Changes in the subjective health of Reserve Component Veterans as a function of mobilization status during the first Persian Gulf War

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Abstract

Data from nearly 1,000 Reserve Component Persian Gulf War veterans were analyzed to assess changes in subjective health as reported retrospectively for four time periods: prior to the war, during the war, between June 1991 and June 1995, and during the past year (1996-1997). Changes were assessed by analysis of variance with repeated measures over time as a function of gender, mobilization status, military rank, branch of service (army/marines versus air force/navy), and ethnic minority status. Both being mobilized within the United States and being deployed to the Persian Gulf region were associated with declines in reported subjective health; declines over the four time periods were not moderated by gender, minority status, ground force status, or rank, but women and minorities did appear to experience more rapid declines in health from pre-war to during the war. Minorities (excluding women), lower ranking veterans, and ground force veterans tended to report poorer subjective health, independently of level of mobilization or time of their retrospective reports. Implications for the search for causal factors responsible for the health problems of many Persian Gulf War veterans are discussed. This article is dedicated to one such veteran, Chaplain (CPT) (P)(Retired) John Peters.

Keywords: Gulf War illnesses, Persian Gulf War, Effects of Deployments, Gender, Mobilization Status

1. Background

The recent report of the Research Advisory Committee on Gulf War Veterans' illnesses [1:1] begins by observing that "a substantial proportion of veterans of the 1990-1991 Gulf War continue to experience chronic and often debilitating conditions characterized by persistent headaches, cognitive problems, somatic pain, fatigue, gastrointestinal difficulties, respiratory problems, and skin abnormalities." Recently, it has been flatly stated that "Consensus exists that service in the 1991 Persian Gulf war resulted in increased symptomatic ill health among those deployed [2: 1370]." Despite the prevalence of veterans' medical concerns, controversy has raged among scholars as to the causes of Gulf War illnesses. Some have attributed most of the problems to the aftermath of war-time stressors [3, 4, 5], while others have suspected that environmental exposures may have played a major role in the development of symptoms. The Presidential Advisory Committee on Gulf War Veterans' Illnesses in 1996 [6] ruled out numerous environmental factors as causal agents for Gulf War illnesses and focused on the role of stress, though admitting that future research might also look at the role of pyridostigmine bromide and nerve agent exposures. However, in spite of some recent progress in research on Gulf War illnesses, the Department of Defense has discontinued support for new research on Gulf War veterans' illnesses [1:11], forcing investigators to rely upon more detailed analysis of previously collected data.

2. Methods

In 1996, the state of Ohio commissioned an independent study of the post-war health of Ohio's Gulf War veterans, through the Center for the Study of Veterans in Society (CSVS). The governor and legislature of Ohio had concerns about the costs of treatment for its veterans, concerns that were magnified by the slow progress being made at that time in understanding the nature and causes of Gulf War illnesses. The CSVS contracted with Kansas State University researchers to conduct the study among a random sample of veterans who had lived in Ohio as of August 1990 or as of March 1996, a study that came to be known as the Ohio Desert Storm Survey Project. The Defense Manpower Data Center provided a list of such veterans, along with current, accurate addresses for about a third of the veterans on the list. Obtaining accurate addresses for the remaining sample proved to be a major challenge, but surveys were initially mailed to veterans in late 1996, a process that continued through the spring of 1997. Details of the project methodology have been explained in several previous reports [7, 8, 9]. Because of the 40-page length of the mailed survey and limited funding that restricted our follow-up process, response rates were limited to approximately 30 percent among Gulf War veterans and were lower among veterans who had not deployed to the Persian Gulf. Our initial efforts have focused on factors related to declines in subjective health [10, 11, 12].

3. Objectives of the Study

For many Persian Gulf War era veterans, subjective health did not decline over time except perhaps as related to the normal aging process. For many others, a decline was perceived. The objective of this study was to assess the average extent of those perceived changes, as they may have occurred differentially for male and female veterans, ethnic minority veterans, those veterans who were mobilized or deployed to the Persian Gulf, and for land component (Army/Marines) veterans as opposed to air/sea component (Air Force/Navy) veterans, labeled as ground force status.

