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The impact of psychiatric disorders on work loss days

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ABSTRACT

Background. To examine relationships between recent DSM-III-R psychiatric disorders and work impairment in major occupational groups in the US labour force.

Method. Data are from the US National Comorbidity Survey (NCS), a survey of respondents ages 15–54 in the US. Employed people are the focus of the report.

Results. There is substantial variation across occupations in the 30-day prevalences of NCS/DSM-III-R psychiatric disorders, with an average prevalence of 18·2% (range: 11·0–29·6%) for any disorder. The average prevalences of psychiatric work loss days (6 days per month per 100 workers) and work cutback days (31 days per month per 100 workers), in comparison, do not differ significantly across occupations. Work impairment is more strongly concentrated among the 3·7% of the workforce with co-morbid psychiatric disorders (49 work loss days and 346 work cutback days per month per 100 workers) than the 14·5% with pure disorders (11 work loss days and 66 work cutback days per month per 100 workers) or the 81·8% with no disorder (2 work loss days and 11 work cutback days per month per 100 workers). The effects of psychiatric disorders on work loss are similar across all occupations, while effects on work cutback are greater among professional workers than those in other occupations.

Conclusion. The results reported here suggest that work impairment is one of the adverse consequences of psychiatric disorders. The current policy debate concerning insurance coverage for mental disorders needs to take these consequences into consideration.

INTRODUCTION

The major concerns of psychiatric epidemiology have traditionally been to estimate incidence and prevalence and to search for risk factors (Eaton & Weil, 1955; Leighton, 1959; Srole *et al*. 1962; Hughes & Tremblay, 1963; Langner & Michael, 1963; Leighton *et al*. 1963). However, another ongoing interest has been to document the social consequences of psychiatric disorders, especially the effects of psychiatric disorders on socioeconomic status (Faris & Dunham, 1939; Hollingshead *et al*. 1954; LaPouse *et al*. 1956; Michael & Langner, 1963; Turner & Wagenfeld, 1967; Eaton, 1980). This interest in social consequences has broadened in the past decade, especially in the United States, as epidemiologists have been joined by policy analysts to estimate the magnitude of the financial costs (Harwood *et al*. 1984; Stoudemire *et al*. 1986; Wyatt & Clark, 1987; Rice *et al*. 1990; Klerman & Weisman, 1992) and broader social consequences (Zeiss & Lewinsohn, 1988; Wells *et al*. 1989; Broadhead *et al*. 1990; Rhode *et al*. 1990; Coryell *et al*. 1993; Tweed, 1993) of psychiatric disorders in an effort to inform the social policy debate about universal health insurance coverage for psychiatric problems. Results of these recent studies have shown that psychiatric

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disorders exact substantial personal costs from the individuals who experience them as well as from their families and communities in terms of finances, role functioning, and quality of life.

Among the most important of these results from a policy perspective are those concerning the effects of psychiatric disorders on lower rates of labour force participation, reduced work hours, and lower earnings (Bartel & Taubman, 1979; Benham & Benham, 1980; Broadhead *et al.* 1990; Frank & Gertler, 1991; Johnson *et al.* 1992; Greenberg *et al.* 1993; Conti & Burton, 1994; Stansfeld *et al.* 1995). The effects on reduced work hours are especially important in that they represent costs both to workers and to their employers. Data from the Epidemiologic Catchment Area (ECA) Study (Robins & Regier, 1991) suggest that these costs are substantial. Three per cent of men and 4·5% of women in the ECA reported that they had one or more days when they were unable to work or carry out their usual activities because of emotional problems during the past 3 months (Kouzis & Eaton, 1994).

Work impairments as common as these have enormous implications for the economy. For example, a recent analysis of the economic burden of depression, the psychiatric disorder thought to have the largest impact on work disability (Conti & Burton, 1994; Kouzis & Eaton, 1994), estimated that this disorder leads to an annual loss of $17 billion due to work absenteeism in the US alone (Greenberg *et al.* 1993). Given the existence of effective models for the management of this disorder in the workplace, such data suggest that it might be in the interests of employers to develop outreach programmes for their psychiatrically impaired employees and to broaden insurance coverage for these conditions. However, experimental research is needed to evaluate treatment effects on work productivity before such an argument can be made convincingly.

A number of issues must be addressed prior to moving forward with this type of experimental research. Four of these issues are examined in the current report. First, we examine the occupational distribution of psychiatric disorders. Although there is a large literature on the relationship between job conditions and non-specific psychological distress (Karasek, 1990), little is known about occupational differences in clinically significant psychiatric disorders. That such differences exist is suggested by a report from the ECA Study, which documented substantial variation in the prevalence of DSM-III major depression across occupations (Eaton *et al.* 1990). However, no comparable data have, until now, been presented for other disorders.

