



A Trillion-Dollar Opportunity: How Brain Research Can Drive Health and Prosperity

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Policies that both increase federal funding for research into mental conditions and enable biopharmaceutical companies to invest more in mental health-related R&D should be incorporated as key components of a national economic growth strategy.

Tens of millions of Americans suffer from a wide variety of mental and neurological health conditions each year. Besides the very significant human costs, these conditions impose massive costs on the economy, likely approaching 9 percent of GDP when all costs are factored in, including direct expenditures on treatment for mental and neurological illnesses, reduced workforce participation and lowered productivity, comorbidity factors, and indirect costs from related social services. As such, public policies to support biopharma innovation related to mental and neurological health conditions should be considered not only as vital health policies, but also as important economic policies. If we could make more progress on biopharma innovation to diagnose, treat, cure, and even prevent mental illnesses, the economic gains would vastly outweigh the research costs. Accordingly, policies that increase federal funding for research into brain diseases and enable biopharmaceutical companies to invest more in mental health-related R&D should be incorporated as key components of a national economic growth strategy.

The Diagnostic and Statistical Manual of Mental Disorders (DSM) of the American Psychiatric Association includes over 450 different mental disorders.¹ Diseases that impact the brain include neurodegenerative diseases such as Alzheimer's and Parkinson's, psychiatric disorders such as anxieties, bipolar disorder, major depression, and schizophrenia, as well as disorders such as autism. Collectively, these conditions impose

economic costs much larger than are commonly understood because they include not just medical treatment and medicines, but also foregone output by workers, comorbidity with addiction and other physical ailments, and increased social costs.

Unfortunately, medical researchers lack fundamental knowledge about what causes these conditions, how they affect our brains, and how to cure or even effectively treat them. The human brain is a vast frontier that researchers have just begun to explore. Such exploration is key to unlocking a new generation of treatments and restarting private innovation on mental and neurological illnesses, which has stalled in recent years as companies have pulled back on financially risky research. Improving diagnosis and treatment depends on discoveries from research focusing on specific mental disorders, on brain functions, and on the chemical and biological compounds that can treat disorders.

In an era of budget shortfalls and a growing national debt, it can be tempting for federal policymakers to reduce funding for mental-health research while imposing price controls, weaker intellectual property protections, and other measures designed to reduce drug costs. But doing so would be penny-wise and pound-foolish: It might modestly improve short-term budget conditions but would reduce the pace of innovation related to mental and neurological health and ultimately mean slower rates of economic growth.

This report first examines the costs of diseases and disorders that disrupt and impair brain function, such as autism, neurodegenerative diseases, and psychiatric disorders. Next it discusses the potential of biopharmaceutical innovation for treating and preventing these conditions. Finally, the report discusses broad policy directions for moving forward. This entails three main thrusts. First, Congress needs to expand federal funding for brain- and mental health-related research. Indeed, the federal government has a crucial role to play in funding this early-stage research.² Second, in the debate over drug prices, policymakers need to remember that price controls come at the cost of reduced research, including in brain and mental health research. Third, policy should seek to encourage private investment in mental-health innovation, in part by making the U.S. tax code more supportive of enterprise investment in scientific research, such as by expanding R&D tax credits, introducing an “innovation box” that would apply lower tax rates to profits earned on products developed using new intellectual property, and allowing foreign profits to be repatriated at a lower corporate tax rate if the monies are invested in research on mental and neurological health conditions.

PREVALENCE OF MENTAL ILLNESS

Numerous and diverse illnesses impact the human brain. In 2014, 43.6 million adults in the United States had some type of psychiatric mental illness, and of these, 9.8 million had a serious psychiatric mental illness.³ This number is larger than the population of California. Put differently, this is equivalent to the total adult populations of the 26 least populous states plus the District of Columbia.⁴ In addition, 5.8 million American adults have a neurodegenerative disease such as Alzheimer’s or Parkinson’s, and 2.4 million American adults suffer from autism. In total, over 50 million American adults, 21.8 percent of the population, experienced a brain disease in the past year.

Table 1: Number of Adults Suffering From Diagnosable Mental or Brain Function Conditions in the Past 12 Months, and Comparable State Adult Populations⁵

Condition	Adults With Mental Illness (Millions)	Percent of Adult Population	Equivalent State Adult Populations
Any Psychiatric Disorder	43.6	18.7%	Texas, New York, and Georgia
Serious Psychiatric Disorder	9.8	4.2%	Illinois
Major Depressive Disorder	15.7	6.7%	Florida
Schizophrenia	2.6	1.1%	Connecticut
Bipolar Disorder	6.1	2.6%	Oregon and Oklahoma
Obsessive-Compulsive Disorder	2.3	1.0%	Utah
Post-Traumatic Stress Disorder	8.2	3.5%	Georgia
Panic Disorders	6.3	2.7%	Virginia
Dysthymia	3.5	1.5%	Louisiana
Autism	2.4	1.0%	Iowa
Neurodegenerative Disorders	5.8	2.5%	Washington
Alzheimer's	5.1	2.2%	Massachusetts
Parkinson's Disease	0.6	0.3%	North Dakota
Total	50.9	21.8%	California and Texas

In addition, the prevalence of mental illness among children is also very high, and only 25 percent receive care or treatment. More than one in five children, 21.4 percent, experience a severe mental disorder between the ages of 13 and 18.⁶ During these teenage years, almost half of adolescents, 46.3 percent, experience some type of mental condition. Moreover, 9 percent of children between 13 and 18 suffer from Attention Deficit Hyperactivity Disorder (ADHD) in a 12-month period, and 1.8 percent have serious cases.⁷ A study in the United Kingdom showed that mothers of children with ADHD had lower incomes as a result, and that ADHD raises a child's educational costs by approximately \$6,500 per year.⁸

Moreover, conduct disorder and oppositional defiant disorder, which impact 5 percent and 10 percent respectively of 10-year-olds, increase costs of care and education for students. Additional public costs per child related to conduct disorders total around \$70,000 over a 7-year period.⁹

Approximately 1.1 million children have autism spectrum disorder, and 2.8 million adolescents between 12 and 17 had major depression episodes in a 12-months period, 2 million of which involved severe impairment.¹⁰ These diseases impact children's educational attainment, and can negatively impact tertiary educational attainment and future earnings. They also frequently reduce family members' incomes, and take up more scarce resources in the school system. However, because children are not in the workforce, all opportunity costs of education occur in future periods, and thus are very difficult to measure.

