



Published in final edited form as:

Psychiatr Clin North Am. 2012 March ; 35(1): 1–14. doi:10.1016/j.psc.2011.11.005.

The Costs of Depression

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Brief summary

Data are reviewed on the societal costs of major depressive disorder (MDD). Early-onset MDD is found to predict difficulties in subsequent role transitions, including low educational attainment, high risk of teen child-bearing, marital disruption, and unstable employment. Among people with specific social and productive roles, MDD is found to predict significant decrements in role functioning (e.g., low marital quality, low work performance, low earnings). MDD is also associated with elevated risk of onset, persistence, and severity of a wide range of chronic physical disorders as well as with increased early mortality due to an even wider range of physical disorders and to suicide. Although effectiveness trials show that expanded MDD treatment can reverse many of these adverse effects, only a minority of people with MDD receives treatment and the quality of treatment is unacceptably low among the majority of those in treatment.

Keywords

Absenteeism; costs of illness; disability; illness burden; impairment; major depressive disorder

Major depression is a commonly occurring, seriously impairing, and often recurrent mental disorder.^{1, 2} The World Health Organization ranks major depressive disorder (MDD) as the 4th leading cause of disability worldwide³ and projects that by 2020 it will be the second leading cause due to currently unexplained increasing prevalence in recent cohorts.⁴ Although data on the prevalence and costs of MDD do not exist for most countries, psychiatric epidemiological surveys of the general population, students, and primary care patients have been carried out in many developed countries as well as in an increasing

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This report was prepared in conjunction with the author's participation in the World Health Organization World Mental Health (WMH) Survey Initiative. WMH is supported by the United States National Institute of Mental Health (R01MH070884), the John D. and Catherine T. MacArthur Foundation, the Pfizer Foundation, the US Public Health Service (R13-MH066849, R01-MH069864, and R01 DA016558), the Fogarty International Center (FIRCA R03-TW006481), the Pan American Health Organization, the Eli Lilly & Company Foundation, Ortho-McNeil Pharmaceutical, Inc., GlaxoSmithKline, Sanofi Aventis and Bristol-Myers Squibb. A complete list of WMH publications can be found at <http://www.hcp.med.harvard.edu/wmh/>.

Dr. Kessler has been a consultant for AstraZeneca, Analysis Group, Bristol-Myers Squibb, Cerner-Galt Associates, Eli Lilly & Company, GlaxoSmithKline Inc., HealthCore Inc., Health Dialog, Integrated Benefits Institute, John Snow Inc., Kaiser Permanente, Matria Inc., Mensante, Merck & Co, Inc., Ortho-McNeil Janssen Scientific Affairs, Pfizer Inc., Primary Care Network, Research Triangle Institute, Sanofi-Aventis Groupe, Shire US Inc., SRA International, Inc., Takeda Global Research & Development, Transcept Pharmaceuticals Inc., and Wyeth-Ayerst; has served on advisory boards for Appliance Computing II, Eli Lilly & Company, Mindsite, Ortho-McNeil Janssen Scientific Affairs, Plus One Health Management and Wyeth-Ayerst; and has had research support for his epidemiological studies from Analysis Group Inc., Bristol-Myers Squibb, Eli Lilly & Company, EPI-Q, GlaxoSmithKline, Johnson & Johnson Pharmaceuticals, Ortho-McNeil Janssen Scientific Affairs., Pfizer Inc., Sanofi-Aventis Groupe, and Shire US, Inc.

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number of developing countries. The results of these surveys are reviewed in this chapter. The paper begins with an overview of information on the descriptive epidemiology of major depression (prevalence, age-of-onset, course, comorbidity) and then focuses primarily on data documenting the individual and societal costs of depression.

Before turning to the review, it is noteworthy that a number of the largest epidemiological surveys of major depression focused on major depressive episodes (MDE) rather than major depressive disorders (MDD). The difference between the two is that MDE includes depressive episodes that occur as part of bipolar disorder while MDD excludes bipolar depression. As the vast majority of lifetime MDE is MDD, the difference between the two is not of great importance when examining lifetime disorders. However, as bipolar depression is considerably more persistent than non-bipolar depression,⁵ the proportion of MDE cases due to bipolar depression increases as the time frame of assessment decreases, making it important to distinguish MDE from MDD in examining current prevalence and correlates. We consequently focus in the current report on MDD, but report data on MDE when they are the only data available for some major studies.