4. Analyses

In our survey, veterans were asked to report their level of subjective health at several times, including before Desert Storm (before August 1990), during Desert Storm (August 1990 to June 1991), after Desert Storm (July 1991 to June 1995), and during the past year (which ranged between late 1995 and late 1997, depending on when they received their survey). Responses available for each time frame included five levels – poor, fair, good, very good, and excellent.

Analysis of variance with repeated measures [13, 14, 15: 438-495] over the four retrospective time points was used to assess perceived average changes in self-reported subjective health. Between subjects factors included gender, mobilization status (not mobilized, mobilized but only within the United States, deployed to the Persian Gulf), ethnic minority status (minority versus non-Hispanic Caucasian), military rank (junior enlisted, grades E1 to E4; noncommissioned officers, grades E5-E9; and all warrant and commissioned officers), and land component (Army/Marines) versus air/sea component (Air Force/Navy), called *ground force* status.

With all between subjects factors used at the same time in the ANOVA model, higher order interaction effects were initially evaluated, but none were significant beyond what would have been expected by chance. Small cell sizes prevented the calculation of some of the higher order interaction terms, as well. Therefore, we report here the results for models in which each between subjects factor (in addition to mobilization status) was analyzed separately.

The statistical validity of the repeated measures analysis of variance depends upon at least two assumptions: (1) homogeneity of variance across the between subjects factors, and (2) sphericity, which, in an over-simplified description, means that the covariances/correlations among the within subjects variables (the four reports of subjective health in these analyses) are approximately the same. When the assumptions are violated, correction factors can be applied to the degrees of freedom for the within-subjects factors, making the statistical tests of significance more conservative and accurate regardless of the assumption violations. The most conservative of the correction factors, called the lower bound estimate, reduces the initial degrees of freedom for both the numerator and the denominator of the within-subjects F-test. When both assumptions are violated, it is safest to use the lower bound correction in order to avoid a Type I error (attributing significance to a result that was not really significant), although Stevens [15: 448] recommends

the Greenhouse-Geisser correction factor as the best combination of accuracy and being conservative rather than the lower bound correction factor, which he believes is too conservative a correction.

Box's M Test is used to test the first assumption concerning homogeneity of variance. The Mauchly Test of Sphericity is used to test the second assumption, although testing each level of the within-subjects factor for homogeneity of error variance, using the Levene test, also helps test the second assumption.

The goal of each analysis was (1) to determine if the apparent pattern over time for each mobilization status changed as a function of gender, rank, ethnic minority status, or ground force status, as indicated by a significant TIME x MOB STATUS x OTHER FACTOR within-subjects effect and (2) to determine if each other factor would yield a significant between-subjects main effect. A significant between-subjects effect might indicate that, regardless of time or mobilization status, a particular subgroup of veterans had reported lower subjective health overall. In all analyses, twenty cases were omitted, of veterans who had deployed overseas, but not to the Persian Gulf.

5. Results

Mobilization Status. Table 1 presents the mean scores and standard deviations for all veterans across the four retrospective times as a function of mobilization status. Results for the between-subjects factors are presented in Table 2, which indicates a very significant effect for mobilization status on overall subjective health. Results for the within-subjects factors are presented in Table 3. Box's M Test was 381.8, $F(20, 116422) = 18.8$ ($p < 0.001$), indicating a violation of the homogeneity of variance assumption. Three of the four Levene Tests were significant ($p < 0.01$), indicating violations of the sphericity assumption. Mauchly's $W = 0.652$, chi-square (df = 5) = 404.9 ($p < 0.001$), indicating, again, a violation of the assumption of sphericity. Given such consistent indications of assumption violations, the lower bound estimate for the degrees of freedom for the within-subjects statistical tests was used (Table 3). However, even the most conservative tests indicated that subjective health status changed over time and that it changed more for certain levels of mobilization status than others. Examination of Table 1 suggests that subjective health declined over time more for veterans who had deployed to the Persian Gulf ($4.37 – 3.07 = 1.30$) than for those who mobilized within the United States only ($4.38 – 3.70 = 0.68$) or those who did not mobilize ($4.31 – 3.98 = 0.33$). In effect, each upgrade in mobilization status approximately doubled the decline in subjective health, compared to the apparent effects of age alone (0.68 versus 0.33) or age and having been mobilized (1.30 versus 0.68).

