Factors Associated with Increased Risk of Early Mortality in People with Mental Illness

by

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Abstract
Several studies have found that people with mental illness have significantly shorter life spans compared to people without mental illness. This is a serious problem that needs to be addressed since mental illness affects many individuals and families. Because it is widely acknowledged that people with mental illness live much shorter lives compared to those without mental illness, mental health clinicians need to become more knowledgeable about the factors that contribute to this problem. This could result in more strategies to prevent premature deaths in this population. This study reviewed different characteristics of people with mental illness to determine which ones are contributing to the earlier mortality rate. Methods: Data was collected from a large database from the Department of Mental Health in Missouri that has information on people who received mental health services in the state. The data included diagnosis, living area, marital status, race, ethnicity, age, education, and other demographic information. Bivariate and multiple regression analyses were used to identify which ones were associated with an increased risk for earlier death. Results identified several predictor variables and a few protective factors that could assist clinicians with the development of treatment and education strategies to combat the risk of early death among people with mental illness.
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Chapter 1: Introduction to the Mortality Rates in Mental Health

**Background**

Mental illness has a major impact on the country. About one in four adults are diagnosed with a mental illness (National Institutes of Health (NIH), 2014a). Mental illness not only affects those afflicted with the illness, but also causes severe hardship to the families of those with mental illness. This problem is very costly to the United States (U.S.). In 2006, the estimated cost for mental health services was almost $58 billion (NIH, 2014b). Along with the cost of treating the mental illness are medical costs for chronic medical conditions that are often associated with a person that has a mental illness (American Psychological Association, 2014). While there have been many advances in the care and treatment for those with mental illness, there are still discrepancies in the medical care and health status between people with mental illness and those without.

One of these discrepancies is in the mortality rate of those with mental illness. Several studies have identified that people with mental illness die at an earlier age than people without mental illness (Henderson, et al., 2011). Studies have reported that life expectancy is shortened anywhere from 8 to 15 years (Bartels, 2004; Collins, Tranter, & Irvine, 2012). Some factors related to mental illness have been identified as being associated with this increased risk. People with schizophrenia often have other chronic medical problems such as diabetes and heart disease, which contribute to the increased early mortality risk (Osborn, et al., 2008). Serious medical conditions have been associated with mental illness, particularly cardiovascular disease (Henderson, et al.,
2011; Baker, et al. 2011). Contributing factors such as smoking, minimal exercise activities, and poor medical care could have some relationship with this increased risk of premature death.

While some of this may be preventable with more exercise and better diets, there are still other factors some identified and some not, that are responsible for the premature death in people with mental illness. One prospective cohort study controlled for health issues, smoking, and alcohol use and still found a significant difference between the average age of death for those with mental illness compared to those without. Those with mental illness had an 84% increased risk of dying before the age of 60 (Henderson, et al., 2011). This risk of early mortality increased as the severity of the mental illness in the individual increased. By controlling for those other identified factors, this study reported that having a psychiatric illness alone increased the person’s risk of early death (Henderson, et al, 2011).

A study of Missouri death records over a three year period found that the years of potential life lost (YPLL) was 17 years for people with mental illness served by publicly operated or funded agencies compared to the general population in Missouri (Phelan & Ortiz, 2013). The study also found that the average age of death dropped during the three year period when compared to a similar period ten years earlier (Phelan & Ortiz, 2013). The study identified heart disease and accidents as some of the major causes of death.

Unfortunately, all of these studies indicate a serious concern for the quality of life and potential years of life for those with a mental illness diagnosis. For this reason, this study investigated deaths of people with mental illness and identified characteristics that
could be contributing to their early death. Data was collected from a database containing patients who received services through the Missouri Department of Mental Health. Variables included diagnosis, living area, race, ethnicity, age, education level, marital status, etc. An examination of the descriptive statistics as well as bivariate and multiple regression analyses were used to investigate which variables were associated with increased risk of early death. Identifying these variables could help the Missouri Department of Mental Health target education and other improvement strategies that could lengthen the person's life while still helping the person have a good quality of life.

**Thesis Statement**

Individuals with mental illness tend to die earlier than individuals without mental illness. Various factors have been associated with premature deaths among people with mental illness. In this study, retrospective analyses was conducted to examine the relationships among a wide variety of variables and the age of death among people with mental illness who received services through the Missouri Department of Mental Health. Based on previous literature, it was hypothesized that diagnoses of schizophrenia, schizoaffective disorder, and bipolar disorder would be associated with earlier aged deaths. Additionally, diagnoses of substance abuse/dependence and nicotine dependence were expected to be related to early deaths. Another hypothesis was that people who live in extremely rural areas were more likely to die early due to their limited access to medical services. In addition to these hypotheses, the relationship of other variables available in the database and age of death was explored in order to determine if other previously unidentified factors were related to early deaths.
Purpose of the Study

The purpose of this study was to identify factors associated with early deaths among people with mental illness. It was not intended to study whether or not people with mental illness die earlier than those without it as that already had been well established. Nor was it intended to compare healthy and unhealthy groups of people. The intent was to study a cohort of people who were receiving public mental health services and who died so that factors related to premature deaths could be identified. By identifying such factors, mental health and medical professionals can develop strategies for intervening, educating, and treating mentally ill individuals in order to reduce the likelihood of premature death.

Research Questions and Hypotheses

The specific research question in this study was to examine what factors are associated with early deaths in people with mental illness. Based on previous literature and the variables available in the database that was used, following are the hypotheses for the study:

Hypothesis 1: People with more severe forms of mental illness such as schizophrenia spectrum disorders, bipolar disorder, and major depression die earlier than those with less severe forms of mental illness.

Hypothesis 2: People with diagnoses of substance abuse or dependence die earlier than those without such diagnoses.

Hypothesis 3: People, who smoke, as indicated by a diagnosis of nicotine dependence, die earlier than those who do not.
Hypothesis 4: Mentally ill people living in rural areas die at younger ages than those living in urban areas.

In addition to these hypotheses, exploratory analyses were conducted in order to investigate if other variables available in the database were associated with early deaths among people with mental illness.

**Theoretical Base**

As mentioned previously, several studies have found that people without mental illness live longer lives than those that have mental illness even when certain aspects of health are taken into account. One possible contributor identified was that people with mental illness often have other chronic medical conditions that further put them at risk for early death. Some studies have identified specific diagnoses that are related to early deaths in those with mental illness. Other possible risks identified include level of exercise, health status, quality of health care received, and prescribed medications. It is probable that there is more than one factor in the person that is increasing their risk, e.g., schizophrenia and multiple antipsychotic medications. This quantitative study reviewed the relationships between several characteristics of people with mental illness and their premature death. Characteristics identified in the literature as high risk along with other variables were analyzed using bivariate analysis and multiple regression analysis to determine which characteristics in people with mental illness have the strongest associations with higher risk of premature death.
Definition of Terms

Bipolar Disorder: A brain disorder associated with severe changes in mood and energy, which makes it difficult to perform daily tasks (NIH, 2014c).

Correlational analysis: A statistical analysis used for evaluating the relationship of variables and the strength of that relationship (FreeDictionary.com, 2014a).

Inter-rater reliability: This measures how consistent two or more people are at determining the same result given the same information (Matuszak & Piasecki, 2012).

Living area: This is referring to the environment the mentally ill person is living (i.e., rural, urban).

Metabolic syndrome: A cluster of abnormalities that severely increase risk of developing diabetes and deaths associated with heart disease (De Hert, et al., 2011).

Multiple regression analyses: This is a statistical analysis tool that measures the value of a dependent or criterion variable when two or more independent variables are involved to determine which variables significantly contribute to the changes in the dependent variable (FreeDictionary.com, 2014b).

Prospective cohort study: A study that follows a group of people going forward over a period of time (Sullivan, 2012).

Psychosocial treatments: These are therapies and rehabilitation techniques that help people cope with and manage the symptoms of mental illness and develop skills to compensate for losses in functioning.

Retrospective study: A study looking backward in time at exposures or outcomes that have already occurred (Sullivan, 2012).
Schizophrenia: A severe, disabling brain disorder that is associated with people hearing voices and having delusional thoughts sometimes causing paranoia and fear which can make it difficult to care for themselves (NIH, 2014d).

Schizoaffective Disorder: A disorder that has many of the characteristics of schizophrenia but also includes serious mood disturbances such as hopelessness, guilt, impulsiveness, sleeplessness, etc. (National Alliance on Mental Illness (NAMI), 2014).

Serious Mental Illness (SMI): This is associated with diagnoses such as schizophrenia, schizoaffective disorder, major depressive disorder, and bipolar disorder. These disorders often result in significant disabilities in one or more area of functioning, e.g., social, occupational, activities of daily living.

Years of potential life lost (YPLL): A measure of premature mortality calculated by the number of years the individual lost relative to the life expectancy of the gender and age (Phelan & Ortiz, 2013).

Assumptions

The main assumption made in this project was that the data in the death records database of Missouri patients receiving mental health services was accurate. Data in this system uses a standardized set of record collection and data entry requirements. People that do the entry and collection are trained on the system and the requirements. Audits are completed on many of the elements in the system with reports sent to the heads of the facilities to increase awareness and responsibility; however, there is no guarantee that all data in the system was accurate.
A second assumption related to a couple of the hypotheses that was studied was that the psychiatric diagnoses provided by the clinician working with the patient was accurate. Reliability of accurate and consistent psychiatric diagnoses has been low (Aboraya, et al., 2006). There are different reasons for this unreliability. Some of the reasons for this inconsistency include whether the patient is being seen for acute care or long-term needs, accuracy of information provided by the patient, interviewing skills and training of the clinician (Aboraya, et al. 2006). The inter-rater reliability of psychiatric disorders has been found to be around 75%; this reliability was generally related to the skill and experience of the clinician (Matuszak & Piasecki, 2012). While this reliability is much higher with skilled clinicians, the criteria for psychiatric disorders are much more subjective than criteria for medical diagnoses and may never reach that level of consistency (Matuszak & Piasecki, 2012). Nonetheless, this research paper assumed that the psychiatric diagnoses provided by the clinicians were accurate.

**Limitations**

This research study evaluated Missouri patient deaths from a statewide database that had data for all mental health patients served by state funded mental health facilities. Since this data was only for those served by state funded, public facilities, the results may not generalize to people served by private mental health services. Additionally, since the patients were people who were served in Missouri, the results may not generalize to other states. The statistical analyses included only variables available in the statewide database. The study cannot compare healthy people versus unhealthy people that have
mental illness because the database did not contain health records, only cause of death and demographics related to the person served.

**Delimitations**

There were no comparison groups in this study. There was not a group of people without mental illness that was measured in this study. The available database included only people who received mental health services. This may not be viewed as a concern due to the number of other studies that already have compared death rates and ages of people with and without mental illness, clearly documenting the early death rate for people with mental illness. While the study was limited to data available in the database, the variables were further limited by what the researcher selected to analyze. There were over 50 variables available for analysis, but this researcher selected several based on the literature review that were more likely to have an association with premature death in a person with mental illness.

