See commentary by Shale and Atherton

Long-Term Mental Health Outcomes of Military Service: National Linkage Study of 57,000 Veterans and 173,000 Matched Nonveterans

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ABSTRACT

Objective: We used data from the Scottish Veterans Health Study to examine long-term mental health outcomes in a large cohort of veterans, with a focus on the impact of length of service.

Methods: We conducted a retrospective, 30-year cohort study of 56,205 veterans born from 1945 through 1985, including 14,702 who left military service prematurely, and 172,741 people with no record of military service, using Cox proportional hazard models, to examine the association between veteran status and length of service and cumulative risk of mental health disorder. We stratified the veterans by common lengths of service, defining *Early Service Leavers* as those who had served for less than 2.5 years.

Results: There were 2,794 (4.97%) first episodes of any mental health disorder in veterans, compared with 7,779 (4.50%) in nonveterans. The difference was statistically significant for all veterans (adjusted hazard ratio [HR] = 1.21; 95% CI, 1.16–1.27; $P < .001$). Subgroup analysis showed the highest risk to be in Early Service Leavers (adjusted HR = 1.51; 95% CI, 1.30–1.50; $P < .001$), including those who failed to complete initial training. The risk reduced with longer service; beyond 9 years of service, risk of mental health disorder was comparable to or lower than that in nonveterans.

Conclusions: The veterans at highest risk of mental health disorder were those who did not complete training or minimum engagement, while those with longest service were at reduced risk, suggesting that military service was not causative. The high risk among the earliest leavers may reflect pre-service vulnerabilities not detected at recruitment, which become apparent during early training and lead to early discharge.

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In the UK Armed Forces, veteran status is conferred by a minimum of 1 day's service, requiring neither participation in operational service nor completion of initial training. Currently, around 22,000 people leave the Armed Forces each year, of whom about 15% fail to complete initial training,[1] and others leave before completing their minimum term of engagement. Periods of service range from a single day to over 40 years. The majority of veterans do well after discharge, with only a minority developing mental health problems.[2] However, analysis of the 2007 Adult Psychiatric Morbidity Survey of England[3] suggested that UK veterans who leave early (designated by the Ministry of Defence as Early Service Leavers) may be at increased risk of poor mental health outcomes. The reasons for this are unclear, and quantitative research remains limited; that study[3] was based on only 98 Early Service Leavers, while Buckman et al[4] examined 80 veterans identified as Early Service Leavers. Although low rank (which is generally associated with shorter service) has been shown to be a risk factor for adverse mental health outcomes,[5] we have not identified any studies that have specifically examined an association between length of service and veterans' long-term health.

The Scottish Veterans Health Study cohort includes over 14,000 Early Service Leavers, recruited over a period of 50 years and followed up for up to 30 years. Comparison of their mental health with that of both longer-serving veterans and with nonveterans was used to explore possible explanations for their poorer outcomes.

METHODS

The Scottish Veterans Health Study is a retrospective cohort study of all 56,570 military veterans resident in Scotland who were born from January 1, 1945, through December 31, 1985, and who were registered with National Health Service (NHS) Scotland both before and after service, and a comparison group of 172,753 individuals with no record of service matched 3:1 for age, sex, and postcode sector of residence (mean population of 5,000). The study cohort and methods have been described in detail elsewhere.[6] Demographic data obtained from electronic NHS registration records were linked at an individual level to routine hospital admissions data (Scottish Morbidity Record [SMR], SMR01), mental health inpatient and hospital day case records (SMR04), and death certificates to provide information on the first episode of a wide range of physical and mental conditions and all-cause death. For the purposes of this study, we have defined incidence of *any mental health disorder* as day cases (attending for treatment on a daily basis), inpatient hospitalization, or death, due to anxiety disorders, including posttraumatic stress disorder (PTSD) (*ICD-10* codes F40–F48 and *ICD-9* codes 300, 308, and 309), mood disorders (*ICD-10* codes F30–F39 and *ICD-9* code 296), and psychosis (*ICD-10* codes F20–F29 and *ICD-9* codes 295, 297, and 298). Quintiles of socioeconomic status were assigned by postcode of residence, based on the Scottish Index of Multiple Deprivation (SIMD)

Clinical Points

- It is widely believed that combat is the most important cause of mental health disorders in veterans.
- When treating veterans with mental health disorders, always explore pre-service factors, as mental health problems are most likely to occur in veterans who left before completing training and therefore could not have been in combat.

