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Chronic physical illness, psychiatric disorder and disability in the workplace

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Abstract

While agreement is growing that mental illness burdens the North American economy, how it impacts productivity — particularly compared to physical illness — is unclear. Hypothesizing that lost work days are only the tip of the iceberg, we also examined the association of mental and chronic physical illness with partial work days and days requiring extra effort to function.

Data from 4225 employed individuals, aged 18–54, were analyzed. These were a subset of respondents to the Ontario Health Survey's Mental Health Supplement, a 1990/91 epidemiologic survey of households across Ontario, Canada. Psychiatric disorder was assessed using the University of Michigan's modification of WHO's Composite International Diagnostic Interview (UM-CIDI).

Similar to US reports, professional/managerial groups had lower rates of affective and anxiety disorders and fewer disability days compared to the rest of the workforce. However, no single occupational group was consistently at greater risk for either physical or psychiatric problems.

Even after accounting for sociodemographic characteristics and work conditions, mental and physical status had clear, but different, impacts on productivity. Physical conditions alone had a fairly constant effect across all types of disability days and were the largest contributor to total work day loss. They also significantly impacted partial and extra effort days but were far less important than conditions involving a mental disorder. Respondents with mental health problems, either alone or in combination with physical illnesses, appeared more likely to go to work but to require greater effort to function.

WHO projects that mental illness will become the second most important cause of global disease burden in the next century. Our findings suggest that among working individuals, it affects productivity more subtly than does physical illness. However, with an estimated eight percent of Ontario's workforce experiencing more than two months annually of decreased productivity, it still incurs significant social and economic costs. © 2000 Elsevier Science Ltd. All rights reserved.

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Introduction

The effects of mental illness on workplace productivity has recently become a prominent concern on

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both the national and international fronts. Part of this can be attributed to the World Health Organization's (WHO) report (1996) that depression is a major cause of lost work days worldwide and will emerge as the leading cause of disability by the year 2020.

Mental illness is a common health problem among working adults. North American studies indicate that from 20 to 30% of adults between the ages of 18 and 64 years will suffer from at least one psychiatric disorder in any 12-month period (Kessler et al., 1994; Offord et al., 1996). Compared with the rest of the population, those with a psychiatric disorder will have a greater number of days during which they are either unproductive or unable to function at full capacity (Goering et al., 1996; Kessler and Frank, 1997).

While there is growing agreement that mental illness may create a heavy burden on the North American economy, how it impacts productivity and whether that impact differs from the effect of physical illness is less clearly understood. In this paper, we examine both issues using a sample of employed citizens drawn from a representative population sample. We hypothesize that lost work days are only the tip of the iceberg. To this end, we examine the association of mental illness with partial work days and days requiring extra effort to function. In addition, we seek to understand the relationship between chronic physical and mental illness, in combination as well as separately, and unproductive work days (herein used as a general term to refer to either full or partial disability days or days requiring extra effort to be productive).

Background

There is strong evidence that mental illness is linked to decreased productivity. For example, studies have found that those with depression have greater difficulty functioning in their normal roles than the rest of the population (Craig and Van Natta, 1983; Wells et al., 1989). Broadhead et al. (1990) estimated that those with major depression were almost five times more likely as individuals with no mental illness to be kept from their regular activities. Kessler and Frank (1997) identified similar trends among workers; employees with psychiatric disorders experienced more days during which they were forced to cut back on their activities.

One way in which the decreased productivity manifests itself is in lost work days. Johnson et al. (1992) reported that about 17% of workers with major depressive symptoms missed at least one week of work during the year. Furthermore, Kouzis and Eaton (1994) estimated that full-time workers with major depressive disorder were about 28 times more likely to have a disability day due to emotional reasons in the

past three months. In general, mental disorders seem to decrease the total number of working hours (Bartel and Taubman, 1986). Looking at short term disability claims, Conti and Burton (1994) found that the average length of short term disability was longer for employees with a diagnosis of a mental disorder than it was for those without one.