**Significance of the Study**

Serious mental illnesses have debilitating effects on nearly every aspect of a person’s life. However, despite great advances in medications and psychosocial treatments for the various mental disorders, people with mental illness still face the prospect of dying prematurely. Early mortality rates among people with mental illness have been well established. Studies have shown that mentally ill people die from 20-25 years sooner than people who are not mentally ill. These tragic outcomes are unacceptable and result not only in great personal suffering but also result in tremendous healthcare costs. This study was unique in that it used a large statewide database of
people who received services through the state mental health authority and who died over a 3-year period of time. By examining such a large sample, it was hoped that some of the factors associated with early deaths among mentally ill people would be identified. The results of this study could have implications for both mental health and medical clinicians working with mentally ill people. It was hoped that the results would assist clinicians and public health care systems to develop treatment, education, and intervention strategies to help people with mental illness avoid chronic medical conditions, access medical services more regularly, and lead more healthy lives. Improvements such as these could reduce the early mortality rates for people with mental illness so they can experience improvements in the quality of their lives and avoid premature suffering and death from medical illnesses. Additionally, as the field becomes more advanced in developing systems of care that address both the psychiatric and medical needs of people with mental illness, many millions, if not billions, of dollars can be saved in healthcare costs, most of which are covered by public entitlement programs (i.e., Medicare and Medicaid).

Summary and Transition

Research has shown that people with mental illness, especially the more severe disorders such as schizophrenia and bipolar disorder, die at younger ages than people who are not mentally ill. This is a very serious problem in the U.S. that causes great suffering and results in enormous healthcare costs. In this study, a variety of factors were examined to determine if they were related to early deaths among mentally ill people. Most of the focus was on variables that were identified previously as being predictive of early death. Thus, it was hypothesized that diagnoses indicative of severe mental illness
would be associated with premature death. Additionally, it was hypothesized that substance abuse and smoking would be related to earlier deaths. Finally, it was hypothesized that mentally ill people living in rural areas would die younger than those living in urban areas. Results were discussed especially in terms of the implications they would have for developing treatment, education, and intervention strategies for both clinicians and public health systems to positively impact this serious health problem.
Chapter 2: Literature Review

**Introduction**

The literature on medical diseases and early mortality for individuals with mental illness is extensive. That people with SMI die younger than those without is well documented. So too is the fact that people with SMI are at greater risk for major medical diseases. This literature review will provide information on the major areas that are believed to be leading to earlier mortality. The first section reviews literature documenting early mortality and morbidity for people with mental illness. The next section addresses the serious medical conditions that people with serious mental illness often suffer from, and some of the factors that have been found to be associated with these conditions. These include lifestyle choices, the mental illness itself, and the medications used to treat the mental illness. The final section focuses on disparities in medical care for people with mental illness. These individuals do not seem to access the same levels of medical care as the rest of the population, which likely contributes to the premature death rate.

**Literature Search**

The Literature search was performed using Academic Search Premier, PubMed, and Google. Several different key search words were used in these engines and the search was limited to peer-reviewed articles. The searches included: high mortality rates in mentally ill people; disparities in medical care for people with mental illness; rural areas and mental illness; inequalities in healthcare for people with mental illness; factors associated with higher mortality rates in people with mental illness; risks associated with
premature death for people with mental illness. Additionally, this author attended a conference on mental illness where she listened to several presentations and one study that related specifically to this topic.

**Body of the Review**

**Premature Deaths for Mentally Ill People**

A number of studies have reported that people with mental illness die at younger ages than those who do not have mental illness. This section will focus on three studies that document this trend.

In 2006, a study reported on 16 states that submitted data on deaths of people with mental illness. The data showed that people with SMI in these states had an YPLL of 25, that is, they were dying 25 years earlier than people without SMI (Mauer, 2006). The study identified factors possibly contributing to this problem. The article reviewed mortality data that had been collected from public mental health agencies from 1997 to 2000 by the National Association of State Mental Health Program Directors (NASMHPD) which was than age-adjusted and analyzed for the average YPLL compared to standardized mortality rates (Mauer, 2006).

The review indicated that the major causes of death were similar to people without mental illness including heart disease and cancer. However, people with mental illness and these chronic conditions died much earlier than those with the same chronic conditions but without mental illness. The data showed that people with SMI were 2-3 times more likely to have these chronic medical conditions (e.g., diabetes, heart disease) than the general population (Mauer, 2006). Other risk factors suggested were
coordination of care among physical and mental health providers, motivation or fearfulness of the individual, and employment (Mauer, 2006). Poor nutrition, smoking, exercise levels, homelessness, symptoms of their mental illness (e.g., disorganized thoughts, paranoia, serious mood swings), lack of health care providers in rural areas, and lack of reimbursement of education and support services also are contributing factors (Mauer, 2006). People with SMI often use more emergency services and fewer routine prevention services (Mauer, 2006). The psychotropic medications have side effects that often cause or lead to the chronic medical conditions. These side effects include weight gain, metabolic syndrome, and diabetes (Mauer, 2006). There is additional risk of increased side effects and even death when people take more than one psychotropic medication.

This study reviewed the findings from several different studies in different states. While it identified several contributing factors to higher mortality that was similar in each of the states, it did not look at the differences between them. It could be that one or two of the states had a much lower rate of death associated with diabetes in people with SMI. A comparison of the differences in the results might have identified states that are doing something very different and more effective in their treatment of this chronic medical condition. This could have led to a strong argument for a particular performance improvement plan.

A related study published by NASMHPD in 2013 reported on deaths of people with mental illness in Missouri and found that this group of people died on average by age 52, which was 5-years younger than the previous data reviewed from 1997-2000.
(Phelan & Ortiz, 2013). Thus, the YPLL worsened for the mentally ill population in Missouri. This study was conducted by NASMHPD to provide further detail on the deaths and to provide comparisons for evaluating improvements (Phelan & Ortiz, 2013). Data was collected on people that received public mental health services in Missouri between 2008 and 2010 in Missouri, who died in the same year they received services, and who had died by April 2011 (Phelan & Ortiz, 2013). There were 1,559 records for the study. Data was pulled from CIMOR, a statewide database for collecting public mental health services and from the Missouri Department of Health and Senior Services (Medicaid data). Information on the top causes of death, the individual’s demographic and socioeconomic characteristics, and whether the person had a major mental illness or a less serious one was reviewed (Phelan & Ortiz, 2013). Overall, data indicated an average YPLL of 29.67. When compared to Missouri deaths excluding those served by Missouri public mental health services, this YPLL indicates that a person with mental illness in Missouri dies 17 years younger than someone without mental illness in Missouri (Phelan & Ortiz, 2013). Other findings included: the majority of the deaths were from natural causes; no significant difference between genders; slightly higher YPLL for black people and other minorities compared to white people; and a slightly higher YPLL for people with serious mental illnesses compared to other mental illnesses (Phelan & Ortiz, 2013). While this study did find that people with mental illness suffered premature deaths compared to those without mental illness, it only compared the average age at death for each person with a few general demographic and clinical characteristics, and only crude mortality rates were used to compare gender, race, and the diagnosis. Another limitation
of this study was that only people receiving public mental health services in Missouri were reviewed; so these findings may not translate to all people receiving mental health services in Missouri or people receiving mental health services in other states.

The next study explored whether or not people with mental illness die younger than others when factors associated with premature death in the general population were controlled. This study identified smoking, cardiac problems, and suicide as confounding and mediating factors that needed to be accounted for before making a determination that SMI resulted in a premature death (Henderson, et al., 2011). The study used a prospective cohort design following people from birth that had been born since 1946 in England, Scotland, and Wales. The study had over 3000 participants and at age 36 they were given an exam that assessed psychiatric symptoms from the preceding month and provided a ranking of no symptoms, mild symptoms, and likely psychiatric diagnosis (Henderson, et al., 2011). The researchers were notified of all deaths until participants reached age 60 and excluded accidental or suicidal deaths (Henderson, et al., 2011). Several confounding and mediating factors were categorized and ranked (e.g. best, intermediate, and worst physical health) to put each of the participants into the correct level for each category selected (Henderson, et al. 2011).

The results of this study indicated that in the 204 deaths between age 36 and 60, while controlling for several factors, there was still a higher risk of death for the people with psychiatric disorders or milder symptoms than those without symptoms (Henderson, et al., 2011). The study also found that people in lower classes or with fathers in lower classes, lower childhood cognitive ability, smoking, poor physical health, and lower
educational attainment had some association with moderate or higher risk of early death (Henderson, et al., 2011). The study ran different analyses controlling for different items, and in each one the researchers found an association of higher mortality rates for people with higher psychiatric symptoms. Thus, the study found that in spite of controlling for many of the commonly associated factors for early death, the risk of mortality for those with psychiatric symptoms was 84% higher (Henderson, et al., 2011). One main limitation was that even though there was follow up for many years after age 36, there was only one measure of psychiatric illness and other physical factors taken at age 36 not accounting for changes that could have occurred later in the person’s life but before their death. Additionally, there was only one crude measure of mental illness of the participants so this may not be accounting for the true picture of mental illness in the group. Also, since this study followed a population in another country, the results may not generalize to this country.

Taken together this research clearly establishes that individuals with mental illness tend to die at younger ages than people without mental illness. This is especially true for people who experience the severe forms of mental illness, including schizophrenia, schizoaffective disorder, bipolar disorder, and major depression. These people lose as many as 20 or more years, on average, of potential life. This is a serious public health problem that we face. In order to change this trend, it is important to understand the serious medical conditions that plague people with mental illness and to identify factors that lead to increased risk for the development of these conditions.

**Medical Conditions**
The literature on the connection between physical disease and mental illness is extensive. A review of the literature from throughout the world and spanning from 1966-2010 provided detailed information on various physical diseases that have been found to be more prevalent in people with SMI (De Hert, et al., 2011). This report focused on factors associated with the physical illnesses so often seen in people with SMI and accounting for their shortened lifespan, including psychotropic medications, exercise levels, smoking and diet habits, psychiatric symptoms, and disparities in health care (De Hert, et al., 2011).

Obesity is a growing epidemic in the U.S. and other developed countries. Along with shorter lifespans, obese people often have other medical conditions such as diabetes and heart disease. People with Schizophrenia have 3 times the risk of becoming obese while people with major depression or bipolar disorder have about 1.5 times the risk (De Hert, et al., 2011). According to this article, as with the general population, this risk is associated with low exercise levels and poor diets, but for people with SMI, their psychiatric symptoms contribute to the risk (De Hert, et al., 2011). Additionally, a well-known side-effect to antipsychotic medication use is weight gain. Studies have indicated this risk for people with schizophrenia is 15 to 72% (De Hert, et al., 2011).

Another physical abnormality commonly found in people with SMI is metabolic syndrome. People with metabolic syndrome have increased risk of developing diabetes and heart disease, and it is very prevalent in people with SMI (De Hert, et al., 2011). Again, antipsychotic medications were listed as a cause of this disorder along with lifestyle choices, e.g., smoking, exercise. People with SMI have a significantly increased
risk of dying from a cardiac illness compared to the general population (De Hert, et al., 2011). Lifestyle choices contribute to this risk, but this association is likely attributable to the various other risk factors for people with SMI, e.g., diabetes, hypertension, obesity (De Hert, et al., 2011). Also, there is increased risk of sudden cardiac death for people on antipsychotic medications; that risk increases with higher doses of medications (De Hert, et al., 2011).