Table 2: Prevalence Rates of Psychiatric Mental Illness Among Children¹¹

Disorder	Percentage of Adolescents With Disorder	Percentage of Adolescents With Serious Disorder	Age Group Studied
Any Psychiatric Disorder	46.3%	21.4%	13 to 18 years old
Anxiety Disorders	25.1%	5.9%	13 to 18 years old
Panic Disorders	2.3%	2.3%	13 to 18 years old
Post-Traumatic Stress Disorder	4.0%	1.4%	13 to 18 years old
ADHD	9.0%	1.8%	13 to 18 years old
Social Phobias	5.5%	1.3%	13 to 18 years old
Dysthymia	11.2%	3.3%	13 to 18 years old
Major Depression	11.4%	8.2%	12 to 17 years old
Autism Spectrum Disorder	1.4%	N/A	0 to 17 years old
Oppositional Defiant Disorder	10.0%	N/A	10-year-olds
Conduct Disorders	5.0%	N/A	10-year-olds

Psychiatric Illnesses

Psychiatric illnesses affect a very large portion of the U.S. population, disproportionately impacting individuals in prime earning and education years. The many lingering effects they create can dramatically reduce individuals' ability to live a full and happy life, despite existing drugs and treatments. These diseases engender costs much larger than the direct costs of treatments, and therefore developing new drugs, along with improving existing treatments, presents a major opportunity for economic growth.

Women are 55 percent more likely to have a mental illness than men, and 40 percent more likely to have a serious mental illness. This may be because women are more likely to seek treatment. These illnesses are most common during an individual's early to middle career, with 20.4 percent of adults between the ages of 26 and 49 suffering from some form of mental illness. Mental illness is also common during tertiary education years—20.1 percent of adults from age 18 to 25 suffer from some form of psychiatric mental disease.¹²

Anxiety Disorders

Anxiety disorders are the most common type of mental disorder. Ranging from panic and eating disorders to phobias, obsessive-compulsive disorder (OCD), and post-traumatic stress disorder, they affect 18.1 percent of adults each year—and among this population more than one in five have disorders that are classified as severe.¹³ Over the course of their lifetimes, 28.8 percent of adults will experience an anxiety disorder.¹⁴ Though some anxieties are highly treatable, and for others therapy has been shown to be effective, only one-third of those suffering from anxieties seek treatment. Those with anxieties account for almost one-third of America's direct mental-health bill.¹⁵ Even mild or moderate cases can seriously impact an individual's ability to be productive in the workplace. Severe cases can be hard to treat, especially when more than one anxiety is present.

In total, neurodegenerative diseases impact 5.8 million Americans and cost \$262 billion.

Bipolar Spectrum Disorder

Patients with bipolar disorder experience mood swings between manic “ups” and depressive “downs.” Some people with Bipolar 1 Disorder experience manic swings lasting as long as seven days, with symptoms so severe that they require hospitalization.¹⁶ Bipolar disorder is the sixth-leading cause of disability worldwide, yet no recent estimates for its total cost have been produced. In 1991, bipolar spectrum disorder was estimated to cost \$45.1 billion annually, which would be the equivalent of \$80 billion in 2016 dollars.¹⁷ However, estimated lifetime prevalence rates for this study were estimated at 1.3 percent, whereas current National Institute for Mental Health (NIMH) estimates show that 2.6 percent of adults suffer from bipolar spectrum disorder over a 12-month period.¹⁸

Because symptom duration and response to treatment are so variable, costs for patients vary widely. A person with only a single manic episode incurs costs of about \$17,000 in total, though a single individual with chronic bipolar episodes that are unresponsive to treatment can cost the economy \$917,000.¹⁹ Developing better treatments to cure bipolar disorder can give patients a much higher quality of life and substantially reduce economic costs.

Major Depression

Nationwide, 2.8 million adolescents and 15.7 million adults have suffered at least one major depressive episode in the last 12 months.²⁰ Episodes last an average of six months, and experts estimate that, at any one time, 10 million Americans are suffering from depressions, or roughly 3.1 percent of the population.²¹

Due to the scope and severity of depression, cost of care and economic costs from lost productivity are large. For those individuals receiving treatment, 30 to 40 percent of sufferers do not respond to existing medications or they exhibit treatment-resistant symptoms. Individuals with no care or treatment-resistant depression are 45 percent less productive than other workers.²² Workers with a response to treatment are still 23 percent less productive than workers without depression, showing that current treatments are not completely effective.²³ Children who suffer from depression receive fewer years of education, and as adults have incomes reduced by \$10,400 per year, experiencing total lifelong costs of \$300,000.²⁴ Lost productivity costs associated with depression among adults amount to approximately \$106 billion each year.²⁵

Additionally, millions of American adults suffer from dysthymia, a form of depression that is typically less severe but much longer lasting. Diseases like dysthymia can dramatically decrease productivity over long stretches of time.²⁶

Schizophrenia and Psychoses

Schizophrenia-spectrum disorders and other psychoses affect a large population, and in most cases are seriously debilitating. Approximately 2.4 million people live with schizophrenia.²⁷ While in some cases the disease can be controlled with proper treatment, there is no cure, and its causes are still unknown. People with schizophrenia usually begin to see symptoms between 16 and 60 years of age, and the disease lasts for life. Due to its severity, the income-lowering effects of these disorders are large. In one survey, only 51

percent of individuals with psychotic disorders were employed, compared with 89 percent of a control group.²⁸ Additionally, individuals with schizophrenia who are in a workplace may be employed at low-income jobs, or jobs subsidized by disability insurance. Suicide is also a major social cost associated with schizophrenia—5 percent of individuals with schizophrenia will kill themselves.²⁹

Neurodegenerative Diseases

Alzheimer's disease affects 5.1 million Americans, of which 43 percent are severe cases.³⁰ Alzheimer's disease does not resemble other mental illnesses, in that it afflicts mostly older adults who have already retired. From an economic standpoint, there are low opportunity costs in terms of lost labor or productivity. However, costs to care for Alzheimer's patients are very high, at \$226 billion per year. By 2050, without improved understanding of the disease or ability to slow the onset of Alzheimer's, direct costs could reach \$1 trillion dollars.³¹

Of the 5.1 million Americans with Alzheimer's, there are between 220,000 and 640,000 who have early-onset Alzheimer's, which begins to manifest in a person's 40s or 50s.³² These individuals lose working years when people typically earn the highest wages, costing approximately \$12.1 billion in lost income per year.³³ In total, Alzheimer's costs the U.S. economy \$238 billion, or 1.5 percent of GDP, annually.

Similarly, Parkinson's disease is most common for individuals over the age of 60, and impacts 630,000 people. Each year, Parkinson's costs \$14.4 billion per year in direct medical costs, increased costs of care and lost productivity.³⁴ Additionally, Huntington's disease and amyotrophic lateral sclerosis (ALS) each impact 30,000 Americans, and together cost approximately \$2.5 billion.³⁵ In total, neurodegenerative diseases impact 5.8 million Americans and cost \$262 billion.