Except for Kessler and Frank (1997), the majority of these studies focus primarily on lost work days as their measure of decreased productivity. This is an obvious choice in that lost work days are easily measured, easily translated into economic loss, and consequently attract the attention of employers. However, there may be more subtle ways in which mental illness effects the national economy. Given that a mental illness is often perceived differently than a physical one, it is not unreasonable to expect that employees will react differently to its occurrence. Because they are physically able to function, they may go to work but be unproductive rather than taking a sick day. Thus, we would expect to see mental illness associated with less obvious measures than simply lost work days.

An additional shortcoming of the studies including Kessler and Frank (1997), is that they frequently do not account for the fact that physical and mental disorders often co-exist. Katon and Sullivan (1990) estimate that individuals with a chronic physical illness have a 41% increase in the relative risk of having a mental disorder with the most prevalent being affective, anxiety and substance use disorders. Conversely, Wells et al. (1989) found that people with a depressive disorder tend to report having a poorer health status than those suffering chronic physical conditions alone. Not accounting for the potentially confounding presence of either a mental or physical disorder could bias estimates of their effects. Furthermore, the combination of mental and physical illness may have different impacts on workplace productivity than either type of disorder alone.

Method

Data

Data were drawn from the 1990/91 Mental Health Supplement (the Supplement) to the Ontario Health Survey (OHS) (Ontario Ministry of Health, 1992), a psychiatric epidemiological survey of 9953 randomly selected household residents across the Province of Ontario, Canada. Sample selection for the OHS (described more fully in Boyle et al., 1996) was based on a stratified, clustered design in which the 42 provincial, public health units were divided into urban and rural strata (Statistics Canada, 1993). Enumeration areas were randomly selected within each strata, and house-

holds were randomly selected within enumeration areas. For the Supplement, one resident, aged 15 or older, was randomly selected from each household participating in the last two quarterly replicates of the OHS. Response rates were 88.1% for the OHS replicates and 76.5% for the Supplement (a total rate of 67.4%).

Supplement respondents were asked to identify their main activity. Those who defined themselves as “working for pay or self-employed” or “working for pay and being a homemaker” were classified as ‘employed’ whether they worked full- or part-time. For comparative purposes with other research done in the US (Kessler and Frank, 1997), our analyses were restricted to “employed” respondents who were between 18 and 54 years of age (unweighted $n = 4225$).

Variables

Variables used in our analyses fell into four categories: occupational groupings, sociodemographic descriptors, physical/mental status and disability. Respondents’ occupations were classified into 14 groups based on the Pineo–Porter–McRoberts (Pineo et al., 1977) occupational group clusters that were developed for use with the Canadian census to reflect skill level and prestige. There are 16 occupational categories in the original classification scheme. However, for our analysis, we combined self-employed and employed professionals (into ‘professionals’) and farmers and farm labourers (into ‘farmers’) because these subgroups were too small for meaningful analysis. Table 1 shows the 14 resulting categories and examples of the types of occupations which they comprise.

Sociodemographic descriptors used in our analyses included *gender* (male/female), *age* (continuous), *high*

school graduate (yes/no) and *marital status* (married/else).

Physical/mental status was defined using a combination of variables. The presence or absence of chronic physical illness was ascertained using items from the parent OHS which covered a list of 20 chronic health problems and their duration (Gnam et al., 1993). Respondents reporting conditions which immediately implied serious chronicity or morbidity (e.g., cancer, paralysis due to stroke) were automatically included in the group of chronically physical ill. For those reporting conditions where severity was a function of the illness’s duration (e.g., stomach ulcer, urinary problems), only those reporting an illness lasting 1 year or longer were classified as having a chronic illness.

Psychiatric disorder was evaluated using the Composite International Diagnostic Interview as modified by the University of Michigan (UM-CIDI) (Kessler et al., 1994; Wittchen, 1994), a structured interview designed to be administered by lay interviewers which generates post-interview diagnoses based on DSM-III-R criteria (APA, 1987). Three broad categories of psychiatric disorder (consisting of 14 Axis I disorders) were assessed: anxiety (panic, agoraphobia, generalized anxiety, social and simple phobias), affective (major depression, dysthymia, manic episode), and substance-related (abuse of or dependence on alcohol, marijuana, or other substances). Schizophrenia, while assessed in the UM-CIDI, could not be analyzed because of extremely small numbers.

