll-out and use of validated measures for mental health and wellbeing outcomes aligned with our previous health and wellbeing study and other UK general population studies' measures.
- Only generalisable to veterans who were in military service during the Iraq/Afghanistan era.
- The study is limited to the context of the COVID-19 pandemic in the UK, June-September 2020.

INTRODUCTION

The COVID-19 pandemic has led to large-scale societal changes all over the world, with governments implementing strict controls on movement and substantial restrictions to people's personal and work lives [1]. Despite the benefits to public health of containment strategies such as 'lockdown', self-isolation and social distancing (e.g., slower spread of infection), the social, economic, wellbeing and health consequences are likely to be profound [2, 3] and felt in the short, medium and long term.

The uncertainty and unpredictable nature of the COVID-19 pandemic has had a general negative impact on psychological and mental health [4]. The impact of COVID-19 is not uniform. Vulnerable groups, such as the elderly, young, females, people with mental or physical ill health or on low income are at greater risk of social isolation and worse health outcomes [2]. The analysis of longitudinal data from the UK Household Longitudinal Study (UKHLS), also known as 'Understanding Society' study indicated that mental health in the UK worsened substantially from prior wave 9 data collected January 2017-May 2019 with increased GHQ scores of 10.8% on average in April 2020, and worse scores in wave 9 data for individuals with pre-existing mental health difficulties [5]. Longitudinal data from the Office for National Statistics (ONS) also reports that there has been a deterioration in mental health of the general population in Great Britain with 19.2% of adults reporting depression in June 2020 compared to 9.7% before the pandemic July 2019-March 2020 [6].

In Great Britain, there are an estimated 2.4 million ex-Service personnel (veterans) making up 5% of household residents aged 16 years and over [7]. It is currently unknown how UK veterans may experience the pandemic and the consequent effect on their health and wellbeing. Individuals with anxiety related disorders (e.g., anxiety or post-traumatic stress disorder (PTSD)) appear to be at higher risk of experiencing psychological distress during the ongoing pandemic [8]. A proportion of the veteran population show increased risk of mental and physical health issues and barriers to help-seeking [9, 10], and there has been some evidence of an increase in the number of wounded veterans who have struggled with their mental and physical health since the start of lockdown in the UK [11]. Loneliness and social isolation are recognised problems for society in general, but ex-Service personnel present with unique experiences of loneliness and social isolation, which for some can be linked to their poor re-integration into civilian life and the community [12, 13]. A study exploring how New Zealand veterans conceptualised loneliness during COVID-19 lockdown indicated that both social and physical isolation and health-related factors were significant drivers of loneliness [14]. However, in contrast to the general population (excluding emergency responders), military personnel are trained to demonstrate readiness and resilience in the face of warfare operations and stressful environments [15]. Therefore, it is unknown whether veteran's military training may also create resilient responses in the face of COVID-19 uncertainties compared to the general population.

The circumstances created by the COVID-19 pandemic may require a reconsideration of how healthcare and systems of support should be adapted to effectively accommodate the needs of the ex-Service population, especially the most vulnerable within this population [16]. The current study (Veterans-CHECK) aims to investigate the impact of the COVID-19 pandemic on the health and wellbeing of UK veterans, assessing mental health and alcohol use before and during the pandemic.

It will measure veterans reports of loneliness during the pandemic and it will also assess the impact of COVID-19 experiences and stressors on mental health, hazardous alcohol use and loneliness outcomes. Understanding this impact will be important to the Government, Armed Forces charities, and other stakeholders to target services and support and ensure current policy initiatives are fit for purpose in the context of the pandemic.

METHOD

Study design and participants

Participants were recruited from the Kings Centre for Military Health Research (KCMHR) health and wellbeing survey. This is a large-scale ongoing investigation of the physical and mental health and wellbeing of UK Armed Forces personnel from all three services (regulars and reservists) and includes personnel who were first surveyed before the recent conflicts in Iraq [17], as well as during and after the conflicts in Iraq and Afghanistan. There have been three phases of data collection, Phase 1: 2004 - 2006, Phase 2: 2007 - 2009 and Phase 3: 2014 - 2016 [9, 18, 19]. Approximately 18,000 have taken part in the survey since it began. Individuals were invited to take part in the Veterans-CHECK study if: they had completed a questionnaire at Phase 3 of the health and wellbeing study, had left the UK Armed Forces, had regular service, were living in the UK, had consented to follow up and provided a valid email address. Invitation emails were sent to N=3547 of individuals who met this eligibility criteria.

Procedure

Data collection was conducted online. Participants were asked to complete a questionnaire in their personal settings through REDCap, a secure web application for building and managing online surveys and databases [20]. Consents were completed online on the REDCap platform. The questionnaire had sections including (a) socio-demographics (b) COVID-19 experiences and stressors (c) current mental health and wellbeing measures. A full description of the study protocol is available on line Sharp, Serfioti [21].

