Self-Reported Health of Persian Gulf War Veterans: A Comparison of Help-Seeking and Randomly Ascertained Cases

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The objective of this study was to compare self-selected Persian Gulf War veterans attending a health assessment program with veterans ascertained in an epidemiological study to determine why Gulf War veterans do, or do not, present for clinical assessment. A postal survey was sent to randomly selected United Kingdom Armed Forces personnel who served in the Persian Gulf conflict. Outcome measures included a symptom checklist, health perception, physical functioning, psychological distress, post-traumatic stress symptoms, and health attributions. A total of 173 survey respondents had also attended the Medical Assessment Program (MAP). MAP attendees were more likely to be female, older, and working part time or not working at all. They had poorer health perception and reported higher levels of illness, and they differed in terms of their health attributions. The belief that one had Gulf War syndrome and attributing health problems to Gulf War service were the most powerful predictors of MAP attendance, even when controlling for the level of physical functioning. The findings suggest that health beliefs rather than symptoms are more important predictors of attendance of an assessment program and that Gulf War veterans who attended the MAP have different characteristics than those who did not. This suggests that MAP patients are unrepresentative of the wider deployment to the Persian Gulf.

Introduction

Since their return from the 1991 Persian Gulf War, many veterans have reported a range of medical complaints. In response, the United Kingdom Ministry of Defense established the Medical Assessment Program (MAP) to assess the health of those who believed that they had been affected by Gulf War service. Since its inception in 1993, more than 3,000 veterans have attended the program, now based at St. Thomas' Hospital in London. Demographic and clinical characteristics of the first[1] and second[2] 1,000 veterans have been published. Nearly all veterans were symptomatic, the most common symptoms being affective problems, fatigue, joint/muscle pains, cognitive problems, and headaches. Although a number of veterans had a condition for which no diagnosis could be made, common conditions included musculoskeletal diseases, behavioral disorders, skin or respiratory diseases, and diseases of the nervous system. Many were also diagnosed with a psychiatric condition, largely post-traumatic stress disorder. Results from a similar program in the United States resemble these findings, which indicate no specific illness or pattern of illness among Gulf War veterans.[3]

A number of epidemiological studies have been commissioned to investigate Gulf War veterans' illnesses, based on randomly selected samples representative of Gulf War veterans. We have previously reported the results of a postal survey investigating the health of military personnel in which we found increased rates of ill health on all outcome measures in veterans of the Gulf War compared with personnel deployed to Bosnia and nondeployed personnel.[4] Again, similar results have been reported from the United States.[5]

The relationship between the random samples of the epidemiological studies and the self-selected patients participating in clinical programs is not known. In a nonmilitary study of chronic fatigue syndrome (CFS) patients, a group referred to a specialist unit scored more poorly on self-reported physical outcome measures compared with those seen in a primary care setting, who tended to score more poorly in terms of psychological measures. The two groups also differed significantly in terms of the types of illness attributions.[6] In this study, we were able to compare questionnaire respondents who also attended the MAP (MAP group) with those who did not (non-MAP group) on outcome measures included in our survey to determine the characteristics of those who seek help and those who do not. We predicted that patients of the MAP group would report higher rates of ill health and have different health attributions than their non-MAP counterparts.

Methods

A cross-sectional postal survey was mailed to a randomly selected sample of United Kingdom Armed Forces personnel who were deployed to the Persian Gulf between September 1, 1990, and June 30, 1991. Three mailings were conducted between July 1997 and December 1998. A total of 69.9% (N = 3,529) returned the completed questionnaire, of whom 173 had also attended the MAP before June 30, 2000. This study forms part of a larger epidemiological study in which two comparison cohorts were included: a group that served in Bosnia and a group that served in the military at the time of the Gulf War but did not serve in either theater (Era cohort). Details of sampling and tracing methods and response rates have been reported previously.[4]

