The burden of psychological symptoms in UK Armed Forces

Margaret Jones[1], Roberto J. Rona[2], Richard Hooper[3] and Simon Wesseley[1]

Objective	To assess the prevalence of psychological symptoms during periods of relatively low deployment activity and the factors associated with each psychological health outcome.
Methods	A survey of 4500 randomly selected UK service personnel was carried out in 2002. The questionnaire included the General Health Questionnaire (GHQ-12), the post-traumatic stress disorder checklist (PCL), 15 symptoms and an assessment of alcohol intake.
Results	A total of 20% were above cut-offs for GHQ-12, 15% for symptoms, 12% for alcohol intake and 2% for PCL. Gender, age, excessive drinking and smoking were independently associated with most outcomes of interest. Number of deployments was independently associated with multiple symptoms and excessive drinking. High post-traumatic stress disorder score was more frequent in the Army and in lower ranks.
Conclusions	Psychological symptoms are highly prevalent in UK Armed Forces. Many risk factors are associated with measures of psychological ill-health.
Key words	Alcohol consumption; GHQ-12; prevalence; PTSD; risk factors; UK Armed Forces.

Introduction

Most studies of psychological ill-health among service personnel have been carried out in the context of specific deployments, with the majority of studies focusing on post-deployment ill-health [1–3]. Studies following the 1991 Gulf War show high rates of reported unexplained physical symptoms, psychological distress and, to a lesser extent, post-traumatic stress reaction in those deployed to the Persian Gulf [1,4–7]. These studies were triggered by reports of ill-health suffered by veterans.

In the civilian populations there is also a high prevalence of self-reported psychological ill-health [8,9], including unexplained physical symptoms [10,11], with at least one-third of symptoms lacking a clear physical explanation in a community setting [12]. It might be expected that military populations would be healthier than civilian populations since they are largely composed of young, physically fit adults. The recruitment process aims to select those who are fit and healthy. Subsequent training and vigorous physical exercise would maintain

a high level of physical fitness compared to the general population. It is reasonable to expect that service personnel would have fewer physical symptoms, lower levels of psychological distress and a higher health-related quality of life than civilian populations. However, surveys following the Gulf War and the recent high profile claim against the Ministry of Defence (MOD) by veterans groups, in respect of post-traumatic stress disorder (PTSD), might lead to a perception that PTSD among service personnel is high in comparison to other groups in the civilian population [1,13]. The expected high consumption of alcohol prevailing in young adults in Britain may further contribute to psychological ill-health in the military [9].

It has been reported in UK Gulf War veterans that only rank, marital status, exposure to danger and being a regular rather than a reservist showed an association with psychological ill-health [14,15]. Studies in civilians have also shown that socio-demographic correlates are only weakly associated with depression and a systematic review of observational studies in civilian and military samples have shown that only a background of psychiatric history is consistently associated with PTSD [16,17].

It is important to assess whether the prevalence of psychological symptoms reporting is still high during periods of relatively low operational deployment activity. Selecting controls for occupational cohorts is problematic but it is especially so in military post-deployment studies. Comparison with civilian groups is inappropriate for the reasons given. Comparison with non-deployed service

[1]King's Centre for Military Health Research, King's College, London, UK.

[2]Division of Asthma, Allergy and Lung Biology, & King's Centre for Military Health Research, King's College, London, UK.

[3]Respiratory Epidemiology and Public Health Group, Imperial College, London, UK.

Correspondence to: Margaret Jones, Weston Educational Centre, Cutcombe Road, London SE5 9RJ, UK. e-mail: Margaret.jones@kcl.ac.uk

personnel could be complicated by the 'healthy warrior effect' [18]. Data on the prevalence of psychological distress, physical symptom reporting, PTSD and excessive alcohol consumption, not collected in the context of a specific deployment, could serve as a useful baseline.

It is also important to confirm, or otherwise, whether the socio-demographic risk factors relevant to the Armed Forces may be related to psychological symptoms because it may guide the search for preventive action or provide a basis for a more intense programme of health surveillance in some groups within the services.

Methods

The data presented here were collected during a study to develop and evaluate a screening process to detect physical and psychological ill-health in the UK Armed Forces using two questionnaires [19]. The two questionnaires were shown to have equal validity [20].

