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# Factors associated with poor self-reported health within the UK military and comparisons with the general population: a cohort study

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## Summary

**Objective:** To investigate the self-rated health of the UK military and explore factors associated with poor self-rated health. Compare self-rated health of the military to the general population.

**Design:** A cohort study.

**Participants:** A total of 7626 serving and ex-serving UK military personnel, aged between 25 and 49; 19,452,300 civilians from England and Wales.

**Setting:** United Kingdom (military), England and Wales (civilians).

**Main outcome measures:** Self rated health for both populations. Additional data for the military sample included measures of symptoms of common mental disorder (General Health Questionnaire-12), probable post-traumatic stress disorder (post-traumatic stress disorder checklist Civilian Version), alcohol use (Alcohol Use Disorders Identification Test), smoking behaviour, history of self-harm and body mass index.

**Results:** In the military sample, poor self-rated health was significantly associated with: common mental disorders and post-traumatic stress disorder symptomology, a history of self-harm, being obese, older age (ages 35–49) and current smoking status. However, the majority of military personnel report good health, with levels of poor self-rated health (13%) not significantly different to those reported by the general population (12.1%).

**Conclusions:** Self-rated health appears to relate to aspects of both physical and psychological health. The link between poor self-rated health and psychological ill-health emphasises the need for military support services to continue addressing mental health problems.

## Keywords

self-reported health, military, well-being, mental health, post-traumatic stress disorder

population. Given poor self-reported health has been related to higher health needs after deployment,<sup>2</sup> a greater understanding of the self-reported health of the UK military can be used to ensure adequate healthcare provisions are in place. Therefore, the aim of the current study was to assess the self-reported health of the UK military, identify factors associated with poor self-reported health in the military and compare it to the general population.

## Methods

### Study population

*King's Centre for Military Health Research Cohort study.* Data used in this study were collected as part of the follow-up phase ( $n = 9990$ ; 56% response rate) of a longitudinal cohort study of the UK Armed Forces.<sup>3</sup> Data were collected using self-report questionnaires. Only those aged between 25 and 49 years with self-reported health data ( $n = 7626$ , 76.3% of the overall respondents) were used. The study received ethical approval from King's Hospital Ethics Committee and the Ministry of Defence Research Ethics Committee.

*2011 Census for England and Wales.* The general population self-reported health data come from the 2011 Census<sup>4</sup> (94% response rate), which collects socio-demographic and health information about the population via a questionnaire. Data from the Northern Ireland and Scotland Census were not included in the general population data, as this could not be accessed at the time of the study.

## Measures

Participants were asked to provide a rating of their general health using a five-point scale; response options were combined to make a binary variable

## Introduction

Few studies have explored self-reported health in active, 'healthy' military populations<sup>1</sup>; indeed little is known about the self-reported health of UK military personnel and how this compares to the general

(good/poor) health. Response options differed slightly between questionnaires, so were combined accordingly: King's Centre for Military Health Research questionnaire (excellent/very good/good = 'good', fair/poor = 'poor') and the Census (very good/good = 'good', fair/bad/very bad = 'poor').

Additional data were available for the military sample.<sup>3</sup> Symptoms of common mental disorder were measured with the General Health Questionnaire-12,<sup>5</sup> probable post-traumatic stress disorder with the post-traumatic stress disorder checklist Civilian Version<sup>6</sup> and alcohol use with the Alcohol Use Disorders Identification Test.<sup>7</sup> Binary variables were created for analyses, with caseness defined according to the following cutoffs:  $\geq 4$  on the General Health Questionnaire-12,  $\geq 50$  on the post-traumatic stress disorder checklist-C and  $\geq 20$  on the Alcohol Use Disorders Identification Test (suggestive of alcohol dependence). Due to co-morbidity between General Health Questionnaire and post-traumatic stress disorder checklist caseness, they were combined into one variable with three categories: 'Neither', 'General Health Questionnaire or post-traumatic stress disorder checklist-C caseness' or 'General Health Questionnaire and post-traumatic stress disorder checklist-C caseness'. Smoking and history of self-harm data were also included. Self-reported height and weight were used to calculate body mass index (weight in kg/height in m<sup>2</sup>).