(http://www.scotland.gov.uk/Topics/Statistics/SIMD). We obtained published data on recruit intake and outflow from Defence Health (Statistics) and obtained aggregated data on Army failures to complete initial training from the Army Medical Directorate.

The electronic NHS record provided dates of entering and leaving military service. The maximum period of follow-up was from January 1, 1981 (or date of leaving the service, for veterans, if later), to December 31, 2012. The data extract was pseudonymized, and approval for the study was granted by the Privacy Advisory Committee of the Information Services Division of NHS Scotland.

Definition of Early Service Leavers

The minimum period of military service has changed over time and also varies between services (Naval Service, Army, Royal Air Force), but has never been less than 3 years during the period covered by our study. Therefore, we applied a cutoff of 2.5 years to define *Early Service Leavers* strictly. We pragmatically defined *failure to compete initial training* as a period of service less than 0.4 years. We defined *non–Early Service Leavers* as those serving for more than 3.5 years so as not to exclude all those who completed a nominal 4-year engagement while allowing for some variability in the dates of joining and leaving. A total of 38,321 veterans (68.2%) met this definition. We excluded 3,182 (5.7%) veterans with between 2.5 and 3.5 years of service from analyses requiring Early-Service-Leaver status, as their Early-Service-Leaver/non–Early-Service-Leaver status could not be inferred with confidence.

Statistical Analyses

Cox proportional hazards models were used to examine the association between veteran status and cumulative risk of mental health disorder, using age as the time-dependent variable, age at first episode as the failure time, and death (if no mental health disorder) as the censor time. The models were run for each of the 3 mental health disorder groups separately and then for any mental health disorder. The a priori rejection level was set at .05. Cox proportionality assumptions were tested using methodology based on Schoenfeld residuals.[7] The models were run univariately and then repeated adjusting for the potential confounding effect of socioeconomic status. The analyses were repeated for each disease group, stratifying by length of service in 3 subgroups to examine the effects of failure to complete initial training and failure to complete a minimum term of military engagement. A further analysis was performed for any mental health disorder by length of military service, categorized into the common terms of engagement. Mean age at entry for each length-of-service group was calculated and compared using 1-way analysis of variance. All analyses were performed using Stata v12.1 (StataCorp).

RESULTS

Main Findings

After data cleansing, 56,205 (99.3%) veterans and 172,741 (99.9%) nonveterans were included in the analysis. Of the veterans, 5,235 (9.3%) were women, reflecting the gender balance of the service population. The mean period of follow-up was 29.3 years, with a total of 6.7 million person-years of follow-up among veterans and nonveterans combined. Among the veterans, there were 14,702 (26.2%) who met the definition of Early Service Leavers. Of these, 5,854 (39.8%) did not complete initial training, comprising 10.4% of all veterans. The mean length of service of all Early Service Leavers was 0.78 years (standard error [SE] = 0.006) and the median was 0.58 years (interquartile range, 0.16–1.33). Twenty-two percent of Early Service Leavers, or 55% of those who failed to complete initial training, were discharged in the first few days of service. The mean age at recruitment for all Early Service Leavers was 20.4 years (SE = 0.05), while for those who left prior to completing initial training, the mean age was 21.7 years (SE = 0.08). Non–Early Service Leavers had a mean age at entry of 19.1 years (SE = 0.02), while for those with more than 12 years of service, the mean age was 18.9 years (SE = 0.04). The difference was highly significant ($P < .001$). Early Service Leavers were more likely than either non–Early Service Leavers or nonveterans to live in the most deprived areas (Table 1 and Figure 1).