The full questionnaire included the civilian version of the post-traumatic stress disorder checklist (PCL), the General Health Questionnaire (GHQ-12) as a measure of psychological distress, 15 somatic symptoms selected from a previously used questionnaire, questions 1, 2 (modified to include a larger range of units consumed) and 10 from the World Health Organisation Alcohol Use Disorders Identification Test and questions about past and current smoking behaviour [1,21–23]. The abridged questionnaire included a PTSD checklist reduced from 17 to 14 items, four items from the GHQ-12, and five of the 15 symptoms of the full questionnaire [19]. We excluded questions on alcohol and smoking behaviour from the abridged questionnaire. Information was also obtained about gender, age, rank and participation in deployments since 1999.

A list of all units (excluding Special Services) of the Armed Forces was obtained from the MOD and stratified by service and by size: small (<150 people), large (≥150 people). Random numbers were generated using Stata 8, assigned to the units and re-sorted in numerical order. The top units in each stratum were selected to give 100 units in total. Similarly, 45 individuals were randomly selected from each unit to give the target sample size of 4500 subjects. The number of units selected from each

service was calculated so that the number of individuals, from each service, in the sample was closely related to the relative strength of each service. The sample size was determined by the validation aspect of the screening study: we anticipated that as few as 200 subjects might be identified as having health problems and be willing to participate, which would still allow a positive predictive value of 60% to be estimated with a 95% confidence interval (CI) of ±7%.

There were three mailings of the questionnaires over a period of 3 months, the first at the beginning of May 2002. Half the units received the full and half the abridged questionnaire. Questionnaires were addressed to individuals at their unit and sent via the Commanding Officer. A reply paid envelope was supplied to each individual for the return of questionnaires direct to the study office. Participants were assured that taking part was voluntary and that their responses were confidential.

Table 1 shows the definition of high score on each scale for this analysis. For comparison with other studies, we have used a threshold of 3/4 ('cases' score ≥4) for the GHQ-12 to identify those with psychological distress, using the 'standard' 0-0-1-1 scoring [8,9,24,25]. (In the evaluation of the screening process, the more stringent 4/5 threshold was used because of the requirement not to overwhelm Defence Medical Services.) A measure of somatization was based on the number rather than the nature of the symptoms endorsed. Symptoms were excluded from the count when the participant reported a recent cold/flu, food-poisoning episode, recent strenuous physical exercise or was being treated by a doctor. We used a score of ≥50 as cut off point for the PTSD checklist [21]. A cut off point of alcohol intake well above prevailing recommendations was used to define excessive alcohol consumption.

The study was given ethical approval by the Defence Medical Services Clinical Research Committee and by King's College Hospital Research Ethics Committee.

The associations between scores for each scale in the full questionnaire were calculated as Spearman's Rank correlation coefficients. The associations between high scores as dichotomous variables for GHQ-12, PCL, alcohol intake and multiple symptoms were calculated using Kendall's tau-b. Multiple logistic regression was

Table 1. Criteria for high score on each scale according to length of the questionnaire

Scale	Full questionnaire	Abridged questionnaire
Symptoms	Five mild or combinations of mild and moderate; three moderate; at least one severe symptom	At least three mild or moderate symptoms or at least one severe symptom
GHQ-12	GHQ-12 score 3/4	GHQ-4 score 1/2
PCL	Seventeen items score of ≥50	Fourteen items score of >40
Alcohol intake	≥40 units a week in males and ≥30 in females or somebody expressed concern with serviceman's drinking in past year	Not applicable

used to determine odds ratios (ORs) for each outcome variable separately, including as independent variables service, gender, age, number of deployments, rank, alcohol intake and smoking status, using data from the full questionnaire only. Additionally, ORs were calculated for PTSD using data from the full and abridged questionnaires combined, adjusting also for length of questionnaire but not alcohol intake and smoking status. Standard errors were adjusted for clustering on unit. All analyses were done using Stata 8 (Stata Corporation, College Station, TX, USA).

Results

In total, 1382 (65%) full and 1491 (70%) abridged questionnaires were completed. Only 8% of the participants were females, the mean age of the total sample was 32 years with a standard deviation of 7.9, and 53% of the participants had had deployment experience. The response rate was similar for each service, the number of completed questionnaires reflecting the relative size of each service.

The prevalence of high scores is shown in Table 2. The difference in number of high scorers (Table 1 for definition) between the two questionnaires was entirely explained by the absence of questions about alcohol intake in the abridged questionnaire.

