

Is the increased reporting of symptomatic ill health in Gulf War veterans related to how one asks the question?

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Abstract

Background: Following the 1991 Gulf War (GW) there was much controversy surrounding service-related health effects. Evidence from the Vietnam experience suggested that self-reported ill health following that conflict might be related to how service during the conflict is framed. The aim of this article is to determine if a GW health effect persisted when the same questions were asked in a “non-GW” context. **Method:** Prevalence of physical and psychological health problems were ascertained in a study assessing health screening from a random sample of UK Armed Forces. Record linkage between the screening survey and service history was conducted to obtain

information on participation in the GW. **Results:** Differences in health outcomes were found between the GW and the non-GW groups. This difference existed for symptomatic measures (OR=1.84, 95% CI, 1.17–2.91) rather than psychological or behavioral measures. No differences were found in psychological measures such as PTSD or behavioral measures such as alcohol consumption. Those deployed to the GW had a poorer self-perception of health (OR=1.47, 95% CI 1.02–2.11). **Conclusions:** Even in the absence of framing, a Gulf-related ill health effect was found.

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Introduction

The debate into the existence of the “Gulf War (GW) syndrome” following the 1991 GW is a contentious issue. Numerous studies have concluded that, overall, those who served in the 1991 GW report increased levels of ill health as compared to control groups. Study groups have reported this from the United States, Canada, Australia, and the UK [1–6]. We are not aware of any exceptions. There is however, a near consensus that this does not represent a new syndrome [7]. However, there is no consensus as to why there is elevated reporting of ill health. Despite considerable efforts, no single cause or mechanism exists to explain these

findings. There is no evidence of excess mortality other than accidents, nor of any significant increase in conventional biomedical outcomes to explain these findings.

The possibility must therefore be considered that this represents a reporting bias, with GW veterans being more likely to report symptoms than the rest in the Armed Forces. Furthermore, we can argue that all the studies so far might have encouraged this. Every study has been commissioned after there has been intense media activity around the so-called GW syndrome. In every study the comparison group, those who were not deployed to the Gulf, were aware that they were not the study group of interest.

It has been shown that the effect of question framing can influence levels of self-reported service-related stress disorder [8]. LaGuardia et al. demonstrated that Vietnam veterans report lower prevalence of stress disorder when the questionnaire asking about their service experiences was framed positively rather than negatively. Subjects were

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assigned to either a positively or a negatively framed group and asked to complete a health questionnaire. The introduction to this questionnaire was either positive toward service in Vietnam or negative (associating service with ill health). While one might not expect a difference, numerous studies have found that the effect of framing a question as a loss rather than a gain affects the reporting of behavior [9,10]. Further, evidence suggests that questions based upon symptomatic rather than psychological measures are influenced more by the effects of question framing [11,12]. McElroy and Seta accessed the use of heuristic processing in the context of framing. They reported that the language used to describe options greatly influenced the decision maker's choice.

The very nature of using self-reported questionnaires to record levels of health and well-being in GW veterans is subjective and adds supports the argument of LaGuardia et al that framing the experience of war negatively will increase levels of self-reported symptoms.

The purpose of this article is to see if the increased level of self-reported health problems associated with GW veterans persists when the confounding variable of question framing is removed. To do this we have taken advantage of an opportunity that arose during the conduct of a study of screening for psychological and physical health of the UK Armed Forces. In this study we asked similar questions to those asked during the conduct of our past GW studies, but on this occasion there was no mention of the GW, personnel were not asked about their 1991 service history and would not have associated their recruitment to the study with their deployment history.

Method

The data were collected during a study to develop and evaluate screening questionnaires to detect physical and psychological ill health in the UK Armed Forces [13].

In brief, a two-stage sampling strategy was employed. A random sample of 100 units from the three services was selected, stratified by service and size of unit, and then 45 individuals were randomly selected from each unit. The units were assigned to two groups—half receiving a full screening questionnaire and half receiving an abridged questionnaire. Each service contributed in approximate proportion to its strength, exactly as in our other GW studies.

