ORIGINAL ARTICLE

Do mental disorders matter? A study of absenteeism among care seeking Gulf War veterans with ill defined conditions and musculoskeletal disorders

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Aims: To investigate the extent that common psychological conditions contribute to lost work among individuals with musculoskeletal and ill defined conditions.

Methods: Cross sectional health and work related survey evaluating Gulf War veterans seeking Department of Defense health care for Gulf War related health concerns. Ordered probit models were used to study whether a provider diagnosed musculoskeletal condition (ICD-9 codes 710–739) or "signs, symptoms, and ill defined conditions" (ICD-9 codes 780–799) have an effect on recent lost work over the previous 90 days in the presence of one or more psychological conditions (ICD-9 codes 290–320) after controlling for sociodemographic variables.

Results: Bivariate analyses revealed that musculoskeletal conditions, ill defined conditions, and psychological conditions were positively associated with lost work. Multivariate analyses showed an independent effect of both psychological conditions and musculoskeletal conditions. A significant interaction existed between psychological conditions and musculoskeletal conditions: the presence of a coexisting psychological condition considerably increased the likelihood that a musculoskeletal disorder resulted in lost work, or vice versa.

Conclusions: Psychological conditions appear to be an important contributor to absenteeism among individuals with musculoskeletal and ill defined conditions. A limitation of the cross sectional design was the inability to sequence the onset of conditions.

The National Institute for Occupational Safety and Health estimated the annual cost of work loss from musculoskeletal conditions in the USA was \$13 billion.¹ While extensive research suggests that there are significant psychosocial contributors to musculoskeletal morbidity, few studies have focused on the impact of mental illness among individuals with musculoskeletal or other symptom based conditions.² Using population based data obtained from the US National Comorbidity Survey, Kessler and Frank found that individuals with psychiatric disorders reported more lost workdays and more days involving reduced hours at work than individuals without psychiatric disorders.³ Having more than one psychiatric disorder was associated with added work impairment.

Other studies have confirmed an important relation between psychosocial difficulties and impaired occupational functioning. In a survey of 79 070 employees from 250 different community based health promotion programmes throughout the United States, Jacobsen *et al* found a significant relation between reports of high stress and absenteeism for both men and women.⁴ In a cross sectional study, Souetre *et al* investigated 345 patients with major depressive disorder and found that severity of depressive symptoms was a strong correlate of absenteeism.⁵ Interestingly, in those reporting depression, individuals receiving antidepressant therapy were less likely to report lost work than those who were not receiving antidepressants. Similarly, Kessler *et al* reported that individuals with generalised anxiety disorder, in conjunction with a major depressive disorder, reported more days missed from work in the past 30 days than those with only generalised anxiety disorder.⁶

Mental disorders may well have an important impact on disability among workers with musculoskeletal conditions. Musculoskeletal conditions were found to be a leading cause of work disability, and that the severity of musculoskeletal

related disability often fluctuates, depending on personal and psychosocial factors that come into play.⁷ One study reported a slower rate of return to work in those who experience psychological distress in association with a musculoskeletal injury when controlling for age and gender.²

The relation between mental disorders and disability is of significant clinical interest. The most common mental disorders (anxiety and depressive disorders) that occur in general medical settings are under recognised and treatable.⁸ Therefore, the potential may exist to reduce disability (and lost work) through the recognition and treatment of mental disorders among people with musculoskeletal conditions. For example, a meta-analysis of data pooled from several randomised antidepressant trials found significant improvement in work functioning associated with drug compared to placebo treatment for individuals with major depression.⁹

METHODS

The purpose of the current analysis is to examine the connection between musculoskeletal conditions, ill defined conditions (for example, isolated signs or clusters of medically unexplained physical symptoms), and ICD-9-CM psychological conditions with lost workdays. Data were collected from Gulf War veterans seeking Department of Defense health care for war related health concerns worldwide. Since shortly after the 1991 war, veterans have expressed a variety of concerns relating to symptoms and exposures during Gulf War service. In mid-1994, the Department began offering a complete history, physical examination, laboratory testing, and diagnostic assessment for anyone with Gulf War related health concerns and has maintained a database of examination results. The database captures, among other information, up to seven diagnoses on each participant, ranked in order of estimated clinical importance (the interested reader may consult Engel and colleagues¹⁰ and Katz and colleagues¹² for a

Table 1 Percentage distribution of CCEP patients by six categories of lost work days for primary diagnoses of three conditions (CCEP patients: n=21670)

Categories of lost work (days)	Primary diagnoses					
	Musculoskeletal conditions (%)		Psychological conditions (%)		Ill defined conditions (SSID) (%)	
	No	Yes	No	Yes	No	Yes
0	79.3	81.5	80.7	75.0	79.4	80.9
1-6	12.2	11.7	11.7	14.0	12.3	11.2
7-15	4.7	3.9	4.3	5.9	4.6	4.5
16-30	2.1	1.5	1.9	2.5	2.0	1.9
31-60	0.8	0.9	0.8	1.0	0.9	0.7
61-90	0.9	0.6	0.7	1.6	0.8	0.9
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0
Sample size	17659	4011	17715	3955	17893	3777

SSID, symptoms, signs, ill defined disorders.