Autism Spectrum Disorder

About 3.5 million Americans have Autism Spectrum Disorder (ASD), or about 1 percent of the population, and this number is growing.³⁶ While just 1 in 150 children was diagnosed in 2000, 1 in 68 was diagnosed with ASD in 2012.³⁷ Scientists have little understanding why this is happening. Educating K-12 students with ASD is \$8,600 more expensive per year than it is for average students, and their health-care costs are \$14,061 higher per year.³⁸ Mothers of autistic children earn 56 percent less than mothers of children without the disorder. Autistic adults are less likely to enter the workforce or acquire tertiary degrees. Accounting for direct costs and lost personal and family income, autism cost \$175 billion for adults and \$66 billion for children in 2012.³⁹ A single individual with autism, over a lifetime, costs the economy between \$1.4 million and \$2.3 million in medical costs, care, and decreased earning potential, depending on the level of intellectual disability.

AGGREGATING THE COSTS OF MENTAL ILLNESS

The overall costs of mental and neurological illness are staggering, and impact not only individuals and their families and communities, but also affect the entire economy. Measuring these costs is not straightforward. As Boston University's Thomas McGuire

writes, “There is a regular need to ‘count up’ costs across the whole economy, a simple-sounding task complicated by the many ways in which mental health affects services.”⁴⁰ Yet, a number of studies counting costs associated with mental illness exclude many of the indirect costs of brain diseases, focusing only on direct expenditures associated with treating the illness, or end their analyses with vague discourses on the opportunity costs of lost output.

In terms of direct medical costs, mental illness, which includes anxiety, mood, and psychotic disorders, among others, is the single costliest class of diseases in the United States in terms of direct cost of care, totaling \$201 billion in 2013, or 1.2 percent of U.S. GDP, up from \$79 billion in 1996.⁴¹ Each year, these psychiatric mental conditions cause 24.5 million hospital visits, which alone cost \$86 billion.⁴² However, most studies analyzing direct and indirect mental health-care costs find that indirect costs from lost worker output dwarf the direct costs of care, often being as much as six or seven times higher.⁴³

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International cases mirror conditions in the United States. A 2013 study in the United Kingdom estimated that mental illness costs 3 percent of GDP in developed economies.⁴⁴ Similarly, one study in 2002 calculated that mental illness costs \$317.6 billion dollars, or 2.9 percent of U.S. GDP. However, these estimates include only direct costs—health-care costs and the costs of care for institutionalized populations with mental illness in prisons, nursing homes, and mental-health institutions. They omit costs from incarceration, homelessness, early mortality, comorbidity conditions, and mild and moderate mental illness.⁴⁵

On a global scale, the World Economic Forum estimated that the direct and indirect costs of mental illness will total \$46.7 trillion in lost global GDP from 2010 to 2030, and about \$2.5 trillion annually, or 3.4 percent of global GDP.⁴⁶ This is partially because diseases impact individuals over long periods of time, at great cost. As a result, by 2030, mental illnesses are projected to cost more than cancer, diabetes, and respiratory diseases combined.⁴⁷ Mental illness accounts for 37 percent of premature years of life lost globally, more than any other illness.⁴⁸ High-income countries like the United States will carry 65 percent of this burden.⁴⁹

In their book, *Thrive: The Power of Evidence-Based Psychological Therapies*, Richard Layard and David Clark estimate that the total cost of mental-health conditions is 8 percent of U.S. GDP, 4 percent coming from lost productivity, 2 percent from increased crime, and 2 percent from the direct costs of care, half of which comes from care for related physical ailments.⁵⁰ This equates to \$1.34 trillion dollars. Moreover, the authors estimate that roughly half of these costs are borne by taxpayers.⁵¹ This estimate includes direct costs of treatment, opportunity costs from lost productivity, and comorbidity costs from factors such as increased risk of suicide, alcoholism and drug abuse, and physical illness.⁵² And yet even these figures may underestimate the true economic impact of mental illness.

Childhood mental illnesses impose costs far beyond increased medical costs. Mental disorders increase risky behavior, drug and alcohol use, and susceptibility to infectious disease.⁵³ Over 70 percent of youth in juvenile justice programs have been diagnosed with a mental disorder, and the cost to society for each of these individuals is between \$1.2 million and \$2 million.⁵⁴ Altogether, these costs have been estimated at around \$29 billion annually.⁵⁵ However, many costs are not captured by this estimate. Parents of children with mental-health conditions are more likely to miss work to care for their child, or stay out of the workforce entirely. And lost years of education, or falling behind peers in the classroom due to a disorder, limits these children's educational achievement and future earning potential.⁵⁶

For some diseases, such as autism, Alzheimer's, and Parkinson's, research has estimated the total cost of each condition. As noted earlier, \$226 billion was spent on direct care and treatment for Alzheimer's patients, along with \$14 billion for Huntington's disorder and \$22 billion for other neurodegenerative diseases. Total costs for autism, considering all direct and indirect costs, has been estimated at \$252 billion per year. Because these estimates already exist, the following sections deal exclusively with costs incurred from psychiatric disorders.

Direct Costs of Psychiatric Illnesses

There are a variety of direct costs associated with mental illness. These costs mirror costs from other diseases, such as the cost of medicine, being seen by a doctor or other professional, and the cost of care. Additionally, for those with diseases who are unable to work, disability payments are a direct cost.

Treatment Costs

Money spent directly on treatment for mentally ill patients is a large expense, yet it is just a fraction of the total cost imposed by psychiatric illness. Costs such as hospitalization, doctors' visits, medicine, state mental-health treatment facilities, and Medicare and Medicaid expenditures are all well documented and easy to calculate, unlike many indirect costs. In 2013, \$201 billion was spent on direct mental-health care.⁵⁷ This constitutes 6.3 percent of health-care expenditures, close to previous estimates that mental illness accounts for 7 percent of total health-care spending.⁵⁸

Disability Payments

In addition to medical expenditures, government and private insurers pay disability insurance to individuals unable to participate in the workforce due to disability. Not counting trauma-related brain injuries and intellectual disabilities, nearly 2.4 million people with brain diseases qualify for federal assistance due to their inability to fully participate in the workforce through the Social Security Disability Insurance (SSDI) program.⁵⁹ These payments total \$28.8 billion annually.

