Published in final edited form as:
Am J Psychiatry. 2006 September ; 163(9): 1561–1568.

The prevalence and effects of mood disorders on work performance in a nationally representative sample of US workers

Ronald C. Kessler, PhD, **Hagop S. Akiskal, MD**, **Minnie Ames, PhD**, **Howard Birnbaum, PhD**, **Paul Greenberg, MA**, **Robert M.A. Hirschfeld, MD**, **Robert Jin, M.S.**, **Kathleen R. Merikangas, PhD**, and **Philip S. Wang, MD, DrPH**

From the Department of Health Care Policy, Harvard Medical School, Boston, Massachusetts (Kessler, Ames, Jin and Wang); International Mood Center, University of California San Diego and VA Psychiatry Service, San Diego, California (Akiskal); Analysis Group Inc., Boston, Massachusetts (Birnbaum and Greenberg); Department of Psychiatry and Behavioral Sciences, University of Texas Medical Branch, Galveston, Galveston, Texas (Hirschfeld); Intramural Research Branch, National Institute of Mental Health, Bethesda, Maryland (Merikangas); and the Division of Pharmacoepidemiology and Pharmacoeconomics, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts (Wang).

Abstract

OBJECTIVE— Research on the workplace costs of mood disorders has focused largely on major depressive episodes (MDE). Bipolar disorder (BPD) has been overlooked both by failing to distinguish MDE due to major depressive disorder (MDD) versus BPD and by failing to evaluate the workplace costs of mania and hypomania.

METHOD— The National Comorbidity Survey Replication (NCS-R) assessed DSM-IV MDD and BPD with the WHO Composite International Diagnostic Interview (CIDI) and assessed work impairment with the WHO Health and Work Performance Questionnaire (HPQ). Regression analysis of MDD and BPD predicting HPQ among workers (n = 3378) was used to estimate the workplace costs of mood disorders.

RESULTS— 1.1% of workers met CIDI criteria for 12-month BPD (bipolar I or bipolar II) and 6.4% for 12-month MDD. BPD was associated with 65.5 and MDD with 27.2 annual lost workdays per ill worker. Subgroup analysis showed that the higher work loss associated with BPD than MDD is due to more severe and persistent MDE in BPD than MDD rather than to stronger effects of mania-hypomania than depression. Annual human capital loss per ill worker was estimated at $9619 for BPD and $4426 for MDD. Annual projections to the US labor force were $14.1 billion for BPD and $36.6 billion for MDD.

CONCLUSIONS— Employer interest in the workplace costs of mood disorders should be broadened beyond MDD to include BPD. Effectiveness trials are needed to study the return on employer investment of coordinated programs for workplace screening and treatment of BPD and MDD.

Although bipolar disorder has traditionally been thought to have a lifetime prevalence of about 1% in the population (1,2), a substantial upward revision of this estimate is occurring based on mounting evidence for a broad bipolar spectrum that includes people with a history of hypomania, sub-threshold manic symptoms, and medication-induced manic symptoms (3–5). The bipolar spectrum is now thought to characterize as much as 5% of the general population (6). People with bipolar spectrum disorder spend a considerably higher proportion of time with

Address comments to RC Kessler, Department of Health Care Policy, Harvard Medical School, 180 Longwood Avenue, Boston, MA 02115. Voice: 617-432-3587; Fax: 617-432-3588; Email: kessler@hcp.med.harvard.edu.

depressive than manic symptoms (7,8), resulting in frequent confusion between depressive episode (MDE) due to major depressive disorder (MDD) and due to bipolar disorder (9). Failure to make this distinction can have dire clinical implications.

The same distinction between MDD and bipolar disorder (BPD) would be useful to make in depression cost-of-illness studies. However, with rare exceptions, these studies fail to distinguish MDE associated with MDD and associated with BPD (10–13). Furthermore, although several recent cost-of-illness studies (14–16) and reviews (17,18) have focused on the costs of BPD, none has presented comparative information on the workplace costs of MDD and BPD. The current report does this using data from the recently completed National Comorbidity Replication (NCS-R) (19), a nationally representative survey of the prevalence and costs of mental disorders in the US household population.

METHODS

Sample

The NCS-R is a nationally representative survey of mental disorders among English-speaking household residents ages 18 and older in the continental US. Interviews were carried out with 9282 respondents between February 2001 and April 2003. Verbal informed consent was obtained prior to data collection. Consent was verbal rather than written to maintain consistency with the baseline NCS. The response rate was 70.9%. Respondents were given a $50 incentive for participation. In addition, a probability sub-sample of hard-to-recruit pre-designated respondents was selected for a brief telephone non-respondent survey, the results of which were used to weight the main sample for non-response bias. Non-respondent survey participants were given a $100 incentive. The Human Subjects Committees of Harvard Medical School and the University of Michigan both approved these recruitment and consent procedures.

The NCS-R interview was administered in two parts. Part I included a core diagnostic assessment of all respondents (n = 9282). Part II included questions about correlates and additional disorders administered to all Part I respondents who met lifetime criteria for any core disorder plus a roughly one-in-three probability sub-sample of other respondents (n = 5692). The HPQ assessment of work performance, described below, was included in Part II. A sub-sample of 3378 Part II respondents were either employed or self-employed 20 hours or more per week in the month before the interview and had valid data on all measures used in the following analyses. This is the sample used here. The records for these respondents were weighted to adjust for differential probability of selection into Part II and for differential non-response. A more detailed discussion of NCS-R sampling and weighting is presented elsewhere (20).