Gender. Table 4 presents the mean scores and standard deviations for all veterans across the four times as a function of mobilization status and gender. As with the previous analyses, presented in Tables 2 and 3, the factors of Time, Time x MOB Status, and MOB Status remained significant ($p < 0.001$) when gender was added to the ANOVA model. The same violations of assumptions occurred. However, the between subjects effect of Gender was not significant, while the Time x MOB Status x Gender interaction term in the within-subjects analysis, $F(2,944) = 2.41$ did not quite reach significance ($p < 0.10$).

However, had we used either the Huynh-Feldt or the Green-house-Geisser corrections instead of the lower bound correction to the degrees of freedom, the F-test for that three-way interaction effect would have (with more degrees of freedom) been significant ($p < 0.05$). Examination of the mean scores in Table 4 suggests that female and male veterans had similar changes over time in subjective health if they did not mobilize, with declines of 0.35 and 0.32, respectively. However, among those who mobilized, the declines were 1.00 and 0.47, for females and males, respectively. Among those deployed to the Persian Gulf, the declines were 1.56 for females and 1.25 for males. Yet, of most interest was the difference in subjective health between before and during the war. For female veterans, the decline was sharper, 1.00 (4.40 – 3.40), than for male veterans for whom it was 0.57 (4.37 – 3.80). Subsequent changes were much more similar for both groups of veterans. To check this observation statistically, we performed the same analysis of variance with repeated measures using only the first two time periods. The Time x MOB Status x Gender effect yielded an $F(2, 946) = 5.13$ ($p < 0.007$), indicating that the changes in subjective health during the war probably did differ beyond chance as a combined function of gender and mobilization status. In that previous analysis, the assumption of sphericity was not violated because there were only two levels of the repeated measure, so no correction to the degrees of freedom was required. When we redid the same analysis for only the last three times, the same three-way interaction was not significant ($p < 0.19$, at best) even without correcting for assumption violations, indicating that gender differences in subjective health did not vary beyond chance with mobilization status after the war.

Military Rank. Table 5 presents the mean scores and standard deviations for all veterans across the four times as a function of mobilization status and military rank. As with the previous analyses, presented in Tables 2 and 3, the factors of Time, Time x MOB Status, and MOB Status remained significant ($p < 0.001$) when rank was added to the ANOVA model. The same violations of assumptions occurred. However, the between subjects effect of Rank was significant, with $F(2,941) = 11.9$ ($p < 0.001$), while the Time x MOB Status x Rank interaction term was not significant.

Examination of the mean scores in Table 5 suggests that subjective health is usually better for those higher in rank. While the largest decline in subjective health does occur for enlisted personnel who deployed to the Persian Gulf — 1.67 (4.43 – 2.76), compared to NCOs (1.30, 4.29 – 2.99) or officers (1.02, 4.56 – 3.54), the pattern was not substantial enough to attain statistical significance, perhaps because the main trends were offset by the unusual pattern among those who did not mobilize, a pattern where enlisted personnel reported the least change in subjective health compared to NCOs or officers.

