

Environmental and Economic Factors Associated with Mental Illness

“Better treatment for mental health would improve happiness directly; and improving happiness in other ways would reduce the frequency of mental illness... If we want a happier world, we need a completely new deal on mental health.” - Layard et al., 2013

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November 2015
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Executive Summary

Mental illness is a widespread condition in the United States. According to the Substance Abuse and Mental Health Services Administration (SAMHSA), approximately 18.5% of adults in the U.S. currently experience any mental illness and 4.2% currently experience serious mental illness. It is thus important to understand the causation and development of various mental disorders to better prevent, detect, and treat mental illness and to mitigate its consequences.

This report examines the numerous environmental factors that are associated with mental health problems, as well as the economic considerations linked to mental illness. Some of the major findings in this report include:

- Mental illness is associated with many contributing and/or causative factors. Genetics and other biological variables (e.g., abnormal balances of neurotransmitters and brain defects and injury) and psychological issues (e.g., trauma and neglect) are examples of such factors that have been significantly linked to mental health. Additionally, numerous environmental factors are associated with mental illness.
- Examples of the environmental factors associated with mental illness include: stressors such as the death of a loved one, separation/divorce, changing schools, job loss, and financial hardships; cultural and social variables; prenatal exposure to viruses, toxins, alcohol and/or drugs; nutritional deficiencies; chronic medical disorders; autoimmune diseases and infections; tobacco use and excessive alcohol intake; air pollution and toxicant exposure; high weather temperatures; seasonal patterns; natural disasters; and rural geographical location.
- Mental disorders tend to result from various combinations of the contributing/causative factors, and so all of these factors and mental health issues must be considered in context.
- Certain environmental factors related to mental illness are modifiable. Awareness of the numerous environmental factors that contribute to mental illness could help individuals, family members, friends, teachers, employers, coworkers, and health care providers utilize and/or develop preventative interventions, early identification and screening services, and immediate treatment strategies for mental health problems.
- Mental illness has a major impact on the economy and is associated with significant costs. These total costs are comprised of both direct and indirect costs. Examples of the direct costs include the costs of medication, clinical visits, and hospitalization; examples of the indirect costs include the costs of reduced labor supply, increased physical health care, public income support payments, educational underachievement, homelessness, and incarceration. SAMHSA reports that although mental health expenditures have increased in the past two decades, they have decreased as a share of all health expenditures.
- A substantial proportion of individuals with mental illness do not receive the mental health care they need, even though reliable and cost-effective evidence-based services exist for all mental disorders. Funding for the mental health system is insufficient.
- The study, prevention, early recognition, and treatment of mental illness are not only economical, but importantly, essential to the overall well-being of society.

Section 1. Introduction

Mental illness is a prevalent condition in the United States. According to the Substance Abuse and Mental Health Services Administration (SAMHSA), in 2013, approximately 43.8 million adults aged 18 or older in the U.S., 18.5% of all adults in this country, had any mental illness (AMI) in the past year and approximately 10.0 million adults aged 18 or older in the U.S., 4.2% of all adults in this country, had serious mental illness (SMI) in the past year.¹ Additionally, mental illness is a condition that is associated with serious and widespread consequences, ranging from physical to social detriments. It is thus important to understand the causation and development of various mental disorders to better prevent, detect, and treat mental illness and to alleviate such consequences.

Mental illness is associated with many contributing and/or causative factors. Genetics and other biological variables are examples of such factors that have been significantly linked to mental health. Hereditary, familial, and twin studies in particular have long supported the possibility of genetic predispositions to mental illness. Advances in genetic mapping have allowed for increased study within this field. Genetic risk factors have been indicated as important in the causation of many mental disorders, including schizophrenia, bipolar disorder, major depressive disorder, generalized anxiety disorder, and obsessive compulsive disorder (OCD).^{2;3;4} Abnormal functioning of nerve cell circuits/pathways, including abnormal balances of neurotransmitters, and brain defects and injury have likewise been noted as potential causative factors of mental illness.⁵

There are also various psychological factors that are associated with the causation of mental illness. For example, psychological trauma, frequently as a result of emotional, physical, or sexual abuse, is a critical etiological factor in the development of many mental disorders in childhood and adulthood.^{6;7} Neglect, particularly regarding symptoms of psychosis and schizophrenia, is another psychological factor that is strongly related to mental health problems within the framework of a causal relationship.⁸

¹ Substance Abuse and Mental Health Services Administration. (2014). *Results from the 2013 National Survey on Drug Use and Health: Mental health findings*, NSDUH Series H-49, HHS Publication No. (SMA) 14-4887. Rockville, MD: Substance Abuse and Mental Health Services Administration.

² Cross-Disorder Group of the Psychiatric Genomics Consortium. (2013). Identification of risk loci with shared effects on five major psychiatric disorders: A genome-wide analysis. *The Lancet*, 381(9875), 1371-1379.

³ Sullivan, P. F., Neale, M. C., & Kendler, K. S. (2000). Genetic epidemiology of major depression: Review and meta-analysis. *American Journal of Psychiatry*, 157(10), 1552-1562.

⁴ Hettema, J. M., Neale, M. C., & Kendler, K. S. (2001). A review and meta-analysis of the genetic epidemiology of anxiety disorders. *American Journal of Psychiatry*, 158(10), 1568-1578.

⁵ Orlovskaya, S., Pedersen, M. S., Benros, M. E., Mortensen, P. B., Agerbo, E., & Nordentoft, M. (2014). Head injury as risk factor for psychiatric disorders: A nationwide register-based follow-up study of 113,906 persons with head injury. *American Journal of Psychiatry*, 171(4), 463-469.

⁶ Terr, L. C. (2003). Childhood traumas: An outline and overview. *Focus*, 1(3), 322-334.

⁷ Read, J., & Ross, C. A. (2003). Psychological trauma and psychosis: Another reason why people diagnosed schizophrenic must be offered psychological therapies. *Journal of the American Academy of Psychoanalysis and Dynamic Psychiatry*, 31(1: Special issue), 247-268.