Mood disorders

NCS-R diagnoses are based on Version 3.0 of the World Health Organization's Composite International Diagnostic Interview (CIDI) (21), a fully structured lay-administered interview. DSM-IV criteria were used to define MDE, dysthymic disorder, bipolar I disorder (BPDI), and bipolar II disorder (BPDII). Because of small sample size, BPDI and BPDII were combined into a single category of BPD for the current analysis. All diagnoses excluded cases with plausible organic causes. Blinded clinical reappraisal interviews using the lifetime non-patient version of the Structured Clinical Interview for DSM-IV (SCID) (22) were administered to a probability sub-sample of 325 NCS-R respondents to assess concordance with CIDI hierarchy-free diagnoses. CIDI-SCID concordance was excellent for BPD, with an area under the receiver operator characteristic curve (AUC) of .93, an odds-ratio (OR) of 582.6, and an insignificant McNemar test ($\chi^2_1 = 0.6$, p = .45). The McNemar test evaluated whether the CIDI prevalence

estimate differs significantly from the SCID prevalence estimate. CIDI-SCID concordance was also good for major depression, with AUC of .75, OR of 18.4, and McNemar test of $\chi^2_1 = 7.2$, p = .006). The significant McNemar test is due to the CIDI prevalence estimate being conservative relative to the SCID estimate. CIDI-SCID concordance was not assessed for dysthymia because the number of respondents with dysthymia in the clinical reappraisal sample was too small for reliable analysis.

Once the mood disorders were operationalized, respondents classified as having lifetime BPD were defined as 12-month cases if they were in an MDE, a manic episode or a hypomanic episode at any time in the 12 months before interview. Respondents classified as having lifetime MDD were defined as 12-month cases if they were in an MDE at any time in the 12 months before interview. The vast majority of respondents with a hierarchy-free diagnosis of 12-month dysthymia also met criteria for 12-month MDD. These "double depressives" (23) were subsequently compared with other cases of MDD in their ability to predict work performance. The handful of respondents with 12-month dysthymia who failed to meet criteria for MDD was excluded from the analysis because of low statistical power.

Persistence and severity of 12-month MDE were compared for respondents with BPD with had 12-month MDE and for respondents with 12-month MDD in order to determine whether more severe or persistent depression could account for observed differences in work performance between the two sub-samples. Persistence was assessed by asking respondents with 12-month MDE to estimate how many days out of 365 in the past year they were in a depressive episode. Severity was assessed with the self-report version of the Quick Inventory of Depressive Symptoms (Q-IDS-SR) (24) referring to the one month in the past year when respondents reported their depression as most severe.

Work performance

Work performance was assessed in the WHO Health and Work Performance Questionnaire (HPQ) (25,26). The HPQ uses self-reports about absenteeism (missed days of work) and presenteeism (low performance while at work transformed to lost work day equivalents) to generate a summary measure of overall lost workdays in the month before the interview. Absenteeism (A) was defined on a 0–100 scale for the percent of work days the respondent missed in the past 30 days, while presenteeism (P) was defined on a separate 0–100 scale where 0 means doing no work at all on days at work and 100 means performing at the level of a top worker. Absenteeism and presenteeism were combined into a measure of total lost work performance by adding A to the value $(100 - A) \times (100 - P)$. Information about salary was used to transform the measures of lost work performance from a time metric to a salary metric for purposes of estimating human capital loss associated with mood disorders. Salary was incremented by 25% to estimate fringe benefits.

Control variables

All analyses included controls for sex, age (18–29, 30–44, 45–59, 60+), race-ethnicity (Non-Hispanic White, Non-Hispanic Black, Hispanic, Other), education (less than high school, completed high school, some college, completed college), and occupation (professional, technical, service-clerical, laborer), as well as for average expected hours of work per week (20–34, 35–44, 45+).

Analysis methods

Sub-group comparison of prevalence estimates was used to study socio-demographic correlates of mood disorders, while linear regression analysis was used to estimate associations of mood disorders with work performance. Mood disorders were coded as yes-no dummy predictor variables in linear regression equations that included socio-demographic variables (age, sex,

race-ethnicity, education, occupation) as controls. The dependent variables in these equations were measures of lost work performance in the metrics of day-equivalents and salary-equivalents that distinguished A and P as well as combined A and P into a summary measure of overall lost work performance.

These basic equations were elaborated in three ways. The first distinguished among BPD cases who reported 12-month episodes of only MDE, only mania-hypomania, and both. The second controlled for severity-duration of MDE. The third evaluated interactions between mood disorders and socio-demographic variables.

The key predictors in the regression equations were measures of 12-month disorder prevalence, while the outcomes were measures of one-month (not 12-month) decrements in work performance. The coefficients were multiplied by 12 to estimate decrements in work performance over the past 12 months due to 12-month mood disorders. These individual-level estimates were then projected to the total US civilian labor force by adjusting for 12-month disorder prevalence and for the fact that the seasonally adjusted number of workers in the US civilian labor force ages 18+ at the time of the NCS-R was 130 million.