### Data analysis

Percentages of good/poor health are presented in Table 1. Initial analyses used Pearson's chi-square test ( $\chi^2$ ) to test associations between self-reported health and sex in the general population data, as well for comparison with the military.

For the military sample, univariable logistic regressions were undertaken to examine the association between self-reported health and a range of socio-demographic, military and health factors. Variables which were statistically significant ( $p < 0.05$ ) were then included in the multivariable logistic regression. Odds ratios, adjusted odds ratios, 95% confidence intervals and  $p$  values are presented and were calculated to estimate associations between the abovementioned variables and poor self-reported health (Table 1).

Analysis was performed to examine if there were significant differences in responses between responders and non-responders. Responders were more likely to be older, female, an officer and engaged as a regular.<sup>3</sup>

All analyses were performed using STATA, v11.0. Sample weights were used to adjust for sampling

design and response weights used to account for non-response in the military sample.<sup>3</sup>

### Results

The military sample ( $n = 7626$ ) was predominantly male (89.3%), in regular Service (90.5%), in the Army (63.6%) and currently serving (74.0%). The majority had not deployed to Iraq/Afghanistan (53.6%). A minority of the sample (5.1%) reached caseness levels ( $\geq 20$ ) on the Alcohol Use Disorders Identification Test, 16.8% reached caseness on either the General Health Questionnaire or the post-traumatic stress disorder checklist-C and 3.5% reached caseness levels on both.

In the military sample, 6725 (87.0%) reported excellent ( $n = 1352$ ), very good ( $n = 3063$ ) or good health ( $n = 2310$ ), with 901 (13.0%) reporting fair ( $n = 750$ ) or poor ( $n = 151$ ) health. In the multivariable model, poor self-reported health (as a binary variable) was statistically significantly associated with: age (being older), a history of self-harm, General Health Questionnaire/post-traumatic stress disorder checklist-C caseness, current smoking and body mass index (being overweight or obese) (Table 1). Rank (officer) and being a reserve were significantly associated with better self-reported health.

In the general population sample, 17,089,231 (87.9%) reported either very good ( $n = 9,630,087$ ) or good health ( $n = 7,459,144$ ), with 12.1% (2,363,069) reporting fair ( $n = 1,700,461$ ), bad ( $n = 518,448$ ) or very bad health ( $n = 144,160$ ). There were no statistically significant differences between poor self-reported health in the military and the general population; either overall or by gender ( $p > 0.05$ ) (Table available upon request from the authors).

### Discussion

This study showed the majority of military personnel report good health, with levels of poor self-reported health not significantly different to those of the general population. In the military sample, poor self-reported health was significantly associated with: common mental disorder, post-traumatic stress disorder symptomology, a history of self-harm, being obese, older age (ages 35–49) and current smoking.

Smoking, being overweight and self-harm are known as negative health behaviours and could reduce perceptions of good health if included in participants' self-reported health assessments, a pattern reflected in our data. Similarly, a lack of psychological well-being, i.e. psychological ill-health, could also be used as a cue for poor health, supported by the relationship between screening positive on the

