Exploring Indices of Multiple Deprivation within a Sample of Veterans Seeking Help for Mental Health Difficulties Residing in England

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Abstract

Background: The interaction between experiencing multiple deprivation and mental illness has been established for non-veteran populations. Less is known for UK veterans.

Methods: Data was extracted from the Department of Communities and Local Government on indices of multiple deprivations (IMD) and from a third sector mental health charity for veterans in the UK. Data linkage was then performed between 1,967 veterans residing in England who had attended a clinical mental health service and measures of multiple deprivations. IMD was explored within this sample of helping-seeking veterans. Analysis of demographic factors was conducted to explore whether sub-groups were at a higher risk of deprivation.

Results: Evidence suggested that veterans who seek support for mental health difficulties experience greater levels of deprivation than the English general public. Forty one percent of the sample resided in locations ranked to be within the three most deprived deciles in England compared to 21% residing in the three least deprived deciles. Taking longer to seek help was associated with a greater risk of deprivation. As were being single, male, in receipt of a war pension and at a younger age. Analysis of the seven sub-domains used to calculate the IMD suggested that veterans are at more risk of deprivation for measures related to their personal circumstances rather than associated with the neighbourhood they reside within.

Conclusions: Help-seeking veterans appear to be at an increased risk of experiencing multiple deprivations. Results from this suggest how care could be targeted effectively to those in higher risk groups.

KeyWords: Veteran; ex-service personnel; social exclusion; deprivation; mental health; military

Introduction

Research has focused on the prevalence and severity of mental health in UK veteran populations and the challenges this can present [1-3]. However, less is known about challenges posed by the context which veterans may live within. A review of the literature suggested that to date, there have been no large-scale studies exploring these issues. Understanding the system around veterans who are experiencing mental illness may present opportunities to intervene beyond the confines of mental health support. Researchers have discussed the importance of considering deprivation as a multi-dimensional issue that encompasses quality of life and availability of resources across a range of measures [4]. The UK government collects data on deprivation across a range of domains (ex: income, health, housing quality, availability of services) associated with geographic areas that can then be combined to define multiple deprivations. This measure of multiple deprivations has been labelled the index of multiple deprivations (IMD) and has been used to understand the distribution of social inequalities associated with a neighbourhood and can be used to allocate resources.

In the UK, a veteran is defined as an individual who has completed one day of military service [5]. It is estimated that there is roughly a 10% turnover of the UK Armed Forces each year. This equates to approximately 12,000 to 16,000 individuals leaving the service each year and becoming veterans [6]. It has been estimated that there are approximately 2.7 million veterans living in England [7]. Recent epidemiological surveys of UK military populations suggest that the prevalence rate of common mental health difficulties is around 20% [8]. Taken together with the information above, this implies there may be significant numbers of veterans who are potentially suffering from mental illnesses.

Within this context, there could be a number of reasons why understanding multiple deprivation is important for help-seeking veterans. In samples not restricted to veterans, evidence suggests an association between social and economic adversity and poorer mental health [9-11]. However, the causality of this relationship is difficult to interpret. One suggestion to account for this association is that those experiencing mental health difficulties may be more dependent on collective resources for support, and in their absence, symptoms are exacerbated [12]. To date, there has been less work within UK veteran populations. One study exploring this population employed a cross-sectional sample of UK veterans not restricted to those with mental health difficulties. The study reported no evidence of higher than expected levels of social exclusion [13,14]. However, when the sample was restricted to only those with mental health difficulties, an association was found between mental illness and social exclusion [13]. This finding suggests a link between mental health difficulties in veterans and greater deprivation. Similarly, associations have been found between higher socio-economic status and educational achievement and lower incidence of mental health difficulties in members of the military [8,15-17].

Exploring issues related to IMD may elucidate potential barriers to engaging with clinical services. For example, low income may be associated with difficulty travelling to appointments, taking time off of work or child care costs. The availability of local services is covered within the measures of IMD and has implications for increased challenges for attending appointments or finding signposting to specialist support.