Respondents were grouped based on whether they had a chronic physical illness or had met diagnostic criteria in the past 30 days for any of the broad psychiatric disorder categories (all coded yes/no). Those with only a single category of disorder were classified

Table 1
Occupational groupings^a

Occupational groupings	Examples of occupations in the groupings
Professional	Accountants, architects, actors, lawyers, social workers, teachers
High level management	General managers, administrators in teaching and related fields
Semiprofessional	Systems analysts and computer programmers
Technician	Life sciences technologists and technicians, technicians in libraries
Middle management	Personnel and industrial relations management, services management
Supervisors	Supervisors for typing, stenographic and bookkeeping occupations
Foremen	Foremen in logging, forestry, farming, horticultural occupations
Skilled clerical/sales/service	Registered nursing assistants, secretaries, stenographers, bookkeepers
Skilled crafts and trades	Fire-fighters, log inspecting, furnace and kiln workers, electricians, carpenters
Farmers	Nursery and related workers, farm machinery operators, farmers
Semiskilled clerical/sales/service	Bus drivers, nursing attendants, typists, receptionists, telephone operators
Semiskilled crafts and trades	Chefs, cooks, blasting occupations
Unskilled clerical/sales/service	Mail carriers, messengers, hotel clerks, street vendors
Unskilled labourers	Assembly line workers, service station attendants, taxi drivers, truck drivers

^a Occupation classification based on Pineo et al. (1977).

as *physical only*, *anxiety only*, *affective only* or *substance-related only*. Those with some combination were divided into *physical plus mental* or *comorbid psychiatric* (i.e. no physical illness but two or more psychiatric diagnostic categories). In addition, a summary category of *mental only* was created (comprised of *anxiety only*, *affective only*, *substance-related only* and *comorbid psychiatric*). The remaining respondents — i.e., those reporting no chronic physical problems and also not meeting 30-day criteria for any assessed UM-CIDI disorder — served as the reference group for the multiple regression analyses.

Three types of disability were considered. Respondents were asked how many days in the previous 30 they had been completely unable to function normally (*total disability* days), partially unable to function normally (*partial disability* days), or able to function normally only with extreme effort (*extra effort* days). Difficulty in functioning could stem from any source and did not have to be limited to problems resulting from mental or physical distress. Each of the categories are mutually exclusive and the total days across these categories were required to sum to 30 days or less.

Analyses

All statistical analyses were performed using SUDAAN (Shah et al., 1996) software because of the nonsimple-random sampling design. The 14 occu-

pational groupings were first compared by gender, age, educational status, and marital status, physical/mental status, and average disability days using two-tailed *t*-tests and chi-square statistics. Significance levels for all analyses were set at the 0.05 level.

The relationship between physical/mental status and disability was then examined using multiple regression controlling for the effects of occupational grouping. The method for this analysis builds on the one used by Kessler and Frank (1997) in their examination of lost work days in the US. We employ their approach of using occupational variables to control for unobserved factors. With this, we assume occupation captures two important aspects about the worker. First, we assume that subjects' decisions to select their occupations are not made at random. As a result, choice of occupation may be linked to factors that are also associated with disability. Second, we assume that occupation also reflects the workplace environment and those characteristics that might be associated with disability. Under ideal conditions, we would control for these nonrandom factors statistically. However, we were limited by the questions that were asked in the Supplement. Though workplace factors may be important influences to consider, we are unable to explicitly measure their contribution to disability. We can however, use occupational status to generally adjust for unknown subject and workplace characteristics, particularly since our concern is the relationship between health/mental-health status and workplace disability rather than these other factors. More technically, because occu-