This review provided results on several other physical diseases and their association with SMI. Some of these include diabetes, cerebrovascular disease, pneumonia, osteoporosis, hepatitis, oral health, and others. There was increased risk for people with SMI for many of these illnesses. One possible factor for many of these risks to physical illness was antipsychotic medication use. Another theme throughout the study that was cited as contributing to the increased mortality rates was poor medical care for these physical illnesses. Even though people with SMI are on antipsychotic medications that increase their risk for several physical illnesses, the psychiatrists and physicians do not regularly screen for them (De Hert, et al., 2011). They do not commonly test glucose, cholesterol, and lipid levels. People with SMI have lower surgical intervention rates for heart problems compared to the general population (De Hert, et al., 2011). Oral health care is largely ignored by the patient and those treating the patient. The study results indicated that better quality of care related to physical illnesses is needed (De Hert, et al., 2011). Delayed diagnosis in many physical illnesses complicates the treatment needs; screenings and closer monitoring of these illnesses by clinicians are important to improving the quality of healthcare for people with SMI.
Another review of the literature focused on obesity in people with SMI (Bradshaw & Mairs, 2014). These researchers reviewed four large-scale national studies of people with SMI conducted in the U.S., Australia, Spain, and France. In all of these studies, a moderate to high percentage of the sample had obesity. In the U.S. (n = 10,084) and Australia (n = 1825), approximately 50% of the samples were obese and more than 50% had metabolic syndrome (Bradshaw & Mairs, 2014). These are much higher rates of obesity and metabolic syndrome than found in the general population. The results from three meta-analyses were included; showing significant weight gain for patients treated with both first and second generation antipsychotic medications. The authors went on to discuss how lifestyle choices (e.g., poor diets, sedentary lifestyles) and antipsychotic medications cause obesity in people with SMI. While this article presented a concise, well-organized discussion of the obesity problem, it appears to have been a highly selective review that was limited in its scope. Despite these limitations, it highlights the seriousness of obesity issues in people with SMI.

Another review of the literature on obesity and SMI attempted to provide explanations beyond psychotropic medications (Taylor, et al., 2012). While the authors acknowledged the biochemical causes of obesity associated with psychiatric medications used to treat both mood disorders and schizophrenia, they went on to provide some additional factors that may account for some of the obesity issues in people with SMI. For example, they pointed out that some of the core symptoms of major depression include excessive sleep, fatigue, and inactivity, all of which contribute to obesity (Taylor, et al., 2012). In schizophrenia, there are negative symptoms, such as motivation, which
lead to reduced activity levels and a sedentary lifestyle. Additionally, people with schizophrenia often experience mood problems such as depression. So, in both cases symptoms of the mental illness itself may be contributing to obesity. While this article provided interesting alternative explanations that may account for some of the obesity problem in people with SMI, it was a highly selective review and some of the explanations appeared somewhat speculative.

The most rigorous empirical study found on major medical disorders and mental illness involved a series of meta-analyses investigating risk of heart disease that pulled data from 36 well-designed studies (Osborn, et al., 2008). These researchers first conducted a comprehensive literature search, reduced their initial search results of 14,592 papers down to 134, had each of those reviewed by up to 4 of the authors, and finally included 36 studies in meta-analyses (Osborn, et al., 2008). All of the studies selected included a comparison group of people without mental illness or at least made comparisons to general population data. This was a very rigorous and thorough approach to selecting data to include in meta-analyses.

The meta-analyses focused on a range of medical disorders. Of the 27 papers on diabetes and hyperglycemia reviewed, nine had data able to be used in a meta-analysis (Osborn, et al., 2008). This analysis included over 9000 people with SMI and nearly 3.5 million without it (Osborn, et al., 2008). The results revealed a pooled risk ratio of 1.70; however, when only people with diagnoses of schizophrenia and schizoaffective disorder were included the risk ratio was 1.87 (i.e., people with these diagnoses were almost 2 times as likely to have diabetes as people without SMI) (Osborn, et al., 2008). There
were 15 papers on hypertension, with data included in a meta-analysis from 7. More than 6000 people with SMI were compared with more than 2 million without it (Osborn, et al., 2008). The results showed no significant differences in rates of hypertension. There were 12 studies on cholesterol and lipid levels. Four provided data used in a meta-analysis on cholesterol levels, including 160 people with SMI and 5702 without (Osborn, et al., 2008). The results showed no significant differences. A review of the cholesterol studies revealed inconsistent findings. For example, one study showed lower total cholesterol with SMI while others found higher levels with SMI. Similarly, data on lipid levels in studies were inconsistent and designs were too disparate to allow meta-analysis.

Based on the meta-analyses conducted, these researchers concluded that diabetes mellitus is the most significant cardiovascular risk in people with SMI (Osborn, et al., 2008). Despite the excellent methodology employed in these meta-analyses, there were some limitations. The most significant limitation was that very few of the studies included were prospective controlled studies designed to study a particular medical risk in people with SMI. Instead, they were samples of convenience pulled from studies designed to study something else, usually a psychotropic drug. Additionally, there was considerable variation in the quality of the studies reviewed, some with excellent methods and others of lesser quality. However, there are important implications from the results, most notably that diabetes are the most serious cardiac risk in people with SMI. Understanding the many possible-contributing factors will be important in developing strategies to manage this risk. Future research will need to examine the relative
contributions to the risk of medications, lifestyle choices, diet, and even the psychiatric disorders themselves.

The research on serious medical diseases in people with mental illness shows that these individuals are at greater risk at earlier ages for developing serious chronic conditions. They are especially at risk for obesity, diabetes, metabolic syndrome, and cardiovascular diseases. Furthermore, these diseases are inter-related, with one large meta-analysis concluding that diabetes is what puts people with SMI at much higher risk for heart disease. Researchers have identified a variety of factors related to the development of these diseases, including diet, sedentary lifestyles, smoking, substance abuse, psychotropic medications, certain mental illnesses themselves, and others. These factors and the serious medical conditions they at least in part cause seem to account for the trend for people with a mental illness to die at earlier ages than those without a mental illness.

Disparities in Medical Care for People with Mental Illness

In addition to the factors associated with increased medical risks in people with mental illness reviewed to this point, some research points to disparities in medical care for this group that may contribute to early death. There are many possible reasons why people with mental illness receive less medical care. Some of these reasons have to do with their personal circumstances and choices. They may not have adequate knowledge about the need for ongoing medical care, or be able to make good judgments about when to see a medical doctor. Many do not have insurance and must rely on government programs (e.g., Medicaid). Many people with mental illness live in rural areas or have
transportation problems that limit access to medical care. Additionally, some of the reasons people with mental illness receive disparate medical care have to do with the health care system. Mental health professionals focus exclusively on mental health matters and leave other medical issues to other medical professionals. Sometimes mentally ill people are not referred for specialized services either because of an inability to pay or perhaps because of the stigma associated with mental illness some practitioners are just less likely to refer them. Whatever the reasons are for the disparity, it is an important contributor resulting in premature deaths for mentally ill people.

One study investigated mortality from heart disease in people with mental illness. The study reviewed whether some of this increased rate of deaths was due to not having access to some specialized medical services. This investigation focused on mentally ill individuals with access to universal health insurance, to determine if they had less access to specialized medical services (Kisely, et al., 2007). The study used data from 3 different databases on psychiatric services provided in Nova Scotia. Data was used for patients that had their first services between 1995 and 2001. The researchers measured rates of death related to heart disease, stroke, and other circulatory diseases and adjusted rates by age and sex and followed up with the individuals until death or the study period ended (Kisely, et al., 2007). The authors used statistical analyses (logistic regression and proportional hazards) to examine the risk of death, first hospital admission, and specialized procedures while comparing several characteristics of the individual (e.g., age, diagnosis, socioeconomic status, treatment location) (Kisely, et al., 2007).
There were over 17,000 deaths during the time period and 2839 of them had received psychiatric services with a mortality rate ratio of 1.31 (Kisely, et al., 2007). People receiving specialized psychiatric services had a significantly higher ratio (1.74) compared to those receiving primary care psychiatric services (1.2) (Kisely, et al., 2007). Psychiatric patients did not receive a significantly different amount of some medical services, but they did have a much lower chance receiving some of the specialized services like cardiac catheterization (Kisely, et al., 2007). Additionally the results showed that patients of lower socioeconomic status (SES) and those who lived in rural areas were less likely to receive specialized cardiac procedures. Thus, even with universal health insurance, disparities were found in the extent to which people with mental illness, lower income status, and/or who lived in rural areas received specialized medical services. There were several limitations of this study. It did not control for tobacco or alcohol use. Additionally, information on the educational level of people was not available. All of these factors could have confounded the results. Another limit is that this study took place in Canada with universal health care coverage, which may not generalize, to the U.S.; however, they did compare their results to a study done in Australia that does not have universal coverage and found similar results.

Another study, investigated access and barriers to medical care among mentally ill individuals receiving services at a community mental health center. There were 59 participants, randomly chosen, from a list of patients at a community mental health center (Miller, et al., 2003). These people participated in a 2-hour private interview conducted by a trained research assistant. (Miller, et al., 2003). Some demographic information was
self-reported (e.g., age, race, income, medical conditions); while other information (e.g., diagnosis) was retrieved from patient records (Miller, et al., 2003). Questions were asked about the prior 6 months of medical services use including emergency care, nights spent at hospital, mental health care and others using the National Health Interview Survey section on health care access (Miller, et al., 2003). Questions from the Health Belief Index and the Short-Form Health Survey also were selected to measure health beliefs and physical and mental health status (Miller, et al., 2003). Another tool, the Primary Care Assessment Tool (PCAT), was used to assess areas of care from first contact to continuity of care.

The results of this study showed that participants reported poorer physical and mental health than normative groups (Miller, et al., 2003). Additionally, while the majority of the participants reported having a regular source of medical care, 40% reported that coordination between their medical and mental health providers was poor. Furthermore, scores on all four domains of the PCAT were significantly lower than a normative sample, indicating that these participants received substandard primary care. The First Contact domain had the lowest score and biggest difference in scores from the normative group, and even the highest scoring domain, Ongoing Care, was much lower than the normative group (Miller, et al., 2003). This study found that the majority of community mental health center patients were willing to seek medical care and trusted the physicians, but they received poor medical care and the care lacked integration with their mental health needs (Miller, et al., 2003).
There were several limitations to this study. It used a small sample from a single mental health center; findings could be improved and more statistical analyses could be done with a larger, more varied sample. Additionally, no comparison group was used. While some of the results could be compared to normative databases, one or more true comparison groups would have strengthened the study. The population for this study was low-income patients and those using a Health Maintenance Organization pulled from one community mental health center. Thus, the findings may not generalize to other populations, particularly ones with better financial characteristics. Finally, the major measures in this study were all self-reports. The study would have benefitted from using reviews of medical records as well.

A qualitative study focused on barriers to healthcare for people with SMI included semi-structured interviews with 10 patients, 10 mental health providers, and 10 medical providers (Kaufman, et al., 2012). It is important to note that this study took place in a hospital that specialized in providing care to incarcerated individuals, homeless, people with SMI, and other disadvantaged individuals. So, the employees involved were quite familiar with many of serious medical risks facing these groups. Each of the participants in this study participated in a semi-structured interview designed with open-ended questions (Kaufman, et al., 2012). Interviewers were allowed to probe answers for clarification and additional information. The interviews were recorded, transcribed verbatim, and then coded for themes.

The results of this study yielded a number of interesting themes. All three groups reported significant barriers to both medical and mental health services, despite the
experience and attempts at integrated care at this hospital and its clinics (Kaufman, et al., 2012). The most common theme for these barriers identified by all three groups had to do with patient issues. These has to do with problems reporting health matters due to symptoms of mental illness, continued poor lifestyle choices such as smoking and using substances, lack of motivation and lack of compliance with medical care, and low SES making it difficult to get certain services, unstable housing, and transportation problems (Kaufman, et al., 2012). While patient-related barriers were the most common ones reported by all groups, the medical provider group mentioned them twice as often as the mental health providers and three times more than the patients. Another major theme identified had to do with barriers to access. These included financial constraints of patients and providers, long clinic waits, and appointments scheduled many months apart (Kaufman, et al., 2012). Other themes for barriers identified were communication among medical and mental health providers, fragmented care, and stigma associated with mental illness (Kaufman et al., 2012).