⁸ Read, J., van Os, J., Morrison, A. P., & Ross, C. A. (2005). Childhood trauma, psychosis and schizophrenia: A literature review with theoretical and clinical implications. *Acta Psychiatrica Scandinavica*, 112(5), 330-350.

Furthermore, numerous environmental factors have been indicated as contributing and/or causative factors of mental illness.^{9;10;11} For instance, life stressors such as death, divorce, changing schools, and financial problems have significant causal relationships with negative mental health outcomes.^{12;13} Cultural and social variables are other examples of these types of environmental factors, as are different external conditions, including: prenatal exposure to viruses, toxins, alcohol, and/or drugs; nutritional deficiencies; chronic medical disorders; presence of pollutants; high temperatures; and rural geographical location.^{14;15;16;17;18;19}

All of these complex, and often times overlapping, contributing and/or causative factors must be considered in context; mental disorders tend to result from combinations of all of the aforementioned factors.^{20;21} Moreover, it is important to note that certain environmental factors related to mental illness are modifiable. The prevention and treatment of mental illness is not only important for individuals' well-beings, since mental health is one of the biggest predictors of life-satisfaction, but also to alleviate the intense, societal economic burden of mental illness.²²

One of the major societal consequences of mental illness is a substantial impact on the economy. The costs resulting from mental illness are significant, though not well-documented. These total costs are comprised of both direct and indirect costs. Examples of the direct costs include the costs of medication, clinical visits, and hospitalization; examples of the indirect costs include the costs of reduced labor supply, increased physical health care, public income support payments, educational underachievement, homelessness, and incarceration.²³ In 2002, the estimated SMI costs in the U.S. in total, excluding costs associated with comorbid conditions, incarceration,

⁹ Sullivan et al., supra, note 3.

¹⁰ Hetteema et al., supra, note 4.

¹¹ Tennant, C. (2002). Life events, stress and depression: A review of recent findings. *Australian and New Zealand Journal of Psychiatry*, 36(2), 173-182.

¹² Kendler, K. S., Karkowski, L. M., & Prescott, C. A. (1999). Causal relationship between stressful life events and the onset of major depression. *American Journal of Psychiatry*, 156(6), 837-841.

¹³ Dohrenwend, B. P. (1998). *Adversity, stress, and psychopathology*. New York, NY: Oxford University Press.

¹⁴ Williams, J. H., & Ross, L. (2007). Consequences of prenatal toxin exposure for mental health in children and adolescents. *European Child & Adolescent Psychiatry*, 16(4), 243-253.

¹⁵ Sarris, J., Logan, A. C., Akbaraly, T. N., Amminger, G. P., Balanzá-Martínez, V., Freeman, M. P., ... & Jacka, F. N. (2015). Nutritional medicine as mainstream in psychiatry. *The Lancet Psychiatry*, 2(3), 271-274.

¹⁶ Katon, W. J. (2011). Epidemiology and treatment of depression in patients with chronic medical illness. *Dialogues in Clinical Neuroscience*, 13(1), 7-23.

¹⁷ Lundberg, A. (1996). Psychiatric aspects of air pollution. *Otolaryngology--Head and Neck Surgery*, 114(2), 227-231.

¹⁸ Connolly, M. (2013). Some like it mild and not too wet: The influence of weather on subjective well-being. *Journal of Happiness Studies*, 14(2), 457-473.

¹⁹ Wang, P. S., Lane, M., Olfson, M., Pincus, H. A., Wells, K. B., & Kessler, R. C. (2005). Twelve-month use of mental health services in the United States: Results from the National Comorbidity Survey Replication. *Archives of General Psychiatry*, 62(6), 629-640.

²⁰ Sullivan et al., supra, note 3.

²¹ Uher R. (2014). Gene-environment interactions in severe mental illness. *Frontiers in Psychiatry*, 5(48), <http://dx.doi.org/10.3389/fpsy.2014.00048>.

²² Layard, R., Chisolm, D., Patel, V., & Saxena, S. (2013). *Mental illness and unhappiness*, CEP Discussion Paper No. 1239. London: Centre for Economic Performance, London School of Economics and Political Science.

²³ Insel, T. (2008). Assessing the economic costs of serious mental illness. *American Journal of Psychiatry*, 165(6), 663-665.

homelessness, and early mortality, was \$317.6 billion.²⁴ In this same year, the estimated SMI costs in the U.S. in lost earnings per year alone was \$193.2 billion.²⁵ Despite the major impact of mental illness, SAMHSA reports that:

Although mental health expenditures have increased in the past two decades (from \$75 billion in 1990 to \$155 billion in 2009), they have fallen as a share of all health expenditures. (Substance Abuse and Mental Health Services Administration, 2013, p. xxiv)²⁶

Layard et al. (2013)²⁷ argues that more treatment of mental illness is the most reliably cost-effective action to reduce misery and enhance societal wellbeing and that to provide even basic mental health services for all in need, governments will have to spend larger proportions of Gross Domestic Product (GDP) on mental health care.

Better treatment for mental health would improve happiness directly; and improving happiness in other ways would reduce the frequency of mental illness... If we want a happier world, we need a completely new deal on mental health. (Layard et al., 2013, p. 16)²⁸

The study, prevention, early recognition, and treatment of mental illness are accordingly critically important.

Section 2. Environmental Factors Associated with Mental Illness

As previously mentioned, numerous environmental factors are associated with mental illness. Stressors compose a noteworthy category of these types of environmental factors. There are many examples of stressors that can have major influences on mental health. These stressors can create strain that often times develops into/contributes to a diagnosable mental disorder.^{29;30;31;32} The death of a loved one is one such example. The literature indicates that the sudden loss of a loved one can trigger various mental disorders such as major depressive disorder, panic disorder, post-

²⁴ Ibid.

