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Physical and mental health of ethnic minority service personnel in the UK Armed Forces: a retrospective pooled cross-sectional analysis

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ABSTRACT

Objectives To assess physical and mental symptoms by ethnicity of a UK Armed Forces cohort.

Design A retrospective, pooled cross-sectional analysis.

Setting Self-report questionnaire collected between 2004–2023.

Participants Three samples of UK Armed Forces, including a Gurkha (n=254), Fijian (n=112) and a heterogeneous sample of British ethnic minority personnel (n=178) were compared with a sample of white British participants (n=254).

Main exposure measure Physical and mental health symptoms were measured using individual items from the Patient Health Questionnaire, Post-traumatic Stress Checklist (Post-Traumatic Stress Disorder Checklist—Civilian Version) and General Health Questionnaire (GHQ-12) drawn from four phases of cohort data. Ethnic samples were matched by military role and veteran or active service status.

Results Based on their first assessment, 60 white British participants (24.2%) met GHQ criteria for common mental disorder, significantly higher than found for the other three groups (χ^2 (3, n=782)=25.03, p<0.001). Across all measures, Gurkha participants were the least symptomatic, though Gurkha and Fijian participants reported more symptoms of post-traumatic stress. British samples reported more somatic reports. Different patterns of post-traumatic and somatic symptoms may be explained by differential levels of traumatic exposures, recruitment profiles and culturally nuanced expressions of distress.

Conclusions Patterns of mental and physical symptoms warrant further investigation to inform prevention, more precise diagnosis and tailored care and treatment for specific ethnic groups.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This study explores retrospective cohort data across 19 years for different ethnic groups serving in the UK Armed Forces.
⇒ Data was collected using the Patient Health Questionnaire-15, Post-Traumatic Stress Disorder Checklist—Civilian Version and the General Health Questionnaire, which are widely used and validated across cultures and countries.
⇒ Samples were matched to the Gurkha group by military role and the percentage of active-duty or veteran personnel.
⇒ Small non-random population samples may not generalise to wider populations.
⇒ Participation rates across groups at all four data collection points suggest that ethnicity did not bias findings.

INTRODUCTION

The UK Armed Forces have a longstanding policy of recruiting overseas in times of shortage, particularly from Commonwealth countries (including Fiji) and Nepal. Overseas recruitment is rooted in a British Imperial notion of using so-called 'martial races' to protect its possessions and to supplement its armed forces during both World Wars.[1 2] For many service personnel, this has become an established tradition. As of April 2024, 15 310 regular service personnel (11.2%) were from ethnic minorities, of whom 40.8% did not have a UK passport.[3] Gurkha and Commonwealth troops have been extensively deployed on overseas operations, largely as frontline, combat troops. They have served in Bosnia, Iraq, Afghanistan and Sierra Leone, sometimes completing multiple tours of duty, thereby encountering severe or enduring stressors. In addition, research has highlighted other challenges, including discriminatory policies and practices during their military careers, delays or barriers to career progression, separation from families in their home countries, difficulties bringing family members to the UK and obstacles to residency and obtaining UK citizenship.[4 5] Although Commonwealth and Gurkha personnel were given the indefinite right to remain in the UK in 2004, this requires 4 years' service[6] and Gurkha personnel have experienced various

inequalities relating to pension entitlements, rates of pay and rank.[7]

Research into military populations exposed to trauma has found significant differences in symptom patterns between groups or between different conflicts. A study of British Army veterans based on random samples of participants receiving war disability pension identified three distinct clusters of symptoms which arose in different proportions across two World Wars and in recent conflicts.[8] Equally, a study of reported symptoms from the US Civil War to the 1991 Gulf conflict found that though some symptoms were common to most wars, variation occurred in the proportion of symptoms that were somatic to psychological.[9] Research on British veterans from a single conflict exposed to the same stressor identified four unique subgroups based on enduring symptoms.[10] A series of studies has analysed self-report symptoms of UK service personnel and veterans deployed to Iraq and Afghanistan to identify mental health and conflict differences.[11 12] Hence, symptom patterns have proven to be an important investigative tool to explore patterns of distress in the armed forces.

Although there is much study of the impact of ethnic inequalities on mental and physical illness in civilian populations,[13 14] there has been limited research into how ethnicity influences symptoms in the UK Armed Forces. This investigation sought to assess whether physical and mental symptoms differ across ethnicity samples of the King's military cohort study, including a Gurkha sample; a Fijian sample (representing the largest Commonwealth cohort recruited by the UK military); a sample of British ethnic minorities personnel and a white British sample.