Table 3: Social Security Disability Insurance Recipients and Payments⁶⁰

Disease	Number Receiving Disability (Thousands)	Average Monthly Payout	Total Annual Payouts (Millions)
Autistic disorders	50	\$759	\$458
Developmental disorders	14	\$749	\$125
Childhood and adolescent disorders	13	\$735	\$113
Mood disorders	1,418	\$1,053	\$17,913
Schizophrenic and other psychotic disorders	510	\$884	\$5,410
Other	392	\$1,010	\$4,747
Total	2,397	\$1,000	\$28,766

Individuals receiving disability insurance payments because of mental-health disabilities account for 1.2 percent of all working age adults in the United States, and 23.6 percent of SSDI disability benefits paid out. However, among workers under 40 years of age, mental illness accounts for over 41 percent of disability recipients.

Table 4: Percent SSDI Recipients Suffering From Mental-Health Disorder, by Age Cohort⁶¹

Age Cohort	Percent of Disabilities Classified as Mental Disorders
Under 30	41.5%
30–39	41.4%
40–49	32.7%
50–59	21.9%
Over 60	15.7%
All ages	23.6%

Public payments from SSDI dwarf annual payments by private long-term disability insurance providers. Here, mental illness accounts for only about 8.3 percent of long-term disability payment recipients, costing about \$1.3 billion per year.⁶²

Incarceration

Mental disorders lead to increased incarceration. Of the United States' 2.2 million inmates, 356,000, or 16 percent, have severe mental disorders.⁶³ This rate mirrors conditions in the United States in the 1840s before reformer Dorothy Dix helped create a network of dedicated psychiatric health facilities and reduced the percentage of inmates with mental illnesses to 2 percent.⁶⁴ Now, state mental hospitals hold only 35,000 patients, with 10 times that number in the prison system.⁶⁵

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Prisoners with severe mental illness cost more than other prisoners. Florida estimates that inmates with mental illnesses cost \$130 per day compared with only \$80 per day for inmates without mental illnesses.⁶⁶ Other evidence also suggests that overall costs are about 50 percent higher for inmates with mental illness, or approximately \$47,000 annually, compared with average incarceration costs of \$31,300.⁶⁷ Much of these costs are for medication for incarcerated persons, which is counted in overall estimates of direct costs of mental-health treatment (which is counted in the estimate of direct care). However, inmates with mental illnesses are also more likely to be involved in fights, break prison rules, and stay longer than other inmates.⁶⁸

And this may be just the tip of the iceberg. Individuals with mental illnesses may be incarcerated without being diagnosed. In 2006, researchers in prisons found that approximately 22 percent of the inmate population had a diagnosed mental illness prior to being incarcerated, yet found that approximately 1,264,300 prisoners, or 57 percent of the prison population, were experiencing symptoms that met criteria for major depression, psychoses, or mania.⁶⁹ Some of these cases were most likely caused by prison conditions, as incarceration can activate or aggravate existing psychoses, anxieties, or depression. Many others may have been influenced by a co-occurring substance abuse disorder, for which arrest rates are much higher regardless of mental illness. In fact, 75 percent of inmates suffered from substance dependence or abuse, compared with 55 percent of prisoners without symptoms of mental illness.⁷⁰ Individuals with both histories of substance abuse and histories or symptoms of mental illness are 37 times more likely to be in prison than the average American adult, 8.6 percent of whom are incarcerated.

Table 5: Mental and Substance Abuse Disorder Prevalence Among Incarcerated Populations⁷¹

Substance or Mental Illness History or Symptoms	Percentage of Prison Population	Total Inmates	Incarceration Rate
Mental Illness Only	18%	390,504	1.2%
Co-occurring Mental Illness and Substance Abuse	40%	873,796	8.6%
Substance Abuse Only	22%	468,559	4.7%
Neither Substance Abuse nor Mental Illness	20%	446,057	0.2%

Comparing incarceration rates among inmates with mental illness and controlling for differences in incarceration rates among inmates with histories of substance abuse, eliminating mental illness would reduce the U.S. prison population by 684,000 inmates. That is nearly one-third of the prison population (a reduction of 31.4 percent), which would save a total of \$27.6 billion.⁷²

Reduced Economic Output

Most mental disorders reduce labor output, either through reduced total lifetime work hours or through reduced worker productivity. There are three main types of costs: 1) being out of the labor market due to factors such as unemployment, incarceration, early death, etc.; 2) reduced work hours from factors such as increased work absences; and 3) reduced output while working. As discussed below, these costs are significant. For example, Thomas Insel, former director of the National Institute of Mental Health, estimated that serious mental illness cost \$193.2 billion in lost productivity and income in 2002, \$257 billion in today's dollars, and attributed 75 percent of this total to lost wages, while about 25 percent was from individuals not earning anything at all.⁷³ However, this leaves out the 33 million people with mental illnesses deemed less severe, who still experience conditions that keep them from reaching their full potential in the labor force.

Not Working

People with mental illnesses are much more likely than others to be out of the workforce. This includes the 2.4 million on federal disability rolls (SSDI), the 356,000 persons with serious mental illnesses in jails or prisons, the 35,000 in state mental hospitals, and others who do not participate in the workforce.⁷⁴

Among those who do participate in the labor force, unemployment rates among people with mental illness are much higher than the overall rate. This stems from the lack of ability to focus, lower ability to handle high-stress jobs, and a higher likelihood of being employed in low-paid, high-turnover jobs. It also may relate to lower education levels.

Table 6: Unemployment Rates by Mental-Health Condition Among Individuals in the Workforce⁷⁵

Mental-Health Status	Total Number (Millions)	Percent of Population	Unemployment (2010-2011)	Additional Unemployed Individuals
No Mental Illness	169.7	82.1	5.8%	N/A
Mental Illness with Mild Impairment	19.6	9.6	7.2%	274,211
Mental Illness with Moderate Impairment	9.0	4.4	8.5%	242,383
Mental Illness with Serious Impairment	5.9	4.0	9.2%	200,600
Any Mental Illness	34.5	18.0	8.0%	717,194

In 2010 and 2011 in the wake of the Great Recession, unemployment levels were above normal for the overall population. But they were even higher for individuals with mental disorders. Even for individuals with mild mental illness, unemployment rates were 1.4 percent higher than average rates. Extrapolating, 717,000 additional individuals were not employed (though they were seeking work) because of mental health, of which 72 percent had moderate or mild illnesses.

Of course, this does not count individuals who are discouraged from looking for work during this time period, a decision that is most likely more common among people with mental illness. A 1999 study found that only 51 percent of schizophrenia patients and 73 percent of those with mood disorders, such as major depression, bipolar spectrum disorder, or dysthymia, were employed, compared with 89 percent in a control group.⁷⁶ Considering the number of people each year who suffer from these illnesses, in total 4.23 million more people are not working than would be expected from these diseases alone. As mood disorders and schizophrenia account for roughly 80 percent of social security disability insurance (SSDI) recipients, it can be guessed that the actual total is even higher, around 5 million individuals. Given the average wage (\$44,300), this total represents a loss of \$221.5 billion in foregone earning opportunities per year.