Table 2
Sociodemographic characteristics by occupational groupings^{a,b}

Occupational groupings	Unweighted <i>N</i>	% Males		Mean age		% High school graduates		% Married	
		%	S.E.	\bar{x} (yr)	S.E.	%	S.E.	%	S.E.
Total	4225	55.5%	(1.0)	36.1	(0.3)	80.5%	(1.1)	75.5%	(1.0)
Professional	412	59.3	(4.5)	36.4	(0.8)	98.8	(0.4)*	77.8	(3.4)
High level management	126	64.0	(7.0)	39.8	(0.9)*	96	(2.1)*	85.5	(3.3)*
Semiprofessional	386	32.4	(3.1)*	36.9	(0.7)	97.4	(1.2)*	74.3	(2.8)
Technician	105	65.1	(6.9)	36.6	(1.3)	93.5	(2.6)*	84.7	(4.0)*
Middle management	383	65.3	(3.8)*	37.5	(0.5)*	87.9	(3.2)*	76.3	(3.7)
Supervisors	120	52.0	(7.7)	36.4	(1.9)	80.4	(5.1)	70	(5.8)
Foremen	130	90.9	(4.4)*	39	(3.1)	69.6	(13.1)	88.6	(3.7)*
Skilled clerical	416	30.9	(4.1)*	35.7	(0.9)	90.5	(1.9)*	73.5	(3.5)
Skilled crafts and trades	493	91.2	(3.1)*	35.1	(0.7)	71.2	(2.7)*	82.4	(2.1)*
Farmers	128	84.8	(3.7)*	35.7	(1.3)	57.6	(5.4)*	67.6	(4.8)
Semi-skilled clerical	538	34.3	(2.6)*	34.5	(0.7)*	71.9	(2.8)*	69.3	(2.8)*
Semiskilled manual	384	67.4	(3.9)*	36.5	(0.9)	60	(4.0)*	74.5	(4.2)
Unskilled clerical	211	16.3	(4.6)*	35.6	(0.9)	80.7	(3.8)	69.1	(5.8)
Unskilled manual	393	71.1	(3.3)*	34.6	(0.6)*	59.5	(3.9)*	71.8	(2.7)

^a Standard errors in parentheses.

^b * Significant at $p < 0.05$ level (two-tailed test). Comparisons for each occupational grouping made with all other groups.

Table 3
Physical/mental status by occupational groupings^{a,b}

Occupational groupings	Anxiety disorder only		Affective disorder only		Substance-related disorder only		Comorbid mental disorders only		Physical disorder only		Both physical and mental disorders	
	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
Total	2.6	(0.3)	0.7	(0.3)	1.2	(0.3)	0.8	(0.3)	25.5	(1.3)	3.1	(0.4)
Professional	4.3	(1.7)	0.0	(0.0)*	0.1	(0.1)*	1.0	(0.4)	25.1	(3.4)	1.2	(0.5)*
High level management	5.7	(4.1)	0.3	(0.3)	0.4	(0.3)*	0.5	(0.5)	16.8	(4.9)	1.8	(1.6)
Semiprofessional	1.2	(0.4)*	2.0	(1.9)	0.2	(0.2)*	0.0	(0.0)*	22.9	(3.3)	3.5	(1.5)
Technician	0.5	(0.4)*	0.0	(0.0)*	2.0	(1.1)	0.9	(0.7)	36.0	(5.4)	0.9	(0.9)*
Middle management	1.4	(0.8)	1.1	(0.9)	1.5	(0.4)	1.8	(1.2)	24.6	(3.5)	1.2	(0.5)*
Supervisors	1.6	(0.8)	0.0	(0.0)*	1.7	(0.3)	0.4	(0.4)	18.8	(5.8)	2.7	(1.5)
Foremen	0.8	(0.8)*	0.0	(0.0)*	2.7	(1.6)	0.0	(0.0)*	35.2	(8.4)	4.5	(2.4)
Skilled clerical	2.6	(0.9)	1.5	(1.3)	2.1	(1.0)	1.3	(0.8)	19.8	(2.8)*	7.3	(3.3)
Skilled crafts and trades	3.6	(1.4)	0.8	(0.7)	1.1	(0.4)	0.5	(0.3)	29.1	(4.2)	2.5	(0.6)
Farmers	1.5	(1.2)	0.0	(0.0)*	3.3	(1.9)	0.0	(0.0)*	28.0	(5.2)	3.5	(3.0)
Semiskilled clerical	3.4	(1.2)	0.2	(0.2)	0.5	(0.3)*	0.6	(0.3)	28.7	(3.4)	2.6	(0.9)
Semiskilled manual	1.5	(0.6)	0.2	(0.2)	1.5	(0.7)	0.0	(0.0)*	27.0	(3.4)	2.8	(0.7)
Unskilled clerical	3.3	(1.9)	0.0	(0.0)*	0.2	(0.2)*	2.6	(2.6)	22.9	(4.2)	3.3	(1.5)
Unskilled manual	1.9	(0.5)	1.9	(1.6)	3.4	(2.0)	0.3	(0.3)	27.7	(3.7)	3.9	(1.4)

^a Standard errors in parentheses.