METHODS

Study setting

A secondary data analysis was conducted using data from the longitudinal King's military study which tracked the health and well-being of UK military personnel from the Iraq War in 2003 to the present day. The cohort has followed-up the health and well-being of current and former military personnel over a 19-year period and consists of four phases (phase 1, 2004–6[15]; phase 2, 2007–9[16]; phase 3, 2014–16[12]; phase 4, 2022–23).[17] Information relating to this retrospective cross-sectional analysis drawn from the cohort data, and levels of participation, can be found in S1 of the online supplemental materials.

Variable measurements

Questionnaires were administered at each phase. Participants were asked about their military characteristics (rank, regular/reserve status and deployment information during phases 1–3, including combat experiences, post-deployment transition and life after leaving the military); mental and physical health symptoms (using a series of validated measures) and other psychosocial outcomes, such as relationship status, smoking and alcohol use. Three unvalidated symptoms were included (joint pain, ringing in the ears and double/blurred vision) because they are not included in the validated scales but are likely to affect military populations.[18 19] Previous publications have described the response rates for each study, along with detail on the studies' procedures.[12 15 16] Mental health has not previously predicted participation in the cohort study, apart from where alcohol misuse at phase 2 predicted non-response at phase 3.[16] Informed consent was obtained for paper surveys through a written, signed process included in the postal pack and for online questionnaires was recorded electronically through the Qualtrics platform.

Data sources and population

The study included samples of participants who took part at any of the four phases of the cohort study. Four ethnicity samples were created using any available self-reported nationality and ethnicity information from UK Defence Statistics:

1. A Gurkha sample (n=254) defined by records of a Nepalese nationality.
2. A Fijian sample (n=112) defined by records of a Fijian nationality.
3. A heterogeneous sample of British ethnic minority participants (n=178). This sample included participants with a 'British' nationality and ethnicities such as 'any Chinese background', 'Asian Bangladeshi', 'Asian Indian', 'Asian Pakistani', 'Black African', 'Black Caribbean', 'Mixed Asian and White', 'Mixed Black African and White', 'Mixed Black Caribbean and White', 'other Asian background', 'other Black background', 'other Ethnic background' or 'other mixed ethnic background'. This sample may include both participants who were born in Britain and those who were not born in Britain who later applied for British citizenship. Participants with a Fijian or Nepalese nationality recorded at any point were not included in this sample. In the analysis, the specific ethnic categories were aggregated into heterogeneous groups since the sample sizes within each subgroup were small and an inferential statistical analysis would not have been viable.
4. A comparator sample of white British participants (n=254): participants were included if records indicated a 'British Nationality', 'Scottish', 'Welsh', 'Northern Irish' and 'English' and who had a 'White background'.

All samples were defined using the main characteristics of the Gurkha sample since this was the largest ethnic minority group of those we aimed to investigate (male, regulars, Army personnel and non-officers). The white British sample was subsampled from a larger white British cohort with these characteristics (n=6013) and the sample size was restricted to 254 to match the size of the Gurkha sample. To ensure the white British and Gurkha samples were from similar military backgrounds, we stratified samples by their reported role in a parent unit across the cohort questionnaires. Random samples of the white British group were then drawn from these categories: combat (43.7%), engineering (3.9%), logistics (16.5%),

communications (14.2%) and a mixture of service, administration and welfare support (21.7%).

We ensured the samples had a similar percentage of serving and ex-serving personnel (identified by their most recent serving status) to account for a potential veteran effect. Studies have shown that ex-serving personnel have worse health outcomes than those serving in the armed forces.[12 13] Logistic regression models performed on our data confirmed that those who had left the military were more likely to report physical and mental health symptoms (analysis available on request). In total, 99.1% of Fijian participants were serving and 94.7% of Gurkhas were serving at the last phase at which they participated. The percentage of serving soldiers for the white British sample was matched to the 94.7% of the Gurkha sample (94.7%). In addition, we used random sampling to ensure that the percentage of serving British ethnic minority personnel was similar to the other groups (92.1%).

A χ^2 test was performed to explore whether ethnic groups were associated with different rates of participation and therefore introduced a possible bias to findings (table 1). The caseness and median scores (table 2) may be affected by a bias in that more participants were white British at phase 1. However, the findings are supported by our investigations of individual symptoms (online supplemental tables S4-9 of the Supplemental materials).