Reduced Work Hours

Mental disorders also contribute to individuals working fewer hours over their lifetime. In extreme cases, this is a result of early mortality, an inability to work, or an inability to find work. However, for millions of workers suffering from a mental illness, this manifests in the form of more time off from a job or fewer productive hours while on the job. While employed, individuals suffering from mental illness are prone to absenteeism, taking off 11 percent of the time for health reasons, compared with 1.5 percent among other workers.⁷⁷ In fact, from one-third to one-half of missed workdays are caused by mental illness.⁷⁸ If workers with mental illness were absent at the same rate as other employees, total hours worked would rise by an estimated 0.75 percent.⁷⁹ This equates to a total lost output of around 1.5 million workers, or \$68 billion.

A 2004 study found absenteeism and reduced productivity while at work from depression and mental illness cost \$348 per employee in the U.S. workforce per year.⁸⁰ In today's dollars, this equates to \$90 billion.

Lower Productivity

Even when employed, mental illnesses often prevent workers from being as productive as they would be otherwise. Given the number of individuals with some form of mental disorder, especially those categorized as non-severe, their lower productivity has a tangible impact on national productivity statistics.

Many individuals with mental illness end up in lower paying jobs with less responsibility or stress. These jobs frequently have high-turnover rates. Around 70 percent of individuals with serious mental illness and college degrees in the workforce earn less than \$10 per hour for their work, significantly below national averages.⁸¹ Rates for individuals without college degrees are likely even higher. However, if 70 percent of the approximately 4.8 million people with serious mental illnesses in the workforce have significantly lower wages than others due to lower productivity, the opportunity costs add to \$85.9 billion annually.⁸²

While at work, individuals with mental illness are frequently unable to fully concentrate on their jobs, and such poor performance on the job, or “presenteeism,” is estimated to cause just as much lost productivity as absenteeism, \$68 billion per year.⁸³

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However, the true lifetime costs of mental illness are very difficult to estimate, as the effects may impact wages for years to come, even if the illness does not last that long. People who began experiencing mental illness in childhood or as young adults may complete fewer years of education, a predictor of lower wages later in life. When they do hold jobs, those jobs may require fewer skills and provide lower compensation.

Just how much these factors coalesce to cause lower wages is under question. However, lifetime earnings for people with mental disorders are expected to be lower both in the short-term while they are dealing with the disease and in the long-term.

Comorbidity Effects

Not all health-care costs incurred by individuals with mental illness are directly for that condition. People with mental illness are more likely to develop other serious conditions, including diabetes, hypertension, coronary disease, heart failure, asthma, and epilepsy.⁸⁴ Moreover, individuals with mental illness are more likely to smoke, drink, and use illicit drugs, incurring costs from addiction, and are overall less healthy and less able to fight physical illnesses. These are referred to as comorbidity effects.

Physical Health Care

Individuals with mental disorders are more likely to suffer from physical disorders. Richard Layard and David Clark estimate that comorbidity from physical ailments costs 1 percent of GDP, or around \$174.2 billion.⁸⁵ For example, when controlling for age and sex, depression can increase the chances of diagnosis for many physical diseases by as much as 50 percent.⁸⁶ Additionally, patients suffering from stress-related psychological problems are more likely to have cancer.⁸⁷

Substance Abuse

About 10.2 million Americans with mental-health problems also suffer from drug or alcohol addictions.⁸⁸ This is just over half of the 20.2 million individuals with substance abuse disorders.⁸⁹ In 2009, treatment and care directly related to substance abuse totaled \$24.3 billion, roughly 1 percent of the total health-care budget.⁹⁰ Direct spending on illicit drug and alcohol substance abuse treatments costs \$36 billion.⁹¹ Considering just these costs, if people with mental illness abused substances at the overall rate for the rest of the population, \$14.3 billion could be saved. However, like mental illness costs, large costs associated with crime, lost work productivity, and comorbidity effects inflate the total costs of drug and alcohol substance abuse to a much higher level.⁹² Given that we estimate these costs elsewhere, only the direct costs of treating drug and alcohol abuse are considered.

One of the costliest comorbidity factors is tobacco use. Forty percent of men and 34 percent of women with mental illness also use tobacco. Together, they consume 31 percent of all cigarettes smoked in the United States.⁹³ If individuals with mental disorders used cigarettes at the same rate as the general population, smoking would decrease by 20 percent, saving \$31 billion in direct health-care costs, \$34 billion from decreased mortality from smoking and secondary smoking, and 96,000 lives annually.⁹⁴

Indirect Costs of Mental Disorders

Indirect costs of mental disorders are very difficult to measure due to commingling factors that may cause or aggravate mental disorders and which make it hard to ascribe causality. For instance, do poverty, substance abuse, criminal activity, and homelessness cause mental illness, or does mental illness cause these conditions? Longitudinal studies examining the lifelong effects of psychiatric mental illness on productivity, income, and net contributions to society, which might be able to answer some of these questions, are not available.

Crime

Crime is commonly associated with mental illness, though research linking mental illness and crime comes to different conclusions regarding causality. Many factors go into determining crime rates, and crimes committed by people with mental illness may in fact be linked to substance abuse, lower education levels, higher rates of economic distress, or histories of incarceration.

As many as 50 percent of missed workdays are caused by mental distress.

Mental illness, especially if untreated, is associated with higher rates of violence. Individuals with serious mental illness are 49 to 68 percent more likely to commit a violent crime, according to a meta-analysis of the highly fractured literature on mental health and crime.⁹⁵ Moreover, individuals with mental disorders are substantially more likely to be murdered, mugged, raped, or assaulted than the general population.⁹⁶ Murders represent a serious cost to society from a variety of angles, chief among them the cost of incarceration, criminal proceedings, and lost output by both the murderer and the victim. If people with mental illnesses committed violent crime no more than others, and were the victims of violent crime no more than healthy individuals, there would be around 900 fewer murders each year, or about 6.3 percent of all homicides, at a benefit to the economy of \$8.1 billion.⁹⁷ Considering all violent crime, including rape, assault, and robbery, costs are around \$15 billion.