²⁵ Kessler, R., Heeringa, S., Lakoma, M., Petukhova, M., Rupp, A., Schoenbaum, M., ... & Zaslavsky, A. (2008). Individual and societal effects of mental disorders on earnings in the United States: Results from the National Comorbidity Survey Replication. *American Journal of Psychiatry*, 165(6), 703-711.

²⁶ Substance Abuse and Mental Health Services Administration. (2013). *Behavioral health, United States, 2012*, HHS Publication No. (SMA) 13-4797. Rockville, MD: Substance Abuse and Mental Health Services Administration.

²⁷ Layard et al., supra, note 22.

²⁸ Ibid.

²⁹ Tennant, supra, note 11.

³⁰ Kendler et al., supra, note 12.

³¹ Dohrenwend, supra, note 13.

³² Kendler, K. S., Hettema, J. M., Butera, F., Gardner, C. O., & Prescott, C. A. (2003). Life event dimensions of loss, humiliation, entrapment, and danger in the prediction of onsets of major depression and generalized anxiety. *Archives of General Psychiatry*, 60(8), 789-796.

traumatic stress disorder (PTSD), and phobias in individuals with no history of mental illness.³³ A recent study of the associations of a loved one's unexpected death with the first onset of common mental disorders found that:

The bereavement period is associated with elevated risk for the onset of multiple psychiatric disorders, consistently across the life course and coincident with the experience of the loved one's death. Novel associations between unexpected death and onset of several disorders, including mania, confirm multiple case reports and results of small studies and suggest an important emerging area for clinical research and practice. (Keyes et al., 2014, p. 864)³⁴

There is also evidence to support the association between relationship breakups and/or divorce and mental illness.³⁵ However, the risk of some mental health problems as a result of breakups/divorce can be increased for certain people and not for others. For instance, a study by Sbarra et al. (2014)³⁶ revealed that individuals who were already depressed prior to a separation/divorce experienced increased rates of depression following a separation/divorce, but individuals who were not initially depressed prior to a separation/divorce did not experience an increased risk for a later major depressive disorder following a separation/divorce. Again, context must be considered in the diagnosis and treatment of mental illness. Changing schools, job loss, and financial hardships are other stressors associated with mental health problems.^{37;38;39}

One of the most consistently replicated findings in the social sciences has been the negative relationship of socioeconomic status (SES) with mental illness: The lower the SES of an individual is, the higher is his or her risk of mental illness. (Hudson, 2005, p. 3)⁴⁰

Stressors, particularly chronic stressors, can thus increase an individual's chances of developing mental health issues, especially if the individual already displays symptoms of mental illness and/or is predisposed to the genetic inheritance of a mental disorder. According to a recent report

³³ Keyes, K. M., Pratt, C., Galea, S., McLaughlin, K. A., Koenen, K. C., & Shear, M. K. (2014). The burden of loss: Unexpected death of a loved one and psychiatric disorders across the life course in a national study. *American Journal of Psychiatry*, 171(8), 864-871.

³⁴ Ibid.

³⁵ Lorenz, F. O., Wickrama, K. A. S., Conger, R. D., & Elder, G. H. (2006). The short-term and decade-long effects of divorce on women's midlife health. *Journal of Health and Social Behavior*, 47(2), 111-125.

³⁶ Sbarra, D. A., Emery, R. E., Beam, C. R., & Ocker, B. L. (2014). Marital dissolution and major depression in midlife: A propensity score analysis. *Clinical Psychological Science*, 2(3), 249-257.

³⁷ Singh, S. P., Winsper, C., Wolke, D., & Bryson, A. (2014). School mobility and prospective pathways to psychotic-like symptoms in early adolescence: A prospective birth cohort study. *Journal of the American Academy of Child & Adolescent Psychiatry*, 53(5), 518-527.

³⁸ Price, R. H., Choi, J. N., & Vinokur, A. D. (2002). Links in the chain of adversity following job loss: How financial strain and loss of personal control lead to depression, impaired functioning, and poor health. *Journal of Occupational Health Psychology*, 7(4), 302-312.

³⁹ Hudson, C. G. (2005). Socioeconomic status and mental illness: Tests of the social causation and selection hypotheses. *American Journal of Orthopsychiatry*, 75(1), 3-18.

⁴⁰ Ibid.

by Chetty et al. (2014),⁴¹ stress can cause long-lasting changes in the brain, potentially through the mechanism of inducing oligodendrogenesis, which contribute to the vulnerability to mental illness.

Cultural and social factors are other types of environmental factors that have long been associated with mental illness. Leighton and Hughes (1961)⁴² states that culture may impact mental health in a variety of ways, including: predetermining the pattern of specific mental disorders; producing basic personality types, some of which are especially vulnerable to mental illness; producing mental disorders through certain child-rearing practices; perpetuating mental disorders by rewarding it in prestigious roles; producing mental illness through certain stressful roles; affecting mental disorders through the indoctrination of its members with particular kinds of sentiment; affecting the distribution of mental disorders through patterns of breeding; and affecting the distribution of mental illness through patterns which result in poor physical hygiene. Other mechanisms through which cultural factors can play a critical role in the etiology of mental illness, as described by Marsella and Yamada (2010),⁴³ include determining the types of coping mechanisms and resources used to mediate stressors, standards of normality, deviance, and health, treatment orientations and practices, classification patterns for disorders and diseases, and patterns of expression of psychopathy. Social factors such as exposure to racism and discrimination, violence, poor educational achievement, and poverty can also negatively impact mental health.⁴⁴

Studies have consistently shown that people in the lowest strata of income, education, and occupation (known as socioeconomic status, or SES) are about two to three times more likely than those in the highest strata to have a mental disorder... (U.S. Department of Health and Human Services, 2001, p. 39)⁴⁵

Relatedly, stigma surrounding mental illness in certain cultures and social settings is a formidable barrier to detecting, diagnosing, and treating mental disorders.^{46;47}

The prenatal environment has similarly been identified as a potential determinant of mental health. Exposure to viruses, toxins, alcohol, and/or drugs during prenatal development can contribute to mental illness. For example, research indicates that exposure to lead, polychlorinated biphenyls,

⁴¹ Chetty, S., Friedman, A. R., Taravosh-Lahn, K., Kirby, E. D., Mirescu, C., Guo, F., ... & Kaufer, D. (2014). Stress and glucocorticoids promote oligodendrogenesis in the adult hippocampus. *Molecular Psychiatry*, 19(12), 1275-1283.