Outcome and independent variables

Physical and mental health symptoms were derived from the Patient Health Questionnaire (PHQ-15), which includes a range of somatic symptoms; the General Health Questionnaire (GHQ-12) which measures symptoms of general distress[20] Post-Traumatic Stress Disorder (PTSD) Checklist—Civilian Version (PCL-C), which measures probable post-traumatic stress[21] and we included some other unvalidated physical symptoms.

To maximise statistical power, we followed an approach that calculated a lifetime occurrence of each symptom within the observational window of 2004–2023. Accordingly, we focused on whether participants had ever reported any of the individual symptoms over the four phases of the cohort study (if participants reported experiencing any of the symptoms over the four phases, they were counted as a 'yes'). This increased the sample size we could use in the analysis and facilitated an exploratory approach to determine potential differences in the specific symptoms reported. However, this approach means causal or temporal interpretations cannot be made. Section S3 of the Supplemental materials describes the variables used in this analysis. Online supplemental Table S4, S5, and S6 report missing data on each symptom included in this analysis.

Statistical analysis

All analyses were conducted using Stata V.18. First, we investigated possible response bias in the subsamples of the present analysis (results are summarised in the Supplemental materials, online supplemental S2).

Table 1 Number and percentage of participants who took part at each stage of the cohort study

	Gurkha sample (n=254)	Fijian sample (n=112)	British ethnic minorities sample (n=178)	White British sample (n=254)
Phase 1	146	61	77	153
	57.48	54.46	43.26	60.24
Phase 2	147	74	105	142
	57.87	66.07	58.99	55.91
Phase 3	101	33	70	94
	39.76	29.46	39.33	37.01
Phase 4	14	<10	13	25
	5.51	–	7.30	9.84

Note: online supplemental Table S1, S2 and S3 provide further detail on phase participation and ethnicity.

Second, χ^2 tests were performed to describe and determine potential differences in the demographic, military and deployment characteristics of each ethnicity sample. Following this, we derived a total score on the PCL-C and GHQ-12 from participants' first assessment. This was to obtain a proxy summary measure to compare levels across the ethnicity samples using the full validated scale (table 2). The median scores and IQRs for GHQ-12 and PCL-C for each ethnicity sample were compared, as well as caseness on GHQ-12 (determined by a cut-off >4) and PCL-C (determined by a cut-off >50). This was not performed for PHQ-15 because not all items of the PHQ-15 were asked at each phase. Total scores provide an overview of the levels of severity of mental health symptoms across the different ethnic groups. For greater detail, we conducted χ^2 tests to compare the reporting of all physical and mental health symptoms across the measures by ethnicity status (online supplemental Table S4-6) and, using logistic regressions, examined associations between physical and mental health symptoms and ethnicity status (online supplemental Tables S8-9).

To consider potential confounders, we ran logistic regressions to assess associations of ethnicity with age, rank, deployment status (yes/no), serving status

Table 2 Caseness based on General Health Questionnaire scores based on participants' first assessment by ethnicity sample (cut-off >4)

	Gurkha sample (N=254)	Fijian sample (N=112)	British ethnic minorities sample (N=178)	White British sample (N=254)	χ^2 (df)
N	20	16	35	60	25.03 (3) p<0.001
%	(8.06)	(14.41)	(20.00)	(24.19)	
Means	0.98	1.25	1.89	2.14	
SD	2.05	2.41	2.79	2.89	
Median	0	0	1	1	
IQR	(0–1)	(0–1)	(0–3)	(0–3)	

(currently serving/have left) and whether participants had follow-up data (single data points/multiple data points). Factors were determined as associated when CIs did not span the null value of 1.0. All factors were associated with many of the symptoms and were therefore accounted for in adjusted analyses.

We re-ran the logistic regression analysis after re-randomising samples (eg, for the white British comparator group and those in the ex-serving British ethnic minorities sample). This was to determine whether the associations remained the same or attenuated when the composition of the reference group changed. 18 symptoms became associated or were no longer associated but, in many of these cases, the lower/upper limit of the CI was already approximate to the null value and the ORs found in the original and repeated analysis were within the CIs of each analysis. Differences that were more pronounced are noted in S4 of the Supplemental materials.

Patient and public involvement

Patients and/or the public were not involved in the study design or conduct of the research. However, the research was part of a wider project that included a patient and public involvement and engagement group of eight Gurkha and Fijian service personnel, community leaders, veterans and family members who advised on research topics, political and cultural sensitivities and the dissemination of results. They are included in our plans to make the findings available to a wider audience.