While this study shed light on important barriers to medical care for people with SMI, it had several limitations. It was a qualitative study that lacked an experimental design, standardized measures, and any sort of a comparison group. Additionally, it had a small number of participants, all from the same hospital-clinic system. Furthermore, the hospital-clinic system from which the participants came is not typical of most in that it specialized in providing services to disadvantaged groups, including people with SMI. These last two limitations severely limit the extent to which the findings generalize to
other settings. However, it is likely that given the specialization of the hospital, the barriers identified were less than would be identified in most other medical settings.

A yet unpublished study examined the barriers to receiving quality psychiatric and medical services that people with mental illness faced in Missouri. In 2009, over 70,000 hospitalizations and almost 65,000 emergency rooms visits for mental health issues occurred (Staiculescu, 2014). This is a high cost to those suffering and to the economy of the state. The purpose of this study was to examine barriers to health care for mentally ill people that were leading to the increase in hospitalizations and higher mortality rates in Missouri. The study used a semi-structured interview process and had a sample size of 25 patients with mental illness living in Missouri (Staiculescu, 2014). The majority of the population was in the 50-59 age group with about an even split of male and female participants and smaller household sizes (1-2 people) (Staiculescu, 2014). The sample had health issues similar to what has been found in other studies of people with mental illness (diabetes, poor nutrition, heart disease, smoking, substance use, oral health issues, etc.). Participants’ responses to the interview were subjected to content analysis to identify themes or categories of barriers to access.

The barriers to accessing health care services were identified as cost, difficult gaining access to the health system, little or no health or dental insurance, perceptions of system being unfair, transportation and communication difficulties, and social isolation (Staiculescu, 2014). Accessing the system can sometimes require learning about the system, understanding what resources are available to the individual regardless of insurance, and having a knowledge base to work through the system. More problems
with accessing the system can be due to not having a primary care physician which often leads to long wait times especially when using the emergency room or a free clinic for the health visits (Staiculescu, 2014). One participant with diabetes discussed their need to have two toenails removed because they were causing tremendous pain and infections. The participant was getting ready to undergo surgery to remove lumps in their feet, but Medicaid would not cover the nail removal even though it could be done during the same surgery. The health literacy of people with mental illness can make it more difficult for them to access services and to follow through on recommendations; as discussed previously, effectively navigating the system requires some knowledge (Staiculescu, 2014). Additionally, providers often associate medical complaints with the person’s mental illness (e.g., paranoia, delusions) and thus, may not be as quick to address the physical needs (Staiculescu, 2014). Social isolation can compound the medical problems. Without support from family or friends for transportation to medical appointments or to ensure recommendations are understood and followed, the severity of the illness can increase before it is treated properly.

Recommendations made in the study included using a medical home model that would help with integration and coordination of medical and mental health services and providing assistance to ensure the person keeps their medical appointments including transportation as needed (Staiculescu, 2014). To improve outcomes, people with mental illness need an integrated approach that includes both the person’s physical and mental health needs.
Although this study has not been published yet, it was included in this review because it was conducted with participants receiving mental health services in Missouri, which is the target population for this investigation, and it found barriers to access to medical services similar to those found in published research. Nonetheless, there were several problems that limit conclusions that can be made. The major limitation to this study is the small sample size. With a larger sample, findings could have been more significant and be generalized to a larger population. Another limitation was the use of a semi-structured interview. There was no evidence that this measure was standardized, reliable, or valid. Furthermore, there was no comparison group to determine if the access issues were worse for this group of participants than for people without mental illness. Also, this study was on Missouri residents, the majority of which were single and living in small households; as such, the findings may not translate to other groups. The participants were given a gift card for participating. This could have biased the sample pool with people that were willing to sit through an interview for that particular reward.

A review of the literature focused on inequalities in healthcare for people with SMI in an effort to identify areas for improvement and increase knowledge surrounding the problem. The authors acknowledged the higher incidence and mortality rates for those with SMI and state that poor outcomes for the illnesses contribute to the higher rates of death (Lawrence & Kisely, 2010). For this review, the authors did a Medline search from 1966 – 2009 for articles related to SMI and health care and then selected those that focused on levels of health care and the factors affecting access and use of services (Lawrence & Kisely, 2010). The authors pointed out that evidence supports that
even with some of the negative side effects of medications, the lifestyles of some with
mental illness, the increased substance use, and inequalities in health care are a factor
(Lawrence & Kisely, 2010). Diet, exercise, motivation, compliance with medical care
and follow-up are reasons for higher mortality rates; however location of individual, the
lack of integration of medical and psychiatric services, someone to take responsibility for
the health problems, and lack of resources for mental health are all systemic factors that
play a huge role in the higher mortality rates (Lawrence & Kisely, 2010). Low SES has
even more of an impact on people with SMI and has been found to be damaging their
mental and physical health, often due to reduced access to needed services (Lawrence &
Kisely, 2010).

The authors suggested improvements are needed. Integrated health care has
shown some promise in several small trials. Additionally, having care managers working
with primary care physicians can be helpful. Health care skills training focused on
patients with schizophrenia and diabetes was shown to increase patients’ understanding
of health information and significantly reduced weight gain in one trial (Lawrence &
Kisely, 2010). Peer support also was recommended as something that may make a
difference in receiving health services. The authors acknowledge that treating people
with more than one health problem is difficult, and that correcting this disparity is a
process that will involve multiple improvements in many areas. This paper did a fairly
extensive review of existing literature on SMI and health problems; however due to the
large number of articles, the authors chose to do an overview rather than a systematic
review; so they could have missed some important information about the connection to medical problems and SMI or other possible improvements.

Based on the research reviewed, it appears that there are discrepancies in healthcare for many people with mental illness. The reasons for these discrepancies are many and varied. Some have to do with individual factors such as people with mental illness not having the motivation, knowledge, or skills to make healthy lifestyle choices. Other factors are related to living circumstances and social factors, such as not having social supports to help navigate the healthcare world, being of low SES and having limited resources, and living in rural areas. Still other reasons for the disparities are related to the healthcare system, including fragmented services, a lack of communication between mental health and physical health providers, a lack of insurance coverage, and stigma among healthcare providers.

Summary

This literature review included several large-scale studies that documented the problem of premature death in people with mental illness. These studies showed that people with SMI die 20 or more years earlier than people without mental illness. The next section of the review focused on major medical diseases people with mental illness often suffer from. The research reviewed showed that people with mental illness are prone to obesity, metabolic syndrome, diabetes, and heart disease. These are the conditions most often found in people with mental illness; however, other illnesses have been found as well, such as cancer, infectious diseases, and dental problems. A wide variety of factors were identified in this literature as increasing risks for these major
medical diseases in people with mental illness. These factors include diet, sedentary lifestyle, substance use, the side effects of psychiatric medications, disparities in medical care, and the mental disorders themselves. In the last section of the review, disparities in healthcare were focused on. If people with mental illness were so susceptible to medical disease, it would seem that they should have increased healthcare and early intervention. However, the opposite is true. People with mental illness experience inequities in medical care, and they often receive substandard services. Reasons for these disparities were discussed and include: factors associated with the patients due to the mental illness, lack of motivation to improve lifestyles, and non-compliance with medical care; systemic issues related to finances, service fragmentation, and lack of communication; and access issues related to low SES, housing instability, lack of social supports, and transportation problems.

Most of the research on premature death has focused on the serious medical conditions that cause the deaths. Certain factors such as lifestyle choices (e.g., diet, sedentary life, smoking) and medication side effects have been examined. The current study attempted to build on this literature by examining data on deaths among people receiving mental health services through the Missouri Department of Mental Health. This study was different from those reviewed in that it examined a wide range of demographic, social, and diagnostic variables to see which ones predict early death, regardless of the cause. This would allow individuals at risk for early death to be identified. Based on the findings, recommendations were made for the development of treatment, education, and intervention strategies to help with this critical problem.
Chapter 3: Research Method

Introduction

The purpose of this research project was to investigate factors associated with premature deaths in people with mental illness. This is a serious healthcare problem in the U.S. and throughout the world. Previous research has shown that on average people with serious mental illness die 20-25 years earlier than people without mental illness. Many of these deaths are from treatable and preventable medical conditions. The current project used data from a large, statewide database of all individuals receiving services through a state mental health authority in an attempt to identify factors that place certain people at risk for these serious medical conditions and subsequently for premature death. Based on the existing published literature and the variables available in the database, the following hypotheses were tested:

Hypothesis 1: People with more severe forms of mental illness such as schizophrenia spectrum disorders, bipolar disorder, and major depression die earlier than those with less severe forms of mental illness.

Hypothesis 2: People with diagnoses of substance abuse or dependence die earlier than those without such diagnoses.

Hypothesis 3: People, who smoke, as indicated by a diagnosis of nicotine dependence, die earlier than those who do not.

Hypothesis 4: Mentally ill people living in rural areas die at younger ages than those living in urban areas.
In addition to these hypotheses, exploratory analyses were conducted in order to investigate if other variables available in the database were associated with early deaths among people with mental illness.

**Research Design and Approach**

The research design used in this study was a retrospective data analysis. Thus, it was a quantitative design using historical data. Data was pulled from a statewide database of the Missouri Department of Mental Health (MODMH). This database contains a wide range of demographic, social, and diagnostic information on all patients who receive services from a MODMH facility or contract agency. Access to this data was granted to the investigator as part of her job with MODMH. Permission to complete this specific study was received from the Professional Review Committee of the MODMH. This committee functions similar to an institutional review board (IRB), and it has statutory authority over all research conducted within the MODMH.

**Setting and Sample**

The population of interest for this study was people who received services from MODMH and who died. More than 70,000 people a year are served through MODMH, all of whom are entered into this database. Thus, this seems to be representative of people who receive mental health services in the state of Missouri, and it is likely at least somewhat representative of other states throughout the U.S. Since the specific research questions under investigation pertain to factors associated with premature death within this population, data was collected only on people who died. When the data is analyzed,
a full range of descriptive statistics will be used to describe the sample in detail. The variables analyzed using descriptive statistics will be explained in more detail below.

**Data Collection and Analysis**

The data used in this study came from a statewide database that contains all patients who received services from the MODMH. The database contains a wide range of demographic variables, such as age, gender, race, and ethnicity. Additionally, it contains information on some social variables such as living area, marital status, education level, number of children, and employment. A third group of variables that was included was diagnosis; both the individual’s principle and secondary psychiatric diagnoses were included. These variables include a mix of categorical data (e.g., gender, county of residence), continuous data (e.g., age), and ordinal data (e.g., diagnosis rank-ordered by severity). All data was pulled into a de-identified database, with only a unique MODMH identification number included (i.e., all names will be removed). Data analyses were conducted within the highly secure computer network of MODMH, and data was never be removed from the facility. Three types of data analyses were performed, including descriptive statistics, bivariate analyses, and multiple regression.

**Descriptive Statistics**

Descriptive statistics were calculated for all variables and presented in tables in order to thoroughly describe the sample. Statistics presented included mean, standard deviation, range, and percentages (for categorical and ordinal variables). Additionally, the distributions of continuous variables were examined, as non-normal distributions could have had implications for the use of correlation and regression statistical
approaches. The distributions of categorical variables were evident from their percentages.