⁴² Leighton, A. H., & Hughes, J. M. (1961). Cultures as a causative of mental disorder. *The Milbank Memorial Fund Quarterly*, 39(3) 446-488.

⁴³ Marsella, A. J., & Yamada, A. M. (2010). Culture and psychopathology: Foundations, issues, directions. *Journal of Pacific Rim Psychology*, 4(02), 103-115.

⁴⁴ U.S. Department of Health and Human Services. (2001). Chapter 2: Culture counts: The influence of culture and society on mental health. *Mental health: Culture, race, and ethnicity—A supplement to mental health: A report of the surgeon general*. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Mental Health Services.

⁴⁵ Ibid.

⁴⁶ Ibid.

⁴⁷ Abdullah, T., & Brown, T. L. (2011). Mental illness stigma and ethnocultural beliefs, values, and norms: An integrative review. *Clinical psychology review*, 31(6), 934-948.

mercury, cocaine, alcohol, marijuana, cigarettes, and antidepressants throughout pregnancy can have negative neurodevelopmental effects.^{48;49;50}

Physical health factors are associated with mental illness. It is important to note that physical and mental health both have a significant influence on an individual's overall quality of life, or general well-being. Good physical health/fitness and healthy behaviors can positively affect mental health. For example, exercise, or physical activity, has particularly prominent mental health benefits in individuals with elevated levels of depression and anxiety.⁵¹ It has been suggested that the positive changes in depression, anxiety, and mood states following exercise are due to endorphin and monoamine mechanisms and potentially increases in blood circulation in the brain and impacts on physiological reactivity to stress.⁵² Besides reducing depression, anxiety, and negative mood, exercise can also improve self-esteem and cognitive functioning.⁵³ Additionally, individuals with SMI have an increased risk of chronic diseases associated with sedentary behavior, the effects of which could be mitigated by lifestyle modifications such as increasing physical activity.⁵⁴ Therefore, integrating physical activity into mental health interventions for individuals with SMI could be especially valuable.

Eating nutritiously can also positively affect mental health. According to a recent report by Sarris et al. (2015),⁵⁵ a diet consisting of higher intakes of foods such as vegetables, fruits, seafood, whole grains, lean meat, nuts, and legumes and avoidance of processed foods is likely to aid in the resilience against the pathogenesis of mental disorders. This report further discusses the associations between a healthy diet and a reduced prevalence of and risk for depression and suicide and the importance of maternal and early-life nutrition on later mental health outcomes in children.⁵⁶ Moreover, there is evidence to suggest that the bacteria in an individual's gut, and consequently the ingestion of probiotics and prebiotics, can affect mood, and thus mental and emotional health.^{57;58}

⁴⁸ Williams & Ross, supra, note 14.

⁴⁹ Thapar, A., & Rutter, M. (2009). Do prenatal risk factors cause psychiatric disorder? Be wary of causal claims. *The British Journal of Psychiatry*, 195(2), 100-101.

⁵⁰ Irner, T. B. (2012). Substance exposure in utero and developmental consequences in adolescence: A systematic review. *Child Neuropsychology*, 18(6), 521-549.

⁵¹ Guskowska, M. (2003). [Effects of exercise on anxiety, depression and mood]. *Psychiatria polska*, 38(4), 611-620.

⁵² Ibid.

⁵³ Callaghan, P. (2004). Exercise: A neglected intervention in mental health care?. *Journal of psychiatric and mental health nursing*, 11(4), 476-483.

⁵⁴ Richardson, C. R., Faulkner, G., McDevitt, J., Skrinar, G. S., Hutchinson, D. S., & Piette, J. D. (2005). Integrating physical activity into mental health services for persons with serious mental illness. *Psychiatric services*, 56(3), 324-331.

⁵⁵ Sarris et al., supra, note 15.

⁵⁶ Ibid.

⁵⁷ Tillisch, K., Labus, J., Kilpatrick, L., Jiang, Z., Stains, J., Ebrat, B., ... & Mayer, E. A. (2013). Consumption of fermented milk product with probiotic modulates brain activity. *Gastroenterology*, 144(7), 1394-1401.

⁵⁸ Schmidt, K., Cowen, P. J., Harmer, C. J., Tzortzis, G., Errington, S., & Burnet, P. W. (2015). Prebiotic intake reduces the waking cortisol response and alters emotional bias in healthy volunteers. *Psychopharmacology*, 232(10), 1793-1801.

It follows that poor physical health/fitness and unhealthy behaviors can negatively affect mental health. A bidirectional relationship exists between chronic disease and mental illness, especially depression.^{59; 60}

The adverse health risk behaviors and psychobiological changes associated with depression increase the risk for chronic medical disorders, and biological changes and complications associated with chronic medical disorders may precipitate depressive episodes... Depression may worsen the course of medical disorders because of its effect on proinflammatory factors, hypothalamic-pituitary axis, autonomic nervous system, and metabolic factors, in addition to being associated with a higher risk of obesity, sedentary lifestyle, smoking, and poor adherence to medical regimens. (Katon, 2011, p. 7)⁶¹

Various medical diseases such as cardiovascular disease, diabetes, cancer, and obesity have been linked with mental illness.^{62;63;64;65;66;67} For example, Nouwen et al. (2010)⁶⁸ found that, compared with non-diabetic controls, individuals with type 2 diabetes have a 24% increased risk of developing depression; Artherholt and Fann (2012)⁶⁹ found that 20% to 40% of individuals with newly diagnosed cancer and those experiencing a recurrence experience significant distress; and Luppino et al. (2010)⁷⁰ confirmed a reciprocal link between obesity and depression, considering obesity was found to increase the risk of depression and vice versa. Infections and viruses can also negatively affect mental health. Autoimmune diseases and infections are risk factors for subsequent mood disorders and schizophrenia and serious viral central nervous system infections

⁵⁹ Patten, S. B. (2001). Long-term medical conditions and major depression in a Canadian population study at waves 1 and 2. *Journal of affective disorders*, 63(1), 35-41.

