Depression and Work Productivity: The Comparative Costs of Treatment Versus Nontreatment

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This article discusses the impact of depression on work productivity and the potential for improved work performance associated with effective treatment. We undertook a review of the literature by means of a computer search using the following key terms: cost of illness, work loss, sickness absence, productivity, performance, and disability. Published works were considered in four categories: (1) naturalistic cross-sectional studies that found greater self-reported work impairment among depressed workers; (2) naturalistic longitudinal studies that found a synchrony of change between depression and work impairment; (3) uncontrolled treatment studies that found reduced work impairment with successful treatment; and (4) controlled trials that usually, but not always, found greater reduction in work impairment among treated patients. Observational data suggest that productivity gains following effective depression treatment could far exceed direct treatment costs. Randomized effectiveness trials are needed before we can conclude definitively that depression treatment results in productivity improvements sufficient to offset direct treatment costs. (J Occup Environ Med. *2001;43:2–9*)

Depression is the mental illness thought to have the largest disease burden in the general population[1]. A growing body of evidence documents that depression is highly prevalent in the labor force[2,3] and that it is associated with substantial lost productivity.[4,5] Greenberg et al[6] estimate that the annual salary-equivalent cost of major depression due to work loss and work cutback in the US labor force is $33 billion. If appropriate treatment restores a substantial proportion of this lost productivity, then aggressive outreach and treatment of workers with depression would represent an investment opportunity for employers rather than a health care cost. This possibility is of considerable interest in light of the current debate regarding whether employer-sponsored health insurance programs should be required to expand coverage of mental disorders.[7]

Because of concerns that depression leads to biased self-reports about performance,[8] a definitive study of the relationship between depression treatment and workplace productivity would require an experimental clinical intervention conducted in collaboration with employers who would provide access to objective data on pre- and post-treatment productivity. To justify such a complex and expensive effectiveness trial, the results of existing studies should be examined first. These results provide data for making reasoned inferences regarding the magnitude of depression-related

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productivity loss and the likely cost saving associated with depression treatment. To this end, the following review examines the literature on depression and workplace performance.

We conducted a computer search for published reports on depression that included the following key terms: cost of illness, work loss, sickness absence, productivity, performance, and disability. The various measures of work productivity or work performance considered included time missed from work because of illness, self-reported productivity while at work (eg, "cutback days"), and observers' ratings of work productivity. Identified studies were organized into four categories: (1) cross-sectional naturalistic studies of the association between depression and self-reported work impairment, (2) longitudinal naturalistic studies of synchrony of change in depression and work impairment, (3) longitudinal uncontrolled treatment studies examining changes in work impairment associated with successful treatment of depression, and (4) controlled treatment trials examining effects on self-report and clinician-rated measures of work impairment.

Cross-Sectional Naturalistic Studies

The first important naturalistic study to document an association between depression and work impairment was the Medical Outcomes Study (MOS),[9] a comparative naturalistic study of the functioning and well-being of medical patients with one of several chronic health problems that included depression. In the MOS sample, the level of overall impairment in work, household, or school activities associated with major depression is comparable to or greater than that associated with other disorders considered in the study. Furthermore, the average number of self-reported bed days in the MOS study is significantly greater for respondents with depression than those with hypertension, diabetes, gastrointestinal problems, angina, back problems, or arthritis. Although severity of depression (major vs minor depression) was not associated with level of functional impairment in the MOS, a significant association between depression symptom severity and level of functional impairment is found in a number of subsequent cross-sectional patient studies.[10,11]

Later comparative studies performed in primary care settings confirmed and extended the MOS results.[12–15] The most ambitious of these is the World Health Organization Collaborative Study of Psychological Problems in General Health Care,[16] a cross-sectional naturalistic survey that screened more than 25,000 primary care patients in 14 countries and interviewed an enriched subsample of those who scored high for psychological distress and a random subsample of others. Over 5000 second-stage respondents received a detailed psychiatric diagnostic interview along with a clinician-rated interview on functional impairment. After controlling for physical disease severity, mental disorder was associated with substantial occupational role impairment for patients in all countries. Results pooled across countries show that 48% of respondents with a current diagnosis of major depression, according to the International Classification of Diseases, 10th Revision, had interviewer-rated moderate or severe occupational role impairment and a mean of 7.7 days with some disability in the past month.[13]

General population surveys performed as part of the National Institute of Mental Health Epidemiologic Catchment Area (ECA) program confirms the association of depression with work impairment found in these primary care studies. The Baltimore site of the ECA survey found that 44% of employed respondents with recent major depression, according to the *Diagnostic and Statistical Manual* (DSM), 3rd Revision, had reported one or more missed days from work because of emotional problems in the 3 months before the interview.[4] After adjustment for demographic factors and comorbid psychiatric disorders, the odds ratio of work loss for emotional problems among respondents with major depression was 27.8 versus respondents with none of the DSM disorders assessed in the survey.