RESULTS

Demographic, military and deployment characteristics of the ethnicity samples

Table 3 details a comparison of the samples' characteristics. Compared with other samples, the Gurkhas had the youngest population with the highest proportion of 18–29 years old recruits (72.1%). Although 65.4% reported having multiple adverse experiences (>1) in childhood, this was the lowest level of all four groups. The two British samples held higher ranks (non-commissioned officers) than the Gurkha and Fijian samples (67.2% of the white British sample and 70.5% of the ethnic minorities sample compared with 53.6% of the Gurkha and 42.3% of the Fijian samples), possibly reflecting the barriers to promotion reported by many ethnic minority soldiers.[4 5] More Fijian personnel had been deployed compared with other samples (82.7%) and comparatively fewer Gurkha personnel had been deployed (68.7%). Of those deployed, similar percentages of the samples were deployed in combat roles and had believed they were in danger of injury or death on deployment (84.8% of the Fijian sample and 90.4% of the Gurkha sample). The two British samples reported the highest number of childhood adversities (36.2% of white British participants and 25.8% of the British ethnic minority participants compared with 4.7% of Gurkha and 13.4% of Fijian participants reported experiencing >6 adversities).

Based on their first reported assessment, low numbers meeting the thresholds for probable PTSD suggested that differences between ethnic groups were not marked, but the small sample sizes prevented statistical comparison (table 2). By contrast, more participants within the white British sample reported common mental disorders (based on the GHQ12) than in the three ethnic minority groups (table 4).

The most commonly reported symptoms among ethnicity samples

This analysis showed differences in which symptoms were most common across the ethnicity samples in the form of heat maps (figures 1–3). A scale was employed that reflects the minimum to the maximum percentages observed in our dataset. χ^2 tests were performed to determine the group's differences across all symptoms. Differences in the percentages of participants who reported 15 physical and neuropsychiatric symptoms are shown in figure 1.

General distress and symptoms of common mental disorders (GHQ-12) were the least common for all samples but were reported more frequently by both British samples. Somatic symptoms showed a more uneven picture, with headaches, back pain and joint issues being among the most common, yet double/blurred vision, rapid heartbeat and shortness of breath were relatively rare. Posttraumatic stress symptoms were more frequently and more uniformly endorsed across all samples than other symptoms.

Comparing the ethnicity groups, the Gurkha sample was generally less symptomatic (eg, the highest endorsed item being 47.4% for feeling upset when reminded of a stressful experience from the PCL-C; while the highest endorsed symptom for the white British group was 56.9% for trouble sleeping from the PHQ-15). The British samples reported more somatic symptoms compared with the Gurkha and Fijian samples overall, with the white British sample reporting the highest number of somatic symptoms. Symptoms relating to PTSD were among the most common symptoms in the Fijian sample, and for some symptoms, the Gurkha sample compared with British samples.

Associations between ethnicity status and physical and mental health symptoms

Results of the logistic regression models (including ORs and 95% CIs) are outlined in online supplemental Tables S7 – S9 in the Supplemental Materials. The following results report the significant associations from adjusted analyses (determined by the 95% CI not spanning the null value).

The white British sample generally reported worse physical and mental health than the other ethnicity samples.

The British ethnic minorities sample was no different in reported somatic symptoms but was less likely to endorse some mental health symptoms (four items across the GHQ and PCL-C).