BASIC DESCRIPTIVE EPIDEMIOLOGY

Prevalence

Weissman et al.⁶ published the first cross-national data on the prevalence of MDD, using the same methods as, the landmark US Epidemiologic Catchment Area (ECA) Study.⁷ Lifetime prevalence estimates in these surveys were in the range 1.5–19.0%, with a midpoint of 9.4% and generally higher rates in high income than lower income countries. Twelve-month prevalence estimates were in the range 0.8–5.8%, with a midpoint of 3.7%. Subsequent studies⁸ using a diagnostic interview developed by the World Health Organization (WHO) explicitly for cross-national comparative research found prevalence estimates of MDD that were very similar to those in the earlier ECA-based surveys, again finding higher rates in high income than lower income countries.⁸ Moussavi et al.⁹ more recently reported data on the 12-month prevalence of MDE (ICD-10 criteria) from the massive (n = 245,404 respondents) WHO World Health Survey (WHS), a 60-country survey designed to assess the recent prevalence and impairment of a wide range of health problems in every region of the world (<http://www.who.int/healthinfo/survey/whsresults/en/index.html>). Major depression was the one mental disorder included in the WHS. The 12-month prevalence of major depression was 3.2% and between 9.3% and 23.0% among participants with a chronic condition. Bromet et al.¹⁰ more recently reported data on the 12-month and lifetime prevalence of MDE from the 18-country WHO World Mental Health (WMH) Surveys (n = 89,037). Mean lifetime and 12-month prevalence estimates of DSM-IV MDE were 14.6% and 5.5% in high income countries compared to 11.1% and 5.9% in low-middle income countries.

The wide cross-national variation in prevalence estimates and generally elevated rates in high income countries might reflect cross-national differences in the threshold for defining clinically significant depression in diagnostic interviews. However, if that was the case, we would expect that depression detected in countries with the lowest estimated prevalence would be the most severe cases, resulting in high impairment rates, and that reports of core depressive symptoms would be more similar across countries than estimates of disorder prevalence. Neither of these expectations was borne out, though, when they were examined in the WMH data, adding indirect support to a substantive interpretation of the cross-national differences in MDE. But why do these prevalence differences exist? Differences in stress exposure, in reactivity to stress, and in endogenous depression unrelated to environmental provoking factors are all possibilities. On one level it seems counter-intuitive that people in high income countries would experience more stress than those in low-middle

income countries. However, it has been suggested that depression is to some extent an illness of affluence.¹¹ A related argument is that income inequality, which is for the most part greater in high than low-middle income countries, promotes a wide variety of chronic conditions that includes depression.¹² While further analyses of existing epidemiological data might shed some light on these perspectives, such analyses have not yet been carried out.

Course of illness

Few large-scale longitudinal general population studies of MDD exist, but clinical studies show that a substantial proportion of people who seek treatment for major depression have a chronic-recurrent course of illness.^{13, 14} Subtyping these people is complicated by the fact that chronic depression subtypes are poorly understood.¹⁵ The community survey finding that lifetime prevalence is two-three times that of 12-month prevalence suggests that between a third and a half of lifetime cases have recurrent episodes in a given year. However, long-term longitudinal studies also show that some people with lifetime MDD fail to report their history of depression in cross-section studies.^{16, 17} We would expect this recall failure to be lower in the WMH surveys because of special probes used for lifetime recall,¹⁸ but it would nonetheless be prudent to consider the 12-month-to-lifetime prevalence ratios in the WMH surveys upper-bound estimates on persistence and WMH lifetime prevalence estimates lower-bound estimates on true lifetime prevalence because of likely recall failure in retrospective reports of lifetime prevalence.

THE COSTS OF MAJOR DEPRESSION

Life course role incumbency, timing, and transitions

Given their typically early AOO, mental disorders might be expected to have adverse effects on critical developmental transitions, such as educational attainment and timing of marriage. A number of epidemiological studies have examined these effects, with a focus on four domains: education, marital timing and stability, childbearing, and occupation.