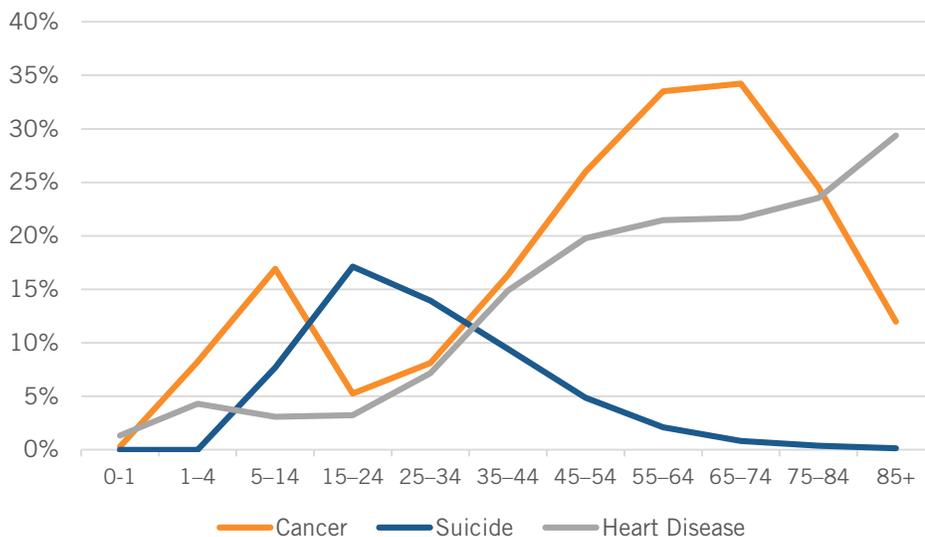
In 1999, crime had a total economic cost of \$1 trillion, over 10 percent of U.S. GDP at the time, when calculating direct costs, costs of deterrents, and the opportunity costs lost due to crime. However, much of the crime that is related to mental illness may be ascribed to substance abuse disorders. The Substance Abuse and Mental Health Service Administration (SAMHSA) found that 2.2 percent of individuals with a psychiatric illness had been arrested in a given year, compared with 1.5 percent in the overall population, consistent with estimates that people with mental illness commit violent crimes at roughly 1.5 times the average societal rate. However, 10.3 percent of individuals with a substance use disorder and 12.4 percent of those with co-occurring mental and substance abuse disorders had been arrested.⁹⁸

Suicide

Suicide is the 10th most common cause of death in the United States.⁹⁹ Over a million people engage in self-harming behavior each year, and almost half a million people are hospitalized for self-inflicted injuries, while 42,773 unfortunately take their own lives.¹⁰⁰ Death rates are relatively constant among adults of all ages. For individuals between the ages of 15 and 34, when death rates from other diseases tend to be lower, suicide is the

leading cause of death. In fact, suicide kills more Americans age 15 to 34 than either cancer or heart disease. And because suicide frequently claims individuals in or near their prime wage-earning years, the economic impact is significant.

Figure 1: Deaths by Suicide, Cancer, and Heart Disease as a Fraction of All Deaths by Age Cohort, 2013¹⁰¹



Most suicides are at least partially influenced by mental health. In fact, 90 percent of suicide victims have at least one diagnosable mental-health condition.¹⁰² This means that approximately 38,500 Americans with mental-health conditions die from suicide each year, and another 445,000 are hospitalized for nonfatal self-inflicted injuries.

The Centers for Disease Control (CDC) estimates that medical and lost-work costs stemming from deaths by suicide total \$51 billion annually. Nonfatal self-inflicted injuries cost another \$10.4 billion.¹⁰³ Given that 90 percent of suicides are related to mental health, the comorbidity costs of mental health stemming from suicide or self-harm total \$55.3 billion.

Homelessness

Many individuals with mental illness become homeless. Between 160,000 and 250,000 people with severe mental illness live on the streets or have no permanent address. Homelessness may be on the rise due to lowered capacity at mental-health treatment hospitals, which has directly led to higher prison and homeless populations.¹⁰⁴ A 1999 study found that homeless individuals cost taxpayers an average of \$40,500 per year.¹⁰⁵

Total Cost of Psychiatric Diseases

Though direct costs associated with mental health-care are only \$201 billion, the total cost to the U.S. economy is over \$1 trillion. Over half a trillion dollars are lost from lower productivity in the workforce or nonparticipation in the workforce due to mental illness.

Table 7: Annual Direct Costs, Indirect Costs, and Opportunity Costs of Lost Output From Mental Illness in the United States¹⁰⁶

Costs Associated With Psychiatric Disorders	Total (Billions)	Percent of GDP
Direct Cost of Care for Psychiatric Disorders	\$201	1.2%
Social Security Disability Insurance	\$29	0.2%
Incarceration	\$28	0.2%
Productivity Loss from Not Working	\$222	1.3%
Productivity Loss from Low-Wage Jobs	\$86	0.5%
Absenteeism and Presenteeism	\$136	0.8%
Comorbidity from Suicide	\$55	0.3%
Comorbidity from Physical Ailments	\$174	1.0%
Comorbidity from Drugs and Alcohol	\$14	0.1%
Comorbidity from Tobacco	\$65	0.4%
Violent Crime	\$15	0.1%
Homelessness	\$8	0.0%
Total	\$1,032	5.9%

Though direct costs associated with psychiatric mental health are only \$201 billion, the total cost to the U.S. economy is well over \$1 trillion.

These represent the direct, indirect, and comorbidity costs that could be measured. In reality, the total is likely higher. Many mental illnesses have lasting impacts on those who suffer from them. Moreover, families and loved ones of those with mental illness are negatively impacted in ways that cannot always be quantified, but are certainly costly. Children with mental illness, for whom this report does not make in-depth estimates in terms of costs beyond direct expenditure on care, may feel the impact of early mental illness for life, whether because of continuing health problems, lower educational attainment, or lower wages and productivity. Similarly, adults with mental illness are less likely to return to the workforce earning the same amount they did when they left, due to the negative impact of employment gaps or due to looking for careers with less stress. These effects can last a lifetime, even if the illness goes away. In total, indirect costs from mental health are far-reaching and affect millions of people.

TOTAL COST OF MENTAL ILLNESS

Taken together, the direct and indirect annual costs of mental and neurological illness amount to approximately 8.8 percent of GDP, or \$1.5 trillion, as Table 8 shows. This includes the cost of medical treatment for mental illness, lost productivity due to lower employment, and reduced ability to work efficiently, as well as indirect costs—including from crime and homelessness. These totals represent the economic opportunity that could be realized by new treatments for neurological and mental diseases.

Table 8: Annual Total Costs From Classes of Brain Disease

Cost	Total (Billions)	Percent of GDP
Psychiatric Illnesses	\$1,032	5.9%
Neurodegenerative Diseases	\$255	1.5%
Autism Spectrum Disorder	\$252	1.4%
Total	\$1,539	8.8%

Taken together, the direct and indirect annual costs of mental and neurological illness amount to approximately 8.8 percent of GDP, or \$1.5 trillion.