⁶⁰ Katon, supra, note 16.

⁶¹ Ibid.

⁶² Ibid.

⁶³ Mezuk, B., Eaton, W. W., Albrecht, S., & Golden, S. H. (2008). Depression and type 2 diabetes over the lifespan a meta-analysis. *Diabetes care*, 31(12), 2383-2390.

⁶⁴ Nouwen, A., Winkley, K., Twisk, J., Lloyd, C. E., Peyrot, M., Ismail, K., ... & European Depression in Diabetes (EDID) Research Consortium. (2010). Type 2 diabetes mellitus as a risk factor for the onset of depression: A systematic review and meta-analysis. *Diabetologia*, 53(12), 2480-2486.

⁶⁵ Artherholt, S. B., & Fann, J. R. (2012). Psychosocial care in cancer. *Current psychiatry reports*, 14(1), 23-29.

⁶⁶ Hotopf, M., Chidgey, J., Addington-Hall, J., & Ly, K. L. (2002). Depression in advanced disease: A systematic review Part 1. Prevalence and case finding. *Palliative medicine*, 16(2), 81-97.

⁶⁷ Luppino, F. S., de Wit, L. M., Bouvy, P. F., Stijnen, T., Cuijpers, P., Penninx, B. W., & Zitman, F. G. (2010). Overweight, obesity, and depression: A systematic review and meta-analysis of longitudinal studies. *Archives of general psychiatry*, 67(3), 220-229.

⁶⁸ Nouwen et al., supra, note 64.

⁶⁹ Artherholt & Fann, supra, note 65.

⁷⁰ Luppino et al., supra, note 67.

are associated with the later development of schizophrenia.^{71;72;73} Examples of infectious agents that have been linked to schizophrenia include the protozoan *Toxoplasma gondii* and cytomegalovirus.⁷⁴ *Toxoplasma gondii* has been suggested as a possible explanatory mechanism for the link between childhood cat ownership and an increased risk for later developing schizophrenia and other SMI.⁷⁵ Maternal exposure to *Toxoplasma gondii* or herpes simplex virus type 2 (HSV-2) is also associated with an increased risk of psychoses among adult offspring.^{76;77} Unhealthy behaviors such as tobacco use and excessive drinking can likewise directly contribute to mental health problems.^{78;79;80}

Finally, external physical surroundings and geographical factors are other types of environmental factors that are associated with mental health. For instance, air pollution and toxicant exposure have been linked to negative psychiatric symptoms such anxiety and depression and changes in mood, cognition, and behavior.^{81;82;83;84} Perera et al. (2012)⁸⁵ even found that high prenatal exposure to widespread urban air pollutants, airborne polycyclic aromatic hydrocarbons, is associated with symptoms of anxiety and depression and attention problems in children. The

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- ⁷¹ Benros, M. E., Waltoft, B. L., Nordentoft, M., Østergaard, S. D., Eaton, W. W., Krogh, J., & Mortensen, P. B. (2013). Autoimmune diseases and severe infections as risk factors for mood disorders: A nationwide study. *JAMA psychiatry*, 70(8), 812-820.
- ⁷² Benros, M. E., Nielsen, P. R., Nordentoft, M., Eaton, W. W., Dalton, S. O., & Mortensen, P. B. (2011). Autoimmune diseases and severe infections as risk factors for schizophrenia: A 30-year population-based register study. *The American journal of psychiatry*, 168(12), 1303-1310.
- ⁷³ Dalman, C., Allebeck, P., Gunnell, D., Harrison, G., Kristensson, K., Lewis, G., ... & Karlsson, H. (2008). Infections in the CNS during childhood and the risk of subsequent psychotic illness: A cohort study of more than one million Swedish subjects. *The American journal of psychiatry*, 165(1), 59-65.
- ⁷⁴ Yolken, R. H., & Torrey, E. F. (2008). Are some cases of psychosis caused by microbial agents? A review of the evidence. *Molecular psychiatry*, 13(5), 470-479.
- ⁷⁵ Torrey, E. F., Simmons, W., & Yolken, R. H. (2015). Is childhood cat ownership a risk factor for schizophrenia later in life?. *Schizophrenia research*, 165(1), 1-2.
- ⁷⁶ Blomström, Å., Karlsson, H., Wicks, S., Yang, S., Yolken, R. H., & Dalman, C. (2012). Maternal antibodies to infectious agents and risk for non-affective psychoses in the offspring—a matched case-control study. *Schizophrenia research*, 140(1), 25-30.
- ⁷⁷ Buka, S. L., Cannon, T. D., Torrey, E. F., Yolken, R. H., & Collaborative Study Group on the Perinatal Origins of Severe Psychiatric Disorders. (2008). Maternal exposure to herpes simplex virus and risk of psychosis among adult offspring. *Biological psychiatry*, 63(8), 809-815.
- ⁷⁸ Gurillo, P., Jauhar, S., Murray, R. M., & MacCabe, J. H. (2015). Does tobacco use cause psychosis? Systematic review and meta-analysis. *The Lancet Psychiatry*, 2(8), 718-725.
- ⁷⁹ Jané-Llopis, E., & Matysina, I. (2006). Mental health and alcohol, drugs and tobacco: A review of the comorbidity between mental disorders and the use of alcohol, tobacco and illicit drugs. *Drug and alcohol review*, 25(6), 515-536.
- ⁸⁰ Fergusson, D. M., Boden, J. M., & Horwood, L. J. (2009). Tests of causal links between alcohol abuse or dependence and major depression. *Archives of General Psychiatry*, 66(3), 260-266.
- ⁸¹ Lundberg, supra, note 17.
- ⁸² Marques, S., & Lima, M. L. (2011). Living in grey areas: Industrial activity and psychological health. *Journal of environmental psychology*, 31(4), 314-322.
- ⁸³ Fonken, L. K., Xu, X., Weil, Z. M., Chen, G., Sun, Q., Rajagopalan, S., & Nelson, R. J. (2011). Air pollution impairs cognition, provokes depressive-like behaviors and alters hippocampal cytokine expression and morphology. *Molecular psychiatry*, 16(10), 987-995.
- ⁸⁴ Genuis, S. J. (2009). Toxicant exposure and mental health—individual, social, and public health considerations. *Journal of forensic sciences*, 54(2), 474-477.
- ⁸⁵ Perera, F. P., Tang, D., Wang, S., Vishnevetsky, J., Zhang, B., Diaz, D., ... & Rauh, V. (2012). Prenatal polycyclic aromatic hydrocarbon (PAH) exposure and child behavior at age 6–7 years. *Environmental Health Perspectives*, 120(6), 921-926.