Understanding the implications of IMD for veterans seeking help for mental illness may have important implications for the allocation of resources, identifying whether particular sub-groups of veterans are at an increased risk of deprivation could allow for support to be targeted more efficiently to those in need. However, little is known about the experiences of multiple deprivations for veterans in England. In particular, those veterans who are experiencing mental health difficulties may be interacting with issues related to social deprivation. The current study explored the pattern of multiple deprivations in veterans seeking support for mental health difficulties. This was done by linking data between ratings of IMD to a sample of help-seeking veterans from across England who had accessed a clinical service for mental health support. Demographic variables were explored to look for sub-groups that may be at increased risks of deprivation on the IMD and the IMD sub-domains.

Method

Setting

The study sample was drawn from UK veterans seeking support from Combat Stress (CS). CS is a national charity and is the largest supplier of clinical mental health services dedicated to veterans in the UK. CS has seen a significant rise in the number of referrals to it over recent years with approximately 2,400 veterans seeking support in 2014 [18]. CS offers inpatient treatment at three treatment centres across the UK, outpatient psychological or psychiatric support and community-based support by nurses and occupational therapists. Employing a sample of veterans engaged with CS ensured that the study used a homogenous group of help-seeking veterans living across England who had been assessed and diagnosed as experiencing a mental illness. A recent audit of new referrals to CS reported that PTSD was the most common mental health difficulty reported followed by depression and anxiety [19].

Whilst CS is a national charity covering the UK, the sample was restricted to veterans residing in England only. This was because of differences in the construction of the measures of IMD between the different countries (England, Scotland, Wales and Northern Ireland) which limit comparisons. In addition, the latest releases of IMD data from the four countries in the UK were collected at different time points which may also affect comparability (from 2010 to 2015). The current study involved linking data connected to the IMD of the area an individual resides in as compiled by the UK government and anonymised demographic data collected routinely by CS.

Participants

Our sample was comprised of participants who had attended at least one clinical appointment between January 2015 and January 2016. An appointment was defined as the attendance of inpatient residential treatment, an outpatient psychology or psychiatric appointment or a community-based appointment. This ensured that the sample was restricted to only 'active' clients engaged with treatment over the data collection period, and excluded those veterans who may have been registered with CS but not actively receiving treatment.

Demographic variables

A number of variables were extracted from CS's electronic patient system on the 1st February 2016. These included the following information: postcode of residence, date of last appointment with CS, date

of first appointment with CS, date the individual left military service, sex, age, marital status and receipt of war pension. From these variables the following two were constructed; number of years post service (i.e. years between leaving military service and the 1st February 2016) and years between leaving military service and initial contact with CS. The latter of these variables was used as proxy measure for time to seek help.

Indices of multiple deprivations

The English IMD was released by the Department for Communities and Local Government in 2015 [20]. The IMD is linked to a geographical area. In England, the IMD is organised by 'lower-layer super output area' (LSOA). An LSOA has on average 1,500 residents and there are 32,844 across England. Each LSOA is associated with a number of postcodes. The IMD is an overall measure of deprivation by people living in the LSOA. The IMD consists of seven differently weighted sub-domains which account for varying proportions of the IMD score. In England, these include Income (22.5%), Employment (22.5%), Education, Skills and Training (13.5%), Health and Disability (13.5%), Crime (9.3%), Barriers to Housing and Services (9.3%) and Living Environment (9.3%). Each LSOA has three variables: IMD score, rank (where one is the most deprived) and decile (where one is most deprived). Deciles provided a method to compare IMD to the national average and rank to compare between individual LSOAs. Scores rank and deciles were also available for each of the seven sub-domains.

Data linkage

In the UK postcodes are used to identify small geographic areas. A postcode directory was sourced from the Office of National Statistics (ONS). The February 2016 edition of the ONS postcode database contained 2,573,419 postcodes from across the UK. Data linkage was performed between an individual's postcode and the LSOA associated with that postcode. In total 1,985 veterans residing in England were sampled. Of these, data linkage was possible for 1,967 individuals. Linkage was not possible for the remaining 18 individuals because of missing (or incomplete) postcode data.