**Table 1.** Self-reported health of military sample (ages 25–49 years).

Variable	Excellent/good/very good n (%)	Fair/poor health n (%)	OR	95% CI	p	AOR	95% CI	p
Total (7626)	6725 (87.0)	901 (13.0)						
Age (years)								
25–34	3253 (89.1)	344 (10.9)	1			1		
35–49	3472 (85.2)	557 (14.8)	1.41	1.19–1.67	<0.01	1.46	1.13–1.88	<0.01
Gender								
Male	5909 (87.0)	788 (13.0)	1					
Female	816 (86.9)	113 (13.1)	1.01	0.79–1.29	0.95			
Marital status <sup>b</sup>								
Relationship	5367 (87.2)	679 (12.8)	1					
Single/Ex-relationship <sup>a</sup>	1333 (85.7)	217 (14.3)	1.14	0.93–1.38	0.20			
Education attainment <sup>b</sup>								
A-Level or above	3989 (88.9)	443 (11.1)	1			1		
O-Level or below	2451 (85.1)	401 (14.9)	1.40	1.18–1.66	<0.01	1.12	0.88–1.42	0.36
Service								
Naval services	1014 (87.0)	147 (13.0)	0.94	0.75–1.17		0.82	0.60–1.11	
Army	4301 (86.2)	609 (13.8)	1					
RAF	1410 (89.4)	145 (10.6)	0.74	0.60–0.93	0.03	0.75	0.56–1.00	0.10
Rank								
NCO	4056 (85.1)	650 (14.9)	1			1		
Officer	1691 (93.7)	115 (6.3)	0.38	0.30–0.49		0.56	0.41–0.77	
Other rank	978 (86.5)	136 (13.5)	0.89	0.70–1.13	<0.01	0.96	0.64–1.44	<0.01

(continued)

Table 1. Continued.

Variable	Excellent/good/very good n (%)	Fair/poor health n (%)	OR	95% CI	p	AOR	95% CI	p
Engagement type								
Regular	5610 (86.6)	773 (13.4)	1			1		
Reserve	1115 (90.3)	128 (9.7)	0.70	0.55–0.89	<0.01	0.53	0.36–0.79	<0.01
Serving status <sup>b</sup>								
Serving	5266 (88.7)	605 (11.3)	1			1		
Left	1447 (82.1)	293 (17.9)	1.70	1.43–2.02	<0.01	1.13	0.87–1.48	0.35
Deployed theatre								
No deployment	3311 (86.0)	506 (14.0)	1			1		
Iraq/Afghanistan	3414 (88.1)	395 (11.9)	0.83	0.71–0.98	0.03	0.87	0.68–1.11	0.27
Role in parent unit <sup>b</sup>								
Combat	1459 (86.7)	201 (13.3)	1.02	0.83–1.24				
Combat support	822 (88.3)	92 (11.7)	0.87	0.67–1.14				
Combat service support	4375 (86.9)	599 (13.1)	1			0.58		
Ever harmed self <sup>b</sup>								
No	6007 (88.8)	678 (11.2)	1			1		
Yes	90 (62.3)	49 (37.7)	4.80	3.15–7.31	<0.01	3.21	1.73–5.94	<0.01
GHQ/post-traumatic stress disorder checklist-C case <sup>b</sup>								
Neither	5597 (91.5)	454 (8.5)	1			1		
GHQ or post-traumatic stress disorder checklist	942 (73.6)	316 (26.4)	3.85	3.19–4.65		3.87	3.02–4.95	
GHQ and post-traumatic stress disorder checklist	126 (50.5)	118 (49.5)	10.53	7.68–14.44	<0.01	8.43	5.35–13.24	<0.01

(continued)

**Table 1.** Continued.

Variable	Excellent/good/very good n (%)	Fair/poor health n (%)	OR	95% CI	p	AOR	95% CI	p
AUDIT (20 case) <sup>b</sup>								
No	6367 (87.5)	812 (12.5)	1			1		
Yes	295 (77.3)	80 (22.7)	2.05	1.51–2.79	<0.01	1.00	0.65–1.56	0.99
Smoking <sup>b</sup>								
Non-smoker	5257 (88.2)	624 (11.8)	1			1		
Smoker	1434 (82.8)	274 (17.2)	1.56	1.30–1.87	<0.01	1.31	1.02–1.68	0.04
body mass index <sup>b</sup>								
<25	1885 (92.1)	163 (7.9)	1			1		
25–29 (overweight)	2602 (87.3)	347 (12.7)	1.70	1.35–2.14		1.59	1.21–2.09	
<30 (obese)	764 (74.8)	242 (25.2)	3.93	3.06–5.05	<0.01	3.55	2.60–4.84	<0.01

Percentages are weighted and numbers are unweighted. Percentages may not add up to 100% due to rounding. OR = odds ratio; AOR = adjusted odds ratio; CI = confidence interval; RAF = Royal Air Force; NCO = non-commissioned officer; GHQ = General Health Questionnaire; post-traumatic stress disorder checklist = post-traumatic stress disorder checklist; body mass index = body mass index; AUDIT = Alcohol Use Disorders Identification Test.