Mental Health Outcomes

There were 2,794 (4.97%) first episodes of any mental health disorder recorded in veterans, compared with 7,779 (4.50%) in nonveterans. The difference was statistically significant (adjusted hazard ratio [HR] = 1.21; 95% CI, 1.16–1.27; $P < .001$). Subgroup analysis by Early-Service-Leaver status showed the increased incidence to be confined to Early Service Leavers, both for any mental health disorder and for the 3 diagnostic groups (Table 2). There was a strong association between any mental health disorder, Early-Service-Leaver status, and deprivation (Figure 2). For all Early Service Leavers, the adjusted HR for any mental health diagnosis was 1.51 (95% CI, 1.30–1.50; $P < .001$) compared with all nonveterans, and for those who did not complete initial training, it was similar (Table 3). For all non–Early Service Leavers analyzed together, there was no increased risk of any mental health disorder (adjusted HR = 1.03; 95% CI, 0.97–1.09; $P = .277$), although subgroup analysis by length of service showed that those in the junior years of service exhibited a modest increase, which had disappeared beyond 9 years of service. When stratified by length of service categorized by common terms of engagement, there was a decrease in risk of any mental health disorder with

Table 1. Socioeconomic Distribution of Nonveterans, Early Service Leavers, and Other Veterans[a]

SIMD Quintile	Nonveterans (N = 172,364)	All Veterans (N = 55,831)	Non-ESL Veterans (n = 38,052)	ESL Veterans (n = 14,617)	Failed Initial Training (n = 5,823)
1 (most deprived)	34,116 (19.8)	11,880 (21.3)	7,328 (19.3)	3,756 (25.7)	1,433 (24.6)
2	35,279 (20.5)	12,228 (21.9)	7,984 (21.0)	3,492 (23.9)	1,367 (23.5)
3	36,454 (21.2)	11,882 (21.3)	8,330 (21.9)	2,906 (19.9)	1,147 (19.7)
4	36,544 (21.2)	11,373 (20.4)	8,247 (21.7)	2,574 (17.6)	1,080 (18.6)
5 (least deprived)	29,971 (17.4)	8,468 (15.2)	6,163 (16.2)	1,889 (12.9)	796 (13.7)

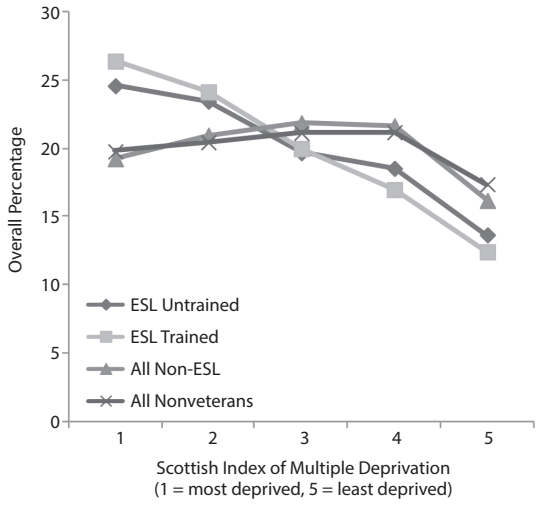
[a]All values are n (%). N is the number for whom a SIMD was recorded; percentages may not add up to 100 due to rounding.
Abbreviations: ESL = Early Service Leaver, SIMD = Scottish Index of Multiple Deprivation.

Table 2. Incident Mental Health Disorders Among Nonveterans, Early Service Leavers, and Other Veterans[a]

Diagnosis	Nonveterans (N = 172,741)	All Veterans (N = 56,205)	Non-ESL Veterans (n = 38,321)	All ESL Veterans (n = 14,702)	Failed Initial Training (n = 5,854)
Any mental health disorder	7,779 (4.50)	2,794 (4.97)	1,526 (3.98)	1,063 (7.23)	423 (7.23)
Anxiety	3,512 (2.03)	1,415 (2.52)	765 (2.00)	551 (3.75)	215 (3.67)
Mood disorder	4,371 (2.53)	1,578 (2.81)	874 (2.28)	593 (4.03)	242 (4.13)
Psychosis	1,867 (1.08)	537 (0.96)	257 (0.67)	225 (1.53)	92 (1.57)