Ethnic Minority Status. Table 6 presents the mean scores and standard deviations for all veterans across the four times as a function of mobilization status and ethnic minority status. As with the previous analyses, presented in Tables 2 and 3, the factors of Time, Time x MOB Status, and MOB Status remained significant ($p < 0.001$) when ethnic status was added to the ANOVA model. The same violations of assumptions occurred. However, the between subjects effect of Ethnic Status was significant, with $F(1, 939) = 5.39$ ($p < 0.03$), while the

Time x MOB Status x Ethnic Status interaction term was not significant. Examination of the mean scores in Table 6 suggests that subjective health is usually lower for ethnic minority veterans. However, we noted that subjective health seemed to decline more sharply for deployed minorities (1.23) during the war than it did for other deployers (0.58), as it had for female veterans. Declines were much smaller for both minorities and others among those who did not deploy to the Persian Gulf. To check this observation statistically, we performed the same analysis of variance with repeated measures using only the first two time periods. The Time x MOB Status x Ethnic Status effect yielded an $F(2, 941) = 3.48$ ($p < 0.04$), indicating that the changes in subjective health during the war probably did differ beyond chance as a combined function of ethnic status and mobilization status. In that previous analysis, the assumption of sphericity was not violated because there were only two levels of the repeated measure, so no correction to the degrees of freedom was required.

Ground Force Status. Table 7 presents the mean scores and standard deviations for all veterans across the four times as a function of mobilization status and gender. As with the previous analyses, presented in Tables 2 and 3, the factors of Time, Time x MOB Status, and MOB Status remained significant ($p < 0.001$) when ground force status was added to the ANOVA model. The same violations of assumptions occurred. However, the between subjects effect of Ground Forces Status was significant, with $F(1, 944) = 5.80$ ($p < 0.02$), while the Time x MOB Status x Ground Forces Status interaction term in the within-subjects analysis, $F(2,944) = 2.22$ did not quite reach significance ($p < 0.12$). However, had we used either the Huynh-Feldt or the Greenhouse-Geisser corrections instead of the lower bound correction to the degrees of freedom, the F-test for that three-way interaction effect would have (with more degrees of freedom) been almost significant ($p < 0.06$). Examination of the mean scores in Table 7 suggests that ground force veterans reported, in most cases, poorer subjective health than did their fellow veterans, although such differences are relatively small except among those veterans who had deployed to the Persian Gulf. Yet, again, of most interest was the difference in subjective health between before and during the war. For deployed ground force veterans veterans, the decline was sharper, 0.74 (4.35 – 3.61), than for other veterans for whom it was 0.45 (4.40 – 3.95). Subsequent changes were much more similar for both groups of veterans. To check this observation statistically, we performed the same analysis of variance with repeated measures using only the first two time periods. However, the Time x MOB Status x Ground Force Status within-subjects interaction effect yielded only a nearly significant result, with $F(2, 946) = 2.95$ ($p < 0.06$).

6. Discussion

The most substantial result obtained in our analyses was that of a significant TIME x MOB STATUS interaction in which veterans reported approximately the same (high) level of subjective health before the Persian Gulf war but after the war began, each increment in mobilization status was associated with a more substantial decline in health. If the declines in health had been similar for all veterans, we might reasonably

attributed those declines to aging or stress associated with membership in the armed forces; since that was not the case here, we do not believe it would be reasonable to explain our findings by those two mechanisms.

If the declines in health had been reserved exclusively for those who had deployed to the Persian Gulf, we might have reasonably attributed the causes to factors strictly associated with deployment to the Persian Gulf; since that was not the case, we do not believe that our findings can be explained solely by factors associated with deployment to the Persian Gulf.

Rather, we saw some declines even for those veterans who never mobilized; such declines might be attributed to membership in the armed forces or to the normal aging process. We saw greater declines associated with mobilization entirely within the United States; such declines might be attributed to factors shared by such veterans, which might include the stress of mobilization or separation from family or exposure to multiple vaccinations or large amounts of dental work (exposure to mercury-based amalgams) in a short period of time. However, since those who remained within the United States were much less likely to receive certain vaccinations (e.g., anthrax, botulism toxin) or anti-nerve agent pills (i.e., pyridostigmine bromide [PB]) or exposures to depleted uranium, it is less likely that those exposures would account for their declines in health. However, the larger declines in health reported by those veterans who deployed to the Gulf might implicate factors encountered primarily by those who deployed to the Persian Gulf – certain specific vaccinations, PB pills, wartime stress, use of pesticides, exposure to depleted uranium, smoke from oil well fires, etc. Since stress has been ruled out as a primary cause of Gulf War health problems [1], the remaining possible factors gain increased importance for future research. Since the use of pesticides, multiple vaccinations, and dental work were among the few factors shared by those who mobilized and those who deployed, those potential causes might receive particular attention.