**Bivariate Analyses**

The variable of interest in this study was the age of death of people with mental illness. Bivariate analyses were conducted to determine which of the predictor variables had a significant relationship with the criterion variable, age of death. T-tests and analysis of variance (ANOVA) were used to determine if variables had a significant statistical relationship with age of death.

**Multiple Regression Analyses**

Each of the variables that showed a statistically significant relationship to age of death were entered into a multiple regression analysis to determine what combination of factors best predicts this criterion variable. Categorical variables were dummy coded. The stepwise multiple regression option was used to determine the subset of variables that, in combination, best predict age of death (Nau, 2014).

**Source of Data**

Data was pulled from a statewide database that contains historical information on patients that have been served by MODMH throughout the state and goes back over 20 years. Inside the database was raw data on several characteristics including but not limited to age, race, ethnicity, commitment status when applicable, marital status, income, education level, diagnosis, employment, and cause of death. These data elements were retrieved from the system for each patient using an Access database that was linked to the necessary tables that stored the web-based information from CIMOR.
The database was queried using Access using the criteria discussed below. The data was reviewed for missing or inaccurate information. Incomplete or inaccurate records were reviewed and deleted when necessary.

The sample of data retrieved included anyone who died between 2010 and 2013 and who had received public mental health services within the last five years prior to their death. Additional records were excluded based on not meeting the purpose of this project. Between 2010 and 2013, there were 28,246 people that were served by the Missouri public mental health systems who died. There were 2,311 people that had been living in psychiatric hospitals or developmental disability habilitation centers before their death who were removed from the sample. The intent of this study was to focus on people with mental illness who were living in the community. Another 13,594 people were removed from the sample because the last time they had received public mental health services was more than five years before their death. These people were not part of the purpose of the project because they were not actively receiving treatment through public mental health services. There were 236 people that were removed from the sample because they were under 18. This project was studying adults only. Another 3,910 records were removed because the deaths were something other than natural causes (e.g., suicide, homicide, accident). Some people receive public mental health services for evaluations or other reasons, but are not given a psychiatric diagnosis. Because the purpose of this study was to review the records of people with mental illness, 3,009 people were removed that did not have a psychiatric diagnosis. Some people receiving services had only a cognitive or intellectual disorder (dementia, intellectual disability,
etc.) or substance abuse diagnosis and no other psychiatric diagnosis. These people also were removed (1,468 records). Another 117 records were removed of people that had diagnoses that are part of the mental health services, but would not traditionally be considered psychiatric illnesses, e.g., acute stress, bereavement, amnesia, stuttering, adjustment disorder, etc.). Additionally, 32 records of people with an Alzheimer’s diagnosis and another 7 records of people with an eating disorder diagnosis were removed. Alzheimer’s is the leading cause of death of people after a certain age; including this population would not have fit the purpose of this project. The same rationale was used for eating disorders. Though this diagnosis contributes to people dying at a younger age; this particular illness did not fit with the rest of the sample of psychiatric illnesses. All of these records were removed because they could have confounded the results in this project. Thus, the sample for this project included 3,562 people who received public mental health services in Missouri in the last 5 years before their death, who died between 2010 and 2013, and did not have any of the exclusionary criteria listed above.

**Protection of Human Participants**

There were no human subjects in this study, but the study pulled data on existing records with patient information. The patient information was de-identified before any data analyses were run. However, because private health information was used, this study was submitted to the Internal Review Board (IRB) for Concordia University in Nebraska (CUNE). Additionally, this study was submitted to the Professional Review Committee (PRC) of the MODMH. The PRC is not a federally approved IRB; however,
it functions much like one. It fulfills Missouri State Statutory requirements to protect MODMH patients who participate in research, and it provides oversight to all research conducted with MODMH patients or data from MODMH patients.

**Summary**

A retrospective study was performed on data collected in a statewide Missouri database that contained anyone who was served by MODMH during the time period under review. Death records of people with mental illness over a three-year period along with several demographic and social characteristics were collected after approval from the CUNE IRB and the Missouri PRC. Along with testing the identified hypotheses, some exploratory analyses was done to see if there were other variables that might have a strong association to mental illness and early death. Analyses included descriptive statistics, bivariate analyses, and multiple regression analyses to determine which variables by themselves and in combination predict early deaths.
Chapter 4: Results

**Introduction**

Mental illness is a serious problem that affects many people in the U.S. This illness is physically and emotionally taxing on the individual and their families. Along with coping with the psychiatric symptoms, people with mental illness often have to deal with medical illnesses that further complicate the person’s struggles. These medical illnesses and other factors contribute to the person’s increased risk of dying earlier than someone without a mental illness. It has been estimated that people with mental illness die about 20-25 years earlier than people without mental illness. This is a serious concern that needs to be addressed. The purpose of this research project is to investigate and identify some of the factors that contribute to the risk of earlier death in people with mental illness. There are four main hypotheses that were tested for this study:

- **Hypothesis 1:** People with more severe forms of mental illness such as schizophrenia spectrum disorders, bipolar disorder, and major depression die earlier than those with less severe forms of mental illness.
- **Hypothesis 2:** People with diagnoses of substance abuse or dependence die earlier than those without such diagnoses.
- **Hypothesis 3:** People, who smoke, as indicated by a diagnosis of nicotine dependence, die earlier than those who do not.
- **Hypothesis 4:** Mentally ill people living in rural areas die at younger ages than those living in urban areas.
In addition to these hypotheses, exploratory analyses were conducted in order to investigate if other variables available in the database were associated with early deaths among people with mental illness.

**Sample Characteristics and Descriptive Statistics**

Three types of data analyses were used to analyze the data: descriptive statistics, bivariate analyses, and multiple regression analysis. As mentioned previously, 3,562 patient death records were analyzed for this study. There were four years of patient deaths in the sample, each year averaged about 900 deaths. The average age of death for the sample was 57.1 years of age with a standard deviation of 12.6 years; additionally, each of the four years was within half a year of this average. Age of death was normally distributed with almost identical mean (57.053), median (57.049), and mode (57.055) values (see Figure 1 for the histogram displaying a normal distribution). The average age of death for males was 55.7, and for females it was 58.2.

**Figure 1:**
*Display of Normal Distribution*
Descriptive statistics were calculated for all variables used in the study. These data are presented in Tables 1 – 8. Table 1 displays the number of deaths per year as well as the distribution and average ages of males and females who died. The sample was fairly evenly distributed between males and females, with 1,608 (45.1%) male records and 1954 (54.9%) female records. In each year, the average age of death for males was 2-3 years younger than for females. Table 2 illustrates this point further. It shows the percentage of deaths by age group. As can be seen, the highest percentage of deaths occurred in the 50-60 year group, followed by the 60-70 year group. The average age of death in the U.S. in 2010 was 78.7 (Murphy, Xu, & Kochanek, 2013).

Table 1
Statistics of sample: total deaths, gender, average age at time of death

<table>
<thead>
<tr>
<th>Deaths By Year</th>
<th>Total Deaths</th>
<th>M</th>
<th>F</th>
<th>Average Age</th>
<th>M</th>
<th>F</th>
<th>Standard Deviation</th>
<th>M</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>771</td>
<td>329</td>
<td>442</td>
<td>57.28</td>
<td>56.14</td>
<td>58.12</td>
<td>12.67</td>
<td>12.09</td>
<td>13.03</td>
</tr>
<tr>
<td>2011</td>
<td>848</td>
<td>398</td>
<td>450</td>
<td>57.17</td>
<td>55.57</td>
<td>58.59</td>
<td>12.85</td>
<td>11.99</td>
<td>13.43</td>
</tr>
<tr>
<td>2012</td>
<td>910</td>
<td>405</td>
<td>505</td>
<td>56.70</td>
<td>55.57</td>
<td>57.61</td>
<td>12.12</td>
<td>10.89</td>
<td>12.96</td>
</tr>
<tr>
<td>2013</td>
<td>1033</td>
<td>476</td>
<td>557</td>
<td>57.14</td>
<td>55.44</td>
<td>58.59</td>
<td>12.72</td>
<td>11.85</td>
<td>13.25</td>
</tr>
<tr>
<td>4 YR Totals</td>
<td>3562</td>
<td>1608</td>
<td>1954</td>
<td>57.06</td>
<td>55.65</td>
<td>58.23</td>
<td>12.59</td>
<td>11.69</td>
<td>13.17</td>
</tr>
</tbody>
</table>
Table 2

Age groups of sample (age at death)

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-30</td>
<td>2.16%</td>
</tr>
<tr>
<td>30-40</td>
<td>5.05%</td>
</tr>
<tr>
<td>40-50</td>
<td>17.49%</td>
</tr>
<tr>
<td>50-60</td>
<td>36.05%</td>
</tr>
<tr>
<td>60-70</td>
<td>24.03%</td>
</tr>
<tr>
<td>70-80</td>
<td>10.61%</td>
</tr>
<tr>
<td>80-90</td>
<td>3.82%</td>
</tr>
<tr>
<td>90+</td>
<td>0.79%</td>
</tr>
</tbody>
</table>

Min Age of Death 18
Max Age of Death 98

Table 3 shows all of the psychiatric diagnoses for all of the patients in the sample—i.e., if a patient had more than one diagnosis, all were included in this table. The most common diagnosis was Major Depressive Disorder followed by Schizophrenia and Bipolar Disorder. These are all considered severe mental illnesses. About 19% of the sample had a substance-related diagnosis in addition to a mental illness or disorder. Table 4 displays the sample with only one diagnosis included per person.

Table 3
Diagnoses by Major Categories
(Patients could be in multiple categories—not exclusive)

<table>
<thead>
<tr>
<th>Diagnosis Category</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Depressive Disorder</td>
<td>41.49%</td>
</tr>
<tr>
<td>Schizophrenia Spectrum</td>
<td>26.17%</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>21.50%</td>
</tr>
<tr>
<td>Substance Related</td>
<td>19.20%</td>
</tr>
<tr>
<td>Anxiety/phobias</td>
<td>18.59%</td>
</tr>
<tr>
<td>Mood Disorders</td>
<td>12.83%</td>
</tr>
<tr>
<td>Impulsive/Dysregulated</td>
<td>9.12%</td>
</tr>
</tbody>
</table>
Table 4:
Main Diagnoses by Major Categories
Unique diagnoses (each patient with only one), chosen by severity

<table>
<thead>
<tr>
<th>DX Category Primary by Severity</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major Depressive Disorder</td>
<td>36.36%</td>
</tr>
<tr>
<td>Schizophrenia Spectrum</td>
<td>26.17%</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>19.79%</td>
</tr>
<tr>
<td>Mood Disorders</td>
<td>7.80%</td>
</tr>
<tr>
<td>Anxiety/phobias</td>
<td>4.27%</td>
</tr>
<tr>
<td>Psychotic</td>
<td>2.98%</td>
</tr>
<tr>
<td>Other</td>
<td>1.97%</td>
</tr>
<tr>
<td>Personality Disorder</td>
<td>0.67%</td>
</tr>
</tbody>
</table>

Figure 3:
Total Deaths by Main Diagnosis
There were 1,693 people in the sample that had more than one diagnosis. Dual-diagnosis is common in people with mental illness; they often have substance abuse diagnoses or cognitive limitations or may have more than one psychiatric illness. To prevent extra weight given to the age of death of those people, when reviewing descriptive statistics and running bivariate analyses for this variable, one main psychiatric diagnosis reflective of a mental illness had to be selected for each person in the sample. The unique diagnosis selected had to be a psychiatric illness (not substance abuse or cognitive impairment) and then when it was necessary to select between psychiatric illnesses, the more severe illness was selected, e.g., mood disorder versus schizophrenia, schizophrenia was selected. The severity ranking for each diagnosis was as follows: schizophrenia, psychotic disorder, bipolar disorder, major depressive disorder, borderline personality disorder, mood disorder, anxiety/phobias, other personality disorders, and finally other psychiatric illnesses. A ranking of psychiatric diagnoses by severity was not found in the literature; thus, a clinical psychologist with expertise in the assessment, diagnosis, and treatment of individuals with SMI was consulted in order to develop these severity rankings. Because there were a very small number of people (N=6) with borderline personality disorder as a main psychiatric illness in this sample, this disorder was combined with other personality disorders. The main mental illness diagnoses for each individual are presented in Table 4. The relative distribution of diagnoses did not change substantially from those in Table 3 when all of a person’s diagnoses were included. Major Depression, Schizophrenia, and Bipolar Disorder still were the most frequent diagnoses in the same order. Individuals with a substance abuse diagnosis,
which was eliminated as a unique diagnosis, was analyzed separately to determine if this secondary diagnosis has an effect on age of death.