The full questionnaire included the civilian version of the PTSD checklist (PCL) [14], the 12-item version of the General Health Questionnaire (GHQ-12) as a measure of psychological distress [15], questions 1 and 2 (modified to include a higher category of units consumed), and 10 from the World Health Organization Alcohol Use Disorders Identification Test [16], and 15 somatic symptoms selected from those used in our GW studies [4]. The symptoms were selected from the original list of 50 to represent those with high, middle, and low prevalence and omitting those

included in other parts of the questionnaire. 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 [13]. We excluded questions on alcohol from the abridged questionnaire. As in our previous Gulf studies, a question on general health perception categorized into excellent, very good, good, fair, and poor was included in both questionnaires. Information was also obtained about gender, age, and rank.

Table 1 shows the definition of high score on each scale for this analysis. As many of the symptoms could be explained by recent cold or flu, food poisoning, or recent intense physical activity, participants were asked to indicate symptoms for which there was such an explanation. Only symptoms for which no treatment or explanations were given contributed to the final score. We used a score of 50 or over as cutoff point for the PCL-17 [14,17]. A cutoff point of alcohol intake well above prevailing recommendations was used to define excessive alcohol consumption. Participants were assured that taking part was voluntary and that their responses were confidential.

After data collection was finished, we carried out a record linkage of service history to determine who had or had not served in the 1991 GW. This was done by the Defence Analyst Services Agency, which maintains a complete registry of all who served in the 1991 GW.

Characteristics of GW and non-GW veterans were compared using χ^2 tests for service, rank, and gender, and a Mann–Whitney test for age. Logistic regression was used to calculate odds ratios for comparing the prevalence of health problems in GW and non-GW veterans, adjusting for length of questionnaire. Odds ratios were calculated with and without adjustment for service, rank, gender, and age. All analyses were carried out using Stata 7 (Stata Corporation, College Station, TX).

Results

From the original sample frame ($n=2873$), record linkage could be performed for 1647 subjects. Of these

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 4/5	GHQ-4 score 1/2
PCL	17 items score of 50 or more	14 items score >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

Table 2
Characteristics of GW and non-GW (NGW) veterans

	NGW (%)	GW (%)	P value
	n=308	n=1339	
Service			<.001
Army	37.0	60.1	
Navy	29.6	17.5	
RAF	33.4	22.4	
Officers	23.8	21.4	.37
Male	95.2	99.4	.001
Age			.75
Median	36	36	
Interquartile range	33–40	33–39	

1647 subjects, 308 (18.7%) had served in the Gulf and 1339 (81.3%) had not. There were no differences in age distribution or rank between these groups (Table 2). A Mann–Whitney test for age showed a positively skewed distribution. Differences were found between the groups for service and gender. Appropriate adjustment was made for this in the analysis and used throughout the results (Table 3).

Table 3
Health problems identified in GW and non-GW (NGW) veterans

	Problems identified on Full questionnaire				Problems identified on Abridged questionnaire				Comparison of GW and NGW ^a					
	NGW (n=622)		GW (n=149)		NGW (n=717)		GW (n=159)		Unadjusted odds ratio ^b			Adjusted odds ratio ^c		
	n	%	n	%	n	%	n	%	OR	95% CI	P	OR	95% CI	P
Health perception	78	12.5	28	18.8	72	10.0	21	13.2	1.49	1.05–2.12	.025	1.47	1.02–2.11	.037
GHQ	107	17.2	28	18.8	132	18.4	24	15.1	0.94	0.67–1.30	.69	0.93	0.66–1.30	.66
Alcohol	41	6.6	11	7.4					1.13	0.57–2.25	.73	0.95	0.46–1.94	.89
PTSD	12	1.9	1	0.7	13	1.8	2	1.3	0.52	0.16–1.72	.28	0.42	0.12–1.42	.16
Symptoms	45	7.2	21	14.1	31	4.3	10	6.3	1.85	1.19–2.86	.006	1.84	1.17–2.91	.009
Individual symptoms														
Chest pain	30	4.8	25	16.8	28	3.9	9	5.7	2.73	1.75–4.25	<.001	2.50	1.58–3.96	<.001
Pain on passing urine	9	1.4	1	0.7	9	1.3	2	1.3	0.72	0.21–2.46	.60	0.76	0.22–2.68	.67
Fatigue	201	32.3	64	43.0	146	20.4	34	21.4	1.33	1.01–1.74	.043	1.37	1.03–1.81	.029
Joint stiffness	109	17.5	38	25.5	77	10.7	26	16.4	1.62	1.18–2.22	.003	1.53	1.10–2.12	.011
Pain, without swelling or redness, in several joints	66	10.6	23	15.4	43	6.0	16	10.1	1.62	1.10–2.40	.015	1.60	1.07–2.39	.023
Feeling feverish	14	2.3	8	5.4					2.46	1.01–5.99	.046	2.66	1.05–6.73	.039
Feeling unrefreshed after sleep	244	39.2	77	51.7					1.66	1.16–2.37	.006	1.83	1.26–2.65	.002
Nausea (feeling sick but not vomiting)	34	5.5	14	9.4					1.79	0.94–3.44	.078	1.94	0.98–3.84	.056
Lump in throat	15	2.4	11	7.4					3.23	1.45–7.18	.004	3.21	1.39–7.41	.006
Diarrhea	32	5.1	23	15.4					3.37	1.90–5.95	<.001	3.18	1.76–5.76	<.001
Sore throat	40	6.4	18	12.1					2.00	1.11–3.60	.021	1.93	1.04–3.56	.036
Forgetfulness	128	20.6	57	38.3					2.39	1.63–3.51	<.001	2.53	1.69–3.77	<.001
Vomiting	7	1.1	1	0.7					0.59	0.07–4.86	.63	0.58	0.07–4.99	.62
Unintended weight loss greater than 10lbs	7	1.1	4	2.7					2.42	0.70–8.39	.16	1.82	0.50–6.57	.36
Ringing in the ears	58	9.3	25	16.8					1.96	1.18–3.26	.009	1.82	1.08–3.10	.026