Education—Several studies show early-onset mental disorders associated termination of education.^{19–26} While disruptive behavior disorders and bipolar disorder tend to have the strongest associations in these studies, MDD also is significantly associated with a roughly 60% elevated odds of failure to complete secondary school than otherwise comparable youth in high income countries.

Marital timing and stability—Several studies have examined associations of pre-marital mental disorders with subsequent marriage.^{27–29} Early-onset mental disorders predict low probability of ever marrying, but are either positively associated²⁸ or unrelated²⁷ with early (before age 18) marriage, which is known to be associated with a number of adverse outcomes, and negatively associated with on-time and late marriage, which are known to be associated with a number of benefits (e.g., financial security, social support). These associations are largely the same for men and women and across countries. MDD is one of the most important of these pre-marital mental disorders. A separate set of studies has shown that pre-marital history of mental disorders predicts divorce,^{30, 31} again with associations quite similar for husbands and wives across all countries and MDD among the most important disorders in this regard.²⁷

Teen childbearing—We are aware of only one study that examined the association between child-adolescent mental disorder and subsequent teen child bearing.³² MDD and a number of other early-onset mental disorders were significant predictors of increased teen

childbearing. Disaggregation found that the overall associations were due to disorders predicting increased sexual activity but not decreased use of contraception.

Employment status—Although depression is known to be associated with unemployment, most research on this association has emphasized the impact of job loss on depression rather than depression as a risk factor for job loss.³³ A recent analysis from the WMH surveys documented the latter association by showing that history of mental disorders as of the age of completing schooling predicted current (at the time of interview) unemployment and work disability.³⁴ However, these associations were only significant in high income countries, raising the possibility that MDD becomes more detrimental to work performance as the substantive complexity of work increases.

Role performance

A considerably larger amount of research has been carried out on the associations of mental disorders with various aspects of role performance, with a special focus on marital quality, work performance, and financial success.

Marital functioning—It has long been known that marital dissatisfaction and discord are strongly related to depressive symptoms (e.g.,^{35, 36}), with an average correlation between marital dissatisfaction and depressive symptoms of approximately $r = .4$ across studies and very similar patterns for men and women.³⁷ Longitudinal studies show that the association is bidirectional,^{38, 39} but with a stronger time-lagged association of marital discord predicting depressive symptoms than vice versa.⁴⁰ Fewer studies have considered the effects of clinical depression on marital functioning,^{41–43} but those studies consistently document significant adverse effects.

Considerable research documents that both perpetration of and victimization by physical violence in marital relationships are significantly associated with depression.⁴⁴ While these studies have generally focused on presumed mental health *consequences* of relationship violence,^{45–47} a growing body of research has more recently suggested that marital violence is partly a consequence of pre-existing mental disorders.^{48–51} Indeed, longitudinal studies consistently find that pre-marital history of mental disorders, including depression, predict subsequent marital violence perpetration^{49, 52} and victimization.^{44, 50, 51, 53} However, few of these studies adjusted for comorbidity. A recent study in the WMH surveys⁵⁴ found that the association between premarital history of MDD and subsequent marital violence disappears after controls are introduced for disruptive behavioral disorders and substance use disorders, suggesting that depression might be a risk marker rather than a causal risk factor.

Parental functioning—A number of studies have documented significant associations of both maternal⁵⁵ and paternal⁵⁶ depression with negative parenting behaviors. These associations are found throughout the age range of children, but most pronounced for the parents of young children. Although only an incomplete understanding exists of pathways, both laboratory and naturalistic studies of parent-infant micro-interactions have documented subtle ways in which parent depression leads to maladaptive interactions that impede infant affect regulation and later child development.⁵⁷

Days out of role—Considerable research has examined days out of role associated with various physical and mental disorders in an effort to produce data on comparative disease burden for health policy planning purposes.^{58, 59} These studies typically find that MDD is associated with among the highest number of days out of role at the societal level of any physical or mental disorder due to its combination of comparatively high prevalence and comparatively strong individual-level association.^{60–62} In the WMH surveys, for example,