The 1-year follow-up interview at the North Carolina site of the ECA survey asked general population respondents less specifically about the number of days they had missed work because of illness over the past 3 months. Employed respondents with major depression in the baseline interview were more likely to report work loss 1 year later (odds ratio, 3.2) compared with those without depression, even after controlling for other comorbid mental disorders and for self-reported chronic medical conditions.[17]

Several more recent nationally representative general population surveys also reported relevant comparative information on depression and work impairment. The National Comorbidity Survey,[5] completed in 1992, found that recent (within the month of interview) DSM-III-R major depression is associated with a significantly elevated risk of both work-loss and work-cutback days after controlling for other comorbid disorders. Respondents with remitted depression had no significant elevation in either work loss or work cutback compared with respondents who were never depressed, arguing indirectly that the work impairment associated with depression remits with the remission of the disorder. The 1996 Centers for Disease Control and Prevention Behavioral Risk Factor Surveillance System[18] investigated condition-specific 30-day activity limitations and found that a composite category of "depression, anxiety, or other emotional problems" is one of the most impairing conditions among adults in the gen-

eral population. A similar result is found in a 1997 national survey performed by the MacArthur Foundation,[19] which found that DSM-IV major depression is one of the five health conditions associated with the greatest work loss and work cutback. Major depression is by far the most prevalent of the top five conditions (the others being panic, ulcers, chronic sleep problems, and autoimmune diseases).

Longitudinal Naturalistic Studies

A limitation of the cross-sectional naturalistic studies reviewed above is that they provide no evidence that work performance is responsive to change in depression. A small number of longitudinal naturalistic studies have addressed this issue indirectly by studying synchrony of change between the severity of depression and severity of work impairment. Most of these studies were done in primary care settings.[20–24] Across all of these studies, the results show a significant synchrony of change between the severity of depression and amount of work impairment.

A good example of work in this area is the study of Von Korff et al,[21] who evaluated untreated depressed medical patients who frequently used health care in a Health Maintenance Organization over a period of 12 months. Respondents with unimproved depression during this follow-up period reported very high levels of work impairment that did not change significantly between baseline and the end of the follow-up period. In comparison, respondents with depression rated as severe at baseline who improved over the follow-up period reported a 36% reduction in work impairment days. Over the 12-month period, this change is equivalent to a reduction from 79 to 51 days per year. Respondents rated as moderately depressed at baseline who improved reported a 72% reduction in number of work impairment days, equivalent to a reduction from 62 days per year to 18 days per year. Studies by Ormel and colleagues[22,23] found similar patterns of synchronous change in primary care samples after considering clinician-rated assessments of work impairment rather than respondents' self-reports.

Ormel et al[24] also used follow-up data from the World Health Organization collaborative primary care study to examine the onset of disability among primary care patients. Among those free of disability at the baseline assessment, the presence of depression at baseline was associated with a 1.5-fold increase in the risk of physical disability after 3 months and a 1.8-fold higher risk at 12 months. The significant association between depression and the onset of disability persisted after adjustment for severity of comorbid medical illness.

In an analysis of 12-month follow-up data from the Baltimore ECA survey, Kouzis and Eaton[25] found evidence of synchrony of change between depression and work impairment in the general population. After controlling for comorbid self-reported mental and physical disorders, investigators found a significantly higher number of self-reported illness-related work-loss days among respondents who met the criteria for major depression in both the baseline and follow-up interviews (approximately 36 days per year) than among those who were depressed at only one of the two interviews (approximately 24 days a year).

Using 10-year longitudinal data from the National Institute of Mental Health Collaborative Study, Judd and colleagues[26] examined change in depression and change in psychosocial disability. Severity of depression showed a strong, dose-response relationship with level of psychosocial disability. Remission of depression was associated with the return of normal psychosocial function.

In all of the studies reviewed so far, work impairment was assessed by self-report. Although methodological research has documented good accuracy of self-reported days missed from work,[27] reliance on self-reporting is an important limitation. Druss and colleagues[28] used employer records of work loss—a source not subject to self-report bias—to document that illness-related absence associated with depression was greater than that for any other chronic medical conditions.