The COVID-19 experiences and stressors section included self-report of having COVID-19 (those who indicated a positive PCR test or reported they had 'probably' had COVID-19 were counted as having COVID-19 for analysis purposes), experiencing isolation, bereavement and other challenges, such as childcare arrangements and caring responsibilities during the pandemic. Participants were asked about employment changes since the start of the pandemic with two categories created of 'no change/furlough' and 'change for worse' which included those that reported unemployment, redundancy or reductions in salary. Individuals were asked whether they had experienced COVID-19 stressors in the past month, followed by a list of stressors they could endorse pertaining to finances, health and other difficulties. Education and military background information were taken from Phase 3 of the cohort study [9] (rank, service branch, length of service). A variable of 'financial difficulties' was constructed using three items from the list of COVID-19 stressors. Experiencing at least one of 'Another bill-payer in your household lost their job or was unable to earn money', 'Unable to pay bills', 'other financial difficulties' was categorised as experiencing 'financial difficulties'. Symptoms of common mental health disorders (CMD) were measured using the 12-item General Health Questionnaire (GHQ-12), cut-off scores for case status used were 4 or more (scores range from 0 to

12) [22]; 10-item Alcohol Use Disorder Identification Test (AUDIT) was used to measure alcohol use, cut off scores of 8 or more were used for hazardous drinking (scores range from 0 to 40), and 16 or more defined as alcohol misuse (which is likely to be harmful to health) [23], AUDIT-C score of 5 or more indicating risky drinking [24]; and the 3-item UCLA Loneliness Scale to measure feelings of loneliness with a cut off of 6 or more (scores range from 3 to 9 [25]).

Data Collection

One invitation email was sent to participants in June 2020 with up to three email reminders sent in June, July and August 2020, with data collection closing at the end of September 2020.

Analyses

To calculate response weights, we utilised social and military demographic data collected at previous phases of the KCMHR cohort study including sex, age, education level, rank (most recent when serving), service branch, marital status, role when serving (combat/support), cohort sample (sampled originally at phases 1, 2 or 3). We constructed a binary response variable such that 0 = did not respond and 1 = responded. We carried out univariable logistic regression to determine which of these demographic/military variables was statistically associated with response at the $p<0.05$ level. The variables found to be associated were entered into a multivariable logistic model. The probability of responding given these characteristics was ascertained, and response weights calculated as the inverse of the probability of responding. The variables in the final response weights model were age, sex, rank, service branch, education level and cohort sample.

The sociodemographic and military characteristics of the sample were described. Mental health and alcohol use during COVID-19 were compared with previous mental health and alcohol use from phase three of our health and wellbeing survey [9]. Logistic regression analyses were conducted to assess the associations between the outcomes of interest (CMD, hazardous drinking and loneliness) and COVID-19 experiences and stressors. Logistic regression analyses were adjusted for sex, age, education, marital status, rank and service. Further analyses were adjusted additionally for previous CMD or hazardous drinking status at phase three of our health and wellbeing study. All statistical analyses were performed using the statistical package, Stata (version 16.0 [26]), with survey commands used to account for weighting. Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.

Ethical Approval

Full ethical approval was obtained from the King's College London Research Ethics Committee (Ref: HR-19/20-18626).

Patient and public involvement

Veterans who sit on our research board provided feedback on the content and flow of the questionnaire; the questionnaire was amended and refined accordingly. Findings from the study will be disseminated to study participants through a newsletter, social media outlets and our stakeholders that represent veteran communities.

RESULTS

The response rate was 44% (1562/3547). Responders were more likely to be older, officers, of higher educational status, have served in the RAF, were less likely to have reported alcohol misuse, but more likely to have reported multiple physical symptoms, and poor/fair health at phase 3 of the cohort (Supplemental Information Table 1). Table 1 describes the socio-demographic and military characteristics of those who participated in the study. The majority of participants were male, Non-Commissioned Officers (NCO), had served in the Army, were educated to A-Level or degree level and in a relationship. Over half the sample had left service 10 or more years ago and the majority were in employment before the pandemic. The majority of respondents lived in England (85.8%, n=1334).

Table 1 – Socio-demographic and military characteristics of sample (N=1562)
*percentages are weighted with unweighted cell counts

Characteristic	n (%) *
Sex	
male	1383 (89.26%)
female	179 (10.74%)
Age band (years at completion of Veterans-CHECK survey)	
25-34	46 (6.65%)
35-44	272 (22.97%)
45-54	554 (35.93%)
55-64	514 (26.95%)
65 and over	176 (7.50%)
Rank (when in service)	
Officer	478 (26.11%)
NCO	954 (61.45%)
Other rank	130 (12.44%)
Service (when in service)	
Royal Navy	290 (19.27%)
Army	873 (58.26%)
RAF	399 (22.47%)
Length of time since leaving service	
Within last year	20 (1.28%)
One year up to five years	166 (12.62%)
Five years up to 10 years	506 (33.86%)
More than 10 years	870 (52.24%)
Education level (reported at Phase 3 of the cohort study)	
No qualifications/O-levels/GCSEs	385 (27.23%)
A-level	506 (33.91%)
Degree	671 (38.86%)
Relationship status (current)	
In a relationship	1361 (86.76%)

Single	72 (5.67%)
Ex-relationship (separated, divorced, widowed)	127 (7.57%)
Employment status (before the COVID-19 pandemic)	
Employed	1246 (83.41%)
Retired	232 (11.18%)
Economically inactive	78 (5.41%)

Before and during COVID-19 pandemic - mental health and alcohol use

Overall, the percentage of participants meeting the threshold for CMD remained stable from pre-pandemic levels, increasing only slightly from 24.5% (n=354) to 26.1% (n=376), where this increase was not statistically significant (Table 2). All measures of alcohol use were statistically significant reductions from pre-pandemic levels. Veterans reported hazardous drinking reductions from 48.5% (n=642) to 27.6% (n=367), alcohol misuse reductions of 9.2% (n=119) to 3.7% (n=50) and high-risk consumption reductions of 73.0% (n=987) to 49.2% (n=649). In further analysis (available upon request) women veterans in the sample reported similar trends as male veterans mirroring the stability in CMD levels and statistically significant reductions in alcohol use.

