ABSTRACT

Title of Thesis: THE KNOWLEDGE OF MENTAL ILLNESS AS A RISK FACTOR FOR CARDIOVASCULAR DISEASE AMONG INDIVIDUALS WITH MENTAL ILLNESS

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Compared to individuals without mental illness, individuals with mental illness (MI) are two times as likely to develop and three times as likely to die from cardiovascular disease (CVD). One reason for this is that they are screened significantly less for CVD risk factors. Encouraging individuals with MI to ask for proper CVD risk factors from providers directly has been suggested to improve the cardiovascular care they receive.

Before this, it was important to determine whether this population knows about their increased risk. Thus, knowledge of MI was compared to five other risk factors (obesity/overweightness, smoking, hypertension, inactivity, hypercholesterolemia) among individuals with MI. A significant difference between knowledge of MI and the other five risk factors was found, meaning individuals with MI are unaware of their increased CVD risk. The study thus highlights the need for interventions to increase knowledge of MI being a CVD risk factor among this population.

# THE KNOWLEDGE OF MENTAL ILLNESS AS A RISK FACTOR FOR CARDIOVASCULAR DISEASE AMONG INDIVIDUALS WITH MENTAL ILLNESS

by

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# Chapter 1: Introduction

## 1.1. Background of the Problem

Compared to individuals without mental illness, individuals with mental illness (MI) are two times as likely to develop cardiovascular disease (CVD) and three times as likely to die from CVD (Baker & Goldie, 2014). One of the reasons for this inequality is the poorer medical care that individuals with MI receive compared to individuals without MI (Leucht et al., 2007). There are essentially two sides to medical care (Lings et al., 2003). The first involves the duties and responsibilities of the physician or primary care provider in providing proper care to their patients (Piyaratn, 1982). Factors such as a lack of knowledge about individuals with MI and underlying stigmatizing attitudes impact the care that physicians provide (Burton et al., 2015; Wallace, 2010). Consequently, several interventions have aimed to increase knowledge and reduce stigma among physicians (Gronholm et al., 2017; Knaak et al., 2017; Mehta et al., 2015).

The other side of care involves what the patients can do within the medical care setting, which primarily revolves around their ability and willingness to take an active role in the healthcare they receive (James, 2013). As mentioned earlier, many physicians do not provide the appropriate cardiovascular healthcare that this population needs due to stigma and a lack of knowledge about the increased risk of CVD among this population (Baller et al., 2015). As such, there has been a call to help patients become more actively involved in the care they receive to discuss and request appropriate tests and procedures with their providers as necessary (Gierisch et al., 2013). Before designing and implementing patient-focused interventions, it is important to determine whether, like the

healthcare professionals discussed above, individuals with MI are also unaware that they have a higher risk of developing CVD.

### 1.2. Research Purpose and Hypothesis

The purpose of the present study is thus, to determine whether individuals with mental illness are aware of their increased risk for developing and dying from CVD as a consequence of their MI. Specifically, the aim of this study is to determine how knowledgeable individuals with MI are about MI being a risk factor for CVD. In order to further understand the extent of knowledge regarding MI as a risk factor, a comparison will be made between knowledge of MI being a CVD risk factor and knowledge of five other CVD risk factors, smoking at least one cigarette a day on average, having hypertension, being overweight/obese, having a family history of heart disease, and not obtaining adequate levels (engaging in at least 150 minutes of moderate intensity exercise a week) of physical activity. Because even trained healthcare professionals are unaware of the increased risk of CVD associated with MI, it is hypothesized that individuals with mental illness do not know that they are at higher risk for developing CVD than the general population due to their MI.

### 1.3. Definitions of Terms

*Cardiovascular health care*. Entails providing and analyzing the results of at least the following five key medical tests (American Heart Association, 2014):

-Blood pressure: systolic and diastolic blood pressure measured using a sphygmomanometer

-Fasting Lipoprotein Profile: a blood test that measures total cholesterol, LDL (bad) cholesterol, HDL (good) cholesterol and triglycerides.

-Body weight: waist circumference, body weight, and height are used to calculate body mass index (BMI) to determine whether individuals are underweight (BMI less than 18.5), normal weight (BMI between 18.5 and 24.9), overweight (BMI between 25 and 29.9), or obese (BMI over 30).