^b * Significant at $p < 0.05$ level (two-tailed test). Comparison made with all other groups.

Table 4
Mean unproductive work days by type during the past 30-days by occupational groupings^{a,b}

Occupational groupings	Mean disability days		Mean partial disability days		Mean extra effort days	
	\bar{x}	S.E.	\bar{x}	S.E.	\bar{x}	S.E.
Total	0.6	(0.1)	0.7	(0.1)	0.5	(0.1)
Professional	0.4	(0.1)*	0.7	(0.1)	0.5	(0.1)
High level management	0.6	(0.3)	0.3	(0.1)*	0.1	(0.04)*
Semiprofessional	0.5	(0.2)	0.8	(0.2)	0.9	(0.5)
Technician	2.1	(1.4)	0.9	(0.3)	1.4	(0.7)
Middle management	0.4	(0.1)	0.6	(0.1)	0.6	(0.1)
Supervisors	0.1	(0.04)*	0.5	(0.2)	0.7	(0.3)
Foremen	0.3	(0.1)*	0.3	(0.1)*	0.2	(0.1)*
Skilled clerical	0.5	(0.1)	0.9	(0.2)	0.5	(0.1)
Skilled crafts and trades	0.6	(0.1)	0.7	(0.2)	0.6	(0.2)
Farmers	0.5	(0.3)	0.6	(0.1)	0.3	(0.1)
Semiskilled clerical	0.5	(0.1)	0.7	(0.1)	0.3	(0.1)*
Semiskilled manual	0.7	(0.2)	0.7	(0.2)	0.4	(0.1)
Unskilled clerical	0.5	(0.1)	1.0	(0.2)	0.5	(0.1)
Unskilled manual	1.2	(0.4)*	1.1	(0.3)	1.0	(0.5)

^a Standard errors in parentheses.

^b * Significant at $p < 0.05$ level (two-tailed test). Comparison made with all other groups.

occupational choice is not truly an independent variable but is chosen by the subject, inference based on the occupational indicator variables may be biased and inconsistent. However, the study's hypotheses do not focus on the coefficients of these indicators. Instead, we include occupation dummy variables (Table 1) to adjust our estimates for unobserved subject heterogeneity in much the same way that a fixed effects specification would. Specifically, the occupation dummy variables control for factors potentially correlated with disability days without explicitly measuring them.

Results

Gender, mean age, educational level and marital status for the 14 occupational categories are shown in Table 2 with each category being compared to the remaining occupational groupings. As anticipated, there are significant differences for all demographic variables with the widest variances for % male (ranging between 16.3 and 91.2%) followed by % high school graduates (57.6 and 98.8%).

The percentages of respondents with either physical or mental difficulties within each occupational grouping are shown in Table 3. Among the total sample of employed respondents, the most prevalent problem is *physical only* (25.5%). Conditions involving a UM-CIDI psychiatric diagnosis are far less prevalent (due to the 30-day criterion) and range from a high of 3.1%

with both physical and mental disorders to a low of 0.7% meeting criteria for *affective only*. While some occupational groupings have rates of disorder twice that of the total employed group, large standard errors prevent these estimates from being statistically significant. With the exception of foremen who have comparatively high percentages with *substance-related only*, *physical only* and *physical plus mental* (all nonsignificant), no single occupational grouping stands out as being consistently at greater risk for either physical complaints or psychiatric conditions.

The mean number of *total*, *partial* and *extra effort* disability days by occupational grouping are shown in Table 4 where some patterns are evident. Foremen report significantly fewer unproductive work days, and high-level managers are less likely to report either *partial* or *extra effort* days. At the opposite end, unskilled manual workers report comparatively higher numbers of *total disability* days.