Table 2 – Pre and during pandemic mental health and alcohol use outcomes

*percentages are weighted

	Before COVID-19 Phase 3 (2014-2016) N (%)*	**During COVID-19** Vet-CHECK (June-Sept 2020) N (%)	P value**
Common Mental Disorders (GHQ-12 $\geq$ 4)	354 /1539 (24.50%)	373/1539 (26.10%)	0.276
Hazardous Drinking (AUDIT Case 8 $\geq$)	642/1387 (48.48%)	360/1387 (27.61%)	<0.0001
Alcohol Misuse (AUDIT Case 16 $\geq$)	119/1387 (9.19%)	48/1387 (3.71%)	<0.0001
Alcohol Consumption AUDIT-C ($\geq$ 5)	987/1366 (73.01%)	649/1366 (49.24%)	<0.0001

**Adjusted Wald test

Loneliness, COVID-19 experiences and stressors

27.4% (n=395) of the sample reported feelings of loneliness. Tables 3 and 4 describe COVID-19 experiences and stressors. 14.8% (n=226) of the sample reported definitely or probably having COVID-19, with 16.5% (n=249) of the sample having to self-isolate. 18.5% (n=286) of the sample knew someone who died from COVID-19. The large majority of the sample had no change in employment or were furloughed (91.6%, n=1425). Just under half of the sample reported being key workers (46.2%, n=674), with 19% (n=131) of these key workers being health and social care key workers.

The large majority of the sample lived with their spouse/partner (84.6%, n=1328). Just under a quarter of the sample were responsible for two or more children under the age of 18 years old (24.2%, n=320). Just under half of those who had children they were responsible for had to change childcare arrangements because of the pandemic (47.6%, n=214) and 44.7% (n=94) reported the change in childcare arrangements had a negative impact on their life. 17.9% (n=271) reported extra or new caring responsibilities because of the pandemic. The most frequently reported COVID-19 stressors were boredom (24.9%, n=352), having to change or delay major plans (23.7%, n=364) and difficulties with family/other social relationships (19.5%, n=278).

Association of mental health outcomes and COVID-19 experiences and stressors

Table 3 and 4 presents odds ratios (AOR) for the association between CMD symptoms, hazardous drinking and loneliness adjusted for sex, age, education, marital status, rank and Service.

Common Mental Disorders

Increased odds of reporting symptoms of CMD was associated with self-report of definitely or probably having COVID-19, knowing someone who died from COVID-19, reporting a change for worse in employment during the pandemic (compared to no change/furlough), not being a key worker, living alone, being responsible for two or more children under 18 years of age (compared to no children), having to change childcare arrangements because of the pandemic, having usual caring responsibilities (compared to none) or extra/new caring responsibilities because of the pandemic (Table 3). Increased odds of reporting CMD were associated with all COVID-19 stressors (Table 4). The stressors with the largest effect sizes included having difficulties with health, difficulties with family/other social relationships, work difficulties, and having financial problems.

Hazardous Drinking

Increased likelihood of reporting drinking at hazardous levels was associated with having difficulties with health, difficulties with family/other social relationships, and experiencing boredom.

Loneliness

Increased reporting of loneliness was associated with knowing someone who died from COVID-19, being a health and social care key worker (compared to other key workers), living alone, being responsible for one or two or more children (compared to none), and having usual caring responsibilities (compared to none) (Table 3). Increased reporting of loneliness was associated with several COVID-19 stressors (Table 4), the largest effect sizes were reporting difficulties with family/other social relationships, difficulties with health, and experiencing boredom.

Table 3 – Association between CMD, Hazardous drinking and Loneliness and COVID-19 experiences
(Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.)
* Adjusted for sex, age, education, marital status, rank, service

COVID-19 Experiences	n (%)	Common Mental Disorders (CMD) (AOR 95% CI) * N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Loneliness (AOR 95% CI) * N = 395 (27.42%)
Had or have COVID-19				
No	866 (53.80%)	1.00	1.00	1.00
Yes (definitely/probably)	226 (14.83%)	1.55 (1.08-2.22)	0.80 (0.55-1.16)	1.36 (0.96-1.95)
Don't know	470 (31.37%)	1.06 (0.79-1.43)	0.78 (0.58-1.05)	1.24 (0.93-1.66)
Had to isolate				
No	1310 (83.51%)	1.00	1.00	
Yes	249 (16.49%)	1.33 (0.96-1.85)	0.89 (0.63-1.26)	1.29 (0.93-1.79)
Know someone who died from COVID-19?				
No	1276 (81.52%)	1.00	1.00	1.00
Yes	286 (18.48%)	1.76 (1.29-2.40)	0.95 (0.68-1.33)	1.54 (1.13-2.12)
Change in employment				
no change or furlough	1425 (91.60%)	1.00	1.00	1.00
change for worse	134 (8.40%)	3.14 (2.15-4.60)	1.26 (0.82-1.93)	1.49 (0.98-2.29)
Key Worker				
Not a key worker	880 (53.72%)	1.42 (1.06-1.89)	1.09 (0.81-1.45)	1.23 (0.92-1.65)
Key worker – Health and social care	131 (8.79%)	1.40 (0.85-2.31)	0.81 (0.47-1.38)	1.69 (1.05-2.70)
Key workers - All other roles	543 (37.48%)	1.00	1.00	1.00
Who usually live with				
Live alone	170 (11.04%)	2.11 (1.07-4.16)	1.56 (0.82-2.96)	2.49 (1.36-4.57)
Live with spouse/partner	1328 (84.55%)	1.00	1.00	1.00
Live with others	59 (4.41%)	1.59 (0.55-4.60)	0.95 (0.35-2.59)	1.60 (0.71-3.61)
Children				
Have no children	357 (24.50%)	1.00	1.00	1.00
Have children but not responsible for them	666 (36.04%)	1.14 (0.78-1.67)	0.93 (0.64-1.36)	1.17 (0.79-1.73)
Responsible for one child under 18 years old	214 (15.23%)	0.87 (0.53-1.41)	0.92 (0.59-1.44)	1.62 (1.03-2.55)
Responsible for two or more children under 18 years of age	320 (24.23%)	1.56 (1.03-2.37)	0.87 (0.57-1.33)	1.94 (1.26-3.00)
Changed childcare arrangements				
No	243 (52.40%)	1.00	1.00	1.00
Yes	214 (47.60%)	2.31 (1.47-3.64)	1.15 (0.73-1.84)	1.00 (0.63-1.57)
Impact of changed childcare arrangements				
Positive impact	33 (14.08%)	0.60 (0.21-1.67)	1.16 (0.45-3.00)	0.59 (0.18-1.93)
Negative impact	94 (44.73%)	1.96 (0.99-3.89)	1.39 (0.68-2.85)	1.66 (0.78-3.52)