-Blood glucose: measures blood glucose levels.

-Smoking, physical activity, diet: patient discusses applicable patterns and frequencies.

*Cardiovascular disease (CVD)*. A group of disorders of the heart and blood vessels that include the following (World Health Organization, 2004):

-Coronary heart disease: disease of the blood vessels supplying the heart muscle

-Cerebrovascular disease: disease of the blood vessels supplying the brain

-Peripheral arterial disease: disease of blood vessels supplying the arms and legs

*Mental Illness (MI)*. A condition that affects a person's thoughts, feelings, or mood. Such conditions may affect someone's ability to relate to others and function each day. The four most common conditions among young adults between the ages of 18 and 30, the prioritized population for this study, are the following (National Alliance on Mental Illness, 2012):

-Depression: characterized by persistently depressed mood or loss of interest in activities of daily life

-Anxiety: characterized by feelings of excessive uneasiness and apprehension, typically with compulsive behavior or panic attacks.

-Bipolar disorder: characterized by episodes of mood swings ranging from depressive lows to manic highs

-Schizophrenic/psychotic disorders: characterized by a disconnection from reality that is often associated with delusions and hallucinations

**1.4. Significance of the Study**

The results of this study can be utilized to determine how best to move forward to help individuals with MI. If individuals with MI are currently unaware of their increased CVD risk, then programs to increase knowledge of MI being a risk factor for CVD can be initiated. Additionally, lifestyle interventions that aim to increase physical activity, improve the dietary habits, and increase engagement in other healthy behaviors among this population, may benefit from including an awareness component that aims to increase knowledge of MI doubling the risk of developing and tripling the risk of dying from CVD (Middleton et al., 2013).

If current findings reveal that individuals with MI are aware of their increased CVD risk, then public health professionals can directly intervene by improving the ability and willingness of individuals with MI to actively discuss their cardiovascular health with their providers and request necessary health services. Consequently, interventions to improve self-efficacy and communication skills of this population to discuss and request necessary tests and procedure imperative to improving cardiovascular health from health care providers can be implemented.

# Chapter 2: Background

## 2.1. Increased CVD Risk

Mental illness (MI) affects millions of Americans each year. An estimated 26.2 percent of Americans ages eighteen and older, which translates to 57.7 million people, suffer from a diagnosable mental disorder in a given year (National Institute of Mental Health, 2008). Mental health care has improved substantially over the past several decades due to advancements in medicine, technology, and research. However, these improvements have not been reflected in the physical health of individuals with MI.

Individuals with MI on average die 15-20 years earlier than individuals without MI (Druss et al., 2011). The majority of excess deaths in this population are due to physical illnesses, particularly due to cardiovascular disease (Kisely et al., 2005; Lawrence et al., 2001; Leucht et al., 2007). Compared to individuals without mental illness, individuals with mental illness are twice as likely to develop and three times as likely to die from cardiovascular disease (Lawrence et al., 2001; Baker & Goldie, 2014). These inequalities in CVD risk among individuals with MI can be attributed to a combination of factors including consequences of MI itself, side effects of its treatment and medication, systemic issues, such as the separation of mental and primary care services from other medical services, and poor or improper medical care (Leucht et al., 2007; Osborn et al., 2007).

These factors can then manifest into an increased susceptibility to CVD risk both directly and indirectly. In the direct sense, mental disorders and elevated psychiatric symptoms have been found to be independent risk factors of CVD (Khayyam-Nekouei et al., 2013). Consequences of MI include disruptions of the proper functioning of

Hypothalamic–Pituitary–Adrenal Axis that lead to a stress-induced elevation of cortisol (Björntorp & Rosmond, 2000; Malik, 2004). This, in turn, increases the risk of a metabolic syndrome type state that includes glucose intolerance, hyperlipidemia, and increased visceral fat mass, all of which are CVD risk factors themselves (Björntorp, 1995; Björntorp & Rosmond, 2000; Malik, 2004). Additionally, mental stress experienced with MI also causes the improper activation of inflammatory reactions and autoimmune mechanisms that in turn leads to oxidative stress, one of the early signs of future CVD (Chauvet-Gélinier et al., 2013; Lerman, 2005).