A question might be raised why the time frame of the measures was not made consistent either by using 12-month decrements in work performance as outcomes or one-month prevalence of mood disorders as predictors. The former was not possible because methodological research has shown that retrospective self-reports about health-related decrements in work performance are inaccurate beyond a one-month recall period (27). The latter (i.e., using measures of one-month mood disorders as predictors) would have been possible, but would have left unresolved the possibility that remitted mood disorders continue to have residual adverse effects on work performance after episode resolution. The use of 12-month disorders to predict one-month work performance resolves this problem by generating an averaged estimate of the effects on one-month work performance of both active episodes and remitted episodes that were active in the past 12 months. The multiplication of this estimate by 12 then produces an unbiased estimate the effect of mood disorders active in the past 12 months on decrements in work performance in the same time period.

Because the NCS-R data are weighted and clustered, the Taylor series linearization method (28) implemented in the SUDAAN software system (29) was used to obtain design-based estimates of statistical significance. Significance tests of sets of coefficients in the logistic regression equations were made using Wald χ^2 tests based on design-corrected coefficient variance-covariance matrices. Statistical significance was consistently evaluated using .05-level two-sided tests.

RESULTS

Prevalence and socio-demographic correlates

Twelve-month prevalence estimates of DSM-IV BPD and MDD (standard errors in parentheses) among employed NCS-R respondents are 1.1% (0.2) and 6.4% (0.5). Estimated prevalence of BPD does not differ significantly by respondent sex, age, race-ethnicity, occupation, or expected work hours, but is inversely related to education. (Table 1) Estimated prevalence of MDD does not differ significantly by respondent race-ethnicity, education, occupation, or expected work hours, but is significantly higher among women than men and is inversely related to age. Neither BPD nor MDD is related to average hours worked per week.

Associations of mood disorders with work performance

BPD and MDD both significantly predict overall lost work performance in the regression analysis, with annualized regression slopes equivalent to 65.5 lost workdays per worker with

BPD and 27.2 lost workdays per worker with MDD. (Table 2) Disaggregation shows that absenteeism, while significantly elevated both for BPD (27.7 days) and for MDD (8.7 days), is less important than presenteeism (35.3 for BPD and 18.2 for MDD). Projections of individual-level associations to the total US civilian labor force yield estimates of 96.2 million lost workdays and $14.1 billion salary-equivalent lost productivity per year associated with BPD and 225.0 million workdays and $36.6 billion salary-equivalent lost productivity per year associated with MDD.

Variation in associations based on persistence and severity of depressive episodes

Roughly three-fourths of respondents with 12-month BPD had depressive episodes in the 12 months before interview (63.1% who also had manic-hypomanic episodes and 11.1% who had only depressive episodes). Persistence (days in depressive episodes in the 365 days before interview) was consistently higher in BPD (Mean: 134.0–164.0; Median: 90–150) than MDD (Mean: 98.1; Median: 60; z = 2.7, p = .010). (Table 3) Severity (Q-IDS-SR scores) was also consistently higher in BPD (Mean: 14.1–17.3; Median: 15.7–16.5) than MDD (Mean: 14.5; Median: 14.7; z = 2.9, p = .007).

The individual-level elevations of absenteeism, presenteeism, and total lost work performance in BPD are consistently higher among respondents with 12-month MDE than only manic-hypomanic episodes. (Table 4) Furthermore, BPD with MDE is consistently associated with significantly more lost work performance than MDD. Statistical control for MDE persistence-severity reduces these discrepancies somewhat, but does not make them disappear. BPD with only manic-hypomanic episodes, in comparison, is associated with levels of lost work performance roughly equal to those in MDD.

Variation in associations based on socio-demographic variables

No significant differences in the associations of BPD and MDD with work performance were found by sex (χ^2_1 = 0.1–1.0, p = .31–.76) or, in the case of BPD, by age (χ^2_3 = 0.5–0.8, p = .66–.79), but the MDD coefficients vary with age (χ^2_3 = 8.0–29.0, p = .001–.018) due to larger coefficients among workers in the age range 30–44 than either younger or older workers. (Detailed results available on request.) We also found variation in associations by occupation in BPD (36.8–212.9, p = .000) but not MDD (χ^2_3 = 1.5–5.9, p = .12–.67). The work loss associated with BPD, although consistently significant in each occupational group, was significantly greater among technical and professional workers in the case of absenteeism and among laborers and professional workers in the case of presenteeism. (Detailed results available on request.)

DISCUSSION

Two potential limitations of this study are the possible existence of inaccuracy in the key measures and the possible existence of unmeasured common causes of the disorders and outcomes. With regard to the first of these two, accuracy of diagnostic assessment was documented in the SCID reappraisal interviews mentioned in the section on measures. However, fully structured instruments like the CIDI are less able to distinguish mixed episodes than are semi-structured clinical interviews, leading to the imposition of a more rigid distinction between MDE and manic-hypomanic episodes in BPD than would have been ideal (30). Accuracy of the HPQ work performance assessment was evaluated in a series of workplace validity studies (25,26) that documented strong relationships of HPQ measures with independent payroll records and supervisor evaluations of job performance.