With respect to the other factors, none of the three-way within-subjects interactions effects proved to be significant, indicating that the effects of mobilization levels were relatively similar across all four times, regardless of the gender, rank, ethnic status, or component of force. At the same time, none of those factors was able to explain away the apparent effects of level of mobilization. However, we did find two significant three-way interaction effects when we confined our times to before and during the war, indicating that women and ethnic minorities appeared to report sharper initial declines in subjective health from before the war to during the war. Were women and minorities the "canaries in the mine" – "leading indicator" victims of Gulf War health problems? If so, why? Those questions would also be of interest in future research.

Otherwise, our only other significant findings were that minorities (but not women), those lower in rank, and ground force personnel tended to report poorer subjective health across all times and/or levels of mobilization. Do those findings suggest that lower status personnel tended to receive less health care before the war? It was not as if their health improved during the war when they probably came under a greater amount of military health care, so it is probably not an issue of unfair allocation of care by the military health care system relative to the civilian health care system (they both might be equally biased in providing better health care to higher status clients, though). However, the apparent effects of mobilization and deployment remained significant even after controlling for gender, rank, minority status, and ground force status. Perhaps the primary implication of our findings for rank, minority status, and ground force status among Reserve Component personnel is that current providers of medical support should not overlook their health care needs even if they might have certain lower status demographic characteristics. Rather, they might be in greater need of health care than those with higher status and, perhaps, greater ability to pay for their health care.

References

[1] Research Advisory Committee on Gulf War Veterans' Illnesses. Scientific progress in understanding Gulf War veterans' illnesses: report and recommendations. Washington, DC: U.S. Government Printing Office, 2004 (September).

[2] Hotopf M, David AS, Hull L, Nikalaou V, Unwin C, Wessely S. Gulf war illness—better, worse, or just the same? A cohort study. BMJ, 2003; 327:1370–4.

[3] Gabriel R, Bolton JPG, Bale AJ, Lee HA. Gulf war syndrome may be post-conflict dysfunction. BMJ, 2002;324:914.

[4] Hyams KC, Wignall FS, Roswell R. War syndromes and their evaluation: from the U.S. Civil War to the Persian Gulf War. Annals of Internal Medicine, 1996;125:398–405.

[5] Straus SE. Bridging the gulf in war syndromes. Lancet 1999; 353:162–3.

[6] Presidential Advisory Committee on Gulf War Veterans' Illnesses. Final report. Washington, DC: U.S. Government Printing Office, 1996.

[7] Schumm WR, Jurich AP, Bollman SR, Sanders D, Castelo CS, Webb FJ. Understanding mail survey response rates among female Reserve Component veterans serving during the Persian Gulf War. Psychological Reports, 1999;85:653–64.

[8] Schumm WR, Jurich AP, Stever JA, Sanders D, Castelo CS, Bollman SR. Attitudes of Reserve Component servicemembers regarding the consequences of frequent overseas deployments. Psychological Reports, 1998;83:983–9.

[9] Schumm WR, Bollman SR, Jurich AP, Castelo CS, Sanders D, Webb FJ. Understanding mail survey response rates among male Reserve Component Gulf War era veterans. Psychological Reports, 2000;87:859–80.

[10] Schumm WR, Reppert EJ, Jurich AP, Bollman SR, Castelo CS, Sanders D, Webb FJ. Pyridostigmine bromide and the long-term subjective health status of a sample of female Reserve Comonent Gulf War veterans: a brief report. Psychological Reports, 2001;88:306–8.

[11] Schumm WR, Reppert EJ, Jurich AP, Bollman SR, Webb FJ, Castelo CS, Stever JC, Sanders D, Bonjour GN, Brown BFC, Hall CA, Owens BL, Krehbiel M, Deng L, Kaufman M. Self-reported changes in subjective health and anthrax vaccination as reported by over 900 Persian Gulf War era veterans. Psychological Reports, 2002;90:639–53.