The abridged questionnaire identified fewer participants above threshold for symptom score than the full questionnaire. The percentages of PCL high scores were similar for the two questionnaires, as were GHQ high scores (standard scoring). The mean GHQ-12 score, calculated using the Likert scale 0, 1, 2, 3 for each item, was 11.2 (95% CI 10.95–11.45). A total of 13% of men and 6% of women had alcohol consumption levels equal to or above the definition of high score and 28% were current smokers.

The correlations between scores on five of the scales used are shown in Table 3.

The associations between defined high scores (dichotomous variable) on each scale were positive varying from 0.1 to 0.34 (P at least <0.05). Current smoking was positively associated with high score on each scale. (Results not shown.)

Symptoms and GHQ scores increased markedly with increasing PCL scores. Likewise high alcohol intake increased with higher PCL scores. (Results not shown.)

Risk factors for each outcome variable in the full questionnaire are given in Table 4.

Multiple symptoms were more often reported by females, older personnel, those with deployment experience and those with a high level of alcohol consumption. Psychological distress was more common in women, those who consumed a high level of alcohol and current smokers.

Table 2. Number (%) of high scorers and median score [interquartile range (IQR)] for each scale by length of screening questionnaire

Scale	Full questionnaire, $n = 1382$		Abridged questionnaire, $n = 1491$	
	Number (%) above threshold	Median score (IQR)	Number (%) above threshold	Median score (IQR)
GHQ-12	270 (20)	1 (0–3)	296 (20)	0 (0–1)
Symptoms	211 (15)	1 (0–3)	59 (4)	0 (0–1)
PCL	33 (2.4)	20 (17–25)	41 (2.7)	16 (14–21)
Alcohol	172 (12)	10 (3.75–20)[a]	N/A	N/A
Total high scorers[b]	478 (35)		326 (22)	

[a]Units/week.

[b]Co morbid and pure.

Table 3. Association between scores on five of the health scales in the full questionnaire

	Symptoms	GHQ-12	PCL	Alcohol
GHQ-12	0.42 (0.38–0.46), $P < 0.001$			
PCL	0.48 (0.44–0.52), $P < 0.001$	0.62 (0.59–0.65), $P < 0.001$		
Alcohol units/week	−0.01 (−0.06–0.04), $P = 0.71$	−0.02 (−0.07–0.03), $P = 0.51$	0.01 (−0.04–0.06), $P = 0.77$	
Smoking cigarettes/day	0.04 (−0.01–0.09), $P = 0.096$	0.08 (0.03–0.13), $P = 0.004$	0.08 (0.03–0.13), $P = 0.002$	0.20 (0.15–0.25), $P < 0.001$

Values shown are Spearman's rank correlation coefficient with 95% CI.

Table 4. Logistic regression analysis of the association between independent factors and psychological health outcomes

	Symptoms ($n = 1382$)		GHQ ($n = 1382$)		PTSD ($n = 1382$)		Alcohol ($n = 1382$)	
	Adjusted OR[a] (95% CI)	*P* value	Adjusted OR[a] (95% CI)	*P* value	Adjusted OR[a] (95% CI)	*P* value	Adjusted OR[a] (95% CI)	*P* value
Service		0.14		0.25		0.38		0.93
Army	1.00		1.00		1.00		1.00	
RN	0.87 (0.58–1.31)		0.74 (0.51–1.07)		0.50 (0.18–1.34)		1.07 (0.75–1.52)	
RAF	0.59 (0.35–1.0)		0.79 (0.52–1.21)		0.77 (0.33–1.84)		0.99 (0.66–1.49)	
Gender		0.04		<0.001		0.196		0.011
Male	1.00		1.00		1.00		1.00	
Female	1.82 (1.04–3.18)		2.05 (1.37–3.07)		1.97 (0.71–5.48)		0.29 (0.11–0.75)	
Age		0.001		0.17		0.36		<0.001
Per 10 years	1.57 (1.21–2.02)		1.16 (0.94–1.43)		0.78 (0.46–1.32)		0.32 (0.24–0.42)	
Number of countries deployed to		0.002		0.16				<0.001
0	1.00		1.00		1.00	0.95	1.00	
1	1.72 (1.26–2.37)		1.22 (0.89–1.67)		0.90 (0.41–1.97)		1.41 (0.93–2.14)	
>1	1.71 (1.15–2.56)		0.92 (0.62–1.37)		0.90 (0.38–2.10)		2.33 (1.53–3.56)	
Rank		0.22		0.23		0.38		0.06
Officer	1.00		1.00		1.00		1.00	
Other ranks	1.33 (0.85–2.08)		1.25 (0.87–1.78)		2.02 (0.42–9.73)		1.87 (0.98–3.56)	
Alcohol[b]		<0.001		0.005		0.032		N/A
Below cut-off	1.0		1.0		1.0		N/A	
Above cut-off	2.15 (1.43–3.24)		1.83 (1.21–2.78		2.25 (1.07–4.73)		N/A	
Smoking		0.093		0.002		0.028		<0.001
Never	1.00		1.00		1.00		1.00	
Ever	0.90 (0.61–1.33)		0.92 (0.63–1.36)		0.51 (0.16–1.67)		1.85 (1.23–2.78)	
Current	1.30 (0.92–1.84)		1.53 (1.62–2.01)		2.03 (0.98–4.20)		2.55 (1.81–3.59)	