Table 5 shows the race/ethnicity and marital status breakdown for the sample. Individuals identified as white comprised nearly 83% of the sample, while those who identify as black made up fewer than 15%. The data for marital status shows that the majority of the individuals had been divorced (34%), followed by those that had never been married (30%). Only 13% of the sample was married at death.

Table 5:
*Additional Demographics*

<table>
<thead>
<tr>
<th>Race/Ethnicity</th>
<th>Percent</th>
<th>Marital Status</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>White</td>
<td>82.90%</td>
<td>Never Married</td>
<td>30.10%</td>
</tr>
<tr>
<td>Black or African American</td>
<td>14.65%</td>
<td>Married</td>
<td>12.66%</td>
</tr>
<tr>
<td>American Indian/Alaska Native</td>
<td>0.65%</td>
<td>Divorced</td>
<td>33.89%</td>
</tr>
<tr>
<td>Asian</td>
<td>0.17%</td>
<td>Separated</td>
<td>6.91%</td>
</tr>
<tr>
<td>Bi-racial</td>
<td>0.31%</td>
<td>Widowed</td>
<td>5.67%</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.59%</td>
<td>Unknown/Missing</td>
<td>17.69%</td>
</tr>
<tr>
<td>Other</td>
<td>0.08%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown/Missing</td>
<td>0.65%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6 shows a breakdown of the sample based on where individuals resided at the time of their death. The Missouri Census Data Center site was used to determine location, i.e., rural or urban, for each of the people in the sample. The site uses the last census and distance from a designated metropolitan area to provide a report that gives a rural or urban designation to each county. Because many counties may have some sparsely populated areas, but still have larger cities located within them, they received both rural and urban designations (Missouri Census Data Center, 2014). When this
occurred, a decision to assign the county a rural or urban designation was based on which designation subsumed more of the county’s population. After these decisions were made, the results indicated that approximately 70% of the sample lived in rural areas at the time of their death as compared to 30% living in urban areas.

Table 6:  
*Residence Counties (rural or urban)*  
*Last known at time of death*

<table>
<thead>
<tr>
<th>Patient’s Residence County</th>
<th>Percent</th>
<th>Avg Age at Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>29.90%</td>
<td>56.73</td>
</tr>
<tr>
<td>Urban</td>
<td>69.79%</td>
<td>57.21</td>
</tr>
</tbody>
</table>

The distribution of education levels among the sample is presented in Table 7. The education levels presented in the table were collapsed from 25 different fields that were available in the database. Each grade for highest completed from Kindergarten through high school was available and used for entry, along with each year of college, master’s, etc. This created too many fields with a small number of the sample in each field and would not have provided for a very good analysis. Thus, these fields were collapsed into four fields: did not graduate high school, high school graduate, some college, and college graduate or higher education level. The majority of the sample graduated high school (28.7%), with about 16% having gone on to some college or more. It should be noted that data was unavailable for more than 27% (n = 984) of the sample on this variable.
Table 7:  
*Levels of Education*

<table>
<thead>
<tr>
<th>Education Groups</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>High School Grad/GED</td>
<td>28.72%</td>
</tr>
<tr>
<td>Did not graduate high school</td>
<td>27.46%</td>
</tr>
<tr>
<td>Some College</td>
<td>11.65%</td>
</tr>
<tr>
<td>College Grad and Post Grad Schooling</td>
<td>4.55%</td>
</tr>
<tr>
<td>Unknown/Missing</td>
<td>27.62%</td>
</tr>
</tbody>
</table>

Table 8 shows employment data. The data for this table was collapsed into four fields. The database provided 16 different options for entry on employment. There were 10 different categories for people that were not employed from those seeking employment, those not in workforce due to being a student, homemaker, or other reason, and those who had been laid off. There were a couple different categories for part-time employment, sheltered workshops or supportive employment, and one category for full-time employment. As with education, the 16 fields were too many to provide good analyses, so the fields were collapses into four for the descriptive statistics. Almost 80% of the sample was not employed at the time of their deaths. Data was unavailable for about 16% (N = 562) of this sample.

Table 8:  
*Employment Table*

<table>
<thead>
<tr>
<th>Employment Groups</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed</td>
<td>79.62%</td>
</tr>
<tr>
<td>Employed (full-time)</td>
<td>2.27%</td>
</tr>
<tr>
<td>Employed (part-time)</td>
<td>1.68%</td>
</tr>
<tr>
<td>Supportive Employment/Sheltered Workshop</td>
<td>0.59%</td>
</tr>
<tr>
<td>Unknown/Missing</td>
<td>15.83%</td>
</tr>
</tbody>
</table>
Bivariate Analyses

As stated previously, the variable of interest in this study is the age of death of people with mental illness. Bivariate analyses were conducted to determine which of the predictor variables had a significant relationship with the criterion variable, age of death.

Diagnoses were entered into a one-way ANOVA with age of death as the dependent variable. The results showed a significant effect for diagnoses on age of death (F=13.42, p < 0.001). This indicates that there are statistically significant differences between some of the diagnostic groups on age of death. These differences were not explored further, since the purpose of the bivariate analyses was simply to determine which variables have some significant relationship with age of death and, therefore, should be included in the multiple regression analysis. Based on these results, the “main diagnoses” variable was entered into the multiple regression.

Whether or not participants had a substance abuse diagnosis was entered into a t-test in order to determine the effect on age of death. Since it was hypothesized that individuals with a substance abuse diagnosis died sooner than those without one, a one-tailed t-test was used. The results showed that individuals with a substance abuse diagnosis on average died six years younger than those without one (M = 52.23 with; M = 58.22 without). This was a statistically significant difference (T = 11.40; p < .001). Thus, substance abuse diagnosis was included in the multiple regression analysis.

Race/ethnicity was entered into a one-way ANOVA. Due to the extremely small numbers of people in the categories other than “white” and “black”, the data for all other levels of this variable were collapsed into one called “other”. Thus, the race/ethnicity
variable was entered into the ANOVA with three levels: white (82.90%), black (14.65%), other (2.45%). Results of this analysis showed statistical significance (F=5.26, p < 0.01), indicating that at least one of the levels was statistically significantly different than at least one other level on age of death. Thus, race was included in the multiple regression analysis.

Before running the bivariate analysis on the marital status variable, the five categories displayed in table 5 were collapsed into four categories for the purposes of this study. The divorced and separated categories were combined because at the time of the person’s death, they were not living with their spouse. The collapsed categories were entered into a one-way ANOVA. The results were statistically significant (F=100.25, p < 0.001), indicating that at least one level differed from at least one other on age of death. Thus, marital status was entered into the multiple regression analysis.

Gender was entered into a two-tailed t-test, since no a priori hypothesis was made. Results were statistically significant (t Stat = 6.10, p < 0.001). The results indicated that on average males died 2.6 years younger than females (M = 58.2 females; M = 55.7 males). Gender was entered into the multiple regression analysis.

Rural environment was entered into a one-tail t-test, since it was hypothesized that people living in rural areas would die younger than those living in urban areas. This was not supported by the analyses as no statistically significant difference was found between the means (M = 56.7 rural; M = 57.2 urban; t Stat = -1.04, p = 0.15). This variable was not entered into the multiple regression analyses, because no significant
differences were found for the age of death of people living in rural versus urban areas in Missouri.

Education was entered into a one-way ANOVA with 4 levels. The results indicated that statistically significant differences in age of death exist among the levels of education ($F=5.56$, $p < 0.001$). Thus, education was entered in the multiple regression analyses.

Due to the small number of people that worked in any of the three categories (full-time, part-time, or sheltered workshop/supportive employment) compared to those that did not work, the employment fields were further collapsed from those 3 fields to just one, employed, to allow for better analysis. So, employment had two levels for analysis—employed or not employed. This variable was entered into a two-tailed t-test, since no a priori hypothesis was made. The results were statistically significant ($t$ Stat = 5.35, $p < 0.001$). The results indicated that people that were employed at the time of their death died earlier than those that were not ($M = 56.5$ unemployed; $M = 51.2$ employed). Employment was entered into the multiple regression analyses. These values from each of the bivariate analyses that were completed are listed in Table 9.

Table 9: Results of Bivariate Analyses

<table>
<thead>
<tr>
<th>Main Diagnosis</th>
<th>$F$ Value</th>
<th>$F$ Critical</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Diagnosis</td>
<td>13.42</td>
<td>2.01</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Race/Ethnicity</td>
<td>5.26</td>
<td>3</td>
<td>0.005</td>
</tr>
<tr>
<td>Education</td>
<td>5.56</td>
<td>2.61</td>
<td>0.001</td>
</tr>
<tr>
<td>Marital Status</td>
<td>100.25</td>
<td>2.61</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employed</th>
<th>$T$ Value</th>
<th>$T$ Critical</th>
<th>$P$ value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Employed</td>
<td>5.35</td>
<td>1.65</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Gender</td>
<td>6.1</td>
<td>1.96</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>Rural v Urban</td>
<td>-1.04</td>
<td>1.65</td>
<td>0.15</td>
</tr>
<tr>
<td>Substance Dx</td>
<td>11.4</td>
<td>1.65</td>
<td>&lt; 0.001</td>
</tr>
</tbody>
</table>
Multiple Regression Analysis

The following variables showed a statistically significant relationship to age of death in the bivariate analyses: diagnosis, gender, marital status, education, employment, substance abuse, and race/ethnicity. Multiple regression analysis was used with these variables to determine what combination of factors best predicts the criterion variable. The SPSS software system was used to run the multiple regression analysis. The categorical variables were dummy coded in SPSS before being entered into the multiple regression analysis. As a result of the dummy coding, a total of 19 variables were entered into the analysis.