^a Data from full and abridged questionnaires combined where available.

^b Adjusted for length of questionnaire (where data from both questionnaires available) but not for other variables.

^c Adjusted for length of questionnaire (where data from both questionnaires available), age, gender, rank, and service.

GW veterans vs non-GW veterans

15-Item symptom checklist

When analyzing the abridged questionnaire 10 (6.3%) of 159 GW subjects, and 31 (4.3%) of the 717 non-GW subjects scored above the cutoff. Using the full questionnaire, 21 (14.1%) of 149 GW subjects and 45 (7.2%) of 622 non-GW subjects scored above the cutoff. Analyzing both questionnaires together, with appropriate adjustment, GW subjects were more likely to score above the cutoff than non-Gulf subjects (OR=1.84; 95% CI, 1.17–2.91; $P=.009$).

Individual symptoms

These analyses look at the difference between GW and non-GW subjects according to whether a symptom was reported, at least as a mild symptom, but not counting those that were known to be short self-limiting illness or due to sporting activity (very common in the service population). For those symptoms that are common to both questionnaires, data were analyzed together, after appropriate

adjustment (Table 3). The prevalence of each of the symptoms was statistically significantly higher in GW veterans than the non-GW, with exception of vomiting and unintended weight loss greater than 10 lb.

Health perception

Forty-nine (15.9%) of 308 GW subjects, and 150 (11.2%) of 1339 non-GW subjects said their health was “fair” or “poor.” Analyzing both questionnaires together, after adjustment, Gulf subjects were more likely to report poor or fair health than non-GW subjects (OR=1.47; 95% CI, 1.02–2.11; $P=.037$).

General Health Questionnaire

Fifty-two (16.9%) of 308 GW subjects and 239 (17.8%) of 1339 non-GW subjects scored above the cutoff (combining both questionnaires). Comparisons within the groups were made with appropriate adjustment for the length of the questionnaire (short version vs long version). Analyzing both questionnaires together, there was no evidence of a difference between GW and non-GW subjects (OR=0.93; 95% CI, 0.66–1.30; $P=.66$).

Alcohol

No statistically significant differences were found between the two groups (7.4% GW vs 6.6% of the non-GW subjects were defined as having a problem; OR=0.95; 95% CI, 0.46–1.94; $P=.89$).

Posttraumatic stress disorder

No statistically significant difference was found between the GW and the non-GW groups in the prevalence of PTSD (1.9% for non-GW vs 1.0% for the GW group; OR=0.42; 95% CI, 0.12–1.42; $P=.16$). However, the statistical power for finding a difference for PTSD was low due to its low prevalence, while the PTSD prevalence in the GW sample was almost double the prevalence of the non-Gulf sample, the difference was not statistically significant.