The possibility of unmeasured common causes is much more difficult to evaluate. To the extent that common causes exist, the estimated effects of BPD and MDD on lost work performance

will be biased. No definitive way exists to evaluate this possibility other than by experimentally changing the prevalence of these disorders, presumably in a treatment effectiveness trial, and evaluating effects on work performance. Results of such experiments in representative workplace samples have not been reported either for BPD or MDD, although such an experiment is currently underway to evaluate the workplace effects of treating MDD (31). Despite the absence of experimental evidence, simulations of likely effects have been carried out using parameter estimates gleaned from clinical trials (32,33). The estimated decrements in work performance associated with MDD in these simulations are broadly consistent with the NCS-R estimates. In addition, the results of a recently reported experimental effectiveness trial aimed at increasing work performance by improving quality of MDD treatment yielded estimates of effects on work performance broadly consistent with the NCS-R estimates (34).

Within the context of the above limitations, the results reported here show that BPD and MDD are both common disorders in the US civilian labor force associated with substantial lost work performance. Our prevalence estimates of BPD and MDD are consistent with those in other recent national surveys (35,36). As noted in the introduction, though, bipolar spectrum disorders could be defined more broadly than in the current report (3–5). The same is true for sub-threshold depression, (37)(38). Future research should investigate the effects of these sub-threshold disorders on work performance (5,39).

Our finding that both BPD and MDD are associated with substantial losses in work performance is broadly consistent with other surveys of workplace costs (12,17,18,40,41). The estimated annual population-level workplace cost of MDD, $36.6 billion, is in the range of the two other recent studies that estimated the workplace costs of MDE -- $31.0 billion (31) and $51.5 billion (12). The larger of these two is probably upwardly biased because it is based on an analysis of days out of role (i.e., including weekends) rather than days out of work. No previous estimates of the population-level workplace cost of BPD are available to compare to our $14.1 billion estimate.

By considering BPD and MDD simultaneously, we documented that BPD is associated with substantially more lost work performance than MDD at the individual level, although aggregate impairment is greater for MDD than BPD because of the higher prevalence of the former than latter disorder. Decomposition showed that the higher individual-level impairment of BPD than MDD was due largely to MDE being more impairing in the context of BPD than MDD rather than to mania-hypomania being more impairing than MDE. The finding that mania-hypomania in the absence of MDE is associated with significantly less work impairment than BPD with MDE is consistent with the observation in a prospective patient study that functional impairment was associated with variation in depressive symptoms but not manic symptoms (42). More detailed analysis of the NCS-R data shows that the higher individual-level work impairment of MDE in BPD than MDD is due partly to the greater persistence and severity of MDE in BPD than in MDD. However, persistence-severity of MDE explained only part of the association between BPD and work impairment. The remaining part of this association could be due either to imprecision in our measures or effects of unmeasured correlates of BPD and work impairment.

An important practical problem related to the finding that most workers with BPD had MDE is that MDE due to BPD is sometimes incorrectly treated as if it was due to MDD (43,44). This problem is exacerbated by people with BPD reporting more distress due to their depressive than their manic symptoms (40). As antidepressant medications can trigger the onset of mania, it is important to screen for history of BPD at the initiation of depression treatment. A short and valid screen for manic-hypomanic symptoms has recently been developed that could be used for this purpose (45). It is important for the same reason to include a screen for BPD in workplace depression screening programs. The prevalence and impairments of sub-threshold

cases should also be examined. Effectiveness trials are needed to calculate the return on investment from the employer perspective of coordinated workplace BPD-MDD screening and treatment effectiveness trials (34,41).

Acknowledgements

The National Comorbidity Survey Replication (NCS-R) is supported by the National Institute of Mental Health (NIMH; U01-MH60220) with supplemental support from the National Institute of Drug Abuse, the Substance Abuse and Mental Health Services Administration, the Robert Wood Johnson Foundation (Grant # 044780), and the John W. Alden Trust. Additional support for preparation of this paper was provided by BristolMyersSquibb. Collaborating NCS-R investigators include Ronald C. Kessler (Principal Investigator, Harvard Medical School), Kathleen Merikangas (Co-Principal Investigator, NIMH), James Anthony (Michigan State University), William Eaton (The Johns Hopkins University), Meyer Glantz (NIDA), Doreen Koretz (Harvard University), Jane McLeod (Indiana University), Mark Olfson (Columbia University College of Physicians and Surgeons), Harold Pincus (University of Pittsburgh), Greg Simon (Group Health Cooperative), T Bedirhan Ustun (World Health Organization), Michael Von Korff (Group Health Cooperative), Philip Wang (Harvard Medical School), Kenneth Wells (UCLA), Elaine Wethington (Cornell University), and Hans-Ulrich Wittchen (Max Planck Institute of Psychiatry). The views and opinions expressed in this report are those of the authors and should not be construed to represent the views of any of the sponsoring organizations, agencies, or US Government. A complete list of NCS publications and the full text of all NCS-R instruments can be found at http://www.hcp.med.harvard.edu/ncs. Send correspondence to NCS@hcp.med.harvard.edu. The NCS-R is carried out in conjunction with the World Health Organization World Mental Health (WMH) Survey Initiative. We thank the staff of the WMH Data Collection and Data Analysis Coordination Centers for assistance with instrumentation, fieldwork, and consultation on data analysis. These activities were supported by the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (1R13MH066849, R01-MH069864, and R01 DA016558), Eli Lilly and Company, GlaxoSmithKline, Ortho-McNeil Pharmaceutical, Inc. and the Pan American Health Organization. A complete list of WMH publications and instruments can be found at (http://www.hcp.med.harvard.edu/wmhcidi).