High alcohol consumption included additionally as an independent risk factor for symptoms, GHQ and PTSD high scores.

[a]Adjusted for each of the other variables.

[b]Adjusted for different cut off score by sex.

Excessive alcohol intake was more likely in younger personnel, in males, in those who had experience of deployment, especially if >1 deployment in the last 5 years, and in current smokers.

The risk of scoring high on the PCL was assessed in those completing the full questionnaire only (Table 4) and the total group (Table 5). The analysis using the full questionnaire was based on only 33 high scorers. In the full questionnaire, high PCL scores were significantly related to alcohol intake and smoking behaviour only (Table 4).

A PCL-17 score extrapolated from the 14 items common to both questionnaires was in close agreement with the correct PCL-17 score for those subjects who completed the full questionnaire—the difference being in the range −2.1 to 2.5 in 95% of instances: hence, we extrapolated the PCL-17 score for those who completed the abridged questionnaire which increased the number of subjects with high score from 33 to 74 (2.5% of the total group). PCL high scores were greater in the Army than in the Royal Navy (RN) and the Royal Air Force (RAF), in younger personnel, and in other ranks compared to officers. The OR was particularly high for other ranks but the 95% CI was wide (Table 5).

Discussion

In this study, based on a random sample of the UK Armed Forces, multiple symptoms, psychological distress and excessive alcohol consumption were between four and eight times more prevalent than PTSD. Psychological ill-health was significantly associated with service, gender, age, number of deployments, rank, alcohol intake and current smoking with an intermediate or fairly high effect size varying from an OR of 1.4 to an OR of 3.64.

Our data were not collected in the context of any specific deployment. The vast majority completed a questionnaire 6 months before the announcement of deployments to Iraq and before preparations for that deployment began. Responses to the questionnaires are therefore unlikely to have been coloured either by media interest surrounding deployment or by the desire to over report symptoms for secondary gains as has been suggested in some post-deployment studies [26].

Our results are based on a self-administered questionnaire and not on a diagnostic interview. High scores in our study increase the probability that a participant has a psychiatric disorder, but a further assessment would be needed to confirm a psychiatric diagnosis.

The cross-sectional design does not allow us to indicate the temporal relation of an association but provides a basis for identifying areas of concern.

This study has shown that there is a high prevalence of self-reported psychological ill-health in the UK Armed Forces. The prevalence of psychological distress, based on the GHQ-12, exceeded by a large margin that reported in the Scottish Health Survey and the Health Survey for England, although the prevalence in the north-east region of England was comparable [8,9]. However, in occupations that may be exposed to similar types of stressors (violence, distressing incidences) such as the police force or doctors in accident and emergency departments, the level of psychological distress appears to be higher than in the UK Armed Forces [25,27].

Although GHQ-12 has been used and validated in many populations, it has not been validated in a UK military population. We would suggest that the contextual environment, in this case the military environment, might influence the responses to a questionnaire. It is possible, for example, that over reporting in this population could be in part an indication of institutional dissatisfaction.

Multiple physical symptoms are highly prevalent in the community [28]. Even after excluding those reporting a recent short-duration illness or intense physical activity, 15% of service personnel in this study reported symptoms above the threshold used. Given that, at any one time, a sizeable proportion of the general population will exhibit symptoms, and that total symptom scores are likely to be associated with somatization, this finding is a useful indicator of the level of symptom reporting in the Armed Forces during a period of relatively low deployment level [11].