Neutral impact	87 (41.19%)	1.00	1.00	1.00
Usual caring responsibilities (pre pandemic)				
No	1361 (87.55%)	1.00	1.00	1.00
yes	195 (12.45%)	1.74 (1.20-2.53)	0.79 (0.52-1.21)	1.63 (1.11-2.40)
Extra or new caring responsibilities during pandemic				
No	1285 (82.10%)	1.00	1.00	1.00
yes	271 (17.90%)	1.77 (1.29-2.43)	1.01 (0.71-1.42)	1.35 (0.97-1.87)

Table 4 – Association between CMD, Hazardous drinking and Loneliness and COVID-19 stressors
(Weighted percentages and odds ratios are presented in tables to account for response weights, together with unweighted cell counts.)
* Adjusted for sex, age, education, marital status, rank, service

COVID-19 Stressors	n (%)	Common Mental Disorders (CMD) (AOR 95% CI) * N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Loneliness (AOR 95% CI) * N = 395 (27.42%)
Financial problems				
No	1379 (86.96%)	1.00	1.00	1.00
yes	183 (13.04%)	2.93 (2.06-4.15)	1.04 (0.69-1.57)	1.75 (1.20-2.56)
Had difficulty accessing enough food				
No	1533 (97.91%)	1.00	1.00	1.00
Yes	29 (2.09%)	3.10 (1.35-7.16)	1.64 (0.70-3.82)	3.91 (1.57-9.73)
Had difficulty accessing medication				
No	1490 (94.86%)	1.00	1.00	1.00
Yes	72 (5.14%)	2.32 (1.34-4.02)	1.01 (0.52-1.95)	3.48 (1.90-6.38)
Had difficulty with health				
No	1374 (87.49%)	1.00	1.00	1.00
Yes	188 (12.51%)	6.94 (4.91-9.83)	1.73 (1.19-2.51)	2.96 (2.07-4.22)
Had somebody close in hospital				
No	1460 (93.24%)	1.00	1.00	1.00
Yes	102 (6.76%)	2.40 (1.51-3.81)	1.25 (0.76-2.07)	1.33 (0.81-2.18)
Lost somebody close				
No	1489 (94.90%)	1.00	1.00	1.00
Yes	73 (5.10%)	1.85 (1.06-3.22)	0.63 (0.32-1.26)	1.13 (0.64-2.01)
Had to change delay or major plan				
No	1198 (76.26%)	1.00	1.00	1.00
Yes	364 (23.74%)	2.50 (1.89-3.32)	1.16 (0.85-1.57)	1.88 (1.40-2.51)

Difficulties with family/other social relationships				
No	1284 (80.53%)	1.00	1.00	1.00
Yes	278 (19.47%)	5.29 (3.85-7.27)	1.70 (1.22-2.36)	4.01 (2.91-5.55)
Difficulties with internet access				
No	1455 (92.95%)	1.00	1.00	1.00
Yes	107 (7.05%)	1.84 (1.17-2.88)	1.06 (0.65-1.72)	2.28 (1.43-3.63)
Work difficulties				
No	1293 (81.03%)	1.00	1.00	1.00
Yes	269 (18.97%)	4.12 (3.01-5.65)	1.39 (1.00-1.94)	2.35 (1.70-3.25)
Difficulties with pets				
No	1522 (97.46%)	1.00	1.00	1.00
Yes	40 (2.54%)	2.79 (1.44-5.41)	0.90 (0.40-2.05)	1.28 (0.63-2.59)
Boredom				
No	1210 (75.06%)	1.00	1.00	1.00
Yes	352 (24.94%)	2.88 (2.15-3.85)	1.75 (1.28-2.39)	2.96 (2.21-3.96)

Adjusting for previous CMD and hazardous drinking

Adjusting for previous CMD or hazardous drinking case status reported at phase three of our health and wellbeing study attenuated the association of CMD and of hazardous drinking with COVID-19 experiences and stressors, but it did not change the direction of association, and the majority of associations remained significant at the 95% level (supplemental information Table 2). For four COVID-19 experiences or stressors, the associations become non-significant, yet their effect size remained large. These included the association of reporting CMD symptoms and living alone, difficulty access enough food, difficulty accessing medication, and losing someone close to you (supplemental information Table 2).