By preventing many early deaths, allowing disabled people to rejoin the workforce, and improving productivity among millions of workers who currently suffer from some form of mental illness, mental-health innovation has an opportunity to increase output by substantially increasing the number of hours worked in the United States. Moreover, governments (at both the federal and state levels) would save billions on services and incarceration costs for individuals with mental illness, and crime would decrease, thus reducing spending on the criminal justice system. Both Medicare and individuals would save billions on health-care expenses. Fewer people would die of diseases linked to tobacco, from myriad physical ailments, including cancer and heart disease, and fewer people would abuse drugs and alcohol.

However, these costs should not be considered to be a truly comprehensive estimate of the opportunity for growth from curtailing mental illness. Mental-health diseases, many of which are compounded by other factors, can linger for decades and impose costs on an individual over the course of a lifetime. Additional research is needed to gain more precise estimates for the costs of mental illness. What is clear is that the measurable costs of mental illness on the U.S. population and economy are very large, prompting the need for serious thought about how to shape public policy to maximize efforts to cure or better treat these diseases.

THE PROMISE OF BIOPHARMACEUTICAL INNOVATION FOR MENTAL HEALTH

Given the significant economic costs from mental illnesses, a critical question is whether biopharma innovation can play a role in helping ameliorate the individual and social costs engendered. For many decades following Sigmund Freud's work in the early 20th century, most mental illnesses were believed to be a result of poor parenting or other psychological trauma. But as science has evolved, researchers have proven that many kinds of mental illness have a direct physical component, sometimes genetic (or chemical) in basis and that biopharma innovation holds the promise for significant progress. Moreover, even where "nurture" (such as harmful parenting) interacts negatively with "nature" in producing or worsening mental illness, it is not clear that biopharma drug solutions could not also reduce mental disorders or related human dysfunction.

In addition, many costs incurred as a result of mental illness can be mitigated through treatment. Decreasing the percentage of those suffering from psychiatric disorders would dramatically reduce costs due to crime, comorbidity with substance abuse, and lingering

disorders. Moreover, many people who do receive treatment do not get treatment reflecting best practices. For instance, about half of people treated for depression do not receive evidence-based treatment.¹⁰⁷ However, even with every person who needs treatment receiving it, the costs of mental illness are high and can only be solved through better drugs and treatment methods.

There has been a long history of discoveries related to the biology of mental health. For example, research by the National Institutes of Health (NIH) identified serotonin transmitters in the brain as a treatment target for drugs designed to reduce depression. This research was then used by the private sector over a period of almost two decades to develop selective serotonin reuptake inhibitors (SSRIs), such as fluoxetine (Prozac), which revolutionized care of depression and many psychiatric disorders, including PTSD, OCD, panic disorders, and social anxiety disorders.¹⁰⁸

But while this and related work has been important and has led to badly needed treatments, at one level it has only scratched the surface of what is possible. As Thomas Insel writes, “Most experts feel the science of mental disorders lags behind other areas of medicine.”¹⁰⁹

However, scientific progress appears possible. Continued improvements in genetic analysis based on the mapping of the human genome, neuroscience, and brain-imaging technology show real promise for better knowledge and potential treatment of mental illness. For example, one study found that some individuals’ genetic makeup renders traditional drug treatments for depression ineffective.¹¹⁰ Likewise, researchers from the Broad Institute in Massachusetts recently announced they had identified over 100 locations in the human genome associated with the risk of developing schizophrenia.¹¹¹ They hope this information can be used to develop cellular models to test key molecular events and eventually develop new molecules that can be implemented in future medication. While Broad Institute Director Erik Lander says that it is too early to talk about a cure for schizophrenia, he acknowledges that this research points in the direction of a potential cure. This is critical, partly because existing medications are limited in their effectiveness, and partly because of significant negative side effects that frequently lead patients not to take their medication.¹¹²

One challenge is that there appears to be many different kinds of mental illnesses, even within narrowly defined categories such as “depression” and “autism.” To help address this, NIH’s Mental Health (NIMH) Research Domain Criteria project aims to collect genomic, cellular, imaging, social, and behavioral information on large numbers of people with “mental disorders” in order, in part, to develop more accurate and precise diagnoses.¹¹³ Another initiative by NIMH, Recovery After an Initial Schizophrenia Episode (Raise), seeks to help reduce the carried impact of schizophrenia after an initial episode, mitigating the impact of the illness.¹¹⁴

What is clear is that the measurable costs of mental illness on the U.S. population and economy are very large, prompting the need for serious thought about how to shape public policy to maximize efforts to cure or better treat these diseases.

Progress toward mental-health discovery will depend on both robust government and private-sector investment in mental-health research.

Additionally, NIH has funded research using optogenetics, with the potential for using lasers on brain tissue to eliminate powerful emotional triggers from specific memories, allowing, for example, a returning soldier to recover from PTSD.¹¹⁵

New research on microglia in the brain, a set of cells previously considered to be “in the way,” may hold insights into how a brain’s damage control mechanisms contribute to mental disorders such as schizophrenia, Alzheimer’s, autism spectrum disorder, and Huntington’s disease.¹¹⁶ Using discoveries from the original research, one of the scientists founded a bioscience company to design a drug capable of slowing the onset of Alzheimer’s and mitigating the harmful effects of autism and schizophrenia.¹¹⁷ Overall, a better understanding of the brain and how it is impacted by various conditions and illnesses is essential for providing a base of knowledge that private innovators can build upon. In the future, brain scans, not symptoms, could be used to diagnose brain health.

There is also the potential of big data analytics to play a role. For example, scientists at Columbia University and IBM have developed a test using automated speech analysis to predict the onset of psychosis.¹¹⁸ Similar speech-pattern technologies can help identify Parkinson’s patients at different stages of the disease. Likewise, the emergence of wearable technology may help with mental illness. Using the Internet of Things, continuous data collection from wearable sensors can track how treatments impact patients with chronic neurodegenerative diseases.¹¹⁹

Notwithstanding these and other advances, progress in diagnosing, preventing, and treating mental illness has been slow, largely because our knowledge of the brain is so limited. Indeed, as V.S. Ramachandran explains in *The Tell-Tale Brain*, neuroscience is at an extremely early stage of development today, where we don’t even know what we don’t know.¹²⁰ This is one reason why the Obama Administration’s new BRAIN Initiative (Brain Research through Advancing Innovative Neurotechnologies) is an important step forward, although its funding levels remain too modest.