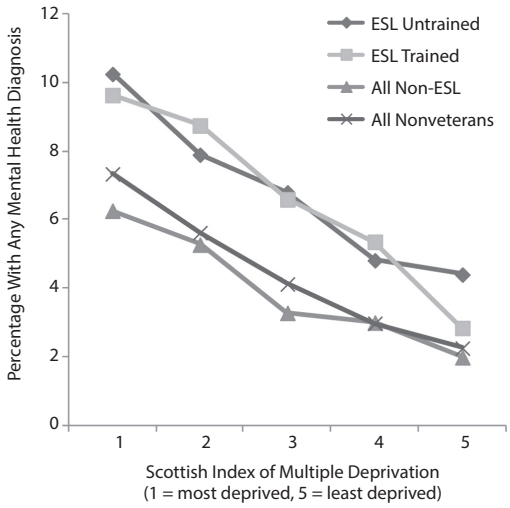
[a]All values are n (%).
Abbreviation: ESL = Early Service Leaver.

Figure 1. Scottish Veterans Health Study Cohort, by Socioeconomic Status and Veteran/Leaver Category



Abbreviation: ESL = Early Service Leaver.

Figure 2. Scottish Veterans Health Study: Mental Health Diagnoses Overall, by Socioeconomic Status and Veteran/Leaver Category



Abbreviation: ESL = Early Service Leaver.

increasing length of service. Those with the longest service experienced a lower risk of mental health disorder than nonveterans (Figure 3). The Cox proportional hazards model demonstrated the decrease in hazard ratio with increasing length of service, those with the longest service showing a reduction in risk compared with nonveterans that was statistically significant for 10–12 years of service and for over 22 years of service (Table 3). When the cohort was stratified by sex, the risk of any mental health disorder showed a similar pattern in men and women, although the overall risk in non–Early-Service-Leaver women was nonsignificantly lower than that in all nonveteran women. The increase in risk was higher in Early-Service-Leaver women who left before completion of initial training than in those who had completed training. There was a small overall increase in the risk of mental health disorder in non–Early-Service-Leaver men compared with nonveteran men (adjusted HR = 1.07; 95% CI, 1.01–1.40; $P = .029$) (Table 4).

DISCUSSION

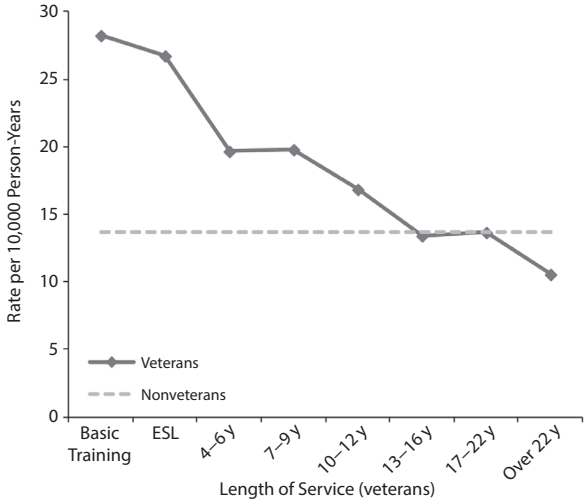
Using data from the Scottish Veterans Health Study, in a large sample of veterans spanning over 50 years of service and followed up for up to 30 years, we found that there was an overall increased risk of diagnosis of a mental health disorder of sufficient severity to result in hospital day care,

Table 3. Cox Proportional Hazards Model of the Association Between Both Veteran Status and Length of Service and Any Mental Health Disorder