References

1. Kessler RC, Rubinow DR, Holmes C, Abelson JM, Zhao S. The epidemiology of DSM-III-R bipolar I disorder in a general population survey. Psychol Med 1997;27:1079–1089. [PubMed: 9300513]
2. Robins LN, Helzer JE, Weissman MM, Orvaschel H, Gruenberg E, Burke JD Jr, Regier DA. Lifetime prevalence of specific psychiatric disorders in three sites. Arch Gen Psychiatry 1984;41:949–958. [PubMed: 6332590]
3. Angst J, Gamma A, Benazzi F, Ajdacic V, Eich D, Rossler W. Toward a redefinition of subthreshold bipolarity: epidemiology and proposed criteria for bipolar-II, minor bipolar disorders and hypomania. J Affect Disord 2003;73:133–146. [PubMed: 12507746]
4. Benazzi F, Koukopoulos A, Akiskal HS. Toward a validation of a new definition of agitated depression as a bipolar mixed state (mixed depression). Eur Psychiatry 2004;19:85–90. [PubMed: 15051107]
5. Judd LL, Akiskal HS. The prevalence and disability of bipolar spectrum disorders in the US population: re-analysis of the ECA database taking into account subthreshold cases. J Affect Disord 2003;73:123–131. [PubMed: 12507745]
6. Akiskal HS, Bourgeois ML, Angst J, Post R, Moller H, Hirschfeld R. Reevaluating the prevalence of and diagnostic composition within the broad clinical spectrum of bipolar disorders. J Affect Disord 2000;59 (suppl 1):S5–S30. [PubMed: 11121824]
7. Judd LL, Akiskal HS, Schettler PJ, Endicott J, Maser J, Solomon DA, Leon AC, Rice JA, Keller MB. The long-term natural history of the weekly symptomatic status of bipolar I disorder. Arch Gen Psychiatry 2002;59:530–537. [PubMed: 12044195]
8. Calabrese JR, Hirschfeld RM, Frye MA, Reed ML. Impact of depressive symptoms compared with manic symptoms in bipolar disorder: results of a U.S. community-based sample. J Clin Psychiatry 2004;65:1499–1504. [PubMed: 15554762]
9. Hirschfeld RM, Vornik LA. Recognition and diagnosis of bipolar disorder. J Clin Psychiatry 2004;65 (suppl 15):5–9. [PubMed: 15554789]
10. Greenberg PE, Stiglin LE, Finkelstein SN, Berndt ER. The economic burden of depression in 1990. J Clin Psychiatry 1993;54:405–418. [PubMed: 8270583]
11. Greenberg, PE.; Kessler, RC.; Nells, TL.; Finkelstein, SN.; Berndt, ER. Depression in the workplace: An economic perspective, in Perspectives in Psychiatry: Selective Serotonin Re-uptake Inhibitors.

In: Feighner, JP.; Boyer, WF., editors. Advances in Basic Research and Clinical Practice. 2. 5. New York: John Wiley & Sons, Inc; 1996. p. 327-363.