Table 3 Demographic, military and deployment characteristics of the four samples

	Total n=798 (100%)	Gurkha sample n=254 (31.8%)	Fijian sample n=112 (14.0%)	British ethnic minorities sample n=178 (22.3%)	White British sample n=254 (31.8%)	Pearson's χ^2	P value
Age at first entry into the cohort						15.4897	0.001***
18–29 years old	522	183	75	96	86		
	(65.4)	(72.1)	(67.0)	(53.9)	(33.9)		
30 years old+	276	71	37	82	168		
	(34.6)	(28.0)	(33.0)	(46.1)	(66.1)		
Rank at first entry into the cohort						31.3122	<0.001***
Enlisted	472	115	61	52	83		
	(60.3)	(46.4)	(57.6)	(29.6)	(32.8)		
NCO	311	133	45	124	170		
	(39.7)	(53.6)	(42.3)	(70.5)	(67.2)		
Childhood adversity						93.7389	<0.001***
0–1	212	88	35	47	42		
	(26.6)	(34.7)	(31.3)	(26.4)	(16.5)		
2–3	247	100	33	51	63		
	(31.0)	(39.4)	(29.5)	(28.7)	(24.8)		
4–5	174	54	29	34	57		
	(21.8)	(21.3)	(25.9)	(19.1)	(22.4)		
6 or more	165	12	15	46	92		
	(20.7)	(4.7)	(13.4)	(25.8)	(36.2)		
Ever deployed to Iraq/Afghanistan						10.6854	0.014*
Yes	590	167	91	138	194		
	(75.7)	(68.7)	(82.7)	(78.9)	(77.3)		
Role on deployment in Iraq/Afghanistan						7.6542	0.054
Combat	256	73	41	47	95		
	(42.5)	(41.2)	(44.6)	(33.8)	(48.7)		
Combat support or combat service support	256	104	51	92	100		
	(42.5)	(58.8)	(55.4)	(66.2)	(51.3)		
Ever perceived threat of injury/death on an Iraq/Afghanistan deployment						3.5194	0.741
Yes	533	160	78	122	173		
	(88.5)	(90.4)	(84.8)	(88.5)	(88.7)		

Comparison of total scores from the GHQ-12 and PCL-C.
GHQ, General Health Questionnaire; PCL-C, PTSD Checklist—Civilian Version; PTSD, post-traumatic stress disorder.

As found in the prior analysis, the Gurkha sample was less likely to report several somatic symptoms (including joint issues, rapid heartbeat, shortness of breath, bowel changes, nausea/gas/indigestion, tiredness and having low energy, trouble sleeping and forgetfulness); symptoms of distress and common mental disorders (GHQ) and probable post-traumatic stress (PCL-C).

Table 4 Caseness according to PTSD Checklist—Civilian Version scores based on participants' first assessment by ethnicity sample (cut-off >50)

	Gurkha sample (N=254)	Fijian sample (N=112)	British ethnic minorities sample (N=178)	White British sample (N=254)	χ^2 (df)
N	<10	<10	<10	19	11.06 (3) p=0.011
%	–	–	–	(7.66%)	
Means	22.74	26.07	25.14	26.40	
SD	8.17	13.43	10.61	12.28	
Median	19	20	21	22	
IQR	(17–25)	(17–30)	(17–29)	(17–30)	

PTSD, post-traumatic stress disorder.

There was a nuanced picture of symptom reporting in the Fijian participants. For example, they were less likely to report some somatic symptoms (nausea, gas or indigestion, bowel changes, trouble sleeping, forgetfulness) and some symptoms relating to distress or common mental disorders but were more likely to report dizziness and double/blurred vision and some symptoms of post-traumatic stress (three items of the PCL-C).

DISCUSSION

This retrospective, pooled cross-sectional analysis suggests differences in the reported physical and mental health symptoms of different ethnic groups within a UK Armed Forces cohort. These remained after adjusting for other potentially explanatory factors like age, deployment status, rank and serving status.

The symptom profiles are not generalisable to the general population of the groups from which the samples were drawn, due to the study's small sample sizes. However, this study found symptom presentation differed by ethnicity; this warrants further research, alongside the exposures that are relative to different ethnic groups in the UK Armed Forces.

Although the small sample sizes preclude definitive statements about causation, some observations can be made about health profiles by ethnicity. Overall, white British personnel in our study reported worse physical and mental ill health than other samples and greater physical symptom reporting. This adds to literature challenging the erroneous assumptions that non-Western populations are more disposed to somatising distress.[22]

The potential hypotheses for these findings include (1) the histories and practices of recruiting non-UK personnel, (2) differences in life-stressors including childhood adversity and discrimination relating to ethnicity and (3) patterns of reporting symptoms. First, the report of better physical health by Gurkha and Fijian participants could be explained by the rigorous recruitment practices relating to non-UK serving personnel. Each year, for example, around 200 applicants are accepted for the Gurkhas from 20 000 shortlisted for a series of tests of strength and endurance. Gurkhas traditionally came