DISCUSSION

Compared to pre-pandemic levels taken in 2014-2016, levels of CMDs in UK veterans remained stable. Veterans reported statistically significant reductions in levels of hazardous drinking during the pandemic compared to pre-pandemic levels. 27.4% reported feelings of loneliness. Just under 15% of people in the study self-reported definitely or probably having COVID-19. Half of individuals with children who they were responsible for reported that changes in childcare negatively affected their life and nearly a fifth of individuals had new or extra caring responsibilities because of the pandemic. The most common COVID-19 stressors reported were boredom, having to change major life plans, and difficulties with family or other social relationships. The COVID-19 stressors of difficulties with family or other social relationships, boredom and difficulties with health were all associated with veterans reporting CMD, hazardous drinking and loneliness. Adjustment for previous CMD or hazardous alcohol use did not change the direction of association and the majority of associations remained statistically significant. Our study identifies there may be a specific impact of COVID-19 experiences and stressors on veterans' CMD, alcohol use and loneliness outcomes.

CMD levels have remained stable with a small, statistically non-significant increase. This should be compared to population data showing significant increases in CMD in the general population. For example, ONS figures found a 9.5% increase in depression from the period July 2019-March 2020 to June 2020 [6]; The UKHLS reported a 7.6% increase in CMD between 2017-2019 and April 2020 [4]. Veterans' pre-pandemic CMD levels were higher than the general population levels (Vet-CHECK Phase three 2014-2016: 24.5% v UKHLS 2018-2019: 18.9% [4]) but were similar during the pandemic (UK studies ranging from 26.0% to 30.6% [4, 27, 28]). The absence of a similarly large increase in CMD caseness in the veteran group may indicate resilient responses in this group who have been previously trained in readiness for deployments, resilience and coping strategies [15, 29, 30]

From further analyses of the veteran sample (available upon request), of the 373 CMD cases, 214 (56.6%) of these were new cases since 2014-2016 (with a similar number of remitting cases). Hence whilst numbers potentially needing clinical treatment remain similar, there may be new individuals that need to engage with services. Additionally, as a majority of the COVID-19 experiences and stressors (particularly difficulties with health, work, or family/other social relationships) were associated with CMD symptoms, it may be this veteran group with CMD particularly impacted by COVID-19 pressures. Similar COVID-19 pressures on families and negative associations with mental health outcomes are reported in US samples [31]. As found in our study, the UKHLS finds negative mental health impacts for parents with childcare responsibilities and home schooling requirements during the pandemic [32]. One fifth of our sample had extra or new caring responsibilities during the pandemic which may have added to family stress levels. Previous research has shown how important social connection is for carers' mental health outcomes [33] and lockdown and social distancing needs may have disrupted support for carers in this sample.

Compared to veterans drinking behaviours pre-pandemic in 2014-2016, levels of hazardous drinking and alcohol misuse reduced (hazardous drinking: 48.5% v 27.6% and alcohol misuse: 9.2% v 3.7% respectively). However, we found the Veterans-CHECK sample to be consuming alcohol, as measured by the AUDIT-C, at higher levels than the general population in England during the pandemic (Veterans-CHECK 49.2% v 38.3% [34]). Hence despite reductions in hazardous drinking and alcohol misuse for veterans in this sample, and increases in general population high-risk drinking, a higher proportion of veterans are still in high risk drinking categories. This finding continues to mirror previous studies that find veterans drinking at higher levels than the general population [35].

There may be several explanations for the reduction in hazardous drinking. Alcohol has often been using as a social bonding tool in Armed Forces community [36, 37], therefore the closing or restrictions placed on the hospitality business may explain the reduction in alcohol consumption. Alternatively, this may represent a general population trend observed in the UK population where high risk drinkers have reduced their alcohol consumption [28, 34]. The Covid-19 Social Study reports that drinking less during the pandemic was associated with being male [38], and our sample is predominantly male. The study identified that responders were less likely to have reported alcohol misuse before the pandemic, however differences in reported alcohol use between responders and non-responders were minimal. Non-responders may have mirrored general population trends of male and high risk drinkers reduction efforts [28, 34, 38] and therefore also followed this reduction trend. Few COVID-19 stressors were associated with hazardous drinking and therefore we could

surmise that alcohol was not being used as a coping mechanism in this community during the pandemic.

Our veteran sample reported lower levels of loneliness compared to a UK general population sample from the COVID-19 Social Study (26% v 39%) [39] and similar levels to another study (27%) [40]. An explanation could be that our study collected data during June to September when lockdown restrictions were less than in March to May when the other studies collected their data. Additionally, the veteran sample may have a level of protection against loneliness due to a majority being in a relationship. Of note are the findings that individuals with children under 18 years of age, and those with caring responsibilities, were more likely to report feelings of loneliness. We, therefore, see a pattern of extra pressures on those with family responsibilities, who would not have had the usual social support networks due to restrictions. The finding that key workers in health and social care were more likely to report feeling lonely compared to other key workers, highlights the extra support that healthcare key workers may need in the pandemic [41].

As seen elsewhere, boredom was common in veterans during the pandemic and was strongly associated with CMD, hazardous alcohol use and loneliness [42], and has been associated with psychological distress for individuals who reported 'high meaning in life', as defined as stable sense of purpose and fulfilment in life[43]. With restrictions reintroduced in the Winter of 2020 and into 2021, the long-term effect of boredom on veterans' wellbeing, identity, purpose and fulfilment remains to be seen [3].