<sup>a</sup>Includes single, separated, divorced, widowed.

<sup>b</sup>Missing data: marital status (n = 30), educational attainment (n = 342), serving status (n = 15), role in parent unit (n = 78), self-harm (n = 802), GHQ/post-traumatic stress disorder checklist-C case (n = 73), AUDIT (n = 72), smoking (n = 37) and body mass index (n = 1623).

General Health Questionnaire and post-traumatic stress disorder checklist-C and poor self-reported health in our study. Given the relation between poor self-reported health and higher health needs after deployment,<sup>2</sup> it is suggested that military support services should continue to address these mental health problems, highlighting the value of initiatives such as decompression<sup>8</sup> and Trauma Risk Management (TRiM).<sup>9</sup> Our results also support the continued use of awareness campaigns within the military such as 'Don't Bottle it Up' and emphasise the need to continue co-working with external services such as 'Big White Wall'.<sup>10</sup>

Other referents used to evaluate health such as comparison with other people, and physical and functional aspects of health,<sup>11,12</sup> could explain some of our other findings. Being in good health for Service personnel may be understood as physical fitness,<sup>1</sup> potentially explaining why reservists reported better health. Reservists spend more time working alongside civilians. Upon comparing themselves to their civilian counterparts, they may have considered themselves to be more physically fit and thus in good health – a comparison heightened by the healthy worker effect.<sup>13</sup> Using physical and functional aspects of health as referents could also explain why older participants were more likely to report poor health, given physical health declines with age.

It is possible that there could have been some elements of bias in the reporting of health within the military population – participants may have been inclined to report themselves as healthier in order to continue serving. However, participants were made aware that it was a voluntary decision to take part as well as being informed their responses would be anonymous and not shared outside of the research team. The independence of the research group to the Ministry of Defence was also emphasised.

Given the association between Alcohol Use Disorders Identification Test scores of  $\geq 20$  and functional impairment, and other psychiatric co-morbidities,<sup>14</sup> it is surprising that we did not find an association with poorer self-reported health. It is possible, despite the health implications, that alcohol misuse (even at harmful levels) is not seen negatively but rather as an inherent part of UK military culture and a way of increasing social cohesion.<sup>15</sup> If so, participants may not have factored hazardous levels of alcohol use into their assessment of health, especially if they felt physically fit and able to fulfil the duties of their role.

### Strengths and limitations

The cross-sectional nature of the study meant that causality cannot be determined. The response options

to the health question differed between the military and civilian populations. It is likely that there was some cross-over between samples, though this would have been minimal given the large civilian sample. However, this study included a large representative sample of military personnel which included reservists and those who had left service.

### Conclusion

Levels of poor self-reported health in the UK military are relatively low, and it is reassuring to find that they do not differ statistically compared to the general population. This study showed that poor self-reported health was associated with being older, being obese, current smoking, history of self-harm and screening positive on the General Health Questionnaire or post-traumatic stress disorder checklist-C. Self-reported health appears to relate to aspects of both physical and psychological health, thus the measure could serve as a useful tool for both assessing health and targeting military support services to specific sub-populations.

### Declarations

**Competing interests:** None declared.

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**Ethics approval:** Ethical approval was granted from King's Hospital Ethics Committee and the Ministry of Defence Research Ethics Committee.

**Guarantor:** NTF.

**Contributorship:** SJ was involved with developing the analytical strategy for this paper, undertook the data analyses presented here and wrote the paper. SS assisted with data analyses. SS and NTF were both involved with the design, developing the analytical strategy and commented extensively on this paper.

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