12. Greenberg PE, Kessler RC, Birnbaum HG, Leong SA, Lowe SW, Berglund PA, Corey-Lisle PK. The economic burden of depression in the United States: how did it change between 1990 and 2000? J Clin Psychiatry 2003;64:1465–1475. [PubMed: 14728109]
13. Rice DP, Miller LS. The economic burden of affective disorders. Adv Health Econ Health Serv Res 1993;14:37–53. [PubMed: 10172899]
14. Wyatt RJ, Henter I. An economic evaluation of manic-depressive illness--1991. Soc Psychiatry Psychiatr Epidemiol 1995;30:213–219. [PubMed: 7482006]
15. Begley CE, Annegers JF, Swann AC, Lewis C, Coan S, Schnapp WB, Bryant-Comstock L. The lifetime cost of bipolar disorder in the US: an estimate for new cases in 1998. Pharmacoeconomics 2001;19:483–495. [PubMed: 11465308]
16. Das Gupta R, Guest JF. Annual cost of bipolar disorder to UK society. Br J Psychiatry 2002;180:227–233. [PubMed: 11872515]
17. Dean BB, Gerner D, Gerner RH. A systematic review evaluating health-related quality of life, work impairment, and healthcare costs and utilization in bipolar disorder. Curr Med Res Opin 2004;20:139–154. [PubMed: 15006007]
18. Kleinman L, Lowin A, Flood E, Gandhi G, Edgell E, Revicki D. Costs of bipolar disorder. Pharmacoeconomics 2003;21:601–622. [PubMed: 12807364]
19. Kessler RC, Merikangas KR. The National Comorbidity Survey Replication (NCS-R): background and aims. Int J Methods Psychiatr Res 2004;13:60–68. [PubMed: 15297904]
20. Kessler RC, Abelson J, Demler O, Escobar JI, Gibbon M, Guyer ME, Howes MJ, Jin R, Vega WA, Walters EE, Wang P, Zaslavsky A, Zheng H. Clinical calibration of DSM-IV diagnoses in the World Mental Health (WMH) version of the World Health Organization (WHO) Composite International Diagnostic Interview (WMHCIDI). Int J Methods Psychiatr Res 2004;13:122–139. [PubMed: 15297907]
21. Kessler RC, Ustun TB. The World Mental Health (WMH) Survey Initiative Version of the World Health Organization (WHO) Composite International Diagnostic Interview (CIDI). Int J Methods Psychiatr Res 2004;13:93–121. [PubMed: 15297906]
22. First, MB.; Spitzer, RL.; Gibbon, M.; Williams, JBW. Structured Clinical Interview for DSM-IV Axis I Disorders, Research Version, Non-patient Edition (SCID-I/NP). New York, NY: Biometrics Research, New York State Psychiatric Institute; 2002.
23. Keller MB, Hirschfeld RM, Hanks D. Double depression: a distinctive subtype of unipolar depression. J Affect Disord 1997;45:65–73. [PubMed: 9268776]
24. Rush AJ, Trivedi MH, Ibrahim HM, Carmody TJ, Arnow B, Klein DN, Markowitz JC, Ninan PT, Kornstein S, Manber R, Thase ME, Kocsis JH, Keller MB. The 16-Item Quick Inventory of Depressive Symptomatology (QIDS), clinician rating (QIDS-C), and self-report (QIDS-SR): a psychometric evaluation in patients with chronic major depression. Biol Psychiatry 2003;54:573–83. [PubMed: 12946886]
25. Kessler RC, Barber C, Beck A, Berglund P, Cleary PD, McKenas D, Pronk N, Simon G, Stang P, Ustun TB, Wang P. The World Health Organization Health and Work Performance Questionnaire (HPQ). J Occup Environ Med 2003;45:156–174. [PubMed: 12625231]
26. Kessler RC, Ames M, Hymel PA, Loeppke R, McKenas DK, Richling DE, Stang PE, Ustun TB. Using the World Health Organization Health and Work Performance Questionnaire (HPQ) to evaluate the indirect workplace costs of illness. J Occup Environ Med 2004;46:S23–37. [PubMed: 15194893]
27. Laurent A, Cannell CF, Marquis KH. Reporting health events in household interviews. Effects of an extensive questionnaire and a diary procedure. Vital Health Stat 1 1972;2:1–80.
28. Wolter, KM. Introduction to Variance Estimation. New York, NY: Springer-Verlag; 1985.
29. Research Triangle Institute. SUDAAN: Professional Software for Survey Data Analysis [computer program]. Research Triangle Park, N.C: Research Triangle Institute; 2002.
30. Bauer MS, Simon GE, Ludman E, Unutzer J. 'Bipolarity' in bipolar disorder: distribution of manic and depressive symptoms in a treated population. Br J Psychiatry 2005;187:87–8. [PubMed: 15994577]

31. Stewart WF, Ricci JA, Chee E, Hahn SR, Morganstein D. Cost of lost productive work time among US workers with depression. JAMA 2003;289:3135–3144. [PubMed: 12813119]
32. Kessler RC, Barber CB, Birnbaum HG, Frank RG, Greenberg PE, Rose RM, Simon GE, Wang PS. Depression in the workplace: Effects on short-term work disability. Health Aff (Millwood) 1999;18:163–171. [PubMed: 10495604]
33. Simon GE, Barber C, Birnbaum HG, Frank RG, Greenberg PE, Rose RM, Wang P, Kessler RC. Depression and work productivity: The comparative costs of treatment versus nontreatment. J Occup Environ Med 2001;43:2–9. [PubMed: 11201765]
34. Rost K, Smith JL, Dickinson M. The effect of improving primary care depression management on employee absenteeism and productivity. A randomized trial Med Care 2004;42:1202–1210.
35. Grant BF, Stinson FS, Dawson DA, Chou SP, Dufour MC, Compton W, Pickering RP, Kaplan K. Prevalence and co-occurrence of substance use disorders and independent mood and anxiety disorders: results from the National Epidemiologic Survey on Alcohol and Related Conditions. Arch Gen Psychiatry 2004;61:807–816. [PubMed: 15289279]
36. Hirschfeld RM, Calabrese JR, Weissman MM, Reed M, Davies MA, Frye MA, Keck PE Jr, Lewis L, McElroy SL, McNulty JP, Wagner KD. Screening for bipolar disorder in the community. J Clin Psychiatry 2003;64:53–59. [PubMed: 12590624]
37. Judd LL, Akiskal HS, Maser JD, Zeller PJ, Endicott J, Coryell W, Paulus MP, Kunovac JL, Leon AC, Mueller TI, Rice JA, Keller MB. A prospective 12-year study of subsyndromal and symdromal depressive symptomatology in unipolar depressive disorders. Arch Gen Psychiatry 1998;55:694–701. [PubMed: 9707379]
38. Pezawas L, Angst J, Gamma A, Ajdacic V, Eich D, Rossler W. Recurrent brief depression--past and future. Prog Neuropsychopharmacol Biol Psychiatry 2003;27:75–83. [PubMed: 12551729]
39. Rapaport MH, Judd LL. Minor depressive disorder and subsyndromal depressive symptoms: functional impairment and response to treatment. J Affect Disord 1998;48:227–232. [PubMed: 9543213]
40. Calabrese JR, Hirschfeld RM, Reed M, Davies MA, Frye MA, Keck PE, Lewis L, McElroy SL, McNulty JP, Wagner KD. Impact of bipolar disorder on a U.S. community sample. J Clin Psychiatry 2003;64:425–432. [PubMed: 12716245]
41. Wang PS, Simon GE, Kessler RC. The economic burden of depression and the cost-effectiveness of treatment. Int J Methods Psychiatr Res 2003;12:22–33. [PubMed: 12830307]
42. Bauer MS, Kirk GF, Gavin C, Williford WO. Determinants of functional outcome and healthcare costs in bipolar disorder: a high-intensity follow-up study. J Affect Disord 2001;65:231–41. [PubMed: 11511403]
43. Judd LL, Akiskal HS. Depressive episodes and symptoms dominate the longitudinal course of bipolar disorder. Curr Psychiatry Rep 2003;5:417–418. [PubMed: 14609495]
44. Hirschfeld RM. Bipolar depression: the real challenge. Eur Neuropsychopharmacol 2004;14 (suppl 2):S83–88. [PubMed: 15142612]
45. Hirschfeld RM, Holzer C, Calabrese JR, Weissman M, Reed M, Davies M, Frye MA, Keck P, McElroy S, Lewis L, Tierce J, Wagner KD, Hazard E. Validity of the mood disorder questionnaire: a general population study. Am J Psychiatry 2003;160:178–180. [PubMed: 12505821]