Whilst CMD levels in our veteran group has not risen from pre-pandemic levels, there are still a significant minority of veterans that may need mental health treatment and support. Due to the nature of COVID-19 lockdowns and restrictions in the UK, the National Health Service and charitable providers should particularly focus on the benefits of telemedicine for veterans into the future [16, 44, 45]. Our study demonstrates an impact of the pandemic on veteran families increasing their stress, relationship/caring difficulties and responsibilities. There has been success in the US promoting parenting skills for veteran families under COVID-19 pressures [46], while in the UK, resources created by King's College London and partners offer practical support for families ('Families Under Pressure') which could be utilised by veteran groups [47]. As with the general population, innovative ways are needed to tackle loneliness and improve social networks and support during the pandemic, particularly focused on those with mental health needs [48, 49].

The study strengths include recruitment from a cohort whose previous mental health status is known, rapid roll-out, and use of validated measures for mental health and wellbeing outcomes aligned with our previous study and other UK general population studies' measures. Study limitations include recruitment from a specific veteran cohort serving during the Iraq/Afghanistan era and therefore we cannot comment on the experiences of veterans outside of this era. Only a minority of veterans in this sample were newly transitioned to civilian life and therefore this study may not capture the experiences of those who have recently left service, some of whom may be negatively impacted by this pressure point [50]. There were only a small number of younger 'other ranks' in this sample who may be more likely to experience financial issues [51] and therefore the extent of negative associations between COVID-19 stressors and outcomes may not be fully represented. The study identified that responders were less likely to have reported alcohol misuse

before the pandemic and therefore the direction of alcohol use of non-responders is unknown which may underestimate reductions in alcohol use during the pandemic. Whilst we were able to identify similar trends in women veterans for CMD and drinking compared to male veterans in this sample, the number of women in the sample was insufficient to robustly examine associations of COVID-19 stressors and outcomes. Whilst the study captures data from veterans regarding their family experiences, such as relationship, childcare and caring pressures, the study was not able to collect data from veterans' partners/spouses and children themselves. The study is limited by the majority of responses arising from veterans living in England and limited to the context of the pandemic in the UK, June-September 2020.

CONCLUSIONS

Our study suggests a COVID-19 impact on veterans' mental health, alcohol use and loneliness, particularly for those experiencing difficulties with family or social relationships. Veterans experienced the pandemic in similar ways to the general population and in some cases may have responded in resilient ways. Whilst stable levels of CMD and reduction in alcohol use are positive, there remains a group of veterans that may need mental health and alcohol treatment services. There is a need to continue to follow up the health and wellbeing of this veteran group to assess developments longer term over the pandemic.

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Competing Interests

SW is Honorary Civilian Consultant Advisor in Psychiatry for the British Army (unpaid). S.W. is affiliated to the National Institute for Health Research Health Protection Research Unit (NIHR HPRU) in Emergency Preparedness and Response at King's College London in partnership with Public Health England, in collaboration with the University of East Anglia and Newcastle University.

NTF is a trustee (unpaid) of The Warrior Programme, an independent advisor to the Independent Group Advising on the Release of Data (IGARD), a member of Independent Scientific Pandemic Insights Group on Behaviours (SPI-B) and their salary is part grant funded by the MoD.

DM is a trustee of the Forces in Mind Trust (unpaid) and is employed as the Head of Research for Combat Stress, a UK Veterans Mental Health Charity.

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Authors' Contributions

MLS, DS, MJ, HB, DP, LH, DP, DM, SW, NTF were involved in the original concept and design of the study. NTF and SW have overseen the conduct of all aspects of the study. MLS led on the formulation of the questionnaire and associated measures, with substantial contributions from all authors in shaping the final questionnaire. DP led on online survey design, format and flow. DS led on the ethics submission with substantial contributions from all authors. MJ, HB and LH led on the design of participant materials including the participant invite and information sheet with input from all authors. MJ led on the data analysis plan and conducted the data analysis with input from all authors. MLS and DS led the writing of the research paper, with drafting and revision input from all authors. MLS, DS, MJ, HB, DP, LH, DP, DM, SW, NTF have all seen and approved the final version of this paper and accept accountability for all aspects of the work. SW and NTF secured the funding from OVA for this work.

Data Sharing Statement

Data will be processed in accordance with the General Data Protection Regulation (GDPR) and the Data Protection Act 2018. We will not make any record-level data publicly accessible because we need to protect the confidentiality and security of the individual cohort members. You are welcome to contact us with proposals for collaborative research, which the investigators will consider on a case-by-case basis, and which will only occur as part of a legal collaborative agreement and after the collaborator has put in place the relevant research ethics, data protection, and data access approvals.