62,971 respondents across 24 countries were assessed for a wide range of common physical and mental disorders as well as for days out of role in the 30 days before interview.⁶³ MDD was associated with 5.1% of all days out of role, the fourth highest population attributable risk proportion of all the disorders considered (exceeded only by headache/migraine, other chronic pain conditions, and cardiovascular disorders) and by far the largest among the mental disorder. A number of epidemiological surveys in the US have estimated the workplace costs of either MDE or MDD on absenteeism and low work performance (often referred to as *presenteeism*).^{64–67} All these studies found that MDE and MDD significantly predict overall lost work performance. Several studies attempted to estimate the annual salary-equivalent human capital value of these losses. These estimates were in the range \$30.1 billion⁶⁶ to \$51.5 billion.⁶⁴

Financial success—One of most striking aspects of the impairment associated with MDD is that the personal earnings and household income of people with MDD are substantially lower than those of people without depression.^{68–73} However, it is unclear whether depression is primarily a cause, consequence, or both in these associations due to the possibility of reciprocal causation between income-earnings and MDD.⁷⁴ Causal effects of low income on depression have been documented in quasi-experimental studies of job loss.³³ Time series analyses have also documented aggregate associations between unemployment rates and suicide rates.⁷⁵ Previous studies of the effects of mental disorders on reductions in income have not controlled for these reciprocal effects, making the size of the adverse effects of depression on income-earnings uncertain. One way to sort out this temporal order would be to take advantage of the fact that depression often starts in childhood or adolescence and use prospective epidemiological data to study long-term associations between early-onset disorders and subsequent income-earnings. Several such studies exist, all of them suggesting that depression in childhood-adolescence predicts reduced income-earnings in adulthood.^{76–77}

Comparative impairments—A number of community surveys, most of them carried out in the US, have examined the comparative effects of diverse diseases on various aspects of role functioning.^{59, 62, 78–81} MDE was included in a number of these studies and the results typically showed that musculoskeletal disorders and MDE were associated with the highest levels of disability at the individual level among all commonly occurring disorders assessed. The most compelling study of this sort outside the US was based on fifteen national surveys carried out as part of the WMH surveys.⁸² Disorder-specific disability scores were compared across people who experienced each of ten chronic physical disorders and ten mental disorders in the year before interview. MDD and bipolar disorder (BPD) were the mental disorders most often rated severely impairing in both developed and developing countries. None of the physical disorders considered had impairment levels as high as those for MDD or BPD despite the fact that the physical disorders included such severe conditions as cancer, diabetes, and heart disease. Nearly all the higher mental-than-physical ratings were statistically significant at the .05 level. Comparable results were obtained when analyses focused exclusively on sub-samples of cases in treatment and when comparisons were restricted to respondents who had both disorders in a given pair (e.g., respondents who had both MDD and cancer or both MDD and heart disease).

Another set of surveys examined comparative decrements in perceived health associated with a wide range of disorders.^{9, 83, 84} MDD was the focus of two such studies. The first study was part of the WHO World Health Surveys of nearly one-quarter of a million respondents across 60 countries.⁹ A consistent pattern was found in these surveys across countries and socio-demographic subgroups within countries for MDD to be associated with a larger decrement in perceived health than any of the four physical disorders compared with it (angina, arthritis, asthma, diabetes). The second study was part of the WMH surveys,

where MDD was compared with 18 other physical (e.g., cancer, cardiovascular disorders, diabetes) and mental (e.g., BPD, panic disorder, post-traumatic stress disorder) disorders in predicting a summary measure of perceived health.⁸⁵ MDD was one of the three disorders associated with the highest decrements in perceived health, the other two being severe insomnia and neurological disorders (epilepsy, Parkinson's disease, multiple sclerosis).