The findings in Tables 2–4 show significant differences in sociodemographic composition, prevalence of illness, and average disability days among the 14 occupational groupings. To determine whether disability days are largely a function of either the specific work conditions or the worker characteristics represented by the occupational categories or whether physical/mental status still makes a meaningful contribution, we regressed physical/mental status on the number of each type of unproductive work days adjusting for occupational category. Our reference group, those without

Table 5
Relationship between 30-day disorders and unproductive work days^{a,b,c}

Disorder category	Additional total disability days			Additional partial disability days			Additional extra effort days			
	β^d	95% C.I.	β	95% C.I.	β	95% C.I.	β	95% C.I.	β	95% C.I.
Physical only	0.4*	(0.01, 0.8)	0.4*	(0.01, 0.8)	0.3*	(0.5, 0.1)	0.3*	(0.5, 0.1)	0.3*	(0.1, 0.5)
Mental only	0.1	(-0.3, 0.5)			0.9*	(0.5, 1.3)			2.3*	(0.3, 4.3)
Affective only			-0.3*	(-0.5, -0.1)			1.0	(-0.4, 2.4)		
Anxiety only			0.1	(-0.3, 0.1)			0.9*	(0.1, 1.7)		
Substance-related only			0.0	(-0.6, 0.6)			0.2	(-0.4, 0.8)		
Comorbid psychiatric			1.4	(-0.8, 3.6)			2.0*	(0.8, 3.2)		
Physical and mental	0.4	(-0.2, 1.0)	0.4	(-0.2, 1.0)	2.0*	(0.6, 3.4)	2.0*	(0.6, 3.4)	1.2*	(0.6, 1.8)

^a 95% confidence intervals in parentheses.

^b Controlling for occupational grouping. Reference group consisted of respondents reporting no 30-day mental or chronic physical disorder.

^c Significant at $p < 0.05$ level (two-tailed test).

^d Unstandardized coefficients from the multiple regression model.

a chronic physical or 30-day mental disorder, averaged 0.5 *total disability* days (0.04 S.E.), 0.5 *partial disability* days (0.01 S.E.), and 0.3 *extra effort* days (0.03 S.E.). The unstandardized coefficients from the regression model (Table 5) represent the number of additional disability days which are attributable to specific physical/mental status categories. Our findings indicate that there are significant effects of physical/mental status net of occupational grouping and furthermore that physical and mental difficulties impact differently on work productivity. Chronic physical illness alone has a constant and significant effect on all three types of disability days adding an additional 0.3 to 0.4 days per month. Mental disorder alone has a negligible effect on *total disability* days (0.1 additional days, $p > 0.05$), a significant impact on *partial* days (0.9 additional days, $p < 0.05$) and its greatest effect on *extra effort* days (2.3 additional days, $p < 0.05$). By contrast, the combination of physical and mental disorders shows a different pattern than either condition alone; together, physical and mental disorders have their greatest effect on *partial* days (2.0 additional days, $p < 0.05$), the next greatest on *extra effort* days (1.2 additional days, $p < 0.05$), and the least on *total disability* days (0.4 additional days, $p > 0.05$).

When the *mental only* group is further subdivided, the patterns seem to depend on the specific disorder category. All four subcategories contribute significantly to *extra effort* days with the strongest effect being 11.6 additional days associated with *affective only*. The *anxiety only* and *comorbid psychiatric* groups were the only ones to show significantly elevated estimates for *partial disability* days.

These findings may be influenced by our choice of 30 days as the prevalence period for the psychiatric disorders. The rationale for this decision was to allow comparability with previous US research (Kessler and Frank, 1997) and to synchronize the time periods for which both psychiatric disorder and disability days were assessed. However, it is a common clinical finding that subclinical symptom levels and the effects of mental illness often persist even after the individual no longer meets full diagnostic criteria. In addition, our measure of physical illness could not be constrained to a 30-day period. Thus, our index of physical/mental status combined 30-day and chronic prevalences. These issues raised the question of whether our choice of time period created an underestimate of the effect of mental disorder and, especially, diminished its relative contribution vis-à-vis physical illness to workplace disability.