Although 13% of men and 6% of women had alcohol consumption levels equal to or above our definition of excessive intake, it compares favourably with drinking behaviour in the civilian population [29]. The 28% rate of current smoking is similar to the findings of the General Household Survey 2002 [30].

It is difficult to compare the prevalence of PTSD across studies since different methods and different diagnostic criteria are used. Only few studies have estimated the prevalence of PTSD in the general population, none of them in the UK population. The overall 1-year prevalence has varied from 0.1% in a German male population to 3.9% in a US population with intermediate rates of 1.2% in Australia, 1.3% in six European cities combined and 2.7% in Canada [31–35]. The PTSD prevalence in selected occupational groups, such as firefighters (18%), is much higher than in Armed Forces—4.6% in Australian personnel who did not deploy to the 1991 Gulf War and 5% in US Army personnel before deployment to the Iraq War, although rising to 12.9% in another group returning from Iraq [36–38]. The latter two studies used the same instrument and cut off score as we did. The PCL, using a cut off score of 50, markedly overestimates the prevalence of PTSD compared to a diagnostic interview [39,40]. The prevalence of 2.5% in our study, using the same instrument, was lower than in either the Australian or US service population and, allowing for the use of PCL rather than a diagnostic interview, lower than or comparable to general populations, and much lower than in occupational groups considered to be at high risk of trauma exposure.

Although the factors included in our analyses may not be good predictors for identifying a person with psychological illness, they are important in informing programmes of primary prevention among those groups that appear most vulnerable. Female gender was a major risk factor for our measures of psychological ill-health, but protective of excessive drinking, as reported in most studies [41]. In contrast to studies in civilian populations, our study and the previous Gulf War study found no statistically significant association between gender and PTSD [1,31,35]. The substantial gender effect found among civilians may not be present in the Armed Forces [17]. Women who enter the Armed Forces might be more resilient than women in the general population.

High GHQ and PTSD scores were associated with smoking and excessive drinking in our study. These associations are consistent with findings from other studies [42,43]. The cross-sectional design of our study does not allow us to infer the temporal relation between these health behaviour variables and psychological distress or PTSD.

Table 5. Logistic regression analysis of factors associated with PCL high scores (14 items common to both questionnaires)

	PTSD both questionnaires combined (n = 2873)	
	Adjusted OR[a] (95% CI)	P value
Service		0.02
Army	1.00	
RN	0.53 (0.27–1.0)	
RAF	0.47 (0.27–0.84)	
Gender		0.27
Male	1.00	
Female	1.42 (0.77–2.64)	
Age		0.03
Per 10 years	0.72 (0.54–0.97)	
Number of countries deployed to since 1999		0.42
0	1.00	
1	0.87 (0.49–1.55)	
>1	0.66 (0.36–1.22)	
Rank		0.02
Officer	1.00	
Other ranks	3.64 (1.23–10.76)	
Questionnaire		0.83
Full	1.00	
Abridged	1.05 (0.67–1.66)	

[a]Adjusted for each of the other independent variables.

It is possible that these behaviours are the consequence rather than the cause of psychological ill-health [43]. A sudden increase in alcohol drinking or smoking uptake in young adults may be indicative of psychological distress.

PTSD was significantly higher in other ranks than in officers, in younger than older service personnel and in the Army than the other two services. Other studies have found an association with younger age, and with education and socio-economic status, for which rank could be said to be a proxy [14,17].

Possible effects of previous deployment in our study were related to excessive alcohol intake and high physical symptoms score. Many publications have reported high scores of physical symptoms in post-deployment samples [1,5]. This has been the basis for claims that a series of environmental exposures are aetiologically linked to the physical symptoms in an undefined Gulf War syndrome. Our study would support the interpretation that multiple symptoms may be a non-specific response to deployment since the deployments included in this study did not include the 1991 Gulf War, but only deployments since 1999. There is little information available on the possible effects of deployment on excessive drinking and our results should serve as a note of warning.

In spite of the high expectation of fitness and health in the Armed Forces, this study shows a high prevalence of physical and psychological symptoms in periods of relatively low deployment activity, and before the current Iraq war. The prevalences reported here should serve as an appropriate comparison for future studies of service personnel returning from operational deployments. A series of risk factors are strongly associated with psychological ill-health, including excessive drinking and they should be taken into account in developing primary prevention programmes.