Table 2 Percentage distribution of CCEP patients by six categories of lost work days for primary or secondary diagnoses of three conditions (percentages listed are the percentage of individuals in the column)

Primary condition	Musculoskeletal conditions (%)				Psychological conditions (%)				Ill defined conditions (%)			
Secondary condition	None*	MS†	Psych‡	SSID§	None	MS†	Psych‡	SSID§	None	MS†	Psych‡	SSID§
<i>Lost work days</i>												
0	79.9	80.5	78.1	80.0	74.7	73.8	70.9	74.2	80.1	77.6	75.6	79.1
1-6	12.1	11.5	12.6	13.7	13.7	14.5	15.1	14.3	12.9	12.9	13.4	12.6
7-15	5.0	4.9	4.6	3.7	6.7	6.2	7.7	5.5	3.9	5.1	5.9	4.7
16-30	1.5	1.3	2.4	1.0	2.3	3.0	2.8	2.8	2.1	2.1	2.6	2.0
31-60	0.9	1.0	1.3	1.1	1.1	0.8	1.3	1.4	0.6	1.0	1.2	0.6
61-90	0.6	0.7	1.1	0.5	1.5	1.7	2.2	1.8	0.3	1.2	1.4	0.9
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Sample size	3331	1484	1098	1465	1874	1914	1546	1349	2883	1556	933	1623

*No secondary diagnoses of psychological conditions, musculoskeletal disorders, or ill defined conditions.

†Secondary musculoskeletal condition diagnosis.

‡Secondary psychological condition diagnosis.

§Symptoms, signs, ill defined disorders diagnosis.

more detailed description of the Comprehensive Clinical Evaluation Program (CCEP) examination and data collection protocol). Thus far, a unique Gulf War exposure or war related illness has not been discovered, but data from this programme (CCEP) offer an opportunity to evaluate the interrelations between mental disorders, musculoskeletal conditions, and ill defined conditions on absenteeism.¹⁰

The CCEP is a worldwide health care programme developed by the Department of Defense to help military personnel and their families address their health concerns related to the Gulf War. Participants self enrol in the CCEP based on their perceived need for care.¹⁰ Family members were excluded from these analyses, and therefore analysed data were from active duty (that is, employed) personnel only. Veterans who had left the military received their evaluations from a similar programme in the US Department of Veterans Affairs.

Written guidelines help clinicians decide how to evaluate participants and when to refer them to specialists. The approach to specialty consultations, testing, and clinical assessment is lengthy, inclusive, and complete. At the time of presentation, the CCEP is explained to participants and written consent is obtained to use their data for aggregate analyses. Current analyses focus on the first 21 795 Gulf War Veterans completing the CCEP who were age 21 or older at the time of evaluation. Family members of veterans were eligible for CCEP participation but were excluded from these analyses to ensure the entire sample would be fully employed when lost workdays were reported. All CCEP participants answered a

series of questions pertaining to demographics, symptoms, Gulf War related environmental exposures, and number of days missed from work in the past 90 days. Self report measures of lost or reduced work have been evaluated and found to be reasonably accurate in both a general health care context and in the context of disability determinations.^{11 12} On completion of the CCEP evaluation, the provider coordinating evaluations at the medical facility where the evaluation was done transcribed the diagnoses as ICD-9 codes and rank ordered them according to their estimated clinical importance.

Clinical information is based on specific diagnoses taken from the International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) to classify conditions.¹³ The most common primary diagnoses identified and included in these analyses were diseases of musculoskeletal system and connective tissue, ICD-9 710-739 (18.6%), psychological conditions, ICD 290-319 (18.3%), and symptoms, signs, ill defined conditions, ICD 780-799 (17.8%).¹⁴

Demographic characteristics were also used as controls: (1) age (in years at the time of evaluation, 21 years and older); (2) gender (male/female); (3) ethnicity (white/minority); (4) marital status (not currently married/currently married); and (5) smoking cigarettes (non-smoker/smoker).