Secondly, we examine whether some psychiatric disorders have greater effects than others on work loss days and work cutback days. Little is known about this matter. Previous research has documented that anxiety disorders (Klerman *et al.* 1991), affective disorders (Broadhead *et al.* 1990; Johnson *et al.* 1992) and substance use disorders (Bromet *et al.* 1990) are all associated with work absence. However, the only attempt to examine the effects of these disorders at the same time (Kouzis & Eaton, 1994) was made with an additive model that failed to consider the fact that there is substantial co-morbidity among these disorders and the fact that co-morbidity affects social functioning over and above the effects of the component disorders (Regier *et al.* 1990; Kessler, 1995). The analysis reported below examines the effects of both individual and co-morbid disorders in order to address this problem.

Thirdly, we examine occupational differences in average numbers of psychiatric disability days and cutback days. Although several recent reports have presented data on the aggregate distribution of disability days in the labour force (Broadhead *et al.* 1990; Klerman *et al.* 1991; Johnson *et al.* 1992; Kouzis & Eaton, 1994), we are aware of no previous data on how work absence for psychiatric disorders varies across occupations. Neither are we aware of previous research on the distribution of psychiatric cutback days.

Finally, we examine the possibility that the impact of psychiatric disorders on work impairment varies across occupations. Possible variation of this sort is consistent with the fact that occupations differ greatly in their required competencies (Miller *et al.* 1980) as well as with the fact that certain psychiatric disorders have greater effects on some dimensions of functioning (e.g. concentration, energy level) than others.

METHOD

Sample

As reported in more detail elsewhere (Kessler *et al*. 1994), the US National Comorbidity Survey (NCS) is based on a stratified, multi-stage area probability sample of persons ages 15 to 54 in the non-institutionalized civilian population in the 48 coterminous United States with a supplemental sample of students living in campus group housing. Fieldwork, which consisted of face-to-face in-home interviews with 8098 respondents, was carried out between 14 September 1990 and 6 February 1992. Informed consent was obtained from all respondents after the content and length of the interview were explained. In the case of minors (ages 15–17), parental consent was obtained before the minor was approached. Consent from both the parent and minor was required to include the minor in the study. The response rate was 82·4%.

The NCS interview was administered in two parts, the Part I interview consisting primarily of the core diagnostic assessment and the Part II interview consisting primarily of a detailed risk factor battery and measures designed to assess the social consequences of psychiatric disorders. Part I was administered to all 8098 respondents, while Part II was administered to a subsample of 5877 respondents consisting of all those who screened positive for any lifetime diagnosis in Part I, all others in the age range 15–24 and a random subsample of other respondents.

The results reported in this paper are based on the 4091 respondents in the Part II subsample who were employed at the time of interview and reported complete occupational data. These cases were weighted to correct for differential probabilities of selection into Part II across strata of the Part I sample. A second weight was used to adjust for variation in within-household probabilities of selection. A third weight was used to adjust for non-response based on the results of a non-respondent survey. Finally, a fourth weight was used to post-stratify the data to approximate the national population distribution of the cross-classification of age, sex, race/ethnicity, marital status, education, living arrangement, region, and urbanicity as defined by the 1989 US National Health Interview Survey (NHIS) (US Department of Health and Human Services, 1992). A more detailed discussion of these weighting procedures is presented elsewhere (Kessler *et al*. 1994). Comparisons between the Part II NCS sample and the NHIS results show that the survey data are representative of the population on a wide range of social and demographic variables (Kessler *et al*. 1995).

Measures

Diagnostic assessment

The 13 psychiatric diagnoses considered below are based on the DSM-III-R (American Psychiatric Association, 1987). The instrument used to generate these diagnoses was a modified version of the Composite International Diagnostic Interview (CIDI: Robins *et al*. 1988; World Health Organization, 1990), a structured diagnostic interview designed to be used by trained interviewers who are not clinicians. World Health Organization (WHO) field trials of the CIDI have documented good reliability (Wittchen, 1994) and validity (Farmer *et al*. 1991) of all the diagnoses considered here. These include affective disorders (major depressive disorder, dysthymia, and mania), anxiety disorders (generalized anxiety disorder, panic disorder with or without agoraphobia, agoraphobia without panic, simple phobia, social phobia, posttraumatic stress disorder), and substance use disorders (alcohol abuse, alcohol dependence, drug abuse, drug dependence). The NCS also assessed conduct disorder (CD) and antisocial personality disorder (ASPD), but 30-day prevalences were not obtained. Schizophrenia and other non-affective psychoses (NAP) were also assessed, but the number of respondents who met diagnostic criteria for these disorders was so small and so highly comorbid with other disorders that we were unable to estimate stable coefficients for their effects on work impairment. As a result, CD, ASPD and NAP were excluded from the analyses.