The questionnaire asked for information regarding demographic factors, lifestyle, and military background. It included some questions regarding health beliefs and attributions, such as the following: "Do you think you have Gulf War syndrome?"; "Have you experienced a change in functioning since the Gulf War?"; and "Do you think any of these symptoms have been

caused by serving in the Gulf?." It also contained several measures of current health status, including a checklist of 50 symptoms,[7] a checklist of 39 medical disorders, a fatigue questionnaire,[8] the General Health Questionnaire (GHQ-12; a measure of psychiatric morbidity),[9] and two subscales of the Medical Outcomes Study Short Form-36 (SF-36)[10]: health perception and physical functioning. Information regarding self-reported chemical sensitivity was sought, and an approximation of post-traumatic stress disorder was created, which we refer to as post-traumatic stress reaction (PTSR; see Unwin et al.[4] for further information). Conventional cutoffs for the fatigue questionnaire (three-fourths), GHQ-12 (two-thirds), and chemical sensitivity (three-fourths) were used to identify respondents as "cases." Symptoms and conditions were taken as continuous variables, and the health perception score (0–100) was recoded into units of 10 (0–10, 11–20, 21–30, etc).

Participants were classified as having poor, middle, or good health according to their responses to the SF-36 physical functioning subscale. The cutoff point was set at the value identifying the lowest 10% of the Era cohort, which was then applied to the Gulf and Bosnia cohorts. Thus, those scoring less than 72.2 were classified as having poor functioning. Those scoring a perfect 100 were classified as having good functioning. The middle functioning group comprised those whose scores fell between these two values.

Data were analyzed using confidence interval analysis and SPSS. Two sets of analyses were performed. First, MAP attendees (n = 173) were compared with the Gulf War veterans who had not attended the MAP (n = 3,356) on a number of health outcome measures. This comparison was then repeated, restricting the analysis to poor and middle health groups only (MAP, n = 122; non-MAP, n = 1,251) (note that some missing values existed for this variable). This was done because we reasoned that most MAP attendees would have some health concerns, and we were interested in the prediction of attendance when comparing them with nonattendees who also had potential health problems. Odds ratios and 95% confidence intervals were used to examine the associations between MAP attendance and demographic and lifestyle variables as well as between health outcome and health belief variables. Logistic regression analysis was performed for the latter to control for potential confounders such as age, gender, rank, education, and physical functioning.

Results

The mean age (as calculated at the time of completion of the survey) of the overall MAP group was 36.5 years (range, 25–58 years). Thirteen veterans (7.5%) were Royal Navy, 48 (27.6%) were Army, 2 (1.1%) were Royal Marines, and 12 (6.9%) were Royal Air Force personnel. Females constituted 12.1% of this group (n = 21).

Analysis 1: MAP vs. Non-MAP—All Health Groups

Table I lists the results for demographic variables. The results from the first set of analyses in which all health groups were included are examined first. Individuals who had been medically discharged from service were almost three times more likely to attend the MAP, and females were twice as likely to attend. MAP attendees were less likely to be educated to O-level standard, were more likely to be working part time or not working at all, and consumed less alcohol. No significant differences were found between the two groups with regard to marital status, rank, and current smoking. Table II indicates that the MAP group (mean age = 36.5 years) was older than the non-MAP group (mean age = 34.4 years), but this difference just reaches statistical significance.

The odds ratios and corrected odds ratios with 95% confidence intervals for a number of health belief and health outcome variables for this analysis are shown in Tables II and III. The corrected odds ratios indicated that even when controlling for possible confounders, including physical functioning, veterans who thought they had Gulf War syndrome (corrected odds ratio = 8.6, 95% confidence interval = 5.5–13.4), those who had experienced a change in functioning since the Gulf War (corrected odds ratio = 6.3, 95% confidence interval = 3.7–10.6), and those who attributed their symptoms to Gulf War service (corrected odds ratio = 6.9, 95% confidence interval = 3.7–12.8) were considerably more likely to attend the MAP.

The odds ratios for the health outcomes were smaller, although still significant. For instance, GHQ cases were nearly twice as likely, and fatigue and PTSR cases were nearly three times more likely, to attend the MAP after controlling for confounders. Similarly, the MAP group reported, on average, twice as many symptoms and conditions as the non-MAP group. Table II indicates that the odds of becoming a MAP attendee increased 7% for every additional symptom reported and 23% for every additional condition reported. The MAP group (mean score = 74.5) scored more poorly than the non-MAP group (mean score = 92.0) on the physical functioning subscale of the SF-36. They also had poorer health perception as measured by the SF-36. This is a continuous variable measured from 0 to 100, but for the purpose of analysis, we recoded it into units of 10. For each step increase in health perception, the likelihood of attending the MAP decreased by 27%. The odds ratio for chemical sensitivity was nonsignificant.