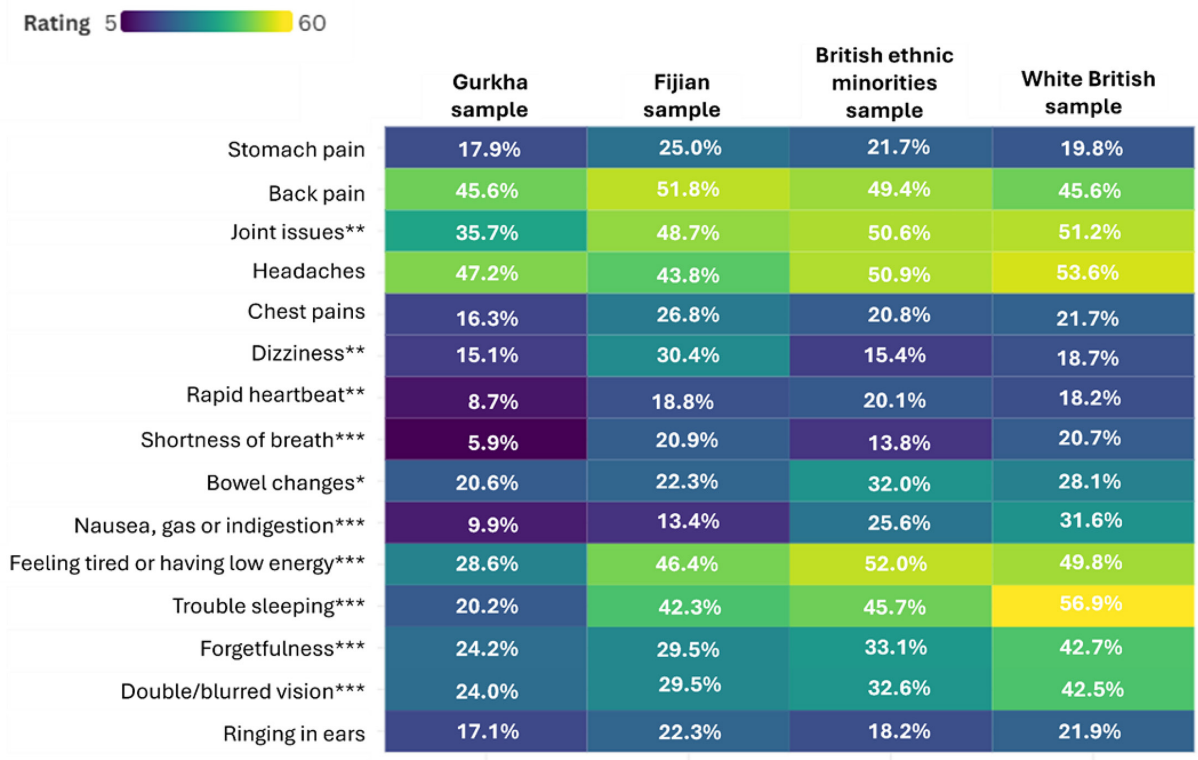

Figure 1 Heat map of somatic symptoms across the samples. Note: percentages reflect non-missing data. Missing data were minimal within these analyses (online supplemental Table S3) *p<0.05, **p<0.01, ***p<0.001.