To test this possibility, we assessed the effect of adding past-year mental disorder dummy variables to the empirical models in Table 5. These dummy variables were used to indicate the presence of a mental disorder during the past 12-months in the absence of a disorder during the past 30-days. To determine whether these

Table 6
Relationship between 30-day and 12-month disorders and unproductive work days^{a,b,c}

Disorder category	Additional total disability days		Additional partial disability days			
	β^d	95% C.I.	β	95% C.I.	β	95% C.I.
Physical only	0.5*	(0.1, 0.8)	0.2	(-0.2, 0.5)	0.2	(-0.02, 0.5)
30-day mental only			0.9*	(0.4, 1.4)		
30-day affective only	-1.2	(-2.6, 0.1)			1.1	(-0.5, 2.7)
30-day anxiety only	-0.4	(-0.8, 0.1)			0.9	(-0.01, 1.8)
30-day substance-related only	-0.4	(-0.9, 0.1)			0.3	(-0.2, 0.8)
30-day comorbid psychiatric	1.5	(-0.7, 3.6)			2.0*	(0.8, 3.2)
30-day mental and physical	0.4	(-0.1, 0.9)	2.0*	(0.7, 3.2)	2.0*	(0.7, 3.2)
12-month mental only			0.2	(-0.1, 0.5)		
12-month affective only	-0.1	(-0.7, 0.5)			0.5	(-0.4, 1.4)
12-month anxiety only	-0.2	(-0.5, 0.2)			0.4	(-0.04, 0.9)
12-month substance-related only	0.6	(-0.4, 1.5)			-0.1	(-0.5, 0.3)
12-month comorbid psychiatric	2.1	(0.4, 4.6)			-0.4	(-1.0, 0.3)
12-month mental and physical	0.02	(-0.6, 0.7)	0.8	(-0.02, 1.6)	0.8	(-0.01, 1.6)

^a 95% confidence intervals in parentheses.

^b Controlling for occupational grouping. Reference group consisted of respondents reporting no 30-day mental or 12-month chronic physical disorder.

^c Significant at $p < 0.05$ level (two-tailed test).

^d Unstandardized coefficients from the multiple regression model.

12-month dummy variables added significantly to the models, we followed Kmenta's (1986) example by performing F -tests to compare the resulting error sums of squares from the resulting regression equations.

Table 6 gives the estimates for the equations for which the null hypothesis (the inclusion of the dummy variables improved the model) could not be rejected at $p < 0.05$. For the most part, in these equations, the pattern of the relationship between the 30-day mental status and disability days remained the same. In addition, the presence of a disorder in the past 12-months but not in the recent 30-days did not seem to have a significant impact on current unproductive workdays. These results suggest that the aftermath of psychiatric disorders suffered earlier in the interview year is less influential than current illness on current disability and the current status impacts most on the workplace. Though not definitive, these results indicate that a history of a mental disorder is not necessarily associated with unproductive work days and in the absence of current symptoms, workplace functioning should be unaffected.

Discussion

The patterns of mental difficulties and disability days found across Canadian occupational groupings are similar, but not identical, to ones reported for American workers by Kessler and Frank (1997) and Sterling and Weinkam (1985). Our findings show lower

rates of affective disorders and fewer *total disability* days among the professional group compared to other occupational groups. However, contrary to Kessler and Frank (1997), we also found lower rates of affective disorders among unskilled clerical laborers and lower rates of substance-related disorders among professionals and high-level managers. It is possible that these reflect actual Canadian-US differences, but the more likely explanation is our separation of 'pure' disorder categories (e.g., *affective only*, *substance-related only*) from comorbid conditions versus the US study which combined them. Since affective disorder is present in most of the comorbid conditions, it is reasonable that the rate of *comorbid mental disorders only* is higher among unskilled clerical laborers — a finding similar to Kessler and Frank (1997) for affective disorders.

Our most significant result is that mental and physical status impact on work productivity even after differences in worker characteristics and particular work conditions (as represented by occupational groupings) are accounted for. However, they affect productivity in different ways. Physical conditions alone have a fairly constant effect across *total*, *partial* and *extra effort* days. But, compared to the other physical/mental status categories, they seem to be associated with the highest number of *total disability* days. In addition, though they also significantly impact *partial* and *extra effort* days, they are far less important than conditions involving a mental disorder.

Similar to what Kessler and Frank (1997) found

for US workers, the effect of mental health on productivity is far less obvious. Rather than contributing to *total disability* days, once physical status is controlled for, it has its greatest impact on both *partial* and *extra effort* days. Respondents with mental health problems, either alone or in combination with those related to physical health, are far more likely to show up for work but require greater effort to function up to par.