Analysis 2: MAP vs. Non-MAP—Poor and Middle Health Groups Only

Removing veterans with a high (good) score on the SF-36 physical functioning subscale from both groups, the MAP group remained older (mean age = 37.6 years) than the non-MAP group (mean age = 35.0 years) (again this was borderline significant; see Table II). Table I gives the results for a number of demographic variables for this set of analyses. The MAP group was still less likely to be educated to O-level standard and consumed less alcohol than their non-MAP counterparts. They were also more than three times more likely to work part time or not to be working, although the odds ratio for not working decreased from 4.9 to 3.5 for the poor and middle health groups. Females were 2.4 times more likely to attend the MAP, a slight increase from the original analysis. However, when the analysis was focused on middle and poor physical functioning groups only, the effect of medical discharge on MAP attendance disappeared. As in Analysis 1, no differences were found between the MAP and non-MAP groups with regard to marital status, rank, and current smoking.

Tables II and III detail the odds ratios for a number of health belief and health outcome variables pertaining to the analysis

TABLE I

PERCENTAGES AND ODDS RATIOS FOR DEMOGRAPHIC AND LIFESTYLE DATA FOR MAP AND NON-MAP GROUPS (UNIVARIATE ANALYSIS)

	Analysis 1			Analysis 2		
	MAP (n = 173)	Non-MAP (n = 3,356)	Odds Ratios	MAP (n = 122)	Non-MAP (n = 1,251)	Odds Ratios
Gender						
Male	152 (87.9%)	3,141 (93.6%)	1	105 (86.1%)	1,173 (93.8%)	1
Female	21 (12.1%)	215 (6.4%)	2.0 (1.3, 3.3)	17 (13.9%)	78 (6.2%)	2.4 (1.4, 4.3)
Marital status						
Married/living as married	128 (74.0%)	2,499 (74.9%)	1	89 (73.0%)	903 (72.9%)	1
Never married	26 (15.0%)	539 (16.2%)	0.9 (0.6, 1.5)	19 (15.6%)	194 (15.7%)	1.0 (0.6, 1.7)
Separated/divorced/widowed	19 (11.0%)	297 (8.9%)	1.3 (0.8, 2.1)	14 (11.5%)	142 (11.5%)	1.0 (0.6, 1.8)
Educational attainment						
Below O level	45 (27.8%)	600 (18.4%)	1	37 (32.5%)	252 (21.0%)	1
O level	80 (49.4%)	1970 (60.4%)	0.5 (0.4, 0.8)	54 (47.4%)	740 (61.6%)	0.5 (0.3, 0.8)
A level and above	37 (22.8%)	692 (21.2%)	0.7 (0.5, 1.1)	23 (20.2%)	210 (17.5%)	0.7 (0.4, 1.3)
Employment status						
Full time	125 (74.4%)	3,043 (92.4%)	1	80 (68.4%)	1,081 (88.4%)	1
Part time	14 (8.3%)	105 (3.2%)	3.3 (1.8, 5.8)	12 (10.3%)	45 (3.7%)	3.6 (1.8, 7.1)
Not working	29 (17.3%)	145 (4.4%)	4.9 (3.2, 7.5)	25 (21.4%)	97 (7.9%)	3.5 (2.1, 5.7)
Rank						
Other ranks	36 (21.4%)	634 (19.7%)	1	31 (26.5%)	266 (22.3%)	1
Noncommissioned officers	111 (66.1%)	2,130 (66.3%)	0.9 (0.6, 1.4)	72 (61.5%)	805 (67.5%)	0.8 (0.5, 1.2)
Officers	21 (12.5%)	450 (14.0%)	0.8 (0.5, 1.4)	14 (12.0%)	121 (10.2%)	1.0 (0.5, 1.9)
Weekly alcohol consumption						
None	25 (14.5%)	283 (8.5%)	1	22 (18.2%)	135 (10.9%)	1
1–10 units	102 (59.3%)	1,877 (56.2%)	0.6 (0.4, 1.0)	71 (58.7%)	696 (55.9%)	0.6 (0.4, 1.1)
11–20 units	28 (16.3%)	741 (22.2%)	0.4 (0.3, 0.7)	18 (14.9%)	256 (20.6%)	0.4 (0.2, 0.8)
21+ units	17 (9.9%)	436 (13.1%)	0.4 (0.2, 0.8)	10 (8.3%)	157 (12.6%)	0.4 (0.2, 0.9)
Currently smoke						
No	47 (37.9%)	919 (43.3%)	1	30 (34.9%)	345 (39.0%)	1
Yes	77 (62.1%)	1,202 (56.7%)	1.3 (0.9, 1.8)	56 (65.1%)	539 (61.0%)	1.2 (0.8, 1.9)
Medically discharged from service						
No	92 (90.2%)	1,455 (96.2%)	1	70 (89.7%)	616 (93.6%)	1
Yes	10 (9.8%)	58 (3.8%)	2.7 (1.4, 5.5)	8 (10.3%)	42 (6.4%)	1.7 (0.8, 3.7)