Work impairment

The NCS included a series of four questions about work loss days and work cutback days that are used to define work impairment for purposes of this analysis. The first question asked respondents to estimate over the past 30 days (‘beginning yesterday and going back 30

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Table 1. *The eight job condition measures*

1	Occupational prestige	Consensus ranking based on public opinion polls of the relative prestige of occupations.
2	Substantive complexity	A summary score based on factor analysis of ratings made by Department of Labor staff of the following job conditions: the extent to which the occupation requires complexity of function in relation to data, general educational development, specific vocational preparation, intelligence, verbal aptitude, numerical aptitude, abstract and creative activities, and repetitious or continuous processes.
3	Interaction with people	Rating based on observations by Department of Labor staff of the extent and complexity of interactions with people. Because every job requires some interaction with people, this rating is designed to measure the extent and complexity of this interaction, reflecting the following dimensions: mentoring, negotiating, instructing, supervising, diverting, persuading, speaking or signalling, serving, and taking instructions and helping.
4	Interaction with things	Rating based on observations by Department of Labor staff of the complexity of the worker's interaction with things along the following dimensions: setting up, precision working, operating, controlling, driving, manipulating, tending, feeding, offbearing and handling.
5	Interaction with data	Rating based on observations by Department of Labor staff of the extent and complexity of interacting with data along the following dimensions: synthesizing, coordinating, analysing, compiling, computing, copying and comparing.
6	Motor skills	Rating based on observations by Department of Labor staff of the extent to which an occupation requires the following complexity of function in relation to things, motor coordination, manual dexterity, colour discrimination and good eyesight.
7	Physical demands	Rating based on observations by Department of Labor staff of the extent to which an occupation requires the following abilities: eye–hand–foot coordination, climbing, balancing, stooping, kneeling, crouching, crawling, outside working conditions and hazardous work conditions.
8	Undesirable work conditions	Rating based on observations by Department of Labor staff of the extent to which an occupation requires working in the undesirable work conditions of extreme cold, extreme heat, wet or humid conditions.

days') 'how many days out of the past 30 were you totally unable to work or carry out your normal activities?'. Among those who reported any such days, the second question asked respondents to estimate '(was this day/how many of these NUMBER days were) due to your emotions, nerves, mental health, or your use of alcohol or drugs?'. The third and fourth questions were similar to the first two but asked about days out of the past 30 when respondents were able to work 'but had to cut back on what (they) did or did not get as much done as usual'. We concentrate on the reports about work loss and cutback due to emotions, nerves, mental health, or the use of alcohol or drugs, which we refer to as 'psychiatric work loss and work cutback days'.

Job conditions

A total of 4115 Part II NCS respondents were employed during the 30 days prior to interview, 4091 of whom had complete data on job characteristics that were used to assign them three-digit Census occupation codes (US Department of Commerce, 1972). Eight variables were used to measure their job conditions: the Duncan scale of occupational prestige (Duncan, 1961; Hoisington & Stevens, 1987) and seven empirically derived core measures of job conditions generated by Roos & Treiman (1980) from analysis of the job conditions contained in the *Dictionary of Occupational Titles* (Miller *et al.* 1980). The definitions of these eight measures are presented in Table 1. Scores on these measures were linked to individual NCS data records through an aggregate match with Census Occupation and Industry Codes (Roos & Treiman, 1980).

Analysis procedures

In order to provide stable estimates of disorder prevalences and work impairment levels within occupations, respondents were classified into 16 broadly defined occupational clusters based on cluster analysis of their job condition profiles. The eight job condition measures used in the cluster analysis were orthogonalized by means of principal components analysis and standardized to a mean of zero and variance of

Table 2. *Sixteen occupational clusters*: *sample distribution, illustrative occupations and average scores on the underlying job condition measures*†

Occupational cluster (illustrative occupations)	Sample distribution		Average‡ scores on job condition measures							
	%	(S.E.)	Occup. prestige	Subs. comp.	People	Things	Data	Motor skills	Physical demands	Undesir. work cond.
I Professionals										
C1 (doctor, therapist)	0·9	(0·2)	1·3	1·4	2·5	0·9	1·1	1·7	−0·1	−0·3
C2 (engineer, architect)	4·4	(0·7)	1·3	1·2	−0·2	1·5	1·2	1·5	−0·4	−0·2
C3 (lawyer, clergy)	6·1	(0·7)	1·3	1·3	2·6	−1·1	0·9	−1·0	−0·5	−0·3
C4 (accountant, programmer)	7·8	(0·5)	1·0	1·1	0·1	−0·9	1·2	−1·1	−0·7	−0·3
II Managers and administrators										
C5 (personnel manager/foreman)	7·9	(1·0)	0·9	1·1	1·6	−0·8	1·1	−0·9	−0·5	−0·2
C6 (manufacturing manager/foreman	5·3	(0·7)	0·1	0·4	−0·2	0·2	0·7	0·2	1·3	0·3
III Craftsmen and kindred workers										
C7 (mechanic, cabinetmaker)	10·4	(1·0)	−0·2	0·0	−0·7	1·1	0·0	0·9	−0·3	−0·3
C8 (carpenter, electrician)	3·6	(0·4)	−0·7	0·2	−0·8	1·7	0·3	1·1	2·8	−0·2
C9 (baker, photographer)	2·8	(0·4)	−1·0	−0·7	−0·8	0·7	−0·7	0·3	−0·1	2·7
IV Clerical and sales workers										
C10 (secretary, typist)	8·1	(0·9)	0·3	0·0	−0·2	1·2	0·3	1·7	−0·8	−0·3
C11 (sales-clerk, bar-tender)	12·4	(0·9)	−0·7	−0·8	−0·6	−0·2	−0·8	0·1	−0·4	−0·1
C12 (sales representative, buyer)	11·8	(0·8)	0·6	0·3	0·3	−1·0	0·5	−1·0	−0·7	−0·3
V Labourers, operatives and kindred workers										
C13 (janitor, cleaner)	10·0	(0·9)	−1·3	−1·3	−0·6	0·0	−1·4	−0·1	1·0	−0·2
C14 (stock-handler, maid)	4·4	(0·5)	−1·2	−1·5	−0·7	−1·0	−1·2	−0·8	0·0	−0·2
C15 (bulldozer operator, dry-waller)	2·6	(0·6)	−1·4	−1·3	−1·0	0·3	−1·8	0·1	2·6	−0·1
C16 (fireman, freightman)	1·5	(0·2)	−1·2	−1·2	−0·7	−0·5	−1·2	−0·2	2·2	7·0
$F_{15,4076}$			744·4*	837·3*	1190·9*	837·1*	987·1*	1063·2*	1681·8*	2373·8*