Analysis

Descriptive statistics were produced to summarise the demographic variables and IMD deciles. The next stage of the analysis was to explore whether demographic variables were associated with better or worse ratings of IMD. Comparison was made between the demographics for participants and the wider English population. This was done by using T-Tests to compare the mean IMD decile for each demographic variable against the mid-decile of five areas from the overall population of England. As such, the mid-decile of five was used as the mean point of deprivation and compared against scores that were above or below five represented areas of England that were either more or less deprived than the mean level of deprivation. Following this, a comparison was made within the sample to assess whether demographic variables were associated with IMD rank. IMD ranks ranged from scores of 1 to 32,844. Univariate regression models were fitted between each demographic variable and IMD rank. These models were refitted and further adjusted for the other demographics (sex, age, marital status, receipt of war pension, years post service and years between leaving service and contacting CS). The above analyses were repeated for each of the seven sub-domains of IMD. All analyses were conducted using STATA 13.

Ethics

Ethical approval for this study was granted by the Combat Stress ethics committee.

Results

Descriptive analysis of the 1,967 participants demonstrated that their mean age was 47.3 years old (95% CI 46.7-47.6), had left service on average 17.6 years previously (95% CI 17.0-18.2) and they had taken on average 12.3 years (95% 11.8-12.9) after leaving the services to seek support from CS. Further demographic characteristics are described in table 1. The majority of the sample were male (97%), equal proportions reported either being in a relationship or being single and 40% were in receipt of a war pension.

The mean IMD decile was 4.7 (95% CI 4.6-4.9) which indicates that participants in this sample are ranked as slightly more deprived than expected from looking at the overall English general public whose mean IMD decile was 5.0. Figure 1 observed the distribution of IMD ranks across deciles and suggests that participant's IMD rankings were skewed towards the lower deciles. For example, 42% of the sample's IMD ranks placed them within the most deprived three deciles compared to 21% in the three least deprived deciles.

Table 1 explored comparisons between the mean decile that IMD rankings fell within for each demographic characteristic to the average decile of five for the English general public. Whilst limitations exist due to the modest sample size, help-seeking female veteran's ratings of IMD did not appear to differ to the general public. In contrast, help-seeking veteran males appeared to have worse IMD scores. Those under 30 or over 65 years old in the veteran sample did not differ but the 30 to 65 year olds appeared more deprived. For participants in relationships, those who had left service less than five years previously and first made contact with CS within five years of leaving the Armed Forces, the IMD rating did not differ from the mid-decile IMD for the English general public.

Demographic characteristics were further examined in table 2, which reported within-participant comparisons of IMD ranks by demographic characteristics. No differences were found between the IMD ranks of females and males. However, this may have resulted from limited power to detect a difference because of the modest number of females in the sample. After adjustment, for each 10 year increase in age, IMD ranks increased by 1,443 (higher rank indicated lower levels of deprivation). This suggested that older participants were less deprived than their younger peers. Those who were not in a relationship appeared to be at an increased risk of deprivation as they had significantly lower IMD ranks than those in relationships. Being in receipt of a war pension was associated with

a lower IMD rank and hence higher levels of deprivation. Increasing time between leaving the Armed Forces was associated with lower IMD ranking, indicating higher levels of deprivation (this was after adjustment for age). Finally, evidence emerged of a positive relationship between the longer it took participants to seek help from CS and being more deprived.

Tables 3 and 4 observed similar analyses to those reported in tables 1 and 2, this time stratified by the seven sub-domains of IMD. A general trend emerged, sub-domains that appeared more likely to be associated with an individual; income, employment, education and health (as reported in table 3a), had significantly higher levels of deprivation for each demographic sub-group than the average decile of five for the English general public. This was except for females and those in a relationship (excluding the education sub-domain). In contrast, sub-domains that

Demographic	N (%)	IMD Deciles	P-Value
Sex			
Female	55 (3)	5.2	0.64
Male	1912 (97)	4.7	<0.00*
Age			
<30	182 (9)	4.6	0.07
30-65	1607 (82)	4.7	<0.00*
65+	178 (9)	5.0	0.98
In a relationship			
Yes	989 (50)	5.1	0.15
No	978 (50)	4.3	<0.00*
War Pension			
No	1188 (60)	4.8	0.01*
Yes	779 (40)	4.7	<0.00*
Yrs post service			
<5	410 (21)	5.0	1.00
5-15	551 (28)	4.7	0.03*
15+	1006 (51)	4.6	<0.00*
Yrs to contact CS			
<5	712 (36)	5.0	0.70
5-15	558 (28)	4.7	<0.00*
15+	697 (36)	4.6	<0.00*