Uncontrolled Treatment Studies

Because of their design, naturalistic studies cannot confirm that the reduced productivity found shortly before depression treatment is a consequence of the depression. Another possibility is that some other unmeasured variable (eg, difficulty in getting along with a work supervisor) leads to both increased depression and increased work impairment. A number of studies have attempted to evaluate this issue by documenting synchrony of change between self-reported measures of work impairment and changes in depression due to treatment in uncontrolled treatment trials.

Mintz et al[29] reported data on synchrony of change among employed patients based on a secondary analysis of six treatment trials performed in the 1980s. Severity of depression was assessed using either the Hamilton Rating Scale of Depression[30] or the Beck Depression Inventory.[31] Serious work impairment was defined dichotomously according to any self-report of absenteeism, reduced productivity, interpersonal problems at work, poor overall work functioning, or unemployment. Five important results emerged from this investigation. First, serious work impairment is significantly less prevalent among patients whose depression remitted than among those whose depression continued. Second, the percentage of patients with serious work impairment decreased with the length of treatment. Third, the effect of the duration of treatment

on decreased prevalence of serious work impairment could not be explained by improved symptoms, because the magnitude of symptom remission was fairly comparable in shorter and longer trials. This means that the remission of serious work impairment lagged behind symptom improvement. Fourth, the gradient of the association between the probability of serious work impairment and symptom severity is most steep at moderate-to-high levels of depression. Assuming a causal association, this means that it is not necessary to achieve complete symptom remission to reduce the prevalence of the serious work impairment associated with depression. And, fifth, follow-up data from several of the studies show that symptom relapse is associated with a return of serious work impairment.

In a secondary analysis of data from a large randomized trial, Simon and colleagues[32] examined the course of depression and work participation over 24 months. Depression outcome at 12 months (persistent major depression, subthreshold depression, or remission) was strongly associated with both the probability of maintaining paid employment and the number of days missed from work because of illness. Although improvement in depression was also associated with reduced health care expenditures, the economic impact of work productivity changes was much greater than the impact of changes in health care utilization.

The findings of other recent studies have generally been consistent with those of Mintz et al,[29] although none have attempted to address all of the subtleties in Mintz et al's analysis. Most recent studies have been short-term, open-label trials of various pharmacotherapies for treating major depression,[33,34] chronic major depression,[28,35] or dysthymia.[36,37] Most have used continuous rating scales of role functioning such as the Social Adjustment Scale,[38] the Sickness Impact Profile,[39] or the MOS Short-Form-36[40] to assess change in functioning. Also, some have reported results only in the aggregate, so it is not possible to focus explicitly on the change in work functioning. Nonetheless, the general finding in these studies, albeit with some exceptions,[34,36] is that significant synchrony exists between change in depression severity and change in work functioning. When this association was not found, the trial was either of a very short duration[34] or it dealt with patients having mild symptoms.[36] The absence of significant associations in these studies is consistent with Mintz et al's findings that synchrony increases with the duration of treatment and with increasing symptom severity.

It is also noteworthy that the strength of synchrony in these studies was documented both for measures of functioning based on patient's subjective perceptions of work performance[28,35] and for the more objective measures of frequency of absenteeism[41] and clinicians' ratings.[33] For example, Finkelstein et al[35] found identical Pearson correlations of 0.59 between changes in Hamilton Rating Scale for Depression scores and changes in both patient-reported subjective work performance and clinician-rated work performance over a 12-week clinical trial. Mauskopf et al[33] found a Pearson correlation of 0.83 between change scores on the Clinical Global Impression-Severity of Illness Scale[42] and change scores on a clinician-rated measure of work and social disability over 8 weeks in a very large, multisite open trial. The existence of such strong correlations for observer-rated (rather than self-reported) measures of work functioning diminishes concerns that subjective work performance ratings of depressed patients may be exaggerated.[8]