* Significant between-cluster difference at the 0·05 level.

† The results are based on the 4091 Part II NCS respondents who were employed at the time of interview and who reported data on their occupation in enough detail to assign a Census three-digit occupation code (US Census Bureau, 1972). An additional 24 respondents (from the total of 4115 who were employed at the time of interview) were excluded from this and all subsequent analyses because of missing data.

‡ The averages are within-cluster means of job condition measures that were standardized to a mean of 0·0 and variance of 1·0 in the sample as a whole. The weighted averages of the means for each measure are 0·0 by construction. Within-cluster variances average 0·15.

one prior to clustering in order to give equal weight to their separate underlying dimensions.

A two-step method was used to cluster these transformed measures. The first step consisted of extracting 100 clusters using the FASTCLUS procedure in SAS (SAS Institute Inc., 1993). The second step consisted of applying Ward's (1963) minimum variance method to these 100 initial clusters using the CLUSTER procedure in SAS. A selection of the 16-cluster solution was made based on the decision to combine clusters only if by doing so the overall variance in the underlying job condition measures explained by the clusters was reduced by $< 1\%$ compared with when the clusters were not combined. Overall explained variance was assessed by using a separate variable for each categorical cluster solution having between 100 and 16 clusters as a predictor of the job conditions measures in a series of multivariate analyses of variance.

The 16 clusters account for 84·6% of the overall variance in the eight job condition measures. Within-cluster means on these measures are presented in Table 2. The first four clusters (C1–C4), which together make up 19·2% of the labour force, consist of professional workers whose occupations are alike in that they all involve substantively complex work with data under conditions of low physical demands and desirable work conditions but differ in the extent to which they require complex motor skills (C1–C2), complex interactions with people (C1, C3), and complex interactions with things (C1, C3). The next two clusters (13·2% of the labour force), made up of managers-administrators, differ primarily in that C5 contains more prestigious occupations than C6 with less need for motor skills and physical demands and much higher substantive complexity of work involving interactions with people and data. The next three clusters (16·8% of the labour force) are

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made up of craftsmen and kindred workers, occupations that are alike in requiring complex skills with things but differ in the extent to which they require high motor skills (C7–C8), high physical demands (C8), and undesirable work conditions (C9). The next three clusters (32·3% of the labour force) are made up of clerical and sales workers, occupations that are alike in requiring low physical demands and below average undesirable work conditions but differ in work complexity and occupational prestige. Occupations in C10 require high motor skills and are associated with somewhat higher than average prestige, while occupations in C11 have much less work complexity and carry less prestige, and occupations in C12 require somewhat more complex interactions with people and carry higher prestige. The final four clusters (18·5% of the labour force) are made up of labourers, operatives and kindred workers, occupations that carry low prestige and are characterized by low work complexity that differ among themselves in the extent to which they require high physical demands (C13, C15, C16) and exposure to undesirable work conditions (C16).

Once the occupational clusters were defined, analysis of variance and linear regression were used to compare 30-day disorder prevalences, work impairments, and the relationships between disorders and impairments within and across the clusters. Due to the complex sample design and weighting of the NCS, standard errors of the within-cluster means were estimated by the method of Jackknife Repeated Replication (JRR) in 44 design-based balanced subsamples (Koch & Leneshow, 1972; Kish & Frankel, 1974) using a SAS-macro. Linear regression coefficients were estimated within the REGRESSION and LOGISTIC procs in SAS. Standard errors were adjusted for design effects using the JRR method and a SAS macro. All significance tests are two-tailed and based on the 0.05 level of significance unless otherwise specified.