	Univariate			Multivariate[b]		
Length of Service[a]	HR	95% CI	*P* Value	HR	95% CI	*P* Value
Basic training only	1.63	1.47–1.80	<.001	1.51	1.37–1.67	<.001
Up to 3 y	1.62	1.51–1.74	<.001	1.48	1.37–1.59	<.001
4–6 y	1.30	1.19–1.42	<.001	1.21	1.11–1.32	<.001
7–9 y	1.18	1.05–1.31	.004	1.13	1.01–1.26	.027
10–12 y	0.86	0.74–1.00	.049	0.84	0.73–0.98	.028
13–16 y	0.99	0.84–1.17	.908	0.97	0.82–1.14	.724
17–22 y	0.85	0.70–1.05	.128	0.90	0.73–1.10	.289
23 y and over	0.59	0.47–0.75	.000	0.67	0.53–0.84	.001

[a]Categories are common lengths of military engagement.
[b]Adjusted for Scottish Index of Multiple Deprivation quintile.
Abbreviations: CI = confidence interval, HR = hazard ratio.

Figure 3. Scottish Veterans Health Study: Incidence of Mental Health Disorder, by Length of Service[a]



[a]All nonveterans for comparison.
Abbreviation: ESL = Early Service Leaver.

Table 4. Cox Proportional Hazards Model of the Association Between Both Veteran Status and Stage of Discharge From Armed Forces, and Any Mental Health Disorder Referent to All Nonveterans, Overall and by Sex

	Univariate			Multivariate[a]		
Variable	HR	95% CI	*P* Value	HR	95% CI	*P* Value
Overall						
All veterans	1.27	1.21–1.33	<.001	1.21	1.16–1.27	<.001
Non-ESL	1.06	1.00–1.12	.066	1.03	0.97–1.09	.277
ESL	1.65	1.54–1.76	<.001	1.51	1.42–1.61	<.001
Basic training	1.63	1.47–1.80	<.001	1.51	1.37–1.67	<.001
Men						
All veterans	1.30	1.24–1.37	<.001	1.24	1.18–1.30	<.001
Non-ESL	1.10	1.03–1.16	.003	1.07	1.01–1.40	.029
ESL	1.68	1.57–1.81	<.001	1.54	1.43–1.65	<.001
Basic training	1.63	1.46–1.81	<.001	1.51	1.35–1.68	<.001
Women						
All veterans	1.08	0.94–1.24	.278	1.06	0.92–1.21	.429
Non-ESL	0.83	0.67–1.03	.089	0.85	0.68–1.05	.126
ESL	1.41	1.18–1.67	<.001	1.32	1.11–1.58	.002
Basic training	1.62	1.24–2.10	<.001	1.53	1.18–2.00	.02

[a]Adjusted for Scottish Index of Multiple Deprivation quintile.
Abbreviations: CI = confidence interval, ESL = Early Service Leaver, HR = hazard ratio.

hospitalization, or death, when compared with age-matched, sex-matched, and geographically matched nonveterans. However, subgroup analysis of mental health disorders by length of service identified that premature leavers were at greatest risk. The risk decreased with increasing length of service, and the longest-serving veterans had a lower risk than nonveterans. Those who left early were older at entry to the Armed Forces than those who had the longest careers; this may reflect differences in employment history and potential, although we had no data on pre-service employment status.

When the sample was stratified by sex and Early-Service-Leaver status, women who did not complete training had the greatest increase in risk of a mental health disorder. Overall, however, women veterans had no increased risk of a mental health problem compared with nonveterans, as the increased risk seen in Early-Service-Leaver women was balanced by the reduction in risk in women who had completed the minimum engagement. There was only a small overall increase in risk of a mental health disorder in non–Early-Service-Leaver male veterans. The reasons for the gender differences are unclear, but may include differences in the proportion discharged for disciplinary reasons, as some women would have been discharged as a result of pregnancy.

The UK definition of "veteran" status, requiring only a single day's service and recognizing the commitment to serve, is one of the most inclusive in the world.[8] There are many reasons for failure to complete training, or for leaving early, including personal choice, family reasons, inadequate fitness, disciplinary problems, or temperamental unsuitability.[9] Around 25% of all failures to complete initial training are for medical reasons, and some 6% of those discharged during training (23% of all who leave for medical reasons) have been found to have failed to declare pertinent medical history, which would have precluded enlistment, but which comes to light under the rigors of training.[10] Injury or illness in training may also preclude completion. Not all premature discharges increase the risk of adverse long-term health outcomes. Those who did not complete training will never have deployed, although trained premature leavers may have done so.