Controlled Treatment Studies

Uncontrolled treatment studies cannot prove that effective treatment for depression increases work productivity. Controlled trials, however, document significant differences between treatment and placebo groups on self-reported measures of work impairment. Mintz et al[29] present results from four such trials performed in the 1980s, all of which document a significant reduction in the prevalence of self-reported serious work impairment with active treatment. Positive findings from more recent trials have also been reported for measures of daily functioning (including but not limited to work impairment). For example Coulehan et al[43] randomized a sample of outpatients with moderate-to-severe depression to a protocol intervention (either antidepressant pharmacotherapy or interpersonal psychotherapy) or to usual care with their primary care physician. All patients were observed for a period of 8 months after randomization. Protocol treatment was associated with a significantly greater reduction in role impairment and increase in social functioning compared with usual care, as assessed by the MOS Short-Form-36. Katzelnick et al[44] recently described a randomized trial of organized depression management for "high utilizers" of medical care (a population with a high prevalence of untreated depression). Compared with patients receiving usual care (most of whom remained untreated), patients randomized to an organized depression management program reported significantly more favorable scores on the Social Function and General Health Perception scale of the SF-20. Similar results using multidimensional assessments of role functioning have been found in other placebo-controlled trials that included patients with major depression,[45] early-onset primary dysthymia,[46] and chronic depression.[47] Wells et al[48] evaluated the effects of a quality improvement program for depression in a diverse sample of 46 primary care practices. The practices were randomly assigned to a control group or to one of two quality improvement programs—one focused

on improving the quality of antidepressant pharmacotherapy and the other focused on increasing access to evidence-based psychotherapy. Compared with the control group, patients in the two intervention groups were significantly more likely to maintain paid employment over a 12-month period.

It is important to note an exception to these positive results. Simon et al[41] reanalyzed the data from two separate trials that evaluated the impact of a collaborative management program for primary care treatment of depression that included such augmentations as patient education, behavioral activation, and monitoring of medication adherence. Patients were randomized to the collaborative management program or usual care from a primary care physician. Among the patients with major depression, approximately 70% of patients in the enhanced-treatment groups compared with 40% in the usual-care groups experienced symptom reductions of at least 50% by the final 7-month follow-up assessment.[49,50] Also, nonsignificant trends suggested that patients in the enhanced-treatment groups were less likely than those in the usual-care groups to be unable to work or to have changed jobs by the end of the study. However, these workplace effects are not statistically significant, despite a significant finding of synchrony of change between remission of depression and decreased work disability.[41] The authors of this study note that these negative results could reflect low power due to the rarity of the adverse work outcomes (unable to work and job change) in conjunction with a comparatively small sample size ($n = 124$).

Estimated Cost Savings of Treatment

Although controlled trials have documented the effects of treatment on multidimensional ratings of work performance, it is difficult to translate these results into monetary terms because the outcome measures have no natural economic metric. Furthermore, because most of these results are based on patients' subjective ratings of work impairment, questions can be raised about the impact of treatment on more objective measures of work functioning. Such questions have merit, given the suggestion that depressed patients exaggerate their work impairments in subjective ratings.[8]

Using data from two nationally representative population samples of workers, Kessler et al[51] attempted to make a crude lower-bound estimate of the workplace cost savings associated with depression treatment by analyzing data on the relationship between severity of depressive symptoms and short-term work loss and work cutback. Logistic regression methods were used to estimate the impact of depression on the odds of work loss among depressed workers, whereas information on respondent earnings was used to assign dollar values to reports about work loss and work cutback. Depressed workers were found to have between 1.5 and 3.2 more short-term disability days per month than those without depression, resulting in a salary-equivalent productivity loss of $182 to $395 per month. Comparison with cost-effectiveness estimates from a recent clinical trial suggest that between 45% and 98% of the incremental costs of depression treatment could be offset by resulting gains in work productivity.

These estimates are conservative in the sense that they do not consider the cost savings of treatment associated with fringe benefits, replacement costs, or decreased profitability. Furthermore, because the results focused exclusively on workers with short-term disability, they ignored the cost savings associated with reductions in long-term disability. Even with these exclusions, the conservatively estimated cost savings exceed the average treatment cost of depression. Nevertheless, the authors could not conclude that treatment of depressed workers would be cost-beneficial. Selection bias in the surveys, reciprocal causation or confounding by unmeasured third variables in estimating the effects of treatment on work impairment in the econometric models, and self-report bias in the respondent reports about short-term disability are among the possible factors that could make the estimates inaccurate.

Future Directions

The enormous magnitude of the work impairment associated with depression must be considered in the current debate on parity of health insurance coverage for mental disorders. In particular, the recovery of lost productivity associated with depression treatment is a potential cost-saving measure that should be considered in decisions about health insurance coverage for depression treatment. The results reviewed here suggest that aggressive outreach and treatment of workers with depression could lead to indirect workplace cost savings that substantially outweigh the increased direct costs of treatment.