RESULTS

Between-cluster differences in disorder prevalences and work impairment

The results in part I of Table 3 show the 30-day prevalences of the core NCS/DSM-III-R disorders within each of the 16 clusters as well as in the employed sample as a whole. A total of 18·2% of employed NCS respondents reported one or more of these 30-day disorders, with overall prevalences ranging from a low of 11·0% for C3 to a high of 29·6% for C14.

There are significant between-cluster prevalence differences of all disorders other than PTSD and drug abuse. In general, workers in professional (C1, C3–C4), managerial-administrative (C5) and crafts (C7) occupations reported the lowest prevalences, while clerical and sales workers (C10–C12), labourers, operatives and kindred workers (C13–14, C16) reported the highest prevalences. Exceptions to this general pattern are significantly lower than average prevalences of some substance use disorders among clerical and sales workers in C10 and C12 and significantly lower than average prevalences of some anxiety disorders among labourers in C15.

The results in part II of Table 3 show average numbers of psychiatric work loss days and work cutback days within each of the clusters as well as in the employed sample as a whole. An average of 0·06 psychiatric work loss days (6 days per month per 100 workers) and 0·31 cutback days (31 days per month per 100 workers) were reported overall. Although the F tests for between-cluster differences are either statistically significant or close to significant at conventional levels, this is due entirely to very high means among the clerical and sales workers in C12. None of the other clusters differs at the 0.05 level of significance on either average work loss days or average work cutback days.

The relationships between 30-day disorders and work impairment

The results in Table 4 show the bivariate relationships between particular 30-day NCS/DSM-III-R disorders and 30-day psychiatric work impairment days in the overall sample of employed NCS respondents. The coefficients, which were obtained from a series of bivariate linear regression equations, are presented in metric form and can be interpreted as differences in the average number of impairment days associated with having a particular disorder *versus* not having that disorder. Almost all the coefficients in this table are positive and a great many are statistically

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Table 3. *Prevalences of 30-day NCS/DSM-III-R disorders and 30-day work impairment days by occupational cluster*

	Professionals				Mgrs and admins		Craftsmen and kindred workers			Clerical and sales workers			Labourers, operatives and kindred workers				Total			
	C1 %	C2 %	C3 %	C4 %	C5 %	C6 %	C7 %	C8 %	C9 %	C10 %	C11 %	C12 %	C13 %	C14 %	C15 %	C16 %	%	(S.E.)	*F*	*P*
I 30-day disorders																				
Affective																				
Depression	0·0*	4·7	0·8*	4·3	2·9	5·9	1·9*	3·6	2·1	6·2	7·0†	4·8	6·8†	4·7†	0·0	3·7	4·4	(0·49)	2·8	0·00
Dysthymia	0·0	0·8	0·5	0·2	0·1	0·3	0·1	0·0	0·0	0·2	0·2	2·4†	0·0	1·2	0·0	2·0	0·5	(0·14)	3·2	0·00
Mania	0·0	0·6	0·0	0·0	0·1	0·0	0·0	0·4	5·2†	0·0	0·1	0·0	0·1	0·0	0·0	0·8	0·2	(0·12)	8·9	0·00
Any affective	0·0*	5·5	1·3*	4·3	2·9*	6·2	2·0*	4·0	6·2	6·4	7·2†	6·4	6·8†	6·0	0·0	4·9	4·9	(0·53)	2·7	0·00
Anxiety																				
GAD	0·0	0·6	0·6	0·4	0·5	1·0	0·7	0·9	1·4	1·8	1·4	3·1†	1·5	5·6	2·5	1·5	1·5	(0·25)	2·7	0·00
Panic disorder	0·0	0·7	0·2	1·3	0·5	0·4	0·6	0·9	5·2†	1·2	2·6†	2·4†	0·7	1·2	0·3	0·6	1·3	(0·25)	2·4	0·00
Agoraphobia	0·0	1·6	0·4	1·7	0·5*	0·4	0·6*	0·4	7·6†	1·9	2·5	2·1	3·0†	4·3†	0·0	0·6	1·8	(0·30)	3·3	0·00
Simple	9·1	4·8	3·9	4·9	2·3*	3·3	3·7	0·8*	9·3†	6·8	8·3†	5·5	7·2†	6·5	1·0*	1·4	5·2	(0·49)	2·8	0·00
Social	0·9	3·4	1·5*	2·5	2·7	2·6	3·6	1·3	3·6	3·4	5·9†	5·3	8·7†	5·0	1·6	9·6†	4·2	(0·37)	3·2	0·00
PTSD	1·6	0·8	2·2	1·6	1·7	1·4	1·4	3·7	1·1	1·2	3·5†	3·7†	1·9	2·9	0·5	5·4†	2·2	(0·37)	1·5	0·11
Any anxiety	11·7	0·4	8·2*	8·9	6·3*	7·7*	6·9*	5·9*	17·2†	2·2	17·2†	2·2	17·8†	17·8†	5·9*	6·5	11·6	(0.82)	5·2	0·00
Substance																				
Alcohol dependence	0·0	6·7	0·8*	2·4	4.1	6·1	2·6	9·2	3·3	1·7	4·5	3·8	4·8	7·7†	7·2	1·7	4·1	(0·42)	3·0	0·00
Alcohol abuse	0·0	3·8	0·7*	2·1	2·8	5·1	4·4	7·5†	2·5	1·8*	3·2	2·1	3·5	3·6	7·1†	3·0	3·2	(0·32)	2·1	0·01
Substance dependence	0·0	1·0	0·9	1·2	0·2	2·4	1·9	1·2	5·2†	0·8	2·7†	0·5*	1·3	0·6	2·1	1·1	1·4	(0·15)	2·0	0·01
Substance abuse	0·0	2·5	0·0	1·4	0·2	1·8	2·0	2·6	1·7	0·3	1·6	0·3*	1·1	2·1	1·8	1·7	1·2	(0·18)	1·5	0·12
Any substance	0·0	1·4	2·0*	4·0	4·5	7·0	5·8	1·1	8·9	2·6*	7·2	4·3	5·8	10·3†	9·2	2·9	5·8	(0·46)	3·5	0·00
Any																				
Any 30-day disorder	11·7*	0·2	11·0*	5·1	11·9*	8·3	12·0*	6·1	23·8†	7·5	25·0†	7·2	24·9†	29·6†	3·6	9·3	18·2	(0·95)	5·4	0·00
II 30-day psychiatric work impairment days																				
Work loss days	0·01	0·02	0·00	0·06	0·02	0·05	0·04	0·04	0·03	0·10	0·03	0·17†	0·03	0·01	0·09	0·01	0·06	(0·02)	1·6	0·07
Work cut-back days	0·00	0·51	0·17	0·21	0·24	0·32	0·18	0·52	0·32	0·19	0·42	0·59†	0·35	0·11	0·14	0·02	0·31	(0·05)	1·7	0·05