[12] Schumm WR, Reppert EJ, Jurich AP, Bollman SR, Webb FJ, Castelo CS, Stever JC, Kaufman M, Deng L, Krehbiel M, Owens BL, Hall CA, Brown BFC, Lash JF, Fink CJ, Crow JR, Bonjour GN. Pyridostigmine bromide and the long-term subjective health status of a sample of over 700 male Reserve Component Gulf War era veterans. Psychological Reports, 2002; 90:707–21.

[13] Ball D, McHenry PC, Price-Bonham S. Use of repeated-measures designs in family research. Journal of Marriage and the Family, 1983;45:885–6.

[14] Schumm WR, Bugaighis MA, Jurich AP. Using repeated measures designs in program evaluation of family therapy. Journal of Marital and Family Therapy, 1985;11:87–95.

[15] Stevens J. Applied Multivariate Statistics for the Social Sciences (2nd Ed.). Hillsdale, NJ: Lawrence Erlbaum, 1992.

Authors' Note: This article is dedicated by the authors to U. S. Army Chaplain (CPT) John Peters, medically retired in 1997 with Multiple System Atrophy, officially diagnosed in 1995 (but revised later to Shy-Drager Syndrome), but whose symptoms began shortly after he had received a series of vaccinations prior to deployment to the Persian Gulf in 1991. He was selected for promotion to the rank of major but due to being medically retired prior to his date of promotion, he has never been promoted. He remains completely bedridden, unable to eat, move, swallow, or talk, but continues to hope that research into his condition and into Gulf War illnesses will find causes and effective medical treatments as soon as possible.

Table 1. Changes in mean scores (standard deviations) for self-reported subjective health across four time periods as a function of mobilization status among Persian Gulf War veterans

	Time Periods			
Mobilization Stuats	**1990**	**1990-1991**	**1991-1995**	**1996-1997**
Never Mobilized	4.31	4.27	4.15	3.98
(N = 238)	(0.78)	(0.81)	(0.92)	(1.03)
Mobilized to USA Only	4.38	4.27	3.92	3.70
(N = 64)	(0.72)	(0.72)	(0.96)	(1.14)
Deployed to the Persian Gulf (N = 648)	4.37	3.73	3.21	3.07
	(0.68)	(0.94)	(1.13)	(1.13)

Table 2. Analysis of variance for between subjects factors, predicting subjective health from mobilization status.

Factors	Sums of Squares (Type IV)	df	Mean Square	F	P
Mobilization Status	259.68	2	129.84	55.25	< 0.001
Error	2725.58	947	2.35		

Table 3. Analysis of variance with repeated measures for within subjects factors, predicting subjective health from time and mobilization status.

Factors	Sums of Squares (Type IV)	df	Mean Square	F	P
Time	146.59	1	146.59	111.43	< 0.001
Time X MOB Status	121.77	2	60.89	46.28	< 0.001
Error	1245.79	947	1.32		

Note: Degrees of freedom corrected by lower bound estimates (0.33).

Table 4. Changes in mean scores (standard deviations) for self-reported subjective health across four time periods as a function of mobilization status and gender among Persian Gulf War veterans

	Time Periods			
Mobilization Status	**1990**	**1990-1991**	**1991-1995**	**1996-1997**
Never Mobilized				
Males (N = 184)	4.33	4.29	4.15	4.01
	(0.80)	(0.83)	(0.96)	(1.03)
Females (N = 54)	4.24	4.20	4.17	3.89
	(0.70)	(0.74)	(0.80)	(1.00)
Mobilized to USA Only				
Males (N = 40)	4.20	4.18	3.98	3.73
	(0.79)	(0.75)	(0.92)	(1.13)
Females (N = 24)	4.67	4.42	3.83	3.67
	(0.48)	(0.65)	(1.05)	(1.17)
Deployed to the Persian Gulf				
Males (N = 531)	4.37	3.80	3.27	3.12
	(0.68)	(0.93)	(1.12)	(1.14)
Females (N = 117)	4.40	3.40	2.92	2.86
	(0.67)	(0.89)	(1.11)	(1.09)