Discussion

The main finding is that subjects who served in the Gulf and who remain in the Armed Forces are more likely to report the presence of a variety of physical symptoms and poorer self-perception of health. There is also some evidence that they are more likely to report their health as “fair” or “poor.” There were no differences in GHQ or PTSD high scores, or alcohol-related problems. This increased reporting of physical symptoms, but not psychological symptoms, differs from previous GW studies that found increases in both [1–6]. A possible explanation for this

difference maybe within a military context; individuals are loath to report psychological symptoms, while for studies explicitly investigating deployment to the GW it may be more socially acceptable to report psychological symptoms. This has been found in Vietnam veterans [18].

The data come from a random sample of serving military personnel who were grouped according to their participation in the 1991 GW. The GW veterans’ group was still serving in the Armed Forces 10 years after the conflict ended, while the other deployments group (non-GW group) may not have been in the Armed Forces for this length of time. However, there was no difference in age distribution between the groups and the subjects all had military service in common.

This is an important test of the question of just how valid are the repeated findings of worse symptomatic ill health in GW veterans. In this article, we did not specifically study the question of framing at the same period in time, but this study is a replication in which the GW was not mentioned in any part of the questionnaire. This study took place 10 years after the conflict. It was restricted to still-serving GW veterans. We know that ill health predicts leaving the Armed Forces, and that those who leave have worse self-reported health than those who did not [19]. Thus, if we had confirmed the null hypothesis of no differences between GW and non-GW veterans, this would in itself not rejected the existence of a GW health effect. Conversely, because we did find such an effect this becomes more powerful evidence against concluding that the Gulf health effect is solely a reporting bias.

This article concurs with previous studies [1–6] in finding that GW veterans report more symptoms and perceived their health to be worse than control groups. Further, it can be concluded that still-serving GW veterans report they suffered from more symptoms even when the questionnaire used does not make reference to their service in the Gulf and hence reduced influences of question framing. The effect of question framing on the health perception of veterans has been demonstrated following the Vietnam War [8]. However, LaGuardia et al found that within this context framing a questionnaire negatively increased the level of reporting of delayed stress disorder. By contrast, conclusions reached in this article suggest that within the context of the GW the effect of question framing will not influence ratings of self-reported illness and there is still an association between serving in the GW and ill health.

Nevertheless, while the influence of question framing has been removed from the questionnaire it is impossible to ignore that in the media, having served during the GW is associated with negative health outcomes. The media have consistently reported stories about GW syndrome and this has framed service in the Gulf in a negative light. This could have acted as a confounding variable so that service personnel who served in the Gulf are more likely to perceive their health as poor, irrespective of how the question is asked. Health perception is a measure of symptomatic ill health. Investigators suggest that symptomatic ill health is more open to influences of question framing [11,12]. The

implication being that because the differences between the GW and non-GW groups were only significant for symptomatic rather than psychological or behavioral measures in this study, that although question framing was removed from this study, the Gulf group had already framed their past experiences as having negative health outcomes. Previous research by Ismail et al. supports these findings. They found that somatic complaints were also more prevalent than other psychiatric complaints in GW than non-GW groups when compared using clinical assessment [20].

In contrast, there was no difference in the rates of PTSD checklist high scores or alcohol problems between GW and non-GW veterans. This is intriguing because several questionnaire-based studies [21–26] have suggested such a difference, although the GW itself was not traumatic for the majority of the coalition forces, and certainly not in the context of other major armed conflicts. Unlike the situation after, for example, Vietnam, the media representations of the consequences of the service in the Gulf have tended to focus on possible environmental, as opposed to psychological/traumatic, hazards in their reporting of the consequences of the GW. Perhaps the lack of differences in these measures is suggestive that direct reporting bias may have played a role in other studies that are clearly targeted at possible traumatic consequences of the GW, which is an effect that has been reported after a different conflict [8].

The opportunity to test the hypothesis arose out of the need to test two different health screening questionnaires with the Armed Forces. Hence, we have two different measures of each construct, albeit in which the shorter one always is a subset of the longer. However, given the random allocation of the two questionnaires we used, independently of GW service (not known to the researchers until after the end of the study), this should not have influenced the results reported here.

Service in the GW has been framed by the media as being linked to negative health outcomes. This has created a context where service personnel completing self-report-based questionnaires may be framing their deployment in the GW as having more adverse health outcomes than other deployments. This study provided an opportunity to examine the health of GW veterans without the influence of framing, concluding that GW veterans report significantly worse physical health and poorer self-concept of health than controls.

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