* The mean for this cluster is significantly lower than the mean for all other clusters combined at the 0·05 level of significance (one-tailed).
† The mean for this cluster is significantly higher than the mean for all other clusters combined at the 0·05 level of significance (one-tailed).

Table 4. *The bivariate relationships between 30-day NCS/DSM-III-R disorders and psychiatric work/impairment days*

	Work loss days		Work cut-back days	
	b	(S.E.)	*b*	(S.E.)
I Affective disorders				
Major depression	0·45	(0·33)	2·77*	(0.67)
Dysthymia	−0·05	(0·14)	2·03	(1·20)
Mania	−0·05	(0·20)	1·26	(1·40)
Any affective	0·40	(0·30)	2·50*	(0·62)
II Anxiety disorders				
GAD	1·15	(0·87)	3·11*	(1·33)
Panic disorder	1·45	(0·98)	4·87*	(1·56)
Simple phobia	0·05	(0·07)	1·42*	(0·59)
Social phobia	0·44	(0·31)	1·11*	(0·47)
Agoraphobia	1·04	(0·71)	2·55*	(1·08)
PTSD	0·81	(0·59)	2·76*	(1·00)
Any anxiety	0·18	(0·12)	1·41*	(0·34)
III Substance use disorders				
Alcohol dependence	0·12*	(0·05)	0·88*	(0·43)
Controlled substance dep.	0·19*	(0·07)	1·50*	(0·65)
Alcohol abuse	0·13	(0·07)	0·17	(0·13)
Controlled substance abuse	0·25*	(0·09)	0·97*	(0·52)
Any substance (general)	0·10*	(0·04)	0·88*	(0·36)
IV Any disorders				
Any disorder	0·17*	(0·08)	1·11*	(0·24)
Exactly one disorder	0·01	(0·02)	0·37	(0·23)
⩾ 2 disorders	0·35	(0·18)	1·89*	(0·39)

* Significant at the 0·05 level, two-tailed test.

significant, which means that the disorders are, in general, positively associated with impairment. The coefficients are uniformly larger in predicting work cutback days than work loss days.

The results in Table 5 show multivariate relationships between 30-day pure and co-morbid disorders in predicting the same outcomes as in Table 4. The disorder combinations were constructed based on preliminary analyses of multivariate disorder profiles. The results show that pure affective disorders are associated with somewhat larger average numbers of both work loss and work cutback days than either pure anxiety disorders or pure substance use disorders and that co-morbid anxiety–depression is associated with the largest average number of work loss days and co-morbid anxiety–depression, anxiety–substance and anxiety–depression–substance are associated with the largest average numbers of work cutback days. The average numbers of work cutback days, but not work loss days, associated with co-morbid disorders are significantly greater than those of pure disorders ($z = 3{\cdot}8$, $P < 0.001$ for work cutback; $z = 1{\cdot}1$, $P = 0.271$ for work loss).