Analysis 1 included all health groups as defined by the SF-36 physical functioning subscale. Analysis 2 was restricted to poor and middle functioning groups only.

TABLE II

MEAN, SD VALUES, AND ODDS RATIOS FOR AGE AND CONTINUOUS ILLNESS VARIABLES

	Analysis 1			Analysis 2		
	MAP	Non-MAP	Odds Ratios	MAP	Non-MAP	Odds Ratios
Age (years)[a,b]	36.5 (7.2)	34.4 (6.8)	1.04 (1.02, 1.06)	37.6 (7.6)	35.0 (7.3)	1.05 (1.02, 1.07)
SF-36 physical functioning[b,c]	74.5 (26.8)	92.0 (15.2)	0.69 (0.65, 0.74)	64.9 (25.6)	79.0 (18.3)	0.76 (0.70, 0.82)
Number of symptoms[d]	20.5 (11.0)	10.3 (9.1)	1.07 (1.05, 1.09)	23.4 (9.9)	15.2 (9.6)	1.07 (1.05, 1.10)
Number of conditions[d]	4.5 (3.3)	2.2 (2.2)	1.23 (1.15, 1.31)	5.4 (3.4)	3.2 (2.4)	1.24 (1.15, 1.34)
SF-36 health perception[c,d]	40.0 (27.8)	67.1 (24.3)	0.73 (0.67, 0.80)	29.1 (21.6)	50.4 (23.6)	0.71 (0.63, 0.79)

[a] Assessed at the time of completion of the survey.

[b] Unadjusted figures.

[c] Odds ratios were calculated on the basis of the continuous scale of 0 to 100, grouped into tens (0–10, 11–20, 21–30, etc.).

[d] Controlling for age (assessed at the time the survey was completed), gender, rank, education, and physical functioning (as measured by the SF-36).

restricted to poor and middle functioning groups. As in Analysis 1, those who believed that they were suffering from Gulf War syndrome, those who had experienced a change in functioning since the Gulf War, and those who attributed their symptoms to Gulf War service were far more likely to seek help, even accounting for the level of physical functioning. Furthermore, corrected odds ratios of 9.5, 8.7, and 14.0, respectively, indicated that the associations between each of these variables and MAP attendance had strengthened considerably from the original analysis, which included individuals with a good physical functioning scores.

The associations between MAP attendance and being a fatigue or GHQ case also increased when restricting the analysis to poor and middle functioning groups, although to a far lesser extent.