We emphasize that the studies reviewed in this article consider relatively short-term effects of depressive illness on functioning and productivity and not the long-term effects on educational attainment and work history. From a societal perspective, these long-term effects on human capital may have a much greater impact than short-term effects on work absences. For example, Berndt et al[52] found that early-onset depressive disorder among women was associated with a 12% to 18% reduction in expected lifetime earnings.

Although the results reviewed here do not prove that depression treatment is cost-beneficial, they provide a rationale for rigorous effectiveness trials of depression treatment among workers to evaluate the impact of treatment on work productivity. There are other treatable illnesses that have substantial effects on the

quantity and quality of workplace performance.[9,19] Nevertheless, depression is an especially attractive potential intervention target compared with other chronic conditions for a number of reasons. First, depression is highly prevalent.[53] Second, the age of onset of depression is much earlier than that of most other chronic diseases.[54] This means that aggressive outreach efforts to detect people with untreated depression, encourage them to seek treatment, and facilitate maintenance therapy to prevent relapse might have positive workplace effects that can be amortized over a much longer payback period than the costs of detecting and treating workers with other chronic conditions.[55] Furthermore, delays in seeking treatment, even among those who eventually get help, often continue for many years,[56] reducing the amortization period of the treatment costs against the indirect cost savings in increased productivity.

In the design of effectiveness trials for evaluating the impact of depression treatment on workplace productivity, innovative methods for recruiting depressed workers into treatment will be an essential element. Conventional placebo-controlled clinical trials are inadequate for this purpose, as are trials aimed at evaluating the incremental effects of enhanced treatment compared with usual care. The goal should be to evaluate the incremental costs and cost savings associated with aggressive outreach and intervention for workers who would not otherwise seek treatment on their own. This means that analyses of program effectiveness must consider all those eligible for treatment, not only those who choose to enter treatment.

The design of these trials should also recognize that work performance may lag behind symptom improvement and may deteriorate again with symptom relapse. This means that policy-relevant trials must deliver long-term treatment that includes maintenance therapy aimed at relapse prevention. Relapse prevention is not a routine part of current treatment for depression, despite clear evidence that depression is often a chronic disorder[57] and that maintenance therapies can dramatically reduce episode recurrence.[58] When evaluating the long-term impact of depression treatment on work productivity, maintenance of remission must be taken as seriously as initial episode resolution.

Documentation of the cost-benefit or cost-effectiveness of depression treatment might require a reorientation of treatment philosophy. As noted by Simon et al,[41] most current treatment of depression focuses on the goal of symptom relief. The implicit assumption is that the recovery of energy, motivation, and concentration, along with the remission of other depressive symptoms, will result indirectly in role functioning improvement without it's being a special focus of the clinician. However, this might not always be the case; as noted above, it might occur only after a considerable delay in symptom remission. Simon suggests that the treatment orientation typically found in vocational rehabilitation programs for patients with hip fractures or chronic pain might lead to more rapid and complete recovery of work functioning in depression. These programs emphasize the resumption of work roles as an integral part of treatment. Behavioral activation strategies currently used in a more diffuse way in depression treatment might also be helpful in this regard.

It is important to note that quality assurance standards are less developed for the treatment of depression and other mental disorders than for many other chronic conditions. A substantial proportion of the people who obtain treatment for depression are treated inappropriately.[59,60] Although high rates of inappropriate treatment can also be found for some physical disorders,[61–63] special concerns exist in the case of mental disorders because of the difficulty in specifying precise process standards for evaluating psychotherapy. Because of these concerns, the implementation of workplace outreach and treatment programs for people with depression should be accompanied by improved quality assurance protocols.

Finally, the willingness of employers to invest in improved depression treatment will depend on expected benefits in the real world rather than those observed in controlled trials. Sophisticated employers are well aware that the quality of everyday depression treatment typically falls far short of that provided in research settings. A number of model quality assurance systems are already in use in the United States to monitor the overall quality of medical care.[64–66] However, most of these systems include relatively superficial evaluations of the quality of mental health care.[66] Therefore, it would be valuable to develop focused systems to monitor the quality of care for specific commonly treated mental disorders. A number of such systems currently exist for specific physical conditions and medical procedures,[67–68] and there is strong evidence that some have led to improvements in the quality of care.[69–70] It is likely that the same systems, if focused on the treatment of depression, would improve the quality and outcomes of care. It might well be that the adoption by employers of outreach and intervention programs for depression treatment will depend as much on the development of these quality assurance protocols as on the experimental demonstration of cost-benefit under controlled conditions.

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