Between-cluster differences in disorder-impairment relationships

It was noted above that between-cluster differences in 30-day disorder prevalences are much stronger than between-cluster differences in 30-day psychiatric work loss days or cutback days. This implies that the relationships between disorders and work impairment differ across clusters; a possibility that, if demonstrated, could have important implications for targeting workplace interventions. A detailed analysis of this possibility is impossible with the NCS due to the small numbers of respondents in each occupational cluster with particular 30-day disorders and combinations of disorders. However, it is possible to carry out a provisional investigation of this issue by using the average numbers of work loss and work cutback days associated with each combination of disorders in Table 4 to create predicted numbers for each respondent and to compare the relationships between the predicted and observed numbers across clusters.

This type of comparison was carried out in the following way: first, each respondent was assigned predicted work loss and work cutback scores based on his or her profile of 30-day disorders and using the predicted values in Table 5. Secondly, bivariate linear regression equations were estimated in which observed work impairment scores were regressed on predicted scores separately within each occupational cluster. The resulting regression coefficients can be interpreted as the extent to which variation in disorder profiles in a particular occupational cluster is associated with greater or lesser variation in work impairment than in the sample as a whole. If psychiatric disorders had the same impact on work impairment in all occupational clusters, all of the regression coefficients would be equal to 1·0, whereas systematic variation in the coefficients would show that psychiatric disorders have a significantly greater impact on work impairment than average in some clusters (those with regression coefficients greater than 1·0) and a

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Table 5. *The multivariate relationship between 30-day NCS/DSM-III-R disorders and psychiatric work impairment days*

30-day NCS/DSM-III-R disorders	Sample distribution %	(S.E.)	Average work impairment days: Work loss days $\bar{x}$	(S.E.)	Work cut-back days $\bar{x}$	(S.E.)
I No disorders						
None	81·8	(1·0)	0·02	(0·01)	0·11	(0·02)
II Pure disorders						
Affective	2·1	(0·2)	0·25*	(0·11)	1·09*	(0·49)
Simple/social phobias	5·1	(0·5)	0·00	(0·00)	0·61*	(0·44)
Other anxiety	3·1	(0·4)	0·19	(0·11)	0·73*	(0·19)
Alcohol abuse	0·6	(0·2)	0·00	(0·00)	0·12	(0·08)
Other substance	3·7	(0·4)	0·14*	(0·06)	0·49*	(0·17)
Total pure	14·5	(0·8)	0·11*	(0·03)	0·66*	(0·20)
III Co-morbid disorders						
Anxiety–affective	2·1	(0·4)	0·70*	(0·59)	3·69*	(0·92)
Anxiety–substance	0·9	(0·1)	0·25*	(0·08)	1·93*	(0·83)
Affective–substance	0·2	(0·1)	—†	(—)	—†	(—)
Anxiety–affective–substance	0·5	(0·2)	0·26	(0·15)	6·62*	(2·47)
Total co-morbid	3·7	(0·5)	0·49*	(0·35)	3·46*	(0·70)

* Significantly different from the no-disorder subsample at the 0·05 level, two-tailed test.
† Subsample too small for stable estimation of means.

Table 6. *The regression of observed psychiatric work impairment days on predicted (from Table 5) psychiatric work impairment days by occupational cluster*

	Work loss days b	(S.E.)	Work cut-back days b	(S.E.)
I Professionals				
C1 (doctor, therapist)	—†	(—)	—†	(—)
C2 (engineer, architect)	−0·04	(0·03)	2·80*	(1·09)
C3 (lawyer, clergy)	−0·05	(0·06)	1·33*	(0·31)
C4 (accountant, programmer)	2·91	(2·06)	1·07*	(0·45)
II Managers and administrators				
C5 (personnel managers/foreman)	0·07	(0·09)	0·16	(0·10)
C6 (manufacturing manager/foreman)	0·27	(0·31)	0·30	(0·25)
III Craftsmen and kindred workers				
C7 (mechanic, cabinetmaker)	0·39	(0·30)	0·40	(0·21)
C8 (carpenter, electrician)	−0·08	(0·08)	1·25	(0·76)
C9 (baker, photographer)	0·54	(0·53)	0·66	(0·47)
IV Clerical and sales workers				
C10 (secretary, typist)	0·42	(0·37)	0·47	(0·41)
C11 (sales-clerk, bar-tender)	0·15	(0·13)	1·48*	(0·33)
C12 (sales representative, buyer)	3·39	(2·70)	1·29	(0·71)
V Labourers, operatives and kindred workers				
C13 (janitor, cleaner)	0·84*	(0·38)	0·63*	(0·24)
C14 (stock-handler, maid)	0·02	(0·03)	0·12	(0·12)
C15 (bulldozer operator, dry-waller)	2·11	(1·29)	0·09	(0·09)
C16 (fireman, freightman)	0·66	(0·61)	0·10	(0·07)

* Significant at the 0·05 level (two-tailed test).
† Coefficients could not be estimated because no psychiatric work loss or work cutback was reported in Cluster 1.

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significantly smaller impact than average in others (those with regression coefficients less than 1·0).