Table 1

Demographic distributions and correlates of 12-month DSM-IV Bipolar Disorder (BPD) and Major Depressive Disorder (MDD) among Part II NCS-R employed respondents (n = 3378)

	Demographic distribution		12-month prevalence				Odds-ratios			
			BPD		MDD		BPD		MDD	
	%	(se)	%	(se)	%	(se)	OR	(95% CI)	OR	(95% CI)
Sex										
Men	53.4	(1.3)	0.8	(0.2)	4.0	(0.4)	1.0	--	1.0	--
Women	46.6	(1.3)	1.5	(0.3)	9.0	(0.9)	1.4	(0.6–3.2)	2.0*	(1.4–2.8)
χ^2_1 (p-value)								0.8 (.368)		18.6 (<.001)*
Age										
18–29	25.3	(1.4)	1.6	(0.3)	7.3	(1.0)	4.3	(0.6–34.1)	4.0*	(2.5–6.3)
30–44	36.6	(1.3)	1.3	(0.3)	7.3	(0.6)	3.8	(0.6–22.7)	4.1*	(2.6–6.6)
45–59	32.1	(1.2)	0.7	(0.3)	5.3	(0.7)	2.2	(0.2–20.0)	2.9*	(1.7–4.8)
60+	6.0	(0.5)	0.5	(0.5)	2.1	(0.4)	1.0	--	1.0	--
χ^2_3 (p-value)								6.3 (.098)		44.9 (<.001)*
Race-ethnicity										
Non-Hispanic white	73.5	(1.6)	1.2	(0.2)	6.6	(0.5)	1.0	--	1.0	--
Non-Hispanic black	11.5	(1.0)	0.8	(0.3)	4.8	(1.0)	0.5	(0.2–1.2)	0.6	(0.4–1.0)
Hispanic	11.3	(1.1)	1.1	(0.5)	6.1	(1.0)	0.6	(0.2–1.6)	0.8	(0.6–1.2)
Other	3.7	(0.4)	1.5	(0.9)	7.9	(2.6)	1.3	(0.3–4.9)	1.1	(0.6–2.1)
χ^2_3(p-value)								5.3 (.151)		5.3 (.154)
Education										
Less than high school	10.4	(0.8)	1.6	(0.6)	6.2	(1.4)	7.0*	(1.8–27.9)	1.3	(0.6–2.7)
Completed high school	31.0	(1.5)	1.6	(0.4)	6.1	(0.6)	5.6*	(2.1–15.1)	1.1	(0.8–1.6)
Some college	30.4	(1.0)	1.2	(0.3)	6.5	(0.7)	3.8*	(1.3–11.2)	1.1	(0.7–1.8)
Completed college	28.2	(1.2)	0.4	(0.2)	6.6	(0.9)	1.0	--	1.0	--
χ^2_3(p-value)								14.0 (.003)*		0.7 (.865)
Occupation										
Professional	34.2	(0.9)	0.9	(0.3)	7.0	(0.8)	1.0	--	1.0	--
Technical	3.0	(0.5)	0.3	(0.4)	5.0	(2.1)	0.2	(0.0–2.0)	0.8	(0.3–2.1)
Service and clerical	21.1	(0.8)	1.8	(0.4)	9.3	(1.0)	0.8	(0.3–2.0)	1.0	(0.7–1.5)
Labor	41.7	(1.3)	1.0	(0.3)	4.5	(0.5)	0.6	(0.3–1.3)	0.7	(0.4–1.3)
χ^2_3 (p-value)								3.4 (.330)		2.8 (.428)
Average work hours										
20–34	13.0	(0.9)	1.8	(0.5)	7.6	(1.2)	1.3	(0.6–2.7)	1.3	(0.8–2.1)
35–44	55.5	(1.5)	1.1	(0.2)	7.0	(0.6)	1.0	(0.5–2.1)	1.3	(1.0–1.8)
45+	31.5	(1.4)	0.9	(0.3)	4.7	(0.7)	1.0	--	1.0	--
χ^2_2 (p-value)								0.7 (.709)		3.3 (.189)