Morbidity and mortality

It is now well established that MDD is significantly associated with a wide variety of chronic physical disorders, including arthritis, asthma, cancer, cardiovascular disease, diabetes, hypertension, chronic respiratory disorders, and a variety of chronic pain conditions.^{86–94} Although most of the data documenting these associations comes from clinical samples in the US, similar data also exist from community epidemiological surveys carried out throughout the world.^{95,96} These associations have considerable individual and public health significance and can be thought of as representing costs of depression in at least two ways. First, to the extent that MDD is a causal risk factor, it leads to an increased prevalence of these physical disorders, with all their associated financial costs, impairments, and increased mortality risk. Evidence about MDD as a cause of these physical disorders is spotty, though, although we know from meta-analyses of longitudinal studies that MDD is a consistent predictor of the subsequent first onset of coronary artery disease,^{97,98} stroke,⁹⁹ diabetes,¹⁰⁰ heart attacks,^{101,102} and certain types of cancer.¹⁰³ A number of biologically plausible mechanisms have been proposed to explain the prospective associations of MDD with these disorders.^{104–108} These include a variety of poor health behaviors known to be linked to MDD, such as elevated rates of smoking and drinking,¹⁰⁹ obesity,¹¹⁰ low compliance with treatment regimens,^{111,112} and a variety of biological dysregulations, such as hypothalamic-pituitary-adrenal hyperactivity and impaired immune function.¹¹³

Based on these observations, there is good reason to believe that MDD might be a causal risk factor for at least some chronic physical disorders. Second, even if depression is more a consequence than a cause of chronic physical disorders, as it appears to be for some disorders based on stronger prospective associations of depression onset subsequent to, rather than before, onset of the physical disorder, comorbid depression is often associated with a worse course of the physical disorder.^{114–116} A number of reasons could be involved here, but one of the most consistently documented is that depression is often associated with non-adherence to treatment regimens.^{112,117,118} Based on these considerations, it should not be surprising that MDD is associated with significantly elevated risk of early death.^{104,106,119} This is true partly because people with MDD have high suicide risk,^{120–122} but also because depression is associated with elevated risk of the many types of disorders noted above. MDD is also associated with elevated mortality risk among people with certain kinds of disorders as part of a larger pattern of associations of MDD with disorder severity. There has been particular interest in MDD as a risk factor for cardiovascular mortality due to heart attack and stroke among people with cardiovascular disease (CVD).^{123–126} Indeed, a number of interventions have been developed to detect and treat depression among people with CVD in an effort to prolong life, although the results of these studies have so far been only modest.¹²⁷

DISCUSSION

The data reported here show clearly that major depression is a commonly occurring and burdensome disorder. The high prevalence, early age of onset, and high persistence of MDD in the many different countries where epidemiological surveys have been administered confirm the high worldwide importance of depression. Although evidence is not definitive that MDD plays a causal role in its associations with the many adverse outcomes reviewed here, there is clear evidence that depression has causal effects on a number of important

mediators, making it difficult to assume anything other than that depression has strong causal effects on many dimensions of burden. These results have been used to argue for the likely cost-effectiveness of expanded depression treatment from a societal perspective.¹²⁸ Two separate large-scale randomized workplace depression treatment effectiveness trials have been carried out in the US to evaluate the cost-effectiveness of expanded treatment from an employer perspective.^{129, 130} Both trials had positive returns-on-investment to employers. A substantial expansion of worksite depression care management programs has occurred in the US subsequent to the publication of these trials.¹³¹ Yet the proportion of people with depression who receive treatment remains low in the US and even lower in other parts of the world. A recent US study found that only about half of workers with MDD received treatment in the year of interview and that fewer than half of treated workers received treatment consistent with published treatment guidelines.¹³² Although the treatment rate was higher for more severe cases, even those with severe MDD often failed to receive treatment.¹³³ The WMH surveys show that treatment rates are even lower in many other developed countries and consistently much lower in developing countries.¹³⁴ Less information is available on rates of depression treatment among patients with chronic physical disorders, but available evidence suggests that expanded treatment could be of considerable value.¹³⁵ Randomized controlled trials are needed to expand our understanding of the effects of detection and treatment of depression among people in treatment for chronic physical disorders. In addition, controlled effectiveness trials with long-term follow-ups are needed to increase our understanding of the effects of early MDD treatment interventions on changes in life course role trajectories, role performance, and onset of secondary physical disorders.

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