This all suggests that it is not unreasonable to expect that with increased funding for biomedical research and drug development that we could create much more effective drugs for diagnosis, prevention, and treatment of mental illness. However, progress will likely remain slow unless there is increased public and private investment. And, importantly, progress will depend on both government and industry investments. As Insel writes, “Over the past 50 years, innovative treatments of mental disorders have emerged from research in both public (often NIH-funded) and private (pharmaceutical and biotech) sectors.”¹²¹

Unfortunately, while the economic costs of mental illness are high, investment in finding cures and treatments remains modest at best. The federal government invested just \$4.1 billion in 2015 on mental health-related R&D, down 1 percent from 2012.¹²² This represents just 2.9 percent of the federal research budget, 13.5 percent of the total NIH budget, and 0.024 percent of GDP.¹²³

The annual budget of the National Institute of Mental Health, which supports most of the government-funded mental health R&D, was \$1.4 billion in 2015, though this expanded by \$56 million, 4 percent, in 2016, largely as a result of the BRAIN initiative.¹²⁴ Alzheimer's funding increased to \$991 million in 2016, up by 57 percent.¹²⁵

Table 9: Federal Government R&D Spending on Mental Illness, Total and by Disease, for Fiscal Year 2015¹²⁶

Research Subject Classification	Public Research Expenditure in 2015 (Millions)
Brain Disorders	\$4,124
Psychiatric Mental Health	\$2,263
Depression	\$390
Schizophrenia	\$241
Anxiety Disorders	\$156
Post-Traumatic Stress Disorder (PTSD)	\$85
Bipolar Disorder	\$80
Attention Deficit Disorder (ADD)	\$41
Neurodegenerative Diseases	\$1,662
Alzheimer's Disease and related dementias	\$631
Parkinson's Disease	\$146
ALS	\$49
Huntington's Disease	\$39
Autism	\$208

On the private-sector side, while biopharma companies are investing in research related to mental health, the fact that the costs of drug development are high, the risks large, and the patient populations sometimes relatively small has limited expansion of funding. On top of that, many existing treatments have come off patent and are available in generic form, limiting the ability of non-generic companies to invest in developing new drugs. According to the Tufts Center for the Study of Drug Discovery, only 11.8 percent of drugs under development are ultimately clinically approved and reach market.¹²⁷ The total cost to develop a single clinical drug is roughly equivalent to the entire annual budget of the NIMH. Moreover, companies have no guarantee that they will recoup any of their investment in research, development, and testing of drugs. For even riskier basic research, often in areas such as researching brain functions for which no clear commercial application is in sight, even less private investment is made.¹²⁸

RECOMMENDATIONS

It is time to view the imperative to significantly reduce mental disorders not just as a medical, but also an economic, challenge. Government and business funding for mental-health R&D need to be viewed as an investment that will potentially result in significant societal economic return. There appears good reason to believe that more scientific

Over the next five years, Congress should seek to double its research support for mental health, including in areas such as the BRAIN Initiative and Alzheimer's.

advancements could play an important role in reducing mental illness. If so, the potential return on investment into research on mental health and brain functions could be very large.

This has two main implications for policy. First, policymakers should expand NIH funding and ensure that a portion goes to the National Institute for Mental Health to support expanded scientific research. Ideally, over the next five years, Congress should seek to double its research support for mental health. Congress should fund the BRAIN Initiative with at least \$1 billion per year.

Even with elevated levels of public funding for brain research, effective progress in biopharma drug development for mental illness will require expanded industry investment. While detailed recommendations are beyond the scope of this report, broadly this means three key factors. First, policy should ensure that intellectual property (IP) protection for drugs is provided, especially in other nations. As the Information Technology and Innovation Foundation (ITIF) demonstrated in *Contributors and Detractors: Ranking Countries' Impact on Global Innovation*, the United States has the best system for protecting IP rights for pharmaceuticals in the world, with 12 years of data exclusivity for biologics and strong patent rights. Many other countries do not have such strong protections, granting only five years of data exclusivity. Other nations offer none at all. This “free riding” by other nations comes at a cost: reduced funding for biomedical research, some of which would go to addressing mental disorders.¹²⁹

Second, in the debate over drug prices, policymakers need to remember that price controls come at a cost. As Bill Gates recently stated, while they reduce health-care expenditures in the short run, they also reduce investment in biopharma research.¹³⁰ For example, the Organisation for Economic Cooperation and Development (OECD) has found that, “There exists a high degree of correlation between pharmaceutical sales revenues and R&D expenditures.”¹³¹ As Scherer writes:

Governmental bodies that regulate prices and profits characteristically have a myopic bias. They are inclined toward what might be called ‘Willie Sutton’ regulation, emphasizing recapture of ‘excess’ profits on the relatively few highly profitable products without taking into account failures or limping successes experienced on the much larger number of other entries. If profits were held to ‘reasonable’ levels on blockbuster drugs, aggregate profits would almost surely be insufficient to sustain a high rate of technological progress. Assuming that important new drugs yield substantial consumers’ surplus untapped by their developers, consumers would lose along with the drug companies. Should a tradeoff be required between modestly excessive prices and profits versus retarded technical progress, it would be better to err on the side of excessive profits.¹³²

Similarly the Congressional Research Services writes, “Actual experience and cited studies suggest that companies which do not control the results of their investments—either

through ownership of patent title, exclusive license, or pricing decisions—tend to be less likely to engage in related R&D.”¹³³ And Simanjuntak and Tjandrawinata find a statistically significant relationship between profits from the previous year and R&D expenditure in the next year.¹³⁴ In short, given the considerable economic benefits from biopharma innovation related to mental disorders, such pricing policies are likely to lead to lower rates of GDP growth.

Third, to support more industry investment in biopharma research focused on mental disorders, Congress should also seek to make the U.S. tax code friendlier toward research.¹³⁵ It should expand the Alternative Simplified R&D tax credit from 14 percent to at least 20 percent and introduce an innovation box policy that lowers corporate tax rates on profits derived from intellectual property.¹³⁶ Congress should also consider allowing biopharma companies to bring foreign source profits back to the United States at a lower rate of taxation if these funds are used for research on mental and neurological health conditions.

Finally, policymakers should not ignore the importance of ensuring that treatments, once developed, are made as accessible as possible. Policies should make sure that insurance companies and health-care providers make high-quality, evidence based treatments available. Additionally, public programs are needed to help reduce the number of untreated mental illnesses that impose large costs on the economy.

CONCLUSION

Mental and neurological health conditions impose significant costs on the U.S. economy, affecting 50 million American adults per year and totaling 8.8 percent of GDP. Because of these costs, R&D into mental-health conditions and brain functions hold promise not just for reducing human suffering but also for increasing U.S. GDP. To unlock this growth, the United States should promote both public and private research to better understand how mental disorders impact the brain. This investment will help develop new pharmaceutical drugs and treatment methods, which have the potential to improve millions of lives and generate substantial growth for the U.S. economy.

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