In a more indirect sense, individuals with MI are also much more likely to have other CVD risk factors. Compared to individuals without MI, individuals with MI are more likely to smoke, have hypertension, be overweight/obese, have a family history of heart disease, and are less likely to obtain adequate levels of physical activity (Hert et al., 2009; Ross, 2014; Scott et al., 2012; Stapelberg et al., 2011). Taken together, individuals with MI are much more susceptible to both developing and dying from CVD.

### 2.2. Economic Impact

In addition to the disproportionately large morbidity and mortality rate associated with CVD that affects individuals with MI, the importance of this health problem can be further highlighted from an economic standpoint. In terms of direct costs, comorbidities between MI and physical health problems present major challenges to the healthcare system by worsening health outcomes, prolonging recovery, and thereby exacerbating costs to the system. For instance, compared to the treatment of individuals who have CVD alone, treatment of individuals with mental illnesses and CVD costs the healthcare system 1.5 times as much (Mcdaid & Park, 2014). More specifically, the cost of treating

comorbid MI and CVD vary from $1457.93 to $2566.95 per comorbid person per month. (American Psychiatric Association, 2014; Goetzel et al., 2004).

Comorbid mental illness and CVD is also associated with indirect costs related to the lost opportunity to contribute to economic productivity, in regard to both absenteeism and presenteeism. Absenteeism, taking off of work due to poor health or premature death associated with comorbid MI and CVD, costs the U.S. $43.7 billion over 200 million days lost from work each year (Goetzel et al., 2004). While research on presenteeism, lost productivity while working, due to comorbid mental illness and CVD is substantially lacking, one study estimates that it may cost the U.S. between $20.8 and $48.3 billion annually (Mitchell & Bates, 2011).

Since economic costs refer to more than just monetary costs, it is also important to consider 'intangible costs' that are difficult to quantify. For instance, one in four families has at least one member currently suffering from a mental illness (WHO, 2013). Individuals with MI themselves have to deal with the symptoms of MI, side effects of medication, and stigma associated with MI coupled with rejection or discrimination leading to a sense of isolation (National Alliance on Mental Illness, n.d.). In addition to this, family members of these individuals are also often subject to the harsh consequences and realities associated with MI. Family members may have to miss other work and obligations to care for these individuals with MI in addition to experiencing the distress of seeing their loved one deal with mental illness (Leggatt, 2002).

It would not be surprising to note that adding CVD into this equation has a multiplicative effect on these intangible costs. For example, individuals with MI and CVD would require even more visits to physicians, medications, and treatments, in

addition to the possibility of interactions between medications (World Health Organization, 2017). The financial burden of this comorbidity can place additional stress on both family members and individuals with MI, which may exacerbate their MI and in turn their CVD. Therefore, reducing the risk of CVD, preferably preventing CVD from occurring in the first place, along with improving treatment and care associated with CVD risk factors not only presents huge economic benefits, including both 'intangible' benefits for family members of individuals with MI and monetary benefits for the nation and larger society as a whole, but it also provides an opportunity to provide some much-needed relief to a population of individuals with MI who have been unfairly suffering for several decades.

### 2.3. Addressing MI Health Disparities

Several steps have thus been taken to address this problem. The implementation of policies such as the Affordable Care Act (ACA) has served as a catalyst to addressing poor and improper care. First and foremost, the ACA has significantly increased access to mental health care by classifying mental health services as one of the ten essential health benefits that must be covered by insurance and extending insurance coverage to around 5.5 million individuals with MI (Mark et al., 2015). Such policies have also encouraged the integration of mental health care and primary care through provisions such as Accountable Care Organizations, which has been shown to significantly improve the physical and mental health outcomes of individuals with MI (Archer et al., 2012).