Table 5. Changes in mean scores (standard deviations) for self-reported subjective health across four time periods as a function of mobilization status and military rank among Persian Gulf War veterans

	Time Periods			
Mobilization Status	**1990**	**1990-1991**	**1991-1995**	**1996-1997**
Never Mobilized				
Enlisted (N = 10)	4.00	3.90	4.10	3.90
	(0.94)	(0.88)	(0.74)	(0.88)
NCOs (N = 146)	4.21	4.14	3.99	3.82
	(0.80)	(0.84)	(0.99)	(1.04)
Officers (N = 82)	4.52	4.54	4.45	4.29
	(0.67)	(0.67)	(0.72)	(0.95)
Mobilized to USA Only				
Enlisted (N = 4)	4.25	4.00	3.75	3.25
	(0.96)	(1.15)	(0.96)	(1.50)
NCOs (N = 40)	4.33	4.20	3.83	3.58
	(0.69)	(0.72)	(0.96)	(1.15)
Officers (N = 20)	4.50	4.45	4.15	4.05
	(0.76)	(0.60)	(0.99)	(1.00)
Deployed to the Persian Gulf				
Enlisted (N = 68)	4.43	3.66	2.87	2.76
	(0.70)	(0.96)	(1.24)	(1.17)
NCOs (N = 452)	4.31	3.66	3.15	2.99
	(0.69)	(0.93)	(1.09)	(1.08)
Officers (N = 128)	4.56	4.00	3.61	3.54
	(0.61)	(0.91)	(1.09)	(1.17)

Table 6. Changes in mean scores (standard deviations) for self-reported subjective health across four time periods as a function of mobilization status and ethnic minority status among Persian Gulf War veterans

Mobilization Status	Time Periods			
	1990	1990-1991	1991-1995	1996-1997
Never Mobilized				
Minority (N=10)	4.00 (0.94)	4.00 (0.94)	4.00 (0.94)	3.70 (0.95)
Non-Minority (N=225)	4.31 (0.77)	4.27 (0.80)	4.15 (0.92)	3.98 (1.03)
Mobilized to USA Only				
Minority (N=8)	4.63 (0.52)	4.25 (0.89)	3.63 (1.19)	3.13 (1.55)
Non-Minority (N=56)	4.34 (0.75)	4.27 (0.70)	3.96 (0.93)	3.79 (1.06)
Deployed to the Persian Gulf				
Minority (N=51)	4.35 (0.69)	3.12 (0.93)	2.65 (1.13)	2.51 (1.07)
Non-Minority (N=595)	4.37 (0.68)	3.79 (0.92)	3.26 (1.11)	3.12 (1.13)

Table 7. Changes in mean scores (standard deviations) for self-reported subjective health across four time periods as a function of mobilization status and ground force status among Persian Gulf War veterans

Mobilization Status	Time Periods			
	1990	1990-1991	1991-1995	1996-1997
Never Mobilized				
Navy/Air Force (N=134)	4.34 (0.78)	4.31 (0.80)	4.19 (0.95)	4.03 (1.03)
Army/Marines (N= 104)	4.27 (0.78)	4.21 (0.82)	4.10 (0.89)	3.92 (1.02)
Mobilized to USA Only				
Navy/Air Force (N=30)	4.33 (0.66)	4.23 (0.73)	4.00 (0.91)	3.90 (0.96)
Army/Marines (N=34)	4.41 (0.78)	4.29 (0.72)	3.85 (1.02)	3.53 (1.26)
Deployed to the Persian Gulf				
Navy/Air Force (N=228)	4.40 (0.67)	3.95 (0.92)	3.54 (1.14)	3.39 (1.15)
Army/Marines (N=420)	4.35 (0.69)	3.61 (0.92)	3.03 (1.08)	2.90 (1.08)