"Healthy Workers" and "Less Healthy Leavers"

The association between continued employment and reduced mortality has long been recognized and has been termed the *healthy worker effect*.[11] The healthy worker effect is strongest in those occupations that are the most physically demanding.[12] Continued good health is a prerequisite to remaining in service; the term *healthy warrior* acknowledges this as a potential source of bias in studies comparing military personnel who are deployed to a war zone and those who are not deployed for health reasons,[13] although the "healthy warrior effect" differs from

the "healthy worker effect" in that it is predominantly used to refer to psychiatric diagnoses. Larson et al suggested that the initial months of training act as a de facto screening mechanism, whereby recruits with mental illness are least likely to continue in service.[14,15] This suggestion is supported by our findings that long-term mental health is poorest among those who leave the Armed Forces earliest and that those who serve longest have a reduced risk of mental health conditions in comparison with members of the wider community. In addition to carrying a greater burden of latent ill-health owing to pre-service factors,[4] Early Service Leavers have also served for too short a period to have benefited from in-service health promotion. Those who leave earliest therefore include a disproportionate number of "less healthy leavers," whose long-term health experience we have shown to be less favorable.

The recruit selection process has changed over the long period encompassed by this study, from a relatively crude exclusion of those with gross problems in the 1960s through to the more recent scientifically validated battery of physical tests and medical examinations based on modern occupational health screening.[16,17] The aim has been to minimize losses through injury,[18] although concealed conditions such as asthma remain common.[19] Effective screening for mental robustness has proved much more difficult to implement. Jones et al[20] conducted a historical review of screening for psychological disability or vulnerability from World War 1 onward and found that the sensitivity and specificity of screening were low in relation to both future performance as a soldier and prediction of mental vulnerability. In a questionnaire-based study of UK personnel deployed to the Iraq war, Rona et al[21] concluded that there was little evidence to support pre-deployment psychological screening to prevent mental disorders, as both positive and negative predictive values were low.

It is therefore inevitable that each intake of recruits includes a number of people who have latent mental health conditions or have concealed a mental health history. The stress of cultural readjustment, which is an intrinsic concomitant of recruit training,[22] will inevitably cause some of these problems to become manifest, often resulting in early discharge. It is therefore plausible that latent or concealed mental health problems will be overrepresented among Early Service Leavers. Further, selective discharge of those who are unsuited to service takes place throughout this period, although skewed toward the early months of service. This "multilayered selection process" has been described by Hyams.[23] Concurrently, the level of latent mental ill-health in the still-serving population reduces. Those discharged for disciplinary reasons may be especially likely to develop later mental health problems; in a follow-back of a longitudinal cohort, Kim-Cohen et al[24] found a history of juvenile conduct or behavioral disorder in 25% to 60% of adults with mental health disorders.

We therefore postulate that the poorer long-term health of Early Service Leavers represents the inverse of the "healthy worker effect"—a "less healthy leaver effect," that arises from selectively following up a subgroup of whom many have left for health or behavioral reasons. This hypothesis is consistent with, and explains, the results of Jones and colleagues' study[25] of 8,261 UK military personnel, which demonstrated, in a multiple logistic regression analysis, that having left service was the greatest contributor to risk of possible PTSD, other factors being low rank, a history of accident, and major childhood adversity. The authors suggested that a possible reason may have been a greater willingness to seek care after discharge[25]; however, Brewin et al[27] have recently demonstrated that the majority (81%) of veterans who experienced PTSD symptoms during service had received medical care in service, while we have shown that the health potential of Early Service Leavers is influenced by selective discharge of those least suited to service. Status as a veteran means that these "occupational leavers" are identifiable within the community and that their long-term health outcomes can be studied.