Results are reported in Table 6. We carried out a test for each outcome that pooled results across the 16 subsamples and tested for the significance of differences of regression coefficients. This test was not significant for the work loss day results reported in the first column of Table 5. This means that there is no overall difference across occupations in the impact of psychiatric disorders on work loss. Consistent with this result, only one of the 16 coefficients is significant at the 0.05 level. Parallel results are presented in the third column for work cutback days. There is a statistically significant between-cluster difference in these coefficients (F 15, 4060 = 15·5, $P < 0.001$), which means that psychiatric disorders have significantly different effects on work cutback across the occupations. There are four statistically significant coefficients greater than 1·0 and only one less than 1·0. Three of the four with coefficients greater than 1·0 are in the professional clusters (C2–C4), which means that psychiatric disorders generally have a greater effect on work cutback days among professionals than other occupational groups.

DISCUSSION

Limitations

A limitation of the above analysis is that results hinge on respondent retrospective self-reports about work impairment, which could be in error. This is a special concern in light of evidence that some types of psychiatric disorders lead to distorted and pessimistic perceptions about personal self-worth (Coyne & Gotlib, 1983) that might promote biased reports about workplace functioning. As research on workplace consequences of psychiatric disorders moves forward into experimental trials aimed at evaluating the effectiveness of clinical interventions not only in terms of symptom relief but also in terms of workplace productivity, there will be a need for more objective and refined measures of work impairment. Promising methodological work along these lines has already been carried out (e.g. Wiersma *et al.* 1988; World Health Organization, 1988), but needs refinement. A World Health Organization committee is currently working on this problem by attempting to develop a state-of-the-art work impairment assessment battery in conjunction with the revision of the International Classification of Impairments, Disabilities and Handicaps (World Health Organization, 1980). Use of such a measure in future investigations would be a major advance over the work reported in this paper.

An additional limitation of the work reported here is that we were required to carry out analyses within occupational clusters rather than within separate Census occupations in order to have enough cases for analysis and to define job conditions on the basis of aggregate matches with the *Dictionary of Occupational Titles*. Although this clustering was done using variables considered to be the main defining characteristics of occupations in the US labour force (Roos & Treimman, 1980), it is possible that more fine-grained distinctions based on other job characteristics would have led to more powerful results concerning between-cluster variations. The sample size problem also limited our ability to evaluate the reasons for between-cluster differences in the relationships between disorders and work impairments. Specifically, the results presented in Table 6 were based on gross bivariate analyses because disaggregated disorder-specific bivariate models (as in Table 4) and multivariate non-additive models (as in Table 5) could not be estimated with adequate precision within separate occupational clusters.

Conclusion

Within the context of these limitations, the results reported here suggest that 30-day DSM-III-R psychiatric disorders are associated with substantial numbers of work loss days and work cutback days, that the effects vary significantly depending on the constellation of disorders that the worker experiences, and that the effects on work cutback days also vary depending on the occupation in which the worker is employed. Concerning variation by types of disorder: pure affective disorder (2·1% of the sample) is associated with a larger average number of work loss days and work cutback days than any of the other pure disorders considered here: a total of 25 work loss days per month per 100 workers with this disorder, equivalent to an annualized national projection of over 4 million work loss days in the US, and 109 work cutback days per

month per 100 workers, equivalent to an annualized national projection of 20 million work cutback days. Co-morbidity involving at least one disorder in at least two of the three categories of affective, anxiety, and substance use disorders (3·7% of the sample) is associated with larger average numbers of work loss days (49 per month per 100 workers) and work cutback days (346 per month per 100 workers) than any pure disorder, equivalent to annualized national projections of over 15 million work loss days and over 110 million work cutback days.

Concerning occupational differences: while effects on work loss were found to be similar across occupations, elevated effects of psychiatric disorders on work cutback were found to be concentrated among professionals. Workers in one of the four professional clusters (C1: doctors, therapists) reported no work loss or work cutback days. However, professionals in the other three clusters (C2–C4) were found to have consistently elevated work cutback days compared to the numbers expected based on the sample-wide averages. It is unclear why this is the case, but there are at least two plausible interpretations. One is that professionls might be more able than other workers to slack off at work in response to psychiatric problems. This could be because professionals are more adept at hiding their work cutbacks from their supervisors, because the nature of their work makes it easier to hide their cutbacks from supervisors, or because they are less likely than other workers to have supervisors. The second possibility is that psychiatric disorders might interfere more with the cognitively complex work tasks required of professionals than with the tasks required of workers in other occupations.

The results reported here have important implications for the social policy debate on national health care insurance in the US and other industrialized societies. This debate is fundamentally concerned with evaluating how much society can afford to guarantee its citizens in terms of health care. In making this evaluation, it is critical to have information on the costs of both treating and of not treating particular classes of disorders and to weigh the competing costs of alternate policy decisions. The results presented here suggest that psychiatric disorders have adverse labour force consequences in terms of lost work productivity. A cost accounting of these and other consequences may well lead to the conclusion that it is not only humane but also rational to provide treatment for psychiatrically impaired workers.

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