Given the large number of variables included, the stepwise option was used for all of the multiple regression analysis in order to account for the greatest amount of variance in age of death with the fewest number of variables (i.e., to achieve the “best model”) (Oswego, 2014). Results of the multiple regression analysis with all variables entered revealed that only 14.9% of the variance in age of death was accounted for by the full model (see Table 10). The 11 variables that were retained in the final stepwise model with significant beta weights are displayed in Table 11. Of these, seven variables had negative beta weights indicating that they were predictive of earlier deaths: never married, having a substance abuse diagnosis, other psychiatric diagnoses, bipolar disorder, male gender, being employed, and other race. Four other variables had positive beta weights indicating that they were “protective” or predictive of death at older ages: being widowed, graduating college or beyond (would include at least some graduate school), schizophrenia diagnosis, and psychotic disorder diagnosis.
Table 10:
*Multiple Regression Analyses (Stepwise) Result Summary*

<table>
<thead>
<tr>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.386</td>
<td>0.149</td>
<td>0.144</td>
<td>10.475</td>
</tr>
</tbody>
</table>

Table 11:
*Multiple Regression Analyses (Stepwise) Coefficients and Significance*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Beta</th>
<th>Std. Error</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Diagnoses</td>
<td>-5.840</td>
<td>1.694</td>
<td>0.001</td>
</tr>
<tr>
<td>Never Married</td>
<td>-5.393</td>
<td>0.515</td>
<td>0.000</td>
</tr>
<tr>
<td>Other Race</td>
<td>-4.253</td>
<td>1.621</td>
<td>0.009</td>
</tr>
<tr>
<td>Substance Abuse</td>
<td>-3.526</td>
<td>0.636</td>
<td>0.000</td>
</tr>
<tr>
<td>Employed</td>
<td>-2.613</td>
<td>0.999</td>
<td>0.009</td>
</tr>
<tr>
<td>Bipolar Disorder</td>
<td>-1.658</td>
<td>0.610</td>
<td>0.007</td>
</tr>
<tr>
<td>Male Gender</td>
<td>-1.322</td>
<td>0.482</td>
<td>0.006</td>
</tr>
<tr>
<td>Psychotic Disorder</td>
<td>3.230</td>
<td>1.641</td>
<td>0.049</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>3.369</td>
<td>0.563</td>
<td>0.000</td>
</tr>
<tr>
<td>College and Beyond</td>
<td>4.608</td>
<td>0.944</td>
<td>0.000</td>
</tr>
<tr>
<td>Widowed</td>
<td>6.760</td>
<td>1.016</td>
<td>0.000</td>
</tr>
</tbody>
</table>

The beta weights in Table 11 can be interpreted as the unique contributions of each variable—i.e., all things being equal, the number of years on average people would be expected to die either earlier or later if they had that characteristic. So, for example, people who were never married (B = -5.39) would be expected to die on average 5.4 years younger than others in the sample. Conversely, people who have a diagnosis of schizophrenia (B = 3.37) would be expected to live about 3.4 years longer than others in the sample who do not have such a diagnosis. Of course, the people in the sample have all different combinations of characteristics so caution is urged in interpreting the Beta weights too literally. Mostly they are useful for interpreting the relative contributions of variables retained in the multiple regression equation. Thus, in reviewing the data in Table 11 it can be seen that the variables that contributed the most to predicting earlier
deaths were other psychiatric diagnoses, never married, other race, and having a substance abuse diagnosis. The variables most predictive of later deaths were being widowed and having a college education or beyond.

**Hypotheses**

There were four hypotheses for this study. Based on the bivariate and multiple regression analyses, following are the results for each of these hypotheses:

**Hypothesis 1:** People with more severe forms of mental illness such as schizophrenia spectrum disorders, bipolar disorder, and major depression die earlier than those with less severe forms of mental illness. This hypothesis was mostly unsupported. People with schizophrenia and psychotic disorders lived longer and in the multiple regression analysis had statistically significant positive Beta weights. The only variable supportive of this hypothesis was bipolar disorder. People with that diagnosis were predicted to die slightly earlier than those without it.

**Hypothesis 2:** People with diagnoses of substance abuse or dependence die earlier than those without such diagnoses. This hypothesis was supported. In the bivariate analysis people who had this diagnosis died on average six years younger than those without it (M = 52.23 with; M = 58.22 without). Additionally, in the multiple regression analysis this variable had a statistically significant negative Beta weight.

**Hypothesis 3:** People, who smoke, as indicated by a diagnosis of nicotine dependence, die earlier than those who do not. This hypothesis was not able to be
tested given the data available. So few people in the dataset had a diagnosis of nicotine dependence that the variable had to be eliminated, as clearly this diagnosis was not being reliably assigned.

Hypothesis 4: Mentally ill people living in rural areas die at younger ages than those living in urban areas. This hypothesis was not supported. In the bivariate analysis there was no significant difference on age of death for people who lived in rural or urban areas.

**Summary**

Data from a large statewide database was analyzed in order to determine factors associated with early deaths among people with mental illness. More than 3500 death records were included, all of which were for people who received services from a state department of mental health. The average age of death for the sample was 57.1 years, which is approximately 20 years younger than the nation’s average.

There were four main hypotheses in the study that were derived from the literature. Of these only one was clearly supported by the analyses—mentally ill people with substance abuse diagnoses die earlier than those who do not have such a diagnosis. Another hypothesis that was partially supported was that people with diagnoses indicative of a serious mental illness die younger than those with other types of mental illnesses. One diagnosis considered a serious mental illness, bipolar disorder, was found to be related to earlier deaths. However, two other diagnoses considered SMI, schizophrenia and psychotic disorder, were both found to be associated with later deaths. A third hypothesis was unable to be tested due to a lack of reliable data—that people who
smoked died younger. The fourth hypothesis, that people with mental illness who live in rural areas die younger than those who live in urban areas, was unsupported by the analyses.

In addition to the hypotheses tested, other variables that were available in the database were included in order to explore other factors that are associated with early deaths among people with mental illness. Several interesting findings resulted from these analyses. Men with mental illness died younger than women. Never being married contributed heavily to early age of death in the regression analysis. Additionally, the other psychiatric diagnoses category contributed most heavily in predicting early deaths.

In summary, a multiple regression analysis was run using a wide range of variables that were available in the database in order to find a combination that would best predict age of death. Nonetheless, a number of factors were found to be associated with earlier deaths among people with mental illness. These included: never being married, having a substance abuse diagnosis, other psychiatric diagnoses, bipolar disorder, male gender, being employed, and other race. Conversely, several other factors were associated with later deaths among people with mental illness, including: being widowed, graduating college or beyond, schizophrenia diagnosis, and psychotic disorder diagnosis. It is important to note that only a modest amount of variance was accounted for in the dependent variable (14.9%).
Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

Mental illness affects about 25% of the U.S. population and has a tremendous impact on affected individuals and their families. Several studies have indicated that people with mental illness die between 20-25 years earlier than people without mental illness. This is a huge public health concern. This study attempted to identify predictive factors of early death in people with mental illness. While some studies have focused on the many comorbidity issues that have often been identified as contributing to early death, this study focused on other characteristics in people with mental illness to identify factors that might predict these chronic medical illnesses and other reasons these individuals die so much earlier than those without mental illness. This study used data from a statewide database of people receiving public mental health services in Missouri. The study retrieved demographic and other characteristics on people that had died between 2010 and 2013 who had received mental health services recently. This data was then analyzed using descriptive statistics, bivariate analyses, and finally multiple regression analyses to identify, which independent variables in people with mental illness taken together contribute to earlier death in people with mental illness.

Several factors were associated with earlier death in people with mental illness. These were the other diagnoses category which included post-traumatic stress disorder, impulse control disorder, ADHD, etc., having never been married, being of a race other than white or black, being employed, being male, having an additional diagnosis of substance abuse, and having a diagnosis of bipolar disorder. There also were four
protective factors identified in people with mental illness in this study: having a diagnosis of schizophrenia or psychotic disorder, having graduated from college or gone on to further education, and being widowed. Some of these findings were not surprising, but some have interesting implications that need further research and review. Only one of the hypotheses was accepted—that having a substance abuse diagnosis increases risk.

The hypothesis on rural environment increasing risk was not supported, but this could be attributed to Missouri being a largely rural state. One hypothesis was unable to be tested due to missing information (smoking increasing risk), and the final hypothesis (severity of the mental illness increasing risk) had interesting mixed results. One severe psychiatric illness was associated with earlier death, but two others were actually found to be protective factors.

**Interpretation of Findings**

The results of this study confirmed the seriousness of the problem that individuals with mental illness die at younger ages than the general population of the U.S. More than 3500 records were included of people who received mental health services and who died during the four years 2010-2013. The average age of death was 57.1, approximately 20 younger than the national average. This finding is consistent with previous literature (Mauer, 2006), and it suggests that the sample was representative of people who receive mental health services. Several hypotheses derived from the literature were tested in this study in an attempt to identify characteristics and factors that may account for these early deaths. Additionally, exploratory analyses were conducted to determine if other characteristics might be associated with this phenomenon. One major hypothesis was
that people with SMI died earlier than people with other mental illnesses. Of the four diagnostic groups considered to be SMI—schizophrenia, psychotic disorder, bipolar disorder, and major depression—only bipolar disorder was found to be associated with earlier death. While most of this hypothesis was not accepted, there were some interesting findings pertaining to psychiatric diagnoses. These findings could provide new information to the psychiatric field that would increase awareness that all mental illnesses are associated with earlier death, not just severe illnesses. Additionally, since two of the more serious illnesses were found to be protective factors, some of the treatments associated with those severe mental illnesses should be reviewed for use in other mental illnesses. While other studies have focused largely on serious mental illnesses such as schizophrenia, major depression, and bipolar disorder, the results of this study suggest that the problem of premature deaths was not limited to SMI. Rather, a number of the less commonly investigated disorders, such as ADHD and PTSD, were associated with earlier deaths. While these other diagnoses were significantly associated with earlier death (people with these diagnoses died almost 6 years younger than people with more common psychiatric illnesses), these results should be interpreted sparingly. The sample size in this “Other Diagnosis” category was very small compared to the other psychiatric illness categories that were reviewed. This category had 70 people (2% of the population. However, the finding that a diagnosis of schizophrenia could be a protective factor has interesting implications. This could be due to the recognition of the severity of this particular illness and the wider body of knowledge and evidence-based treatment practices for this illness. Clinicians treating this illness know of the many different side
effects and comorbidities that can occur and are more actively looking for them. Some of these other illnesses do not have as much standardized, evidence-based treatment available. Thus, people with schizophrenia could be receiving better treatment than people with other mental illnesses for these reasons. This area needs further exploration.

A second hypothesis related to diagnoses was accepted. This was that people with mental illness who also had a substance abuse diagnosis died earlier than those without such a secondary diagnosis. This is an important finding that is consistent with previous literature and confirms the serious additional debilitating effects of substance abuse. The incidence of co-occurring mental and substance abuse disorders is high. National data indicates that nearly 9 million people in the U.S. have both a mental disorder and a substance abuse disorder (SAMHSA, 2014). Not only can substance abuse complicate the course and treatment of mental disorders, but also as shown in this study, it can lead to serious medical problems and early death.

A third hypothesis was not supported, that people with mental illness living in rural areas died younger than those living in urban areas. No difference was found between the two groups. However, this warrants further research in other states as Missouri is considered a more rural state (over 70% of this sample lived in a rural area). Because Missouri is more rural and the majority of the sample was from rural areas, a difference in quality of care between urban and rural areas may not have been extreme enough to be detected. Figure 4 is a map of Missouri that shows the rural designations in Missouri and how this designation covers the majority of the state and most counties. There are only 2 counties in Missouri that are less than 5 percent rural, and under 20
other counties that have a smaller percentage of rural areas. All other counties in Missouri have 50% or more areas that are considered rural inside their region. Another possible explanation for this null finding is that there is not a difference in access to quality medical care based on where a person with mental illness lives. Instead, any disparity in access to quality healthcare may be due to other factors such as income, being dependent on entitlement programs, biases among healthcare providers, etc. None of these factors could be investigated in this study based on the information available in the database.