Table 1: Comparison between demographic IMD deciles and national IMD 5th deciles
Note: sample size n=1967. *=p ≤ 0.05. Higher deciles indicate less deprivation.
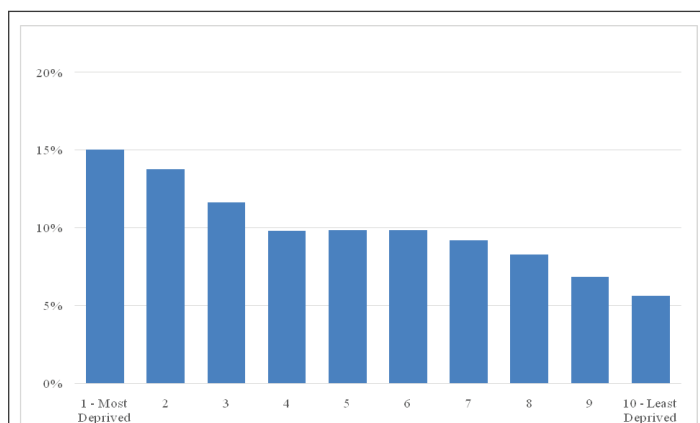
Figure 1: Distribution of help-seeking veterans across deciles of deprivation in England
Observed the distribution of IMD ranks across deciles and suggests that participants IMD rankings were skewed towards the lower deciles. For example, 42% of the sample's IMD ranks placed them within the most deprived three deciles compared to 21% in the three least deprived deciles.

Demographic	Unadjusted β β (95%CI)	Adjusted β[1] β (95% CI)
Sex		
Female	1.00	1.00
Male	-1526 (-4014, 962)	-2011 (-4462, 441)
Age		
Age in units of 10 yrs	231 (-83, 545)	1443 (857, 2028)*
In a relationship		
Yes	1.00	1.00
No	-2691 (-3503, -1879)*	-2417 (-3245, -1588)*
War Pension		
No	1.00	1.00
Yes	-391 (-1230, 448)	-1006 (-1953, -59)
Yrs post service		
Per 10 yr increase	-325 (-631, -18)*	-881 (-1671, -92)*
Yrs to contact with CS		
Per 10 yr increase	-417 (750, -84)*	-660 (-1326, -6)*

Table 2: Exploring associations between demographic factors and IMD rank
Note. *=p ≤ 0.05. Reductions in rank β less deprivation.
[1] Model adjusted for sex, age10, marital status, war pension, years post service, years between leaving service and contacting Combat Stress.

Demographic	Income[1] Dec. (p-value)	Employment[1] Dec. (p-value)	Education[1] Dec. (p-value)	Health[1] Dec. (p-value)
Sex				
Female	5.2 (0.59)	4.9 (0.81)	4.9 (0.68)	5.02 (0.96)
Male	4.7 (<0.001)*	4.7 (<0.001)*	4.6 (<0.001)*	4.7 (<0.001)*
Age				
<30	4.7 (0.14)	4.6 (0.06)	4.2 (<0.001)*	4.5 (0.02)*
30-65	4.7 (<0.001)*	4.7 (<0.001)*	4.6 (<0.001)*	4.7 (<0.001)*
65+	5.0 (0.96)	4.9 (0.66)	4.7 (0.16)	5.1 (0.71)
In a relationship				
Yes	5.1 (0.15)	5.0 (0.65)	4.8 (<0.001)*	5.1 (0.24)
No	4.4 (<0.001)*	4.3 (<0.001)*	4.4 (<0.001)*	4.3 (<0.001)*
War Pension				
No	4.8 (0.02)*	4.8 (0.01)*	4.6 (<0.001)*	4.8 (<0.001)*
Yes	4.7 (<0.001)*	4.5 (<0.001)*	4.5 (<0.001)*	4.6 (<0.001)*
Yrs post service				
<5	5.0 (0.81)	5.0 (0.77)	4.7 (0.06)	4.9 (0.71)
5-15	4.8 (0.15)	4.7 (0.01)*	4.6 (<0.001)*	4.7 (0.01)*
15+	4.6 (<0.001)*	4.5 (<0.001)*	4.5 (<0.001)*	4.6 (<0.001)*
Yrs contact CS				
<5	5.0 (0.82)	4.9 (0.56)	4.8 (0.01)*	4.9 (0.43)
5-15	4.7 (0.03)*	4.6 (<0.001)*	4.5 (<0.001)*	4.6 (<0.001)*
15+	4.5 (<0.001)*	4.5 (<0.001)*	4.4 (<0.001)*	4.5 (<0.001)*