Strengths and Limitations

The major strength of this present study is that it was based on a large cohort covering the whole of Scotland, giving unprecedented access to data on over 14,000 Early Service Leavers, and almost 3,000 veterans with a mental health diagnosis, over a period of around 30 years of follow-up. The veterans served over the period 1960 to 2012, encompassing a wide range of deployments in those who completed training. The Early Service Leavers were able to be subdivided into those who did not complete initial training and those who were trained but left before completion of the minimum engagement. The results were able to be matched or adjusted for confounders including sex and regional socioeconomic status, and compared with those of nonveterans. It was possible to do subgroup analysis by sex and length of service, greatly adding to the existing quantitative data on Early Service Leavers. Consistency of the findings in respect of Early Service Leavers with earlier small studies[2,3,4] indicates that the results are unlikely to have arisen by chance. The overall reducing risk with increasing length of service indicates that the multiple comparisons problem should not be considered as an explanation of our findings.

Limitations of the study include possible loss to follow-up of subjects due to migration away from Scotland, for which no data are available, and the lack of any follow-up data prior to January 1, 1981. Mental health conditions diagnosed and treated solely in primary care could not be identified and were not included; therefore, our data reflect the more severe end of the spectrum of mental health disorders. No information was available on mental health conditions occurring in service as we were unable to link to military health records; conditions persisting into the veteran period would not have been picked up until first presentation to the NHS. We used a cutoff of 2.5 years to define Early Service Leavers. This is a tighter definition than that in many recent studies, which have defined Early Service Leavers as serving for less than

4 years, but this cutoff would have erroneously categorized many older veterans in our cohort who had completed the earlier 3-year minimum engagement. Some veterans whose Early-Service-Leaver status could not be determined with confidence were omitted from the subgroup analysis. The "best fit" definition of length of initial training as 0.4 years will have resulted in some people being incorrectly classified. Veterans with Reserve service only could not be identified from NHS records and would have been included among the nonveterans. Any effect would have been to underestimate observed differences between veterans and nonveterans. Data on combat exposure in the veterans were not available. No information was available on the service to which a veteran had belonged (Army, Royal Navy, or Royal Air Force), and rates of mental health disorders have been shown in other studies to differ between the 3 services.[26]

Summary

Our findings show that although veterans are at higher risk overall of subsequent mental health disorders than the wider population, the increased risk occurs predominantly in veterans with the shortest service. Neither deployment nor combat can be causal in those who did not complete training. Early training acts to screen out recruits who have latent or concealed mental health problems. People who have longer service demonstrate better long-term mental health despite being more likely to have experienced multiple deployments. Older age at recruitment is a risk factor for leaving prematurely. Failure of some previous studies to differentiate between veterans according to length of service may have resulted in some mental ill-health in veterans being inappropriately ascribed to military service; incorrect attribution has implications for care.