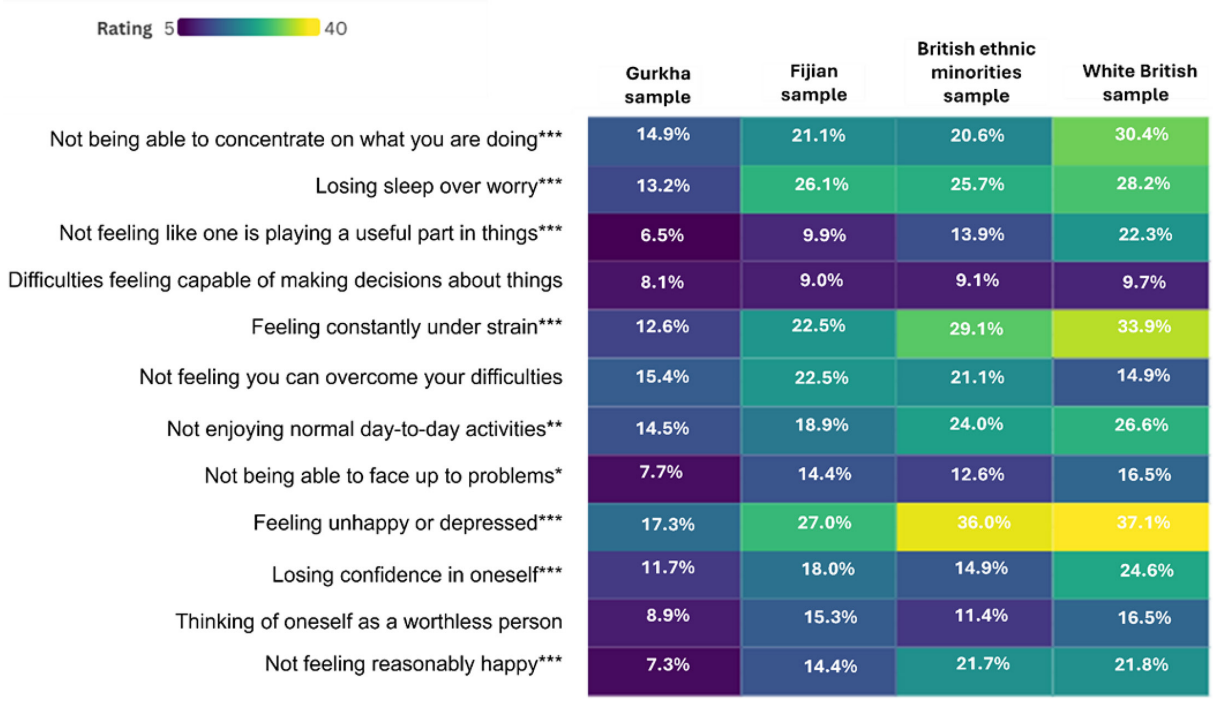

Figure 2 Heat map of General Health Questionnaire-12 items across the samples. Note: percentages reflect non-missing data. Missing data were minimal within these analyses (online supplemental Table S4) *p<0.05, **p<0.01, ***<0.001.

from the hill districts of Nepal, which arguably prepared them for the rigours of campaigning. Fijian recruits are often recruited into infantry regiments where physical strength is valued. Because they are often given tasks that require great exertion, it is also hypothesised that their reported levels of back pain and joint issues had been elevated by this managerial practice.

In terms of mental health, all samples reported signs of general distress and common mental disorders. Symptom profiles for Gurkha and Fijian samples were characterised more by PTSD symptoms (figure 2). While the prevalence of distress/common mental disorders (as measured by the GHQ-12) is usually more common than PTSD in both military and non-military adult populations,[12 23] this

Figure 3 Heat map of Post-Traumatic Stress Disorder Checklist—Civilian Version items across the samples. Note: percentages reflect non-missing data. Missing data were minimal within these analyses (online supplemental Table S5) *p<0.05, **p<0.01, ***p<0.001.

was not the case for our samples. Since most of those in our analysis were still serving in the Army and many had deployments over the study's time period, it is possible that their repeated deployments to Iraq and Afghanistan were associated with serial traumatic stressors. Overall, there were few differences in deployment characteristics (in terms of role and combat exposure) across the samples. However, the white British sample reported greater childhood adverse experiences, potentially influencing the generally worse health outcomes we found in this sample. Some studies have found that recruitment to the infantry in the UK is associated with socio-economic deprivation and childhood adversity.[24 25] Indeed, experiencing multiple childhood adversities is a major risk factor for a host of health concerns.[26] For the Gurkha, Fijian and British ethnic minorities personnel, discrimination and racism may also play a role in indicators of somatic and psychological ill-health. In 1996, the Office of Public Management revealed endemic racism in the UK Armed Forces and though much has been done to address discrimination, it cannot be assumed to be eradicated.[27] In part, therefore, the trauma expressed by the Gurkha, Fijian and UK ethnic minority participants may reflect past or enduring discrimination. Indeed, results of our qualitative study suggest this is the case.[28] In the current context, it is likely that a combination of deployment exposures, patterns of career management and preselection characteristics could determine the differences observed in this analysis.

It is important to note that differences in symptom presentations could also relate to (1) language barriers which may inform participants' understanding or interpretation of the cohort questionnaire (written in English), and (2) cultural differences in the phenomenology and emotional expression and somatic experiences.[29] For instance, studies based in Nepal and the Pacific Islands have indicated that some somatic/psychological experiences (including numbness and tingling, social shame, 'mental torture' and soul/spirit loss) may not map directly onto Euro-American paradigms of health.[30–32] The PCL-C and GHQ have undergone cross-cultural validation in Nepalese but not Fijian samples specifically, suggesting that these measures show some sensitivity for detecting 'probable' disorder.[33–35] As we explored individual items, it is not known how the conceptual relevance and phrasing of individual items may affect participants' comprehension and, subsequently, their responses.