Table 3a: Comparison between demographic IMD sub-domains deciles and national IMD 5th deciles: Income, Employment, Education and Health
*=p ≤ 0.05 [1]Higher deciles indicate less deprivation.

Demographic	Crime[1] Dec. (p-value)	Barriers[1] Dec. (p-value)	Environment[1] Dec. (p-value)
Sex			
Female	5.6 (0.14)	5.5 (0.13)	5.9 (<0.001)[1]
Male	5.4 (<0.001)[1]	5.6 (<0.001)[1]	5.5 (<0.001)[1]
Age			
<30	5.1 (0.78)	6.0 (<0.001)[1]	5.6 (<0.001)[1]
30-65	5.3 (<0.001)[1]	5.6 (<0.001)[1]	5.5 (<0.001)[1]
65+	5.8 (<0.001)[1]	5.3 (0.23)	5.7 (<0.001)[1]
In a relationship			
Yes	5.7 (<0.001)[1]	5.6 (<0.001)[1]	5.8 (<0.001)[1]
No	5.0 (0.89)	5.6 (<0.001)[1]	5.2 (0.02)*
War Pension			
No	5.3 (<0.001)[1]	5.7 (<0.001)[1]	5.4 (<0.001)[1]
Yes	5.4 (<0.001)[1]	5.4 (<0.001)[1]	5.7 (<0.001)[1]
Yrs post service			
<5	5.5 (<0.001)[1]	5.5 (<0.001)[1]	5.7 (<0.001)[1]
5-15	5.4 (<0.001)[1]	5.6 (<0.001)[1]	5.5 (<0.001)[1]
15+	5.3 (<0.001)[1]	5.6 (<0.001)[1]	5.4 (<0.001)[1]
Yrs contact with CS			
<5	5.4 (<0.001)[1]	5.7 (<0.001)[1]	5.7 (<0.001)[1]
5-15	5.4 (<0.001)[1]	5.4 (<0.001)[1]	5.4 (<0.001)[1]
15+	5.3 (<0.001)[1]	5.6 (<0.001)[1]	5.4 (<0.001)[1]

Table 3b: Comparison between demographic IMD sub-domains deciles and national IMD 5th deciles: Crime, Barriers to services and Living Environment
*=p ≤ 0.05 [1]Higher deciles indicate less deprivation

appeared to be associated more with the area that an individual resided in; crime, barriers to services and living environment, had lower levels of deprivation than the general public.

Tables 4a and 4b report associations between different sub-groups of the sample and IMD sub-domain ranks. Being younger and not being in a relationship (versus being in a relationship) were associated with higher levels of deprivation on six of the seven sub-domains and being in receipt of a war pension (versus no pension) on five of the seven domains. Associations between increasing numbers of years since leaving the Armed Forces and higher levels of deprivation were significant for the Income, Employment, Crime and Living Environment sub-domains. Of the seven sub-domains, only the health domain was associated with increasing number of years to seek help from CS and higher levels of deprivation. This suggests that those individuals who take longer to seek help are at an increased risk of health difficulties.

Discussion

Data presented in this study suggested that help-seeking veterans are at risk of residing in neighbourhoods in England with higher than average levels of multiple deprivations. When looking at the distribution of deprivation within the sample compared to the general population of England, this appeared to be skewed towards a greater number of participants being in the most deprived groups. Being male, single, younger, in receipt of a war pension, an increased time since leaving the Armed Forces and taking longer to seek help for difficulties were all associated with increased levels of multiple deprivation. Analysis of the IMD sub-domains indicated higher levels of deprivation in factors associated with the individual (income, employment, education and health) than those associated with the neighbourhood an individual resides in (crime, barriers to housing and services and living environment). This could imply that the deprivation that help-seeking veterans experience is related to their individual circumstances rather than wider systematic factors.