weather can also impact mental health. Low temperatures can increase happiness and reduce stress, raising overall positive feelings, and high temperatures can decrease happiness.⁸⁶ Other parameters of weather besides temperature such as wind power and sunlight can similarly affect mood.⁸⁷ Seasons, too, can act on mental health, as indicated by seasonal affective disorder.⁸⁸

Seasonal affective disorder is a combination of biologic and mood disturbances with a seasonal pattern, typically occurring in the autumn and winter with remission in the spring or summer. In a given year, about 5 percent of the U.S. population experiences seasonal affective disorder, with symptoms present for about 40 percent of the year. Although the condition is seasonally limited, patients may have significant impairment from the associated depressive symptoms. (Kurlansik and Ibay, 2012, p. 1037)⁸⁹

Natural disasters can contribute to the development of mental disorders such as PTSD and mild or moderate depression and anxiety.^{90;91} The built environment (e.g., the quality and design of housing, furniture configuration, residential crowding, exterior noise sources, toxins, lighting, etc.) can directly and indirectly affect mental health.⁹² Furthermore, geographical location can control access to basic medical and mental health services. Access to nutritious foods, health care, and mental health services is directly related to individual and community's mental health status. Specifically, rural areas tend to have a scarcity of treatment resources, including: less access to mental health services and mental health providers; and fewer programs to train and promote the placement of rural mental health professionals.^{93;94}

Section 3. Preventative Opportunities in Relation to Environmental Factors Associated with Mental Illness

Many of the previously discussed environmental factors associated with mental illness are readily identifiable and even modifiable. Awareness of the numerous environmental factors that contribute to mental illness could help individuals, family members, friends, teachers, employers, coworkers, and health care providers utilize and/or develop preventative interventions, early identification and screening services, and immediate treatment strategies for mental health problems.

⁸⁶ Connolly, *supra*, note 18.

⁸⁷ Denissen, J. J., Butalid, L., Penke, L., & Van Aken, M. A. (2008). The effects of weather on daily mood: A multilevel approach. *Emotion*, 8(5), 662-667.

⁸⁸ Dominiak, M., Swiecicki, L., & Rybakowski, J. (2015). Psychiatric hospitalizations for affective disorders in Warsaw, Poland: Effect of season and intensity of sunlight. *Psychiatry research*, 229(1), 287-294.

⁸⁹ Kurlansik, S. L., & Ibay, A. D. (2012). Seasonal affective disorder. *American Family Physician*, 86(11), 1037-1041.

⁹⁰ Satcher, D., Friel, S., & Bell, R. (2007). Natural and manmade disasters and mental health. *JAMA*, 298(21), 2540-2542.

⁹¹ North, C. S., & Pfefferbaum, B. (2013). Mental health response to community disasters: A systematic review. *JAMA*, 310(5), 507-518.

⁹² Evans, G. W. (2003). The built environment and mental health. *Journal of Urban Health*, 80(4), 536-555.

⁹³ Wang et al., *supra*, note 19.

⁹⁴ New Freedom Commission on Mental Health. (2004). *Subcommittee on rural issues: Background paper*, DHHS Publication No. SMA-04-3890. Rockville, MD: Substance Abuse and Mental Health Services Administration.

For example:

- Regarding stressors, following the death of a loved one, a separation or divorce, or the loss of a job, a strong social support system can be organized and physical activity and healthy lifestyle behaviors (e.g., eating nutritiously, reducing caffeine intake, avoiding alcohol and drugs, and sleeping adequately) can be encouraged. Bereavement periods must be respected, and professional help through the use of therapists, support groups, and/or educational materials, can be beneficial.
- Regarding cultural and social factors, research to better understand and decrease the stigma surrounding mental illness in certain cultures can be strengthened and health care providers can be better educated and prepared for these issues. Impoverished individuals, or those of a lower SES, can be provided increased access to appropriate services.
- Regarding physical health factors, individuals who are pregnant can be given relevant educational materials on substances to avoid and nutritional guidelines to follow and health care providers can better monitor the prenatal development process and relieve or treat any complications. The general population should be encouraged to practice good exercise and nutritional habits and discouraged from tobacco use and excessive alcohol use, and health care providers can spread relevant educational materials and workplaces and schools can promote wellness programs. Individuals who are experiencing nutritional deficits can, if at all possible, use nutrient-based supplements to remedy deficiencies. Those with chronic medical conditions can be made aware of the bidirectional relationship between chronic medical disorders and mental illness and can seek appropriate care from health care professionals.
- Regarding external physical surroundings and geographical factors, individuals living in the presence of or encountering pollutants/toxins can follow professional recommendations for combatting and treating potential side effects. Leaving the area or source of, or limiting exposure to, the pollutants/toxins, if at all possible, is encouraged. The general population should be made aware of the potential effects of weather and seasons on mental health, and individuals can seek care if associated mental health problems develop. Government leaders, health care providers, and advocates can, and should, work together to ensure that there is adequate access to sufficient mental health services. In areas at particular risk (e.g., rural areas), more funding for services can be allocated, provider incentives can be given, and innovative interventions such as telemedicine programs can be expanded.