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REFERENCES

1. UK Armed Forces Quarterly Personnel Report. GOV.UK Web site. https://www.gov.uk/government/statistics/uk-armed-forces-quarterly-personnel-report-2014. Updated 2014. Accessed January 29, 2015.
2. Iversen A, Nikolaou V, Greenberg N, et al. What happens to British veterans when they leave the armed forces? *Eur J Public Health*. 2005;15(2):175–184.
3. Woodhead C, Rona RJ, Iversen A, et al. Mental health and health service use among post-national service veterans: results from the 2007 Adult Psychiatric Morbidity Survey of England. *Psychol Med*. 2011;41(2):363–372.
4. Buckman JEJ, Forbes HJ, Clayton T, et al. Early service leavers: a study of the factors associated with premature separation from the UK Armed Forces and the mental health of those that leave early. *Eur J Public Health*. 2013;23(3):410–415.
5. Iversen A, Dyson C, Smith N, et al. 'Goodbye and good luck': the mental health needs and treatment experiences of British ex-service personnel. *Br J Psychiatry*. 2005;186(6):480–486.
6. Bergman BP, Mackay DF, Pell JP. Acute myocardial infarction in Scottish military veterans: a retrospective cohort study of 57,000 veterans and 173,000 matched nonveterans. *Am J Epidemiol*. 2014;179(12):1434–1441.
7. Grambsch PM, Therneau TM. Proportional hazards tests and diagnostics based on weighted residuals. *Biometrika*. 1994;81(3):515–526.
8. Dandeker C, Wessely S, Iversen A, et al. What's in a name? defining and caring for "Veterans:" the United Kingdom in international perspective. *Armed Forces Soc*. 2006;32(2):161–177.
9. Deu N, Srinivasan M, Srinivasan P. Issues in temperamental unsuitability re-examining concepts and current practice in the British Army. *J R Army Med Corps*. 2004;150(3):179–181.
10. Bergman BP. *The Scottish Veterans Health Study: A Retrospective Cohort Study of 57,000 Military Veterans and 173,000 Matched Nonveterans* [PhD thesis]. Glasgow, Scotland: University of Glasgow; 2015.
11. McMichael AJ, Spirtas R, Kupper LL. An epidemiologic study of mortality within a cohort of rubber workers, 1964–72. *J Occup Med*. 1974;16(7):458–464.
12. Li C-Y, Sung F-C. A review of the healthy worker effect in occupational epidemiology. *Occup Med (Lond)*. 1999;49(4):225–229.
13. Haley RW. Point: bias from the "healthy-warrior effect" and unequal follow-up in three government studies of health effects of the Gulf War. *Am J Epidemiol*. 1998;148(4):315–323.
14. Larson GE, Highfill-McRoy RM, Booth-Kewley S. Psychiatric diagnoses in historic and contemporary military cohorts: combat deployment and the healthy warrior effect. *Am J Epidemiol*. 2008;167(11):1269–1276.
15. Manos GH. War and the military family. *J Am Acad Child Adolesc Psychiatry*. 2010;49(4):297–299.
16. Bilzon JLJ, Scarpello EG, Bilzon E, et al. Generic task-related occupational requirements for Royal Naval personnel. *Occup Med (Lond)*. 2002;52(8):503–510.
17. Wilkinson D, Rayson M, Bilzon J. Development and revalidation of physical selection standards for recruits in the British Army. Presented at: International Congress on Soldiers' Physical Performance; January 1, 2005; Jyväskylä, Finland.
18. Blacker SD, Wilkinson DM, Bilzon JL, et al. Risk factors for training injuries among British Army recruits. *Mil Med*. 2008;173(3):278–286.
19. Dickinson JG. Asthma in the army: a retrospective study and review of the natural history of asthma and its implications for recruitment. *J R Army Med Corps*. 1988;134(2):65–73.
20. Jones E, Hyams KC, Wessely S. Screening for vulnerability to psychological disorders in the military: an historical survey. *J Med Screen*. 2003;10(1):40–46.
21. Rona RJ, Hooper R, Jones M, et al. Mental health screening in armed forces before the Iraq war and prevention of subsequent psychological morbidity: follow-up study. *BMJ*. 2006;333(7576):991.
22. Bergman BP, Burdett HJ, Greenberg N. Service life and beyond—institution or culture? *RUSI Journal*. 2014;159(5):60–68.
23. Hyams KC. Mental health screening before troop deployment: is not supported by current evidence. *BMJ*. 2006;333(7576):979–980.
24. Kim-Cohen J, Caspi A, Moffitt TE, et al. Prior juvenile diagnoses in adults with mental disorder: developmental follow-back of a prospective-longitudinal cohort. *Arch Gen Psychiatry*. 2003;60(7):709–717.
25. Jones M, Sundin J, Goodwin L, et al. What explains post-traumatic stress disorder (PTSD) in UK service personnel: deployment or something else? *Psychol Med*. 2013;43(8):1703–1712.
26. Brewin CR, Andrews B, Hejdenberg J. Recognition and treatment of psychological disorders during military service in the UK armed forces: a study of war pensioners. *Soc Psychiatry Psychiatr Epidemiol*. 2012;47(12):1891–1897.
27. Jones M, Rona RJ, Hooper R, et al. The burden of psychological symptoms in UK Armed Forces. *Occup Med (Lond)*. 2006;56(5):322–328.