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Supplemental Information

Table 1 - Comparison of social and military demographic characteristics of responders and non-responders. Column percentages. N = 3547

	Responder N = 1562	Non responder N = 1985	OR (95%CI)	AOR (95% CI)*
Sex				
male	1,383(88.54%)	1,794(90.38%)	1.00	1.00
female	179(11.46%)	191(9.62%)	1.22 (0.98-1.51)	1.51 (1.21-1.90)
Age band				
25-34	46(2.94%)	190(9.57%)	0.31 (0.22-0.44)	0.34 (0.23-0.49)
35-44	272(17.41%)	552(27.81%)	0.63 (0.53-0.76)	0.63 (0.52-0.77)
45-54	554(35.47%)	710(35.77%)	1.00	1.00
55-64	514(32.91%)	444(22.37%)	1.48 (1.25-1.76)	1.51 (1.27-1.79)
65 and over	176(11.27%)	89(4.48%)	2.53 (1.92-3.35)	2.56 (1.91-3.43)
Rank				
Officer	478(30.60%)	462(23.27%)	1.31 (1.12-1.53)	1.02 (0.85-1.22)
NCO	954(61.08%)	1,209(60.91%)	1.00	1.00
Other rank	130(8.32%)	314(15.82)	0.52 (0.42-0.66)	0.92 (0.71-1.19)
Service				
Royal Navy	290(18.57%)	393(19.80%)	1.02 (0.85-1.21)	0.88 (0.74-1.06)
Army	873(55.89%)	1,201(60.50%)	1.00	1.00
RAF	399(25.54%)	391(19.70%)	1.40 (1.19-1.65)	1.18 (0.99-1.40)
Education level				
No qualifications/O-levels/GCSEs	385(24.65%)	577(29.10%)	0.72 (0.61-0.85)	0.83 (0.69-1.00)
A-level	506(32.39%)	682(34.39%)	0.80 (0.69 0.94)	0.93 (0.78-1.10)
Degree	671(42.96%)	724(36.51%)	1.00	1.00
Relationship status				
In a relationship	1,337(86.82%)	1,679(86.24%)	1.00	1.00
Single	90(5.84%)	145(7.45%)	0.78 (0.59-1.02)	1.03 (0.77-1.37)
Ex-relationship	113(7.34%)	123(6.32%)	1.15 (0.88-1.50)	1.06 (0.80-1.39)

*adjusted for sex, age, education, service and rank

Table 2 – Association between CMD, Hazardous alcohol consumption and Loneliness and COVID19 experiences and stressors

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Had or have COVID-19					
No	866 (53.80%)	1.00	1.00	1.00	1.00
Yes (definitely/probably)	226 (14.83%)	1.55 (1.08-2.22)	1.49 (1.02-2.16)	0.80 (0.55-1.16)	0.68 (0.45-1.05)
Don't know	470 (31.37%)	1.06 (0.79-1.43)	1.03 (0.76-1.40)	0.78 (0.58-1.05)	0.70 (0.50-0.98)
Had to isolate					
No	1310 (83.51%)	1.00	1.00	1.00	
Yes	249 (16.49%)	1.33 (0.96-1.85)	1.24 (0.88-1.74)	0.89 (0.63-1.26)	0.69 (0.47-1.02)
Know someone who died from COVID-19					
No	1276 (81.52%)	1.00		1.00	
Yes	286 (18.48%)	1.76 (1.29-2.40)	1.73 (1.26-2.38))	0.95 (0.68-1.33)	0.97 (0.66-1.43)
Change in employment					
no change or furlough	1425 (91.60%)	1.00		1.00	
change for worse	134 (8.40%)	3.14 (2.15-4.60)	3.07 (2.03-4.65)	1.26 (0.82-1.93)	1.04 (0.64-1.71)
Key Worker					
Not a key worker	880 (53.72%)	1.42 (1.06-1.89)	1.43 (1.06-1.93)	1.09 (0.81-1.45)	0.87 (0.63-1.22)
Key worker – Health and social care	131 (8.79%)	1.40 (0.85-2.31)	1.33 (0.77-2.30)	0.81 (0.47-1.38)	0.70 (0.40-1.21)
Key workers - All other roles	543 (37.48%)	1.00		1.00	1.00
Who usually live with					
Live alone	170 (11.04%)	2.11 (1.07-4.16)	1.82 (0.91-3.66)	1.56 (0.82-2.96)	1.81 (0.88-3.71)
Live with spouse/partner	1328 (84.55%)	1.00	1.00	1.00	1.00
Live with others	59 (4.41%)	1.59 (0.55-4.60)	1.40 (0.51-3.86)	0.95 (0.35-2.59)	1.11 (0.36-3.45)
Children					
Have no children	357 (24.50%)	1.00	1.00	1.00	1.00
Have children but not responsible for	666 (36.04%)	1.14 (0.78-1.67)	1.09 (0.74-1.59)	0.93 (0.64-1.36)	1.05 (0.68-1.62)

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Responsible for one child under 18 years old	214 (15.23%)	0.87 (0.53-1.41)	0.88 (0.54-1.46)	0.92 (0.59-1.44)	1.08 (0.64-1.82)
Responsible for two or more children under 18 years of age	320 (24.23%)	1.56 (1.03-2.37)	1.62 (1.07-2.47)	0.87 (0.57-1.33)	1.18 (0.72-1.94)
Changed childcare arrangements					
No	243 (52.40%)	1.00	1.00	1.00	
Yes	214 (47.60%)	2.31 (1.47-3.64)	2.24 (1.41-3.54)	1.15 (0.73-1.84)	1.11 (0.65-1.90)
Impact of changed childcare arrangements					
Positive impact	33 (14.08%)	0.60 (0.21-1.67)	0.72 (0.26-1.98)	1.16 (0.45-3.00)	0.99 (0.30-3.26)
Negative impact	94 (44.73%)	1.96 (0.99-3.89)	1.91 (0.94-3.88)	1.39 (0.68-2.85)	1.27 (0.56-2.87)
Neutral impact	87 (41.19%)	1.00	1.00	1.00	1.00
Usual caring responsibilities (pre pandemic)					
No	1361 (87.55%)	1.00	1.00	1.00	
yes	195 (12.45%)	1.74 (1.20-2.53)	1.73 (1.19-2.51)	0.79 (0.52-1.21)	0.90 (0.55-1.48)
Extra or new caring responsibilities during pandemic					
No	1285 (82.10%)	1.00		1.00	
yes	271 (17.90%)	1.77 (1.29-2.43)	1.77 (1.27-2.48)	1.01 (0.71-1.42)	1.07 (0.71-1.60)
Financial problems					
No	1379 (86.96%)	1.00	1.00	1.00	
yes	183 (13.04%)	2.93 (2.06-4.15)	2.67 (1.89-3.78)	1.04 (0.69-1.57)	0.96 (0.59-1.58)
Had difficulty accessing enough food					
No	1533 (97.9%)	1.00	1.00	1.00	1.00
Yes	29 (2.09%)	3.10 (1.35-7.16)	2.27 (0.91-5.67	1.64 (0.70-3.82)	1.28 (0.51-3.21)
Had difficulty accessing medication					