TABLE III

PERCENTAGES, ODDS RATIOS, AND CORRECTED ODDS RATIOS FOR CATEGORICAL HEALTH BELIEF AND ILLNESS VARIABLES FOR MAP AND NON-MAP GROUPS

	Analysis 1 (n = 3,529)				Analysis 2 (n = 1,373)			
	MAP	Non-MAP	Odds Ratios	Corrected Odds Ratios[a]	MAP	Non-MAP	Odds Ratios	Corrected Odds Ratios[a]
Thinks he/she has Gulf War syndrome								
No	43 (32.1%)	2,401 (85.1%)	1	1	18 (19.1%)	704 (72.5%)	1	1
Yes	91 (67.9%)	422 (14.9%)	12.0 (8.3, 17.6)	8.6 (5.5, 13.4)	76 (80.9%)	267 (27.5%)	11.1 (6.5, 19.0)	9.5 (5.3, 17.0)
Experienced a change in functioning since the Gulf War								
No	19 (11.0%)	1,775 (54.9%)	1	1	4 (3.3%)	356 (29.5%)	1	1
Yes	154 (89.0%)	1,461 (45.1%)	9.9 (6.1, 15.9)	6.3 (3.7, 10.6)	118 (96.7%)	850 (70.5%)	12.4 (4.5, 33.7)	8.7 (3.2, 24.1)
Believes symptoms caused by service in the Gulf War								
No	12 (8.1%)	1,291 (47.4%)	1	1	3 (2.8%)	318 (30.3%)	1	1
Yes	137 (91.9%)	1,431 (52.6%)	10.3 (5.7, 18.7)	6.9 (3.7, 12.8)	105 (97.2%)	732 (69.7%)	15.2 (4.8, 48.3)	14.0 (4.3, 45.6)
Chemical sensitivity (cutoff 4)								
Non-case	79 (82.3%)	1,357 (89.7%)	1	1	63 (81.8%)	599 (85.3%)	1	1
Case	17 (17.7%)	155 (10.3%)	1.9 (1.1, 3.3)	1.1 (0.6, 2.1)	14 (18.2%)	103 (14.7%)	1.3 (0.7, 2.4)	1.0 (0.5, 1.9)
Fatigue								
Non-case	36 (21.6%)	1,763 (54.7%)	1	1	12 (10.3%)	383 (32.1%)	1	1
Case	131 (78.4%)	1,460 (45.3%)	4.4 (3.0, 6.4)	2.8 (1.8, 4.3)	105 (89.7%)	810 (67.9%)	4.1 (2.3, 7.6)	3.6 (1.8, 6.9)
GHQ								
Non-case	57 (33.7%)	2,020 (62.0%)	1	1	23 (19.5%)	533 (44.3%)	1	1
Case	112 (66.3%)	1,238 (38.0%)	3.2 (2.3, 4.4)	1.9 (1.3, 2.8)	95 (80.5%)	671 (55.7%)	3.3 (2.1, 5.3)	2.6 (1.6, 4.4)
PTSR								
Non-case	108 (62.8%)	2,948 (88.1%)	1	1	70 (57.9%)	994 (79.6%)	1	1
Case	64 (37.2%)	398 (11.9%)	4.4 (3.2, 6.1)	2.9 (2.0, 4.3)	51 (42.1%)	254 (20.4%)	2.9 (1.9, 4.2)	2.5 (1.6, 3.8)

Numbers differ in each analysis because of missing values.

[a] Controlling for age (assessed at the time the survey was completed), gender, rank, education, and physical functioning (as measured by the SF-36).

In agreement with the previous analysis, the MAP group reported more symptoms and conditions than the non-MAP group, although the mean difference between groups for symptoms had decreased slightly. Similarly, the mean difference between scores on both the physical functioning and health perception subscales for each group was reduced, although the MAP group still had significantly poorer scores. Indeed, an examination of the corrected odds ratios indicated that the strength of the associations between health perception and number of reported symptoms and conditions and MAP attendance mirrored that presented in the original analysis. The likelihood of attending the MAP increased by 7% for every additional symptom and by 24% for every additional condition reported, and for each step increase in health perception, the odds of MAP attendance decreased by 29%. Again, no significant difference was found between groups on the self-reported chemical sensitivity measure.

Discussion

This study aimed to place those self-selected Gulf War veterans attending the MAP in the context of a randomly selected cohort of Gulf War veterans. The purpose was to provide an understanding of why veterans do and do not present for medical assessment. This was done by comparing serving and ex-serving military personnel of the Gulf War who did and did not attend the MAP on outcome measures in our survey.