Since mental disorders have various combinations of contributing causes, other factors associated with mental health such as genetics and other biological factors and psychological factors should also be considered during diagnosis and treatment. These other factors should be particularly noted when they exist in the presence of the environmental factors and vice versa. For instance, individuals with a genetic predisposition for depression should be cautious when encountering major life stressors. Overall, presentations of mental health problems should be contextually examined by health care providers. Accordingly, a comprehensive approach to each individual's

mental health treatment plan would be beneficial (e.g., recommendations for examining and remedying potential environmental contributors could be employed).

Certain settings, including primary care centers, workplaces, and schools, need to be more mental health conscious. Education on mental health in general is critical to successful prevention, early detection, and treatment. As stated in the Introduction, the prevention and treatment of mental illness is not only important for individuals' well-beings, since mental health is one of the biggest predictors of life-satisfaction and mental illness is one of the main causes of unhappiness, but also to alleviate the huge societal and economic burdens of mental illness.⁹⁵

Section 4. Economic Factors Associated with Mental Illness

Economic factors are associated with mental illness both directly and indirectly. As previously mentioned, an individual's financial status can be relevant to the development of mental health problems. Individuals who face financial stressors (e.g., low-income or poverty status) and compromised financial security (e.g., lack of employment or excessive debt) are more likely to have a mental disorder.

Also as previously discussed, mental illness imposes a severe economic burden on society and major financial losses. The costs from lost productivity/employment in addition to the costs of related effects on physical health and the costs of mental health services are substantial. Regarding costs in the workplace, it is predicted that employment would be 4% higher if individuals with mental illness worked as much as the rest of population without mental illness.⁹⁶ Moreover, individuals with mental illness are more likely to take sick leave, and if these individuals were no more absent than individuals without mental illness, it is predicted that hours worked would be 1% higher. From a governmental perspective, it is important to note that:

Finance ministries in high-income countries are typically losing at least 1.5% of Gross Domestic Product (GDP) in disability benefits and lost taxes due to mental illness. (Layard et al., 2013, p. 8)⁹⁷

The aforementioned relationship between chronic physical illness and mental illness also creates significant economic effects. According to Naylor et al. (2012),⁹⁸ the comorbidity of mental health problems with physical illness can increase total health care costs by at least 45% for each individual with a long-term condition and a comorbid mental health problem. Studies have shown that depression in particular is associated with significantly higher health care costs in individuals with various chronic comorbid diseases such as cardiovascular disease and diabetes.^{99;100}

⁹⁵ Layard et al., supra, note 22.

⁹⁶ Ibid.

⁹⁷ Ibid.

⁹⁸ Naylor, C., Parsonage, M., McDaid, D., Knapp, M., Fossey, M., & Galea, A. (2012). *Long-term conditions and mental health: The cost of co-morbidities*. London: The King's Fund and Centre for Mental Health.

⁹⁹ Unützer, J., Schoenbaum, M., Katon, W. J., Fan, M. Y., Pincus, H. A., Hogan, D., & Taylor, J. (2009). Healthcare costs associated with depression in medically ill fee-for-service Medicare participants. *Journal of the American Geriatrics Society*, 57(3), 506-510.

¹⁰⁰ Welch, C. A., Czerwinski, D., Ghimire, B., & Bertsimas, D. (2009). Depression and costs of health care. *Psychosomatics*, 50(4), 392-401.

Besides the costs of lost productivity and increased physical health care, consideration of the additional costs of childhood mental illness, educational underachievement, mental illness consequences for the criminal justice system, and social care further highlights the gravity of the economic burden of mental illness.¹⁰¹ More research, however, is needed on the true extent of the costs of mental illness to society.

Even though mental health expenditures have increased in the past two decades (but they have decreased as a share of all health expenditures), treatment rates for individuals with mental illness remains inadequate.¹⁰² According to SAMHSA, in 2013, among the 43.8 million adults aged 18 or older with AMI, 19.6 million (44.7%) received mental health services in the past year; in this same year, among the 10.0 million adults aged 18 or older with SMI, 6.9 million (68.5%) received mental health services in the past year.¹⁰³ Additionally:

In 2013, there were 11.0 million adults aged 18 or older (4.6 percent of all adults) who perceived an unmet need for mental health care at any time in the past year. Among adults who reported a need for mental health care, 5.1 million adults did not receive any mental health services in the past year. (Substance Abuse and Mental Health Services Administration, 2014, p. 24)¹⁰⁴

Less than one-third of adults with mental illness receive a minimally adequate type or amount of treatment.¹⁰⁵

Mental health care treatment in general has developed rapidly throughout the past 50 years. Evidence-based treatments, pharmacological and/or psychosocial options, exists for all mental disorders. Many such treatments have been shown to be cost-effective and reliable.^{106;107;108} Community-based care is especially important for individuals with mental illness, and various community-based services offer cost-effective, ethical, and successful care for individuals with SMI and a potential cost-effective alternative (e.g., through acute residential mental health services

¹⁰¹ Layard et al., *supra*, note 22.

¹⁰² Substance Abuse and Mental Health Services Administration, *supra*, note 26.

¹⁰³ Substance Abuse and Mental Health Services Administration, *supra*, note 1.

¹⁰⁴ *Ibid.*

¹⁰⁵ Substance Abuse and Mental Health Services Administration, *supra*, note 26.