Descriptive, bivariate, and multivariate analyses examined the relation between most frequently occurring diagnoses of musculoskeletal conditions, mental disorders, and ill defined

Table 3 Percentage distribution of CCEP patients by five categories of lost work days for primary diagnoses of three conditions: derived from ordered probit models adjusting for sociodemographic characteristics (effective sample size = 20896)

Categories of lost work (days)	Primary diagnoses					
	Musculoskeletal conditions (%)		Psychological conditions (%)		Ill defined conditions (SSID) (%)	
	No	Yes	No	Yes	No	Yes
0	80.2	82.6	81.6	76.2	80.4	81.9
1–6	12.0	10.8	11.3	13.8	11.9	11.2
7–15	4.4	3.8	4.1	5.5	4.4	4.0
16–30	1.9	1.6	1.7	2.4	1.9	1.7
31–90	1.5	1.2	1.3	2.1	1.5	1.3
Total	100.0	100.0	100.0	100.0	100.0	100.0

SSID, symptoms, signs, ill defined disorders.

Table 4 Percentage distribution of CCEP patients by five categories of lost work days for primary or secondary diagnoses of three conditions: derived from ordered probit models adjusting for demographic characteristics (effective sample size = 20896)

Primary condition	Musculoskeletal conditions (%)				Psychological conditions (%)				Ill defined conditions (SSID) (%)			
Secondary condition	None*	MS†	Psych‡	SSID§	None	MS†	Psych‡	SSID§	None	MS†	Psych‡	SSID§
<i>Lost work days</i>												
0	81.1	81.7	79.5	82.2	76.4	75.5	72.6	75.6	81.8	79.2	77.5	81.0
1–6	11.5	11.2	12.3	11.0	13.7	14.1	15.3	14.1	11.2	12.5	13.2	11.6
7–15	4.2	4.0	4.6	3.9	5.4	5.6	6.4	5.6	4.0	4.7	5.1	4.2
16–30	1.8	1.7	2.0	1.6	2.4	2.5	3.0	2.5	1.7	2.0	2.3	1.8
31–90	1.4	1.3	1.6	1.2	2.1	2.2	2.7	2.2	1.3	1.6	1.9	1.4
Total (%)	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

*No secondary diagnoses of psychological conditions, musculoskeletal disorders, or ill defined conditions.

†Secondary musculoskeletal condition diagnosis.

‡Secondary psychological condition diagnosis.

§Symptoms, signs, ill defined disorders diagnosis.

conditions to veteran reported lost workdays. As the dependent variable in this study, categories of lost work days, was categorical and ordered, we used ordered probit model to examine whether the link between each diagnostic pattern (for example, primary musculoskeletal with a secondary psychological condition) and lost work days held after adjusting for the aforementioned control variables. Ordered probit model was subsequently performed to determine the added effect, if any, of having either a musculoskeletal, mental, or ill defined condition on lost workdays. In particular, we calculated the percentage distribution of patients in five ordered categories of lost workdays for each diagnostic pattern under study (treated as a dichotomous variable in the model), using results of 15 ordered probit models. In deriving such predicted percentage distributions, all control variables were fixed at their sample means, which we represented as a “typical” population of veterans with Gulf War health concerns. Hence, the pattern of lost workdays linked with the presence of each diagnosis under examination can be efficiently assessed.

RESULTS

Of the 21 795 veterans with completed evaluations, the vast majority are male (87.1%). Nearly half were in the 31–40 year old age group (47.1%). The overall distribution of work days lost among CCEP patients, not presented here, is available on request. In brief, 79.7% of those who responded to the inquiry concerning work days lost (17 264 persons) had no days lost, and 12.1% (2628) had 1–6 days lost. Less than 2% (363) had more than 30 work days lost during the previous 90 days.

Bivariate analyses were performed to compare individuals with a primary psychological condition to those with musculoskeletal conditions and ill defined conditions using lost workdays as the outcome variable. Table 1 shows that approximately 5% fewer individuals with a primary psychological condition have gone the past 90 days without losing a day of work compared to individuals with either a primary musculoskeletal disorder or ill defined conditions. Among individuals reporting various (non-zero) numbers of recent lost work days, the proportion with lost work is consistently higher among the psychological conditions group than in either of the other two diagnostic groupings.