Figure 4:
*Map of Missouri by County*
Displays Percent Total Rural Population
Data Source: U.S. Decennial Census, 1980 and 1990
Image from Bowles, 1998

In addition to the hypotheses that were tested, a number of exploratory analyses were conducted. One finding that was not surprising was that males with mental illness died earlier than females. This trend is consistent with sex differences found in the U.S.
population with males dying nearly 5 years younger than females on average (Murphy, Xu, & Kochanek, 2013). While that finding is consistent with the general population of the U.S., it was not something that was focused on in previous research. Thus, there was insufficient basis for developing a hypothesis. Nonetheless, this is an important finding. The average man in this study died at the very young age of 55.7. This concerning finding deserves further research and clinical interventions.

Three other variables were found to be predictive of earlier death—never having been married, being of a race other than white or black, and being employed. The first of these, never having been married, makes some intuitive sense. A person who has never been married may lack the social support to encourage and assist him or her to seek medical treatment and/or comply with it. People that have more support in their lives tend to do be healthier. Being married usually increases the social support available to a person. The other two findings lack any logical explanation and may have been statistical anomalies. There were less than 3% of the sample of a race other than white or black, and there were less than 5% who were employed at the time of their death. Such skewed distributions for these variables may have affected the analyses.

Two other variables not previously discussed were found to be protective factors—being widowed and being a college graduate or beyond. Both of these variables were found to be predictive of later deaths. Being widowed is consistent with the idea that social support is an important factor. People with mental illness who were married for some period of time may have received support, encouragement, and assistance to seek and comply with medical treatment. The finding related to being a college graduate
or having even more education may suggest that people with more education are more likely to seek medical treatment and follow the instructions of healthcare providers. Additionally, they may be more knowledgeable about the serious medical risks that people with mental illness face and take actions to reduce those risks—e.g., diet, exercise, etc.

**Summary**

Premature death among people with mental illness is a serious public health concern. Research has shown that people with mental illness die 20 or more years younger than the general U.S. population. In this study, data from a statewide database of more than 3500 people who received publicly funded mental health services and who died was analyzed in order to determine if there were factors that predicted early death. Overall, the results were consistent with previous findings in that the average age of death was 57.1, approximately 20 years younger than the U.S. average. It is important to note that only a modest amount of variance was accounted for in the dependent variable (14.9%). This could be because other important predictors like medications prescribed at death, additional medical illnesses, etc., were not included in the database. Thus, caution must be taken in interpreting the results.

Results of bivariate and multiple regression analyses found several factors that predicted early death as well as several others that was associated with later deaths. Specifically, people that had diagnoses that fit in the other category (ADHD, PTSD, etc.), people that were never married, people that were not white or black, having an additional diagnosis of substance abuse, being employed, having a diagnosis of bipolar disorder,
and being married were all factors that predicted earlier deaths. While being widowed, having a college degree or further education, or having a diagnosis of schizophrenia or psychotic disorder were all protective factors. The other diagnoses, other race, and being employed categories were statistically significant predictors, but both were very small portions of the sample. However, never being married and having a diagnosis of substance abuse had larger sample sizes and also were statistically significant predictors. Further research may be necessary, but recommendations involving these two predictors would be warranted. The variables that were found to be protective have interesting implications. Two of these variables were diagnoses that are known to be severe, but in this study, they were found to add years of life compared to people with other diagnoses. This could lead to further research of these other less studied diagnoses, but also could lead to increased awareness that this problem is not just isolated to people with SMI. Additionally, the being widowed and being a college graduate or beyond protective factors imply that developing stronger support systems, gaining experience and independence, increasing a person’s own education and awareness, and possibly their income potential can be strong prevention against early death.

Limitations of Study

There were a number of potential weaknesses in this study that may have limited the findings and their generalizability. Only individuals receiving mental health services in Missouri were included. Thus, the results may not generalize to people with mental illness living in other states. Additionally, no comparison group was included of people
who were not receiving mental health services, so it is unknown how the various factors investigated may have differed between the two groups.

Another major limiting factor of this study was that the investigation was limited to the variables available in a statewide database. Many variables were not available that could have helped to explain why people with mental illness tend to die at younger ages than those without mental illness. For example, only general categories of causes of death were available such as natural death, suicide, accident, etc. No specific medical illnesses that caused the deaths were included. Additionally, information was not available on many other important factors such as: the medications people were taking; the frequency with which they saw healthcare providers; information related to lifestyle choices like diet, exercise, and smoking. These and other factors could have helped to better predict early deaths.

More limitations were associated with the data that was used. This investigation was entirely dependent upon the accuracy and reliability of information input into a statewide database by dozens of agencies throughout the state. No data was available on the validity or reliability of the data. This may have been problematic especially for data requiring judgment, like diagnoses. Psychiatric diagnoses are notorious for having reliability problems (Matuszak & Piasecki, 2012). The diagnoses used in this study were given by hundreds of different physicians. There was no evidence of their reliability available.

Other problems with the data pertain to the distributions of some of the variables. Data on employment and race were skewed with very few people being employed at the
time of their death and very few people were from races other than white or black. Both of these variables were found to have significant relationships with age of death; however, caution is urged in their interpretation due to the skewed distributions. Furthermore, a couple of the variables had a large amount of missing data, including employment, education, and marital status. So much missing data could have affected the analyses with these variables.

**Recommendations for Action**

This study supported other findings in the literature that people with mental illness die 20-25 years earlier than people without mental illness. One of the main purposes of this study was to further increase the awareness of this problem in the psychiatric community. Increasing awareness could be achieved by highlighting the finding that two severe psychiatric illnesses were actually protective factors. While people with those diagnoses still died much earlier than people without mental illness, they lived longer than people with many other psychiatric diagnoses. This may be surprising to some, but it shows how serious the problem is for people with any mental illness and why action is needed.

That people with an additional diagnosis of substance abuse died earlier than those without such a diagnosis was an important finding in this study. This should support more treatment focus in this area. As mentioned previously in the literature review section, there is some literature indicating that one reason that people with mental illness die from medical complications earlier than people without mental illness is because the health care professionals are focusing on the primary illness, the psychiatric
illness, and treating it. Many physicians are trained to deal with the major emergent problems and not prevention, so they may not identify these other problems quickly in these individuals because their focus is on the psychiatric illness. This also could be a factor in people with dual-diagnosis of mental illness and substance abuse. If the health care professional’s focus is on the primary illness, many of the complications with substance abuse could be missed. This is another recommendation for increasing awareness of dual-diagnosis and treatment of both illnesses and recognition that both illnesses have severe complications that should be monitored closely by the primary health care professional.

One final recommendation also related to the literature, is that people with mental illness need improved access to medical care. Previous literature has shown that there are discrepancies resulting in people with psychiatric illnesses not receiving the medical services they need. Some of the reasons for these discrepancies have to do with the person’s knowledge of their health and recognition of symptoms, poor communication between medical and psychiatric personnel, limited access to services, not having insurance making preventative medicine and physicals difficult to obtain, the physician not trusting the report of the patient, fragmented services, etc. This problem and the many reasons for it stress the need to improve communication and coordination of mental health services and primary care. People with mental illnesses, especially those on Medicaid or without insurance, often have many different people treating their psychiatric and medical illnesses (MODMH, 2014). The use of Health Homes is one effective way to improve communication and address gaps in services for people with
lower incomes and chronic medical conditions (MODMH, 2014). The passage of the Affordable Care Act provided states with opportunities to introduce these health systems in their state. Missouri lead the way in implementing these health homes (MODMH, 2014). Missouri set their system up to not only include primary care health homes that focused on chronic medical conditions, but also linked these homes to the Community Mental Health Centers and their services. The recognition that to be more effective these health homes needed to include a connection to mental health services made the structure set up in Missouri very innovative. The program began in 2012, so it is too soon to tell how effective it is, but the program shows promise for addressing the communication and service gaps that exist in most current formats.

**Recommendations for Further Study**

The results of this study had several interesting findings and a few limitations that could lead to future research. One interesting finding is that schizophrenia and psychotic disorder were found to be protective factors while other less studied illnesses were found to be predictors of earlier death. As mentioned, the sample of people with these other diagnoses was small and for this reason, it warrants further research. If additional studies support this finding, clinicians could use the information to identify people that are at higher risk for earlier death and also compare treatments used for those with the protective diagnoses to identify what might be working and what could be used with other populations. Schizophrenia and other psychotic disorders are considered the most serious of psychiatric illnesses, but they have some well-known and established evidence-based treatment practices associated with the illnesses that include an awareness of the
medical complications associated with them. Some of the psychiatric illnesses in the “other diagnosis” category do not have as many standardized, evidence-based treatments associated with their illness. If this finding is explored further and supported, it could provide more incentive for identifying treatments that work with these individuals.

Another study that could draw from this data is to obtain the medication and the medical illness data for the people in this study. It has been well established that some of the medications used to treat mental illness have very serious side effects that can cause chronic medical conditions. Another statewide database used by Medicaid contains the medication information for all mentally ill people who receive Medicaid. However, there was not enough time during this study to get the access, retrieve the data, and analyze it. This study only identified about 15% of the variance from the variables it used, which means there are other variables that are affecting the age of death. Retrieving this data would allow a researcher to review certain medications and illnesses to determine how much the variables contribute to earlier age of death.

A person who was widowed was found to live quite a bit longer than someone who was never married, and never being married was predictive of earlier death. Together these findings would seem to indicate that having a support system could prevent early death. The role of having a social support system for people with mental illness should be studied further. The focus of this study should be on the extent to which the support helps with medical care and lifestyle decisions that are associated with improved health and living longer. The results of this study did not find that people living in a rural area in Missouri had any more risk of earlier death than someone living
in an urban area in Missouri. It was hypothesized that the rural versus urban distinction would be a proxy measure of access to quality medical services. Future research should focus on more direct measures of access such as the frequency with which individuals with mental illness see a primary care physician and the frequency with which they receive specialty medical services. This would help to determine if there are discrepancies in access to medical services and the extent to which such discrepancies result in early death. One last study that could add to the body of knowledge on this problem is related to another limitation of this study. This study did not have a comparison group because the focus was on identifying predictor variables from a sample of people that received mental health services before they died. There are several research articles that compared people that are mentally ill with people that do not have a mental illness. These studies identified various factors that contributed to early death in the person with mental illness compared to a person without a mental illness. However, these studies do not identify what specific factors in a person with a psychiatric illness makes the person higher risk compared to other people with mental illness. This study attempted to do that. This study might be enhanced by using a comparison group but still using the current sample. The control group would be people with mental illness that did not die at an early age. The comparison group would be the people with mental illness in the sample that did die younger. The results of this comparison might allow for the protective and predictive factors to stand out more which would provide more information about what to look for to health care professionals and the psychiatric community.
References


Inequitable access for mentally ill patients to some medically necessary procedures. *Canadian Medical Association*, Vol. 176, No. 6


Missouri Department of Mental Health (MODMH). Health Care Home. Retrieved from http://dmh.mo.gov/about/chiefclinicalofficer/healthcarehome.htm


Oswega State University of New York. Multiple Regression. Retrieved from

Staiculescu, I (2014). *Access to Health Care Services: Perspectives from Patients with Mental Illness.* Center for Health Policy, University of Missouri.