Methodological limitations must be considered. First, self-reported data were used, the associated biases of which have been well documented.[11] It is also important to remember that the survey data are up to 4 years old. A follow-up study of a small, randomly selected sample of survey respondents[12] suggested that the health of the sample had improved. Indeed, 40% of those originally classified as "ill" by the SF-36 were classified as "well" in the follow-up study. Therefore, if respondents had completed a questionnaire more recently, the analysis may have yielded different results. Individuals who attended the MAP after June 2000 are not included in the MAP sample, and it is possible that individuals classified as non-MAP for the purpose of this study have since attended the MAP. The health of MAP attendees who had not completed a survey is also not known.

Our findings indicate that MAP attendees are not randomly selected from the entire cohort of Gulf War veterans. For both sets of analyses performed, we found that being female, working part time or not working at all, and being educated to below O-level standard were all associated with MAP attendance. Marital status, rank, and current smoking, however, were not predictors, and being medically discharged lost significance when the healthy group was removed from the analyses. With regard to the health outcome measures, self-reported ill health proved to be predictive of MAP attendance. Given that the MAP and similar programs aim to target veterans with postdeployment health problems, the MAP is achieving its purpose.

The odds ratios for all of the significant health outcome and belief variables increased when the healthy group was removed from the analysis, with the exception of PTSR. This suggests that the association between outcome variables and MAP attendance is more prominent among poorer-functioning groups. However, the fact that the high-functioning group also reported symptoms and believed that their health had been affected by Gulf War service may indicate a "ceiling" effect, because the SF-36 physical functioning outcome rarely shows impairment in a young, previously fit sample such as this. Alternatively, it is possible that believing that one has a Gulf War illness is not inevitably related to physical disability.

Being older and female, among other demographic and service factors, were also found to be associated with participation in the Veterans Affairs Persian Gulf Veterans Health Registry and the Comprehensive Clinical Evaluation Program (CCEP) in the United States.[13] Another study of 20,000 Gulf War veterans who had attended the CCEP reported that the program included a higher proportion of females and older veterans compared with U.S. Gulf War veterans as a whole.[3] However, the psychosocial determinants of attendance of these types of health programs were not considered.

Indeed, although the current study finds an association between ill health and MAP attendance, we report a much stronger association with health attribution variables. Believing that one's health has been affected by Gulf War service and thinking that one has Gulf War syndrome were far more powerful predictors. Furthermore, the help-seeking group (MAP) differed from non-help-seekers (non-MAP) in terms of their health attributions despite controlling for the level of physical functioning. This suggests that, rather than attracting veterans with ill health in general, the MAP is assessing those who attribute their health problems directly to Gulf War service.

Gender differences in morbidity and health care utilization in nonmilitary populations are well documented. It has been found, for example, that females report an excess of symptoms and exhibit higher rates of medical service utilization.[14] Although medical service utilization was found to increase with increased number of symptoms reported and age, females had a higher medical utilization rate in all symptom-reporting groups and in nearly all age groups. However, a study of CFS patients who had been seen in a primary care setting and a specialized unit did not find a higher proportion of women in the referred group.[6] Furthermore, although the referred group, like the MAP group, tended to score more poorly on physical health outcomes, the primary care group had poorer psychological outcomes, a finding not replicated here.

These discrepancies may be explained by the fact that the help-seeking group in the CFS study had been medically referred, whereas many in the MAP group were self-referred. It was also reported that the primary care group was more likely to attribute its fatigue to psychological or psychosocial causes. In contrast, CFS patients attending a specialized unit were more likely to believe in a physical cause, providing support for the differences in the illness attributions of help-seekers and non-help-seekers found in the current study.

Conclusions

The findings from the current study suggest that beliefs about health are more important in precipitating attendance of a health program than ill-health (measured by symptoms) per se. However, it is important to remember that the MAP, and the CCEP in the United States, were set up specifically for those concerned about their health in the light of considerable media attention. This study demonstrates that Gulf War veterans who attended the MAP have different characteristics from those who

did not attend and are a subsample of Gulf War veterans who have specific views about the link between Gulf War service and health. This has implications for scientific and research policy. If the MAP sample did not differ from the epidemiological samples, then research on these self-selected samples could be generalized to the wider population. Because they do differ, the necessity for the more difficult and expensive epidemiological surveys is emphasized.

Acknowledgments

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