Acknowledgements

Conflicts of interest

Simon Wesseley is Honorary Civilian Advisor in Psychiatry to the British Army.

References

1. Unwin C, Blatchley N, Coker W *et al.* Health of UK servicemen who served in Persian Gulf War. *Lancet* 1999;**353:** 169–178.
2. Litz BT, Orsillo SM, Friedman MA. Posttraumatic stress disorder associated with peacekeeping duty in Somalia for U.S. military personnel. *Am J Psychiatry* 1997;154: 178–184.
3. O'Toole BI, Marshall RP, Grayson DA *et al.* The Australian Vietnam Veterans Health Study: III: psychological health of Australian Vietnam veterans and its relationship to combat. *Int J Epidemiol* 1996;**25:**331–340.
4. Barrett D, Gray G, Doebbeling B *et al.* Prevalence of symptoms and symptom based conditions among Gulf War veterans: current status of research findings. *Epidemiol Rev* 2003;**24:**218–227.
5. Cherry N, Creed F, Silman A *et al.* Health and exposures of United Kingdom Gulf War veterans: the pattern and extent of ill health. *Occup Environ Med* 2001;**58:**291–298.
6. Kang H, Mahan C, Lee K *et al.* Illnesses among State veterans of the Gulf War: a population based survey of 30,000 veterans. *J Occup Environ Med* 2000;**45:**491–501.
7. Steele L. Prevalence and patterns of Gulf War illnesses in Kansas veterans: association of symptoms with characteristics of person, place and time of military service. *Am J Epidemiol* 2000;**152:**992–1002.
8. *The Scottish Health Survey 1998.* http://www.show.scot. nhs.uk/scottishhealthsurvey/sh811-19.html (30 January 2006, date last accessed).
9. *The Health Survey for England 2003.* http://www.official-documents.co.uk/document/deps/doh/survey03/card/card31. htm#10.8 (30 January 2006, date last accessed).
10. Hyams KC. Developing case definitions for symptom-based conditions: the problem of specificity. *Epidemiol Rev* 1998;**20:**148–156.
11. Peveler R, Kilkenny L, Kinmouth AL. Medically unexplained symptoms in primary care: a comparison of self-report screening questionnaires and clinical opinion. *J Psychosom Res* 1997;**42:**245–252.
12. Kroenke K, Price RK. Symptoms in the community: prevalence, classification, and psychiatric morbidity. *Arch Intern Med* 1993;**153:**2474–2480.
13. Kang H, Natelson B, Mahan C *et al.* Post-traumatic stress disorder and chronic fatigue like illness among Gulf War veterans: a population based survey of 30,000 veterans. *Am J Epidemiol* 2003;**157:**141–148.
14. Ismail K, Blatchley N, Hotopf M *et al.* Occupational risk factors for ill health in Gulf veterans of the United Kingdom. *J Epidemiol Community Health* 2000;**54:**834–838.
15. Cherry N, Creed F, Silman A *et al.* Health and exposures of United Kingdom Gulf War veterans: the relation of health to exposure. *Occup Environ Med* 2001;**58:**299–306.
16. Kessler RC, Berglund P, Demler O *et al.* The Epidemiology of major depressive disorder: results from the National Comorbidity Survey Replication. *J Am Med Assoc* 2003; **289:**3095–3105.
17. Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *J Consult Clin Psychol* 2000;**68:**748–766.

18. Hotopf M, Wessely S. Can epidemiology clear the fog of war? Lessons from the 1990-91 Gulf War. *Int J Epidemiol* 2005;**34:**791–800.

19. Rona RJ, Jones M, French C *et al.* Screening for physical and psychological illness in the British Armed Forces: I the acceptability of the programme. *J Med Screen* 2004;**11:**148–153.

20. Rona RJ, Hooper R, Jones M *et al.* Screening for physical and psychological illness in the British Armed Forces: III the value of a questionnaire to assist a Medical Officer to decide who needs help. *J Med Screen* 2004;**11:**158–161.

21. Forbes D, Creamer M, Biddle D. The validity of the PTSD checklist as a measure of symptomatic change in combat related PTSD. *Behav Res Ther* 2001;**39:**977–986.