Table 2 illustrates the bivariate relation between missed days and having comorbid conditions. The relations observed with lost work are similar to those observed for the primary diagnoses themselves. That is, within any of the three primary diagnosis groups, the greatest possibility of missing any work is associated with a secondary psychological condition compared to having a secondary musculoskeletal condition, ill defined condition, or neither of these secondary conditions. For example, in those with a primary musculoskeletal condition with a secondary psychological condition, 1.1% missed 61–90 days of work compared to 0.6% without a secondary psychological condition.

Tables 3 and 4 are similar to tables 1 and 2, but reflect results of 15 ordered probit analyses (available on request) that adjust for age, gender, ethnicity, marital status, and smoking status. There were variations in absolute values of various percentages between the two sets, because values of all control variables on sample means were held constant. Differences in

percentage distributions of lost workdays across various diagnostic groups were strikingly similar to tables 1 and 2, with the presence of psychological conditions playing an important role in missing workdays.

DISCUSSION

These findings suggest that psychological conditions are consistently associated with significant increases in lost work among military personnel seeking care for Gulf War related health concerns. Furthermore, there was a much weaker association between musculoskeletal conditions and ill defined conditions and lost work. Given that psychological conditions were frequent comorbid conditions, the relatively weak association of musculoskeletal and ill defined conditions with lost work was even further diminished once these comorbid psychological conditions were taken into account.

As noted, however, an important correlate of lost work among these veterans and perhaps others with musculoskeletal or ill defined conditions is the presence of a psychological condition. Successful treatment of coexisting psychological conditions may therefore yield improvements in work functioning among individuals with ill defined or musculoskeletal injuries. Concern that physicians in general have not been adequately educated in dealing with problems of the diagnosis of patients who have symptoms in the absence of verifiable structural or laboratory pathology was reported in one recent study.¹⁵ The authors found that this lack of education has contributed to exorbitant healthcare expenditure and needless disability, since these conditions are so common in routine clinical practice. Similarly, Fordyce has suggested that many healthcare providers lack the proper understanding of the important roles that social and behavioural factors play in perpetuating illness and disability.¹⁶

Our findings are important in that the most common psychological conditions, namely anxiety and depressive disorders, are generally responsive to readily available pharmacological and non-pharmacological therapies. Appropriate recognition and treatment of these psychological conditions may lead to improvements in functioning and reductions in absenteeism in the subsets of patients who suffer with them along with musculoskeletal or ill defined conditions.

Other investigators have published findings suggesting the importance of psychological conditions as a potential factor leading to physical disability. For example, there is evidence that depression places individuals at an increased risk for the subsequent onset of physical disability.¹⁶

Data from the population based Epidemiological Catchment Area survey showed that individuals with panic disorder and schizophrenia who were not receiving disability compensation at baseline were at increased risk of receiving disability compensation one year later compared with those without any of the six disorders they investigated.¹⁷ Another study using a population based case-control design determined that alcohol abuse or dependence, major depressive disorder, and phobias all significantly increased the risk of incident self reports of disability over a 15 year follow up period.¹⁸ When major depression and chronic illness were both present at baseline, there was approximately a 17-fold increased risk of incident disability in activities of daily living during the follow up period compared to when neither problem was present at baseline. Significant differences in the quality of life between hypertensive and diabetic patients with and without comorbid anxiety disorder have also been well documented.¹⁹ A survey of 17 558 primary care outpatients identified that individuals with depressive conditions have noted reductions in mental, role emotional, and social function abilities compared to patients with many chronic medical conditions alone.^{20 21}

There are limitations to these analyses that must be considered when interpreting these results. First, the absence of a comparison group means these results cannot be used to infer the relation of various conditions to absenteeism. Second, veterans participating in the CCEP are a self selected group, and the degree that they are representative of other veteran or civilian populations is not known. Third, clinicians made the diagnoses used in these analyses, and clinician diagnoses and ICD-9 codes may have varied from clinician to clinician. However, the clinical assessments performed were more thorough and time consuming than those accomplished in usual clinical practice, providing a more complete dataset. In addition, these data are cross sectional in nature, and therefore the temporal sequence is difficult to discern. For example, it may be that psychological conditions are a consequence of more severe musculoskeletal injury that leads to more lost work, rather than the psychological condition driving the disability per se.

Future work should assess whether appropriate recognition coupled with appropriate, feasible, and acceptable mental health care for depression, panic disorder, and other treatable mental illnesses can result in decreases in future disability and disability compensation related to chronic musculoskeletal disorders and ill defined conditions in the general population. Some research suggests that proper treatment for major depression can result in improvements in work functioning, though improvements in functioning occur several weeks later than usual depression symptom responses.⁹ Certainly, systematic efforts to improve the accurate recognition and treatment of Gulf War veterans' psychological conditions appear warranted.

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