Within mental disorders, the specific categories most likely associated with partially missed or extra effort days are affective disorders alone and comorbid psychiatric conditions. The latter result can be explained by the fact that approximately 71% of the comorbid psychiatric group meet criteria for an affective disorder. Thus, those with affective disorders only and those with comorbid psychiatric disorders share a similar pattern of reduced productivity.

The most common explanation for why differences occur between how mental and physical illnesses are addressed is stigma. Workers may be concerned about being labeled as mentally ill by their employers and coworkers for fear of the ramifications. While there is abundant support for the power of negative social values in shaping or inhibiting behavior, other evidence suggests a more complex picture. In an analysis of the lag time between onset of symptoms and treatment seeking for psychiatric problems, two recent studies (Kessler et al., 1998; Olfson et al., 1998) found that dramatic symptoms (such as those associated with panic attacks) are perceived as problems and attended to more quickly than those which are more subtle (such as those associated with depression). In addition, the threshold of when a condition justifies taking a sick day may differ for mental and physical problems. Where physical symptoms often provide concrete and visible evidence of impairment, mental symptoms are often hard to distinguish from ordinary 'off-days'. As a result, they are not attended to early. Indeed, one of the premises behind depression awareness campaigns is the need to educate the public in the recognition of what constitutes signs of the illness (Regier et al., 1988).

Our findings should be interpreted within the limitations of our methodology and research design. A major constraint of this study as with most of the literature, is that the definition of disability is subjective; it relies heavily on the individual's memory and perception (Kessler and Frank, 1997). The person must remember how many days s/he missed during a period of time and the number of those days that were due to his/her inability to function to full capacity. In addition, the definition depends on an individual's perception of what constitutes full functional capacity.

One person's full functional capacity may be another one's partial capacity. These problems of recall and definition add to the imprecision of our measures of workplace disability but likely do not systematically affect the overall patterns observed.

Conclusions

Mental illness is quickly becoming one of the leading causes of disability in the world. WHO (1996) projects that it will become the second most important cause of global disease burden in the next century, second only to ischemic heart disease. Our findings suggest that, in the relatively healthier set of individuals who constitute the workforce (Sterling and Weinkam, 1986), it affects productivity in a more subtle manner than physical illness. Nevertheless, it still has a significant economic and social cost. According to our estimates, about eight percent of the Ontario workforce will experience more than two months of lost or decreased productivity days each year. Furthermore, evidence shows that emotional and mental conditions are one of the fastest rising reasons why workers take long-term disability (WHO, 1996). Thus, while mental illness may have a less immediate effect on the workplace than physical illness, it may have a more costly long term impact.

One explanation why mental illness exhibits different effects from physical illness is because employees often cope with it differently. Though they might take time off from work in response to a physical condition, they are less likely to do so for a mental one. Consequently, they dutifully show up to work day after day without seeking treatment. Yet, if the mental illness is related to the workplace, they may be subjecting themselves to the factors that could exacerbate the problem. In the long run, the absence of early detection and help may lead to significant disability and force them to leave the labour force. Thus, employers are hit twice — once with low productivity when employees are at work and again when they lose their workers. In work situations that emphasize teamwork, there may be a triple cost as other workers must compensate for affected workers' low productivity often without knowing the reason why.

This suggests that managers need to be aware of the more subtle patterns of behaviour associated with mental disorders. If they are able to identify decreases in worker efficiency early on, they may be able to decrease the impact of mental disorders on the workplace. There are several ways in which this may be done including encouraging early treatment through the use of Employee Assistance Programs (EAPs), company sponsored services designed to provide confi-

dential off-site mental health counselling to employees on a short term basis free of charge. In addition, the manager may work with the company's Occupational Health Services to create a work environment that will promote recovery.

The WHO reports that in developing countries, physical illness is one of the leading causes of disability (WHO, 1996). But, in developed countries, the pattern changes with mental disorders taking the lead. As the economies of developing countries transition and the traditional workplaces begin to change, employers will need to develop new sensitivities to and methods of coping with the effects of mental disorders in their employees. Otherwise, a significant barrier to achieving full economic growth will be poorly addressed.

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