22. Goldberg D, Williams P. *A Users Guide to the General Health Questionnaire.* Windsor, UK: NFER-Nelson, 1988.

23. Barbor TF, Higgins-Biddle JC, Saunders JB *et al. The Alcohol Use Disorders Test: Guidelines for Use in Primary Care,* 2nd edn. Geneva: World Health Organisation, 2001.

24. Goldberg D, Gater R, Sartorius N *et al.* The validity of two versions of the GHQ in the WHO study of mental illness in general health care. *Psychol Med* 1997;**27:**191–197.

25. Collins PA, Gibbs ACC. Stress in police officers: a study of the origins, prevalence and severity of stress-related symptoms within a county police force. *Occup Med (Lond)* 2003;**53:**256–264.

26. Frueh BC, Hamner MB. Apparent symptom overreporting in combat veterans evaluated for PTSD. *Clin Psychol Rev* 2000;**20:**853–885.

27. Burbeck R, Coomber S, Robinson SM *et al.* Occupational stress in consultants in accident and emergency medicine: a national survey of levels of stress at work. *Emerg Med J* 2002;**19:**234–238.

28. Katon W, Lin E, von Korff M *et al.* Somatization: a spectrum of severity. *Am J Psychiatry* 1991;**148:**34–40.

29. *Statistical Bulletin 2003/20: Statistics on alcohol: England, 2003.* http://www.publications.doh.gov.uk/public/sb0320.htm (30 January 2006, date last accessed).

30. *Living in Britain: Results from the 2002 General Household Survey.* http://www.statistics.gov.uk/lib2002/ (30 Jan 2006, date last accessed).

31. Perkonnigg A, Kessler RC, Storz S *et al.* Traumatic events and post-traumatic stress disorder in the community: prevalence, risk factors and comorbidity. *Acta Psychiatr Scand* 2000;**101:**46–59.

32. Kessler RC, Zhao S, Katz SJ *et al.* Past year use of outpatient services for psychiatric problems in the National Comorbidity Survey. *Am J Psychiatry* 1999;**156:**115–123.

33. Creamer M, Burgess P, McFarlane AC. Post-traumatic stress disorder: findings from the Australian National Survey of mental health and well-being. *Psychol Med* 2001;**31:**1237–1247.

34. The ESEMeD/MHEDEA 2000 Investigators. Prevalence of mental disorders in Europe: results from the European Study of Mental Disorders (ESEMeD) project. *Acta Psychiatr Scand* 2004;**109:**21–27.

35. Stein MB, Walker JR, Hazen AL *et al.* Full and partial posttraumatic stress disorder: findings from a community survey. *Am J Psychiatry* 1997;**154:**1114–1119.

36. Wagner D, Heinrichs M, Ehlert U. Prevalence of symptoms of posttraumatic stress disorder in German professional firefighters. *Am J Psychiatry* 1998;**155:**1727–1732.

37. McKenzie DP, Ikin JF, MacFarlane AC *et al.* Psychological health of the 1991 Gulf War: an assessment using the SF-12, GHQ-12 and PCL-S. *Psychol Med* 2004;**34:**1419–1430.

38. Hoge CW, Castro CA, Messer SC *et al.* Combat duties in Iraq and Afghanistan, mental health problems, and barriers to care. *N Engl J Med* 2004;**351:**13–22.

39. Ikin JF, Sim MR, Creamer M *et al.* War-related psychological stressors and risk of psychological disorders in Australian veterans of the 1991 Gulf War. *Br J Psychiatry* 2004;**185:**116–126.

40. Bliese P, Wright K, Adler A *et al. Screening for stress among redeploying soldiers.* http://www.usamru-e.hqusareur.army.mil/Traumatic%20Stress%20Screen%20Validation%20Report1.pdf (30 January 2006, date last accessed).

41. Sieri S, Agudo A, Kesse E *et al.* Patterns of alcohol consumption in 10 European countries participating in the European Prospective Investigation into Cancer and Nutrition (EPIC) project. *Public Health Nutr* 2002;**5:**1287–1296.

42. The Scottish Health Survey 1995. http://www.archive.official-documents.co.uk/document/scottish/shealth/shhm.htm (30 Jan 2006, date last accessed).

43. Ismail K, Sloggett A, de Stavola B. Do common mental disorders increase cigarette smoking? Results from five waves of a population-based panel cohort study. *Am J Epidemiol* 2000;**152:**651–657.