¹⁰⁶ Heekin, K., & Polivka, L. (2014). *Adult mental health services – update*. Tallahassee, FL: The Claude Pepper Center, Florida State University.

¹⁰⁷ Chisholm, D. (2005). Choosing cost-effective interventions in psychiatry: Results from the CHOICE programme of the World Health Organization. *World Psychiatry*, 4(1), 37-44.

¹⁰⁸ Knapp, M., Barrett, B., Romeo, R., McCrone, P., Byford, S., Beecham, J., Patel, A., & Simon, J. (2004). *An international review of cost-effectiveness studies for mental disorders*. London: Centre for the Economics of Mental Health, Institute of Psychiatry.

and crisis services) to inpatient services.^{109;110;111} For example, Fenton et al. (2002)¹¹² found that the average acute treatment episode cost for individuals with SMI was \$3046 in a residential crisis program and thus 44% lower than the \$5549 average episode cost for individuals with SMI in a general hospital. There is also research to support the potential cost-effectiveness of supported employment and Assertive Community Treatment (ACT) for individuals with mental illness.^{113;114;115}

Cost-effectiveness in terms of mental health expenditures is critically important as, even though mental and substance use disorder (M/SUD) treatment spending from all public and private sources is expected to total \$280.5 billion in 2020, funding is limited given the magnitude of the issue.¹¹⁶

As a result of slower growth in M/SUD treatment spending compared with all-health spending, M/SUD treatment spending as a share of all-health spending is expected to fall from 7.4 percent in 2009 to 6.5 percent in 2020. (Substance Abuse and Mental Health Services Administration, 2014, p. iv)¹¹⁷

Overall, mental health is one of the biggest predictors of life-satisfaction and when considering the impact of mental health on life-satisfaction, mental health expenditures are disproportionately low compared with other areas of government expenditure.¹¹⁸ This is especially unfortunate given that successful and cost-effective mental health services exist. Also as stated in the Introduction, Layard et al. (2013)¹¹⁹ argues that more treatment of mental illness is thus the most reliably cost-effective action to reduce misery and that to provide even basic mental health services for all in need, governments will have to spend larger proportions of GDP on mental health care. Again:

Better treatment for mental health would improve happiness directly; and improving happiness in other ways would reduce the frequency of mental illness...

¹⁰⁹ Heekin & Polivka, supra, note 106.

¹¹⁰ Thomas, K. A., & Rickwood, D. (2013). Clinical and cost-effectiveness of acute and subacute residential mental health services: A systematic review. *Psychiatric Services*, 64(11), 1140-1149.

¹¹¹ Substance Abuse and Mental Health Services Administration. (2014). *Crisis services: Effectiveness, cost-effectiveness, and funding strategies*, HHS Publication No. (SMA)-14-4848. Rockville, MD: Substance Abuse and Mental Health Services Administration.

¹¹² Fenton W. S., Hoch J. S., Herrell J. M., Mosher L., Dixon L. (2002) Cost and cost-effectiveness of hospital vs residential crisis care for patients who have serious mental illness. *Archives of General Psychiatry*, 59, 357–364.

¹¹³ Heekin & Polivka, supra, note 106.

¹¹⁴ Substance Abuse and Mental Health Services Administration. (2009). *Supported employment: The evidence*, DHHS Pub. No. SMA-08-4364, Rockville, MD: Center for Mental Health Services, Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services.

¹¹⁵ National Alliance on Mental Illness, Fact Sheet. (2007). *Assertive Community Treatment: Investment yields outcomes*. Arlington, VA: National Alliance on Mental Illness.

¹¹⁶ Substance Abuse and Mental Health Services Administration. (2014). *Projections of national expenditures for treatment of mental and substance use disorders, 2010–2020*, HHS Publication No. SMA-14-4883. Rockville, MD: Substance Abuse and Mental Health Services Administration.

¹¹⁷ Ibid.

¹¹⁸ Layard et al., supra, note 22.

¹¹⁹ Ibid.

If we want a happier world, we need a completely new deal on mental health.
(Layard et al., 2013, p. 16)¹²⁰

Section 5. Conclusion

The consequences of mental illness, especially untreated mental illness, are serious and can include: unhappiness and/or decreased enjoyment of life; negative impacts on quality of life and physical health; family/friend/social conflicts and interpersonal relationship strains; reduced labor supply and absenteeism at work/school; educational underachievement; hospitalization; homelessness; incarceration; self-harm and suicide; and significant financial burden. Sufficient and appropriate mental health care is essential. The condition of the U.S.'s mental health system is thus crucial. Continued advancements in the understanding of the etiology and presentation of mental disorders, the reliance on evidence-based and community-based and cost-effective services, the development of preventative and integrated programs, and the expansion of mental health and substance use disorder coverage are positive changes. However, the U.S.'s mental health system is still critically underfunded and there is a continuous need for increased access to better quality mental health services. Some recommendations for policy and budget change needed regarding the mental health system include: expanding funding for state mental health services; supporting integrated physical and mental health care programs, especially those that can help prevent, screen, diagnose, and treat mental illness; increasing community-based services, crisis intervention services, and psychiatric beds to decrease the number of individuals with mental illness who are in emergency rooms, homeless, or in forensic facilities; and improving the criminal justice system to divert individuals with mental illness from jails and prisons and into structured community placements or treatment settings.

There are numerous environmental contributors to mental health problems. These environmental factors should be widely recognized and understood. Efforts to increase mental health consciousness, especially in primary care centers, the workplace, and educational settings, must be implemented. Early recognition of risk factors for mental illness and symptoms of mental health problems, preventative interventions, and better access to adequate mental health services are key to better managing mental illness. The identification, prevention, and treatment of mental illness are not only economical, but importantly, ethically imperative. The overall well-being of an individual (e.g., physical health, mental health, and life-satisfaction) should be considered paramount. This consideration can in turn lead to a healthier, happier, and more efficient society.

¹²⁰ Ibid.