Additionally, offering integrated care provides a solution to the ongoing controversy over who is responsible for providing physical health care to individuals with MI (National Institute of Mental Health, 2017). Primary care physicians argue that they

do not have specific training in dealing with MI and thus, psychiatrists should be responsible Fleischhacker et al., 2008; Marder et al., 2004). Mental health care providers argue that they do not have the adequate training to provide physical health care to patients, that their role is in dealing with MI itself, and that primary care physicians should be responsible for the physical health of individuals with MI (Millar, 2008). It has also been estimated that, based on direct and indirect costs associated with comorbid mental illness and CVD in 2012, $21.16 billion dollars could be saved annually through proper integration of primary care and mental health care (American Psychiatric Association, 2014). Nevertheless, until successful integrated care becomes a reality, any steps to improve the physical, particularly the cardiovascular health, of individuals with MI must be taken.

### 2.4. Provider-level Concerns

Out of the factors that are associated with the cardiovascular health disparities among individuals with MI mentioned above, one of the most modifiable factors to target in order to improve CVD outcomes among this population is the poor quality of medical care they receive. While physicians today are more attuned to the risk of cardiovascular disease (CVD) among patients, many physicians are unaware that MI is associated with increased risk of CVD (Burton et al., 2015). Unfortunately, stigmatizing attitudes against individuals with MI are also prevalent among primary care physicians, which have prevailed as one of the major barriers to addressing the CVD health of the population (Wallace, 2010). Both of these factors often mean that physicians do not properly screen individuals with MI for CVD risk factors to the extent necessary to reduce preventable CVD and associated mortality (Lawrence & Kinsley, 2010). For instance, a review of ten

studies summarizing screening rates for CVD risk factors found that not only were individuals with MI screened significantly less than individuals without MI, but as low as 6% of individuals with MI were adequately screened for CVD risk factors (Baller et al., 2015). This has profound implications; a large percentage of CVD and associated mortality among individuals with MI may have been prevented had they been appropriately screened for CVD risk factors.

Several interventions that aim to increase physician awareness of the increased risk of CVD among individuals with MI and interventions that aim to reduce stigma against individuals with MI among physicians and healthcare providers are underway (Gronholm et al., 2017; Knaak et al., 2017; Mehta et al., 2015). The evidence for the success of these interventions is mixed. Thus, the Agency for Healthcare Research and Quality (AHRQ) posits that trying to encourage individuals with MI to ask their providers for proper cardiovascular healthcare, such as CVD risk factor screenings, may yield more promising results (Gierisch et al., 2013). This may be because physicians are much less likely to deny appropriate screenings and other services when patients openly discuss why they are necessary and directly request these services (Chapman et al., 2013; Alcalá et al., 2015). If individuals with MI receive the appropriate cardiovascular care and are adequately screened for CVD risk factors, the prevalence of increased preventable CVD and associated mortality within this vulnerable population may be substantially reduced.

## 2.5. Theoretical Models and Steps toward Patient-level Interventions

Interventions that aim to increase self-efficacy and communication skills of the MI patient population to encourage them to discuss their CVD risk and request necessary screenings from physicians have been suggested (Gierisch et al., 2013). However, before designing these interventions, it is important to determine whether individuals with MI are aware of their increased CVD risk and are not discussing or pursuing CVD risk factor screenings from physicians or whether these individuals are unaware of their increased risk for CVD to start. While it makes sense to begin developing and implementing interventions to improve patient-provider communication in the former situation, these interventions may be less likely to be effective if individuals with MI do not know that have a higher CVD risk. Not only might this be less influential in improving the quality of cardiovascular health care that this population receives, but the time, effort, and resources used to develop and implement these interventions would have been misspent. In this case, interventions to improve knowledge among the MI patient population about their increased risk for CVD and associated mortality would be more appropriate and may improve the effectiveness of interventions that encourage patient-provider communication about cardiovascular health. Subsequent improvements in the cardiovascular health of this population would also be more likely since increasing patient education and understanding is associated with improvements in health outcomes (Adams, 2010). Therefore, determining whether individuals with MI know that they are at higher risk for developing and dying from CVD is important.