We observed an association between taking longer to seek support and higher levels of deprivation (and worse health on the sub-domain analysis). The causality of this relationship is unknown. On the one hand it could be that taking longer to seek help increases the risk of deprivation, whilst on the other, it could be that those living in more deprived areas face more challenges in engaging in support. A wealth of literature supports an adverse relationship between taking longer to seek help and worse mental health outcomes [21,22].

Being in receipt of a war pension was associated with increased levels of multiple deprivation and implies that war pensions are being allocated appropriately to those most in need. Men and those not in relationships were also observed to be at an increased risk of deprivation. A similar relationship has been reported between these variables and an increased risk of experiencing mental illness [8,23].

Implications

The findings from the current study suggest that overall there were modest differences in the average rating of deprivation for veterans residing in England who are seeking support for mental health difficulties compared to the wider English public. However, more detailed analysis of the population suggests a skew towards living in areas in England at most risk of multiple deprivation and that certain sub-groups are at a higher risk of experiencing multiple deprivation. For example, those individuals who are not in relationships were at higher risk. As such, when providing support to this client group it may be cost-effective to target support for groups at most risk. Furthermore, on a more systematic level, two of the risk factors; namely, increasing number of years since leaving the military and taking longer to seek help, provide evidence about the importance of supporting individuals during their post-service transition period to access support in a timely fashion.

Demographic	Income[1] β (95%CI)	Employment[1] β (95% CI)	Education[1] β (95% CI)	Health[1] β (95% CI)
Sex				
Female	1.00	1.00	1.00	1.00
Male	-1957 (-4399, 485)	-1207 (-3700, 1285)	-1208 (-3615, 1198)	-1476 (-3984, 1032)
Age				
Age in units of 10 yrs	137 (794, 1961)*	1380 (784, 1975)*	1374 (799, 1949)*	1311 (712, 1911)*
In a relationship				
Yes	1.00	1.00	1.00	1.00
No	-2225 (-3959, -1400)*	-2208 (-3051, -1366)*	-975 (-1788, -161)*	-2541 (-3390, -1694)*
War Pension				
No	1.00	1.00	1.00	1.00
Yes	-1100 (-2044, -156)*	-1398 (-2361, -435)*	-963 (-1893, -33)*	-1358 (-2327, -389)*
Yrs post service				
Per 10 yr increase	-883 (-1669, -96)*	-939 (-1741, -136)*	-685 (-1460, 91)	-501 (1309, 307)
Yrs to contact with CS				
Per 10 yr increase	-592 (-1255, 72)	-566 (-1244, 111)	-632 (-1286, 22)	-877 (-1558, -195)*

Table 4a: Exploring associations between demographic factors and IMD sub-domains ranks: Income, Employment, Education and Health
Note: *=p ≤ 0.05. [1]Model adjusted for sex, age10, marital status, war pension, yrs post service, yrs between leaving service and contacting Combat Stress.

Demographic	Crime[1] β (95% CI)	Barriers[1] β (95% CI)	Environment[1] β (95% CI)
Sex			
Female	1.00	1.00	1.00
Male	-1438 (-4015, 1139)	195 (-2299, 2689)	-1789 (-4325, 748)
Age			
Age in units of 10 yrs	1185 (569, 1801)*	-419 (-1015, 177)	638 (31, 1244)*
In a relationship			
Yes	1.00	1.00	1.00
No	-2205 (-3076,-1333)*	-434 (-1277, 409)	-1846 (-2703,-989)*
War Pension			
Yes	1.00	1.00	1.00
No	-9.7 (-1005, 986)	-961 (-1924, -3)	1049 (69,2029)*
Yrs post service			
Per 10 yr increase	-996 (-1826, -166)*	780 (-23, 1583)	-780 (-1596,-37)
Yrs to contact with CS			
Per 10 yr increase	-129 (-830, 571)	-477 (-1154, 201)	-163 (-852, 526)