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
No	1490 (94.86%)	1.00	1.00	1.00	1.00
Yes	72 (5.14%)	2.32 (1.34-4.02)	1.57 (0.89-2.76-)	1.01 (0.52-1.95)	0.82 (0.36-1.86)
Had difficulty with health					
No	1374 (87.49%)	1.00	1.00	1.00	1.00
Yes	188 (12.51%)	6.94 (4.91-9.83)	5.47 (3.83-7.81)	1.73 (1.19-2.51)	1.67 (1.07-2.61)
Had somebody close in hospital					
No	1460 (93.24%)	1.00	1.00	1.00	1.00
Yes	102 (6.76%)	2.40 (1.51-3.81)	2.50 (1.54-4.05)	1.25 (0.76-2.07)	1.10 (0.60-2.01)
Lost somebody close					
No	1489 (94.90%)	1.00		1.00	1.00
Yes	73 (5.10%)	1.85 (1.06-3.22)	1.55 (0.86-2.79)	0.63 (0.32-1.26)	0.51 (0.22-1.17)
Had to change delay or major plan					
No	1198 (76.26%)	1.00	1.00	1.00	1.00
Yes	364 (23.74%)	2.50 (1.89-3.32)	2.27 (1.69-3.06)	1.16 (0.85-1.57)	0.97 (0.68-1.38)
Difficulties with family/other social relationships					
No	1284 (80.53%)	1.00	1.00	1.00	1.00
Yes	278 (19.47%)	5.29 (3.85-7.27)	4.64 (3.33-6.46)	1.70 (1.22-2.36)	1.56 (1.05-2.30)
Difficulties with internet access					
No	1455 (92.95%)	1.00	1.00	1.00	1.00
Yes	107 (7.05%)	1.84 (1.17-2.88)	1.88 (1.18-3.00)	1.06 (0.65-1.72)	1.31 (0.75-2.26)
Work difficulties					
No	1293 (81.03%)	1.00	1.00	1.00	1.00

	N (%)	Common Mental Disorders (AOR 95% CI) * N = 376 (25.97%)	Common Mental Disorders (AOR 95% CI) ** N = 376 (25.97%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI) * N = 367 (27.82%)	Hazardous drinking (AUDIT ≥8) (AOR 95% CI)** N = 367 (27.82%)
Yes	269 (18.97%)	4.12 (3.01-5.65)	3.68 (2.64-5.14)	1.39 (1.00-1.94)	1.40 (0.94-2.09)
Difficulties with pets					
No	1522 (97.46%)	1.00	1.00	1.00	1.00
Yes	40 (2.54%)	2.79 (1.44-5.41)	2.52 (1.25-5.06)	0.90 (0.40-2.05)	0.88 (0.36-2.17)
Boredom					
No	1210 (75.06%)	1.00	1.00	1.00	1.00
Yes	352 (24.94%)	2.88 (2.15-3.85)	2.69 (1.98-3.65-)	1.75 (1.28-2.39)	1.55 (1.09-2.20)

* Adjusted for sex, age, education, marital status, rank, service

** Adjusted for sex, age, education, marital status, rank, service and phase 3 GHQ or AUDIT-8 as appropriate

STROBE Statement—Checklist of items that should be included in reports of ***cohort studies***

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract (*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	1-2
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	3
Objectives	3	State specific objectives, including any prespecified hypotheses	3
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4-5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up (*b*) For matched studies, give matching criteria and number of exposed and unexposed	4-5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4-5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	4-5
Bias	9	Describe any efforts to address potential sources of bias	5
Study size	10	Explain how the study size was arrived at	4
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	5
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding (*b*) Describe any methods used to examine subgroups and interactions (*c*) Explain how missing data were addressed (*d*) If applicable, explain how loss to follow-up was addressed (*e*) Describe any sensitivity analyses	5
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram	5
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) Summarise follow-up time (eg, average and total amount)	5-6
Outcome data	15*	Report numbers of outcome events or summary measures over time	6-7

Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (*b*) Report category boundaries when continuous variables were categorized (*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	6-10
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	10
Discussion			
Key results	18	Summarise key results with reference to study objectives	11
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	11-12
Generalisability	21	Discuss the generalisability (external validity) of the study results	13
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	14

*Give information separately for exposed and unexposed groups.

Note: An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at http://www.plosmedicine.org/, Annals of Internal Medicine at http://www.annals.org/, and Epidemiology at http://www.epidem.com/). Information on the STROBE Initiative is available at http://www.strobe-statement.org.