Another factor that leads to cardiovascular disparities among this population that could be modified revolves around the lifestyle patterns and behaviors of individuals with

MI. For instance, compared to individuals without MI, individuals with MI are significantly less likely to be physically active and significantly more likely to have unhealthy dietary habits, (Zschucke et al., 2013; Scott & Happell, 2011). Therefore, interventions to improve the dietary habits and increase physical activity among individuals with MI are necessary. Several interventions aimed to do just that among individuals with MI (Alvarez-Jiménez et al., 2008; Faulkner et al., 2007; Kalarchian et al., 2005; Lowe & Lubos, 2008; Markowitz et al., 2006; Verhaeghe et al., 2011). Unfortunately, most of these interventions have been unsuccessful. It is important to note that the few successful interventions have all used a theoretical framework, specifically the Transtheoretical Model (TTM) and the Health Belief Model (HBM), to provide a conceptual foundation for designing the interventions (Farholm & Sørensen, 2016; Mo et al., 2016).

Knowledge is a crucial component that underlies both models. TTM views the process of behavior change that begins with changes in cognition that occur across the first three stages, such that new knowledge essentially leads individuals to a decisional balance, and helps move from one stage to the next (Prochaska & Velicer, 1997). Knowledge underlies most of the constructs of HBM, particularly the constructs of perceived severity and susceptibility (Glanz et al., 2002; Rosenstock, 1974). The interventions that included a knowledge component, explaining why exercise is necessary generally, were more effective (Farholm & Sørensen, 2016). If individuals with MI currently lack the knowledge of their increased risk for CVD, including a component that aims to increase this knowledge, may help motivate individuals to engage in healthy behaviors (Middleton et al., 2013). This, in turn, may improve the cardiovascular

outcomes of individuals with MI and increase the effectiveness of lifestyle and behavior change interventions conducted among this population. Determining if individuals with MI do not know about their increased CVD risk is essential in understanding whether they stand to benefit from learning this information, is important.

Therefore, the purpose of the present study is to determine the level of knowledgeable individuals with MI have about their increased risk for CVD and associated mortality due to their MI. In order to understand the extent of knowledge regarding MI as a risk factor, a comparison will be made between knowledge of MI being a CVD risk factor and knowledge of five other CVD risk factors: smoking at least one cigarettes a day on average, having hypertension, being overweight/obese, having a family history of CVD, and not obtaining adequate physical activity. These five risk factors were chosen for comparison because, as mentioned earlier, individuals with MI are more likely to suffer from these CVD risk factors than the general population (Ross, 2014; Scott et al., 2012; Stapelberg et al., 2011).

# Chapter 3: Methods

## 3.1. Population of Study

The population base for the present study was individuals with MI. MI affects individuals of all racial and ethnic groups, across every level of socioeconomic status and nearly all age groups. According to the National Institute of Mental Health, results from the 2015 SAMHSA National Survey on Drug Use and Health revealed that 29.2% of biracial or multiracial Americans, 21.2% of Native Americans, 19.3% of Caucasians, 15.4% of African Americans, 14.3% of Native Hawaiian and other Pacific Islanders, 12% of Asian Americans, and 14.5% of Hispanics have a MI. However, it should be noted that due to cultural stigmas against mental illness, Hispanics, Asian Americans, African Americans, and Native Hawaiian and other Pacific Islanders are much more likely to underreport MI than other groups. In fact, one study estimates that when such cultural stigmas and views are accounted for, the percentage of these groups that have MI is likely to be close to that of Caucasians and Native Americans (Miller et al., 2016). Therefore, the priority population was not narrowed down to a particular racial or ethnic group, since the prevalence among each group is comparable.

The results of the 2015 SAMHSA National Survey on Drug Use and Health also revealed that while 21.2% of females have MI, only 14.3% of males have MI. However, as in the case of minority racial and ethnic groups, males are much more likely than females to underreport MI due to social norms and stigma associated with MI and treatment-seeking behavior in males. The study by Miller and colleagues (2016) also found that if these gender-related norms and stigmas are taken into consideration, then there would likely be no significant differences in the prevalence of MI between females

and males. Thus, because the prevalence between the sexes is comparable, the priority population was also not limited to a particular sex and instead focused on both sexes.

Half of all individuals with MI who will ever be clinically diagnosed with a MI show signs of the disease by age 14 and 75% of all individuals with MI who will ever be diagnosed with a MI show signs by age 25 (Talbott, 2006). Although half of all individuals with MI show signs by the age of 14, most cases are not diagnosed that early. In fact, 78% of cases of MI are diagnosed between the ages of 18 and 25 (Substance Abuse and Mental Health Services Administration, 2015).