Table 4b: Exploring associations between demographic factors and sub-domains ranks: Crime, Barriers to services and Living Environment.
Note. *=p ≤ 0.05. [1]Model adjusted for sex, age10, marital status, war pension, yrs post service, yrs between leaving service and contacting Combat Stress

Strengths and Limitations

The sample used in this study was the entire population of veterans who engaged with the national charity over a one year period and who had been assessed as experiencing mental health issues. The use of this homogenous sample increases the confidence in the generalisability of the findings reported. For example, there has been a focus on the experiences of Iraq and Afghanistan veterans [2] whilst research conducted within UK help-seekers demonstrated that veterans take significant periods of time to seek support and that the largest proportion of those seeking help each year are from earlier deployments such as to Northern Ireland or the Balkans conflict [18]. The use of data collected by the UK Government allowed comparisons between the study sample and the wider English population. Given the complexity of deprivation, the IMD allowed us to be confident in capturing the complex and multi-faceted nature of deprivation [4].

However, there are a number of limitations that need to be considered when interpreting this data. As mentioned above, the sample was drawn from a national charity and previous audits conducted exploring the presentations of new referrals to this charity suggest those seeking support have complex mental health and welfare needs [24]. As such, this may not be representative of those veterans with less complicated mental health presentations. In addition, being a charity may influence the profiles of which individuals access it. However, CS receives a substantial number of referrals each year and has been commissioned by the UK National Health Service to provide a national specialist treatment for veterans with PTSD which may go some way to limit this potential bias. The sample was restricted to only those veterans who reside in England because of differences between the construction of the IMD measure between Northern Ireland, Scotland, Wales and England which limits the general is ability of the observed findings to veterans living in these countries. Another consideration is that the sample was restricted to only those veterans who had been able to engage in clinical services. Whilst previous research has suggested that veterans are now seeking help more quickly than in the past, other work has indicated that only a fifth of UK military personnel with mental health difficulties seek support [18,25]. It could be that those who do not seek support are able to manage their symptoms themselves. Alternatively, it could also be that the opposite is true and that individuals who are in most need of support are those who are at increased risk of not being able to access services and they would be missing from the sample used for the current study. Another consideration is that the cross-sectional design of this study offers little information about the causality of why veterans appear to be at an increased risk of deprivation.

Conclusion

Whilst limitations exist, this is the first study of its kind in the UK to elucidate the deprivation experiences of veterans who are seeking support for mental health difficulties. Demographic factors were observed for increasing the risk of experiencing multiple deprivations for veterans with mental health difficulties who reside in England. This has implications for the targeting of support and early interventions for specific sub-groups. More work is needed to understand the causality of these associations and the relationships between deprivation and physical and mental health in this population.

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Significance for Public Health

- Little is known about the experiences of deprivation in veterans with mental health residing in England.
- This study links data exploring multiple deprivations collected by the UK government to a clinical population of veterans engaged with a national clinical mental health service in England.
- The results suggest that veterans with mental health difficulties are at increased risk of experiencing multiple deprivations.
- Taking longer to seek help was associated with higher levels of deprivation.
- This data suggest that veterans with mental health difficulties are a vulnerable population and need extra support to engage in help-seeking behaviours.

Author Contributions

Murphy D, Palmer E and Busuttil W were involved in the experimental design, data analysis and writing up.

Reference

1. Goodwin L, Wessely S, Hotopf M, Jones N, Greenberg N, et al. (2015) Are common mental disorders more prevalent in the UK serving military compared to the general working population. Psychol Med 45: 1881-1891.

2. Sundin J, Herrell R, Hoge C, Fear N, Adler A, et al.(2014) Mental health outcomes in US and UK military personnel returning from Iraq. Br J Psychiatry 204: 200-207.

3. Jones M, Sundin J, Goodwin L, Hull L, Fear N, et al. (2013) What explains post-traumatic stress disorder (PTSD) in UK service personnel: deployment or something else. Psychol Med 43: 1703-1712.

4. Townsend P (1987) Deprivation. Journal of Social Policy 16: 125-146.

5. Dandeker C, Wessely S, Iversen A, Ross J (2006) What's in a Name? Defining and Caring for ''Veterans'' : The United Kingdom in International Perspective. Armed Forces and Society 32: 161-177.