A third hypothesis is that different symptom patterns could be due to the cultural and social patterning of stigma surrounding mental illness.[36–38] For example, people from collectivistic societies may express more social desirability bias in their self-disclosures.[39] Given the barriers to career development reported by ethnic minorities serving in the armed forces,[4 5] the need to report competence and good health may be amplified. This is consistent with qualitative research relating to Gurkha and Fijian veterans, which indicated that they were hesitant to report difficulties or experiences of discrimination because of a heritage of military achievements, a history deficient in channels for reporting and an enduring sense of not being heard.[28]

Logistic regression analysis showed that the British ethnic minorities sample demonstrated the fewest differences compared with the white British sample. Greene suggested that British ethnic minorities personnel may have a greater sense of agency in making choices within the military compared with Gurkha or Fijian personnel, but were dissatisfied with how diversity issues were managed and reported evidence of racism within the Army.[40] While studies of 'non-UK personnel' have grown, research on British ethnic minorities serving in UK Armed Forces is limited; more attention is needed to understand the experience of this cohort.

Limitations

Overall, the study adds to a small but growing body of work seeking to address the potential disparities and needs of different ethnicities within the UK Armed Forces. Limitations of the study include the lack of representative samples, and that the cohort study was not designed to answer specific questions about ethnicity status. This limits the generalisability of the results. Further research using larger samples is necessary to determine whether distinctive symptom patterns (such as the nuanced picture of Fijian participants) exist and may suggest that treatment and management of such symptoms should be adapted. The small sample sizes led to some variation in the associations found when repeating the logistic regression analysis using re-randomised ethnicity samples (such as the white British sample). Although similar patterns were broadly found, the exact symptoms may vary depending on idiosyncrasies within the samples. The analysis of the most commonly reported symptoms and associations between ethnicity status and all symptoms relied on a variable that collapsed repeated measures from four phases into a single variable. This was undertaken to enhance statistical power. The construction of a single variable comprised of different time points of data means that we have not accounted for temporality in this analysis and therefore no temporal interpretations can be made. We considered potential bias from our sampling patterns and levels of phase participation for each ethnic group (online supplemental S2 and S3 of the Supplemental Materials). Although there was some variation in the symptoms associated, the effect sizes and CIs were largely stable for the majority of symptoms investigated. It is therefore unlikely that variation has a substantial impact on the results.

The variable used to identify participants' nationality did not necessarily reflect place of birth. As a result, the British ethnic minorities sample may include individuals who had obtained British citizenship at some point during their participation in the cohort questionnaire. Since this process usually occurs after discharge from the armed forces, this is unlikely to affect many participants. The composite group of various British ethnic minority groups was created to maximise the sample size and the

statistical power of the analysis. However, we recognise the diversity within this category and that there will be a variety of experiences affecting British ethnic minority groups. Our analysis further indicated that there were variations in the childhood adversities reported by the samples; analysis that can ascertain how symptoms relate to specific (combinations of) adversities in early life and in military service in the specific ethnic groups would be beneficial.

CONCLUSIONS

Overall, the samples included in this study showed that white British participants generally reported worse health on all outcomes than other ethnicity samples. However, variations in the pattern of PTSD and somatic symptoms suggest nuanced differences in symptom presentation relating to ethnicity. It is hypothesised that such differences may relate to a variation in practices relating to enlistment, recruitment and career management; differential exposures to traumatic experiences and discrimination and how distress is expressed/reported according to cultural differences. While deployment intensity and duration have been shown to be a key risk factor for military PTSD, the pre-service experiences of the Gurkha, Fijian, white British and UK ethnic minority recruits are noticeably different, and it is hypothesised that these may serve as both risk and protective factors. In addition, the influence of discrimination on health relating to ethnicity for Gurkha, Fijian and British ethnic minorities personnel may also influence an expression of somatic or psychological symptoms.

Our findings underline the responsibility of the Ministry of Defence (MoD) to create a safe and inclusive working environment without different terms and conditions and to ensure the implementation of fair and inclusive policies. In 2018, the Defence Diversity and Inclusion Strategy (2018–2030) described the MoD's commitment to develop a more inclusive working culture. The strategy acknowledged actions already taken to improve the institution's practices of diversity and inclusion, but did not outline any specific actions relating to ethnic minorities groups within the UK Armed Forces, including Commonwealth or foreign personnel.[41] Although the MoD has addressed severe examples of discriminatory practices dating back to an imperial past, these issues may continue to influence mental health and well-being of the groups in this study. Since we could not measure the effects of discrimination and racism on these groups (as this was not asked in the cohort questionnaires), further work is necessary to determine the nature of discrimination and its effects for ethnic minority groups. It remains unclear whether changing policies around diversity and inclusion have resulted in tangible cultural changes.

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