Since the present study aims to examine the knowledge of CVD risk among individuals with MI, it was important that those who were enrolled as participants were aware that they have MI. In other words, participants will need to have been diagnosed with MI, which is why participants were recruited from mental health care settings. Additionally, according to the Board on Children, Youth, and Families, Institute of Medicine, and the National Research Council (2013), the earlier an intervention, such as an intervention to increase knowledge or improve healthy habits like increasing physical activity, is implemented, the more likely it is to be effective and have a greater impact on the lives of affected individuals. As stated earlier, because most cases of MI are diagnosed between the ages of 18 and 25, from a more practical perspective, the earliest ages during which such interventions could be implemented would thus be between 18 and 25. However, due to the limited time available for data collection, the age range for recruitment was extended from 18 to 25 to 18 to 30 to ensure that a sufficient number of participants could be recruited within the allotted timeframe. Furthermore, it has been shown that efforts to improve cardiovascular health are most effective at significantly

reducing preventable CVD and associated mortality when initiated among young adults within this age group (Graham & Cooney, 2015). Before planning and implementing interventions among this age group, it is imperative to study the knowledge of CVD risk factors among young adults with MI. Therefore, taken together, the prioritized population for this study included individuals with MI between the ages of 18 and 30 of all racial and ethnic groups.

### 3.2. Design and Measurement

A comprehensive list of individuals with MI was not available at the time the study was initiated, so although obtaining a random sample of individuals with MI between the ages of 18 and 30 would yield more scientifically rigorous data, it was not feasible or practical. Therefore, a convenience sampling technique was utilized in the present study. Individuals with MI were recruited from mental healthcare settings in Maryland, D.C., and Virginia. Healthcare facilities that serve diverse catchment populations were purposively selected to obtain more racially, ethnically, and socioeconomically diverse study samples that better represent the racial, ethnic, and socioeconomic diversity of the population base indicated above.

First, mental health care providers were contacted through email or over the phone to explain the details of the study and to determine if they would allow participants to be recruited from their mental health care facilities. If they agreed to allow participant recruitment from their facilities, they were asked to send an email (Appendix A) to their patient base explaining that a voluntary 5-minute survey will be administered to individuals between the ages of 18 and 30 during the wait times before their appointment with their mental health care provider. This technique of asking providers to email their

participants was used because it may have made patients more willing and comfortable with taking the survey, increasing the likelihood of participation. The email was also used to let patients know that their decision to participate would not affect the care and services that they receive in any way. This, in turn, helped ensure that patients were not coerced to participate.

On the day of recruitment, an announcement (Appendix B) was made by the researcher at different times to provide patients with additional information about the survey. Individuals between the ages of 18 and 30 were approached and asked if they would be willing to take the survey. Interested individuals were then asked whether they would prefer to take the survey through Qualtrics on an iPad provided by the researcher at that time or on paper. Depending on their choice, the appropriate instrument was handed to them. Before beginning the survey, participants had to read the consent form on the iPad (Appendix C) or paper (Appendix D). Participants were given the opportunity to ask any questions they had before completing the consent form and beginning the survey. Only individuals who were able and willing to provide informed consent and were between the ages of 18 and 30 were allowed to take the survey. Eligible and interested participants then completed the survey (Appendix E) during wait times between appointments to meet with their mental health care providers. A more detailed description of the steps and procedures followed during the recruitment process, along with important dates is provided in Appendix F. The corresponding study timeline is provided in Appendix G.

*Survey Instrument*

A CVD risk factor knowledge questionnaire was used as the survey instrument in this study. CVD risk factor knowledge questions were adapted from the questions found in three CVD risk factor knowledge instruments used in previous studies (Bergman et al., 2011; Awad & Al-Nafisi, 2014; McClendon, 2011). The psychometric properties of these three instruments have been well established previously and have been used in numerous other studies to assess CVD risk factor knowledge (Bergman et al., 2011; Awad & Al-Nafisi, 2014; McClendon, 2011).

The final Cardiovascular Disease Risk Factor Knowledge Questionnaire (Appendix E) used in the present study was pilot tested among 50 individuals with MI between the ages of 18 and 30 who rated the