6. (2016) Ministry of Defence. UK Armed Forces Monthly Service Personnel Statistics. London.

7. Woodhead C, Sloggett A, Bray I, Bradbury J, McManus S, et al. (2009) An estimate of the veteran population in England: based on data from the 2007 Adult Psychiatric Morbidity Survey. Popul Trends 138: 50-54.

8. Fear NT, Jones M, Murphy D, Hull L, Iversen A, et al. (2010) What are the consequences of deployment to Iraq and Afghanistan on the mental health of the UK armed forces? A cohort study. Lancet 375: 1783-1797.

9. Power C, Stansfeld SA, Matthews S, Manor O, Hope S (2002) Childhood and adulthood risk factors for socio-economic differentials in psychological distress: evidence from the 1958 British birth cohort. Soc Sci Med 55: 1989-2004.

10. Stafford M, Marmot M (2003) Neighbourhood deprivation and health: does it affect us all equally. Int J Epidemiol 32: 357-366.

11. Fone D, Dunstan F, Williams G, Lloyd K, Palmer S. (2007) Places, people and mental health: a multilevel analysis of economic inactivity. Soc Sci Med 64: 633-645.

12. Barnett K, Mercer S, Norbury M, Wyke S, Guthrie B, et al. (2012) Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. Lancet 380: 37-43.

13. Iversen A, Nikolaou V, Greenberg N, Unwin C, Hull L, et al. (2005) What happens to British veterans when they leave the armed forces. Eur J Public Health 15: 175-184.

14. Iversen A, Dyson C, Smith N, Greenberg N, Walwyn R, et al. (2005) 'Goodbye and good luck': The mental health needs and treatment experiences of British ex-service personnel. Br J Psychiatry 186: 480-486.

15. Meltzer H, Bebbington P, Brugha T, Farrell M, Jenkins R, et al. (2003) The reluctance to seek treatment for neurotic disorders. Int Rev Psychiatry 15: 123-128.

16. Murphy D, Marteau T, Wessely S (2012) A longitudinal study of UK military personnel offered anthrax vaccination: Informed choice, symptom reporting, uptake and per-vaccination health. Vaccine 30: 1088-1094.

17. (2015) Ministry of Defence. Op Herrick casualty and fatality tables: up to 2015. MOD, UK.

18. Murphy D, Weijers B, Palmer E, Busuttil W (2015) Exploring patterns in referrals to Combat Stress for UK veterans with mental health difficulties between 1994 and 2014. Int J Emerg Ment Health 17: 652-658.

19. Murphy D, Palmer E, Wessely S, Oddy M, Ramos S, et al. (2015) Prevalence and associations between traumatic brain injury and mental health difficulties within UK veterans accessing support for mental health difficulties. Psychol Res 11: 613-623.

20. (2015) Department of Communities and Local Government. The English Indices of Deprivation. London.

21. Wang PS, Lane M, Olfson M, Pincus HA, Wells KB, et al. (2005) Twelve-month use of mental health services in the United States: Results from the National Comorbidity Survey Replication. Arch Gen Psychiatry 62: 629-640.

22. Wang PS, Angermeyer MC, Borges G, Bruffaerts R, Chiu W, et al. (2007) Delay and failure in treatment seeking after first onset of mental disorders in the World Health Organization's World Mental Health Survey Initiative. World Psychiatry 6: 177-185.

23. Iversen AC, van SL, Hughes JH, Greenberg N, Hotopf M, et al. (2011) The stigma of mental health problems and other barriers to care in the UK Armed Forces. BMC Health Serv Res 11: 31.

24. Murphy D, Hodgman G, Carson C, Spencer-Harper L, Hinton M, et al.(2015) Mental health and functional impairment outcomes following a six week intensive treatment programme for UK military veterans with post traumatic stress disorder (PTSD): a naturalistic study to explore dropout and health outcomes at follow-up. BMJ Open 5: e007051.

25. Murphy D, Busuttil W (2014) PTSD, stigma and barriers to help-seeking within the UK Armed Forces. J R Army Med Corps 126: 322-326.