*Significant at the .05 level, two–sided test

Table 2

Associations of 12-month DSM-IV Bipolar Disorder and Major Depressive Disorder with annualized work loss days due to absenteeism and presenteeism among Part II NCS-R employed respondents (n = 3378)

	Individual level				Aggregate level (Total US Labor Force)[1]			
	Days/year		Dollars/year		Million days/year		Million dollars/year	
	Days	(se)	Dollars	(se)	Days	(se)	Dollars	(se)
I. Bipolar Disorder								
Absenteeism	27.7*	(7.0)	4067*	(1034)	40.7*	(10.3)	5973*	(1518)
Presenteeism[2]	35.3*	(7.7)	5184*	(1137)	51.8*	(11.4)	7613*	(1670)
Total[3]	65.5*	(10.4)	9619*	(1527)	96.2*	(15.3)	14128*	(2242)
II. Major Depressive Disorder								
Absenteeism	8.7*	(2.6)	1420*	(418)	72.2*	(21.2)	11742*	(3456)
Presenteeism	18.2*	(3.6)	2961*	(591)	150.5*	(30.1)	24482*	(4890)
Total[3]	27.2*	(4.8)	4426*	(784)	225.0*	(39.9)	36602*	(6485)

*Significant at the .05 level, two–sided test

[1]These results are based on a projection to the total civilian US labor force based on data from the 2002 Current Population Survey.

[2]Presenteeism is defined in lost day equivalents.

[3]Entries in the Total row do not equal the sum of parallel entries in the Absenteeism and Presenteeism rows because the Total results were based on a separate regression equation in which the dependent variable was a measure of total work loss days rather than on the simple summation of the results in the earlier rows.

Table 3

Persistence and severity of 12-month Major Depressive Episodes among Part II NCS-R employed respondents with 12-month DSM-IV Bipolar Disorder or Major Depressive Disorder

	BPD				
	MDE-only	MDE and Mania/Hypomania	Major Depressive Disorder	z-test[1]	p-value
I. Persistence (number of days in MDE episodes in the past 365 days)					
Mean (se)	134.0 (53.5)	164.0 (19.8)	98.1 (5.1)	2.7	.010
Median (IQR)	90.0 (30.0–183.0)	150.0 (52.0–250.0)	60.0 (28.0–150.0)		
II. Severity (scores on the Quick Inventory of Depressive Symptoms Self-Report)					
Mean (se)	14.1 (1.5)	17.3 (0.8)	14.5 (0.3)	2.9	.007
Median (IQR)	15.7 (11.5–17.5)	16.5 (15.7–19.6)	14.7 (11.5–17.5)		
(n)	(7)	(37)	(342)		

[1] The z-tests compare all respondents with 12-month MDE who have either BPD or MDD.

Table 4

Individual level associations of 12-month DSM-IV Bipolar Disorder (BPD) disaggregated by type of 12-month episode and Major Depressive Disorder (MDD) with annualized work loss days due to absenteeism and presenteeism with and without controls for persistence and severity of major depressive episodes among Part II NCS-R employed respondents (n = 3378)

	BPD							
	Mania/hypomania-only		MDE-only		Both		MDD	
	Days	(se)	Days	(se)	Days	(se)	Days	(se)
I. Without controls for persistence-severity of MDE								
Absenteeism	12.5	(8.6)	32.2*	(13.9)	33.1*	(11.9)	8.7*	(2.6)
Presenteeism[1]	27.8*	(12.4)	62.0*	(29.9)	33.3*	(11.4)	18.2*	(3.6)
Total[2]	39.6*	(18.0)	105.4*	(29.7)	69.0*	(16.6)	27.2*	(4.8)
II. With controls for persistence-severity of MDE								
Absenteeism	12.6	(8.6)	25.6*	(13.1)	25.4	(19.6)	2.9	(5.5)
Presenteeism[1]	28.2*	(12.4)	42.6	(30.2)	3.4	(15.8)	−2.0	(9.6)
Total[2]	40.1*	(17.9)	79.4*	(24.7)	32.5	(31.3)	3.8	(15.3)

*Significant at the .05 level, two-sided test

[1]Presenteeism is defined in lost day equivalents

[2]Entries in the Total row do not equal the sum of parallel entries in the Absenteeism and Presenteeism rows because the Total results were based on a separate regression equation in which the dependent variable was a measure of total work loss days rather than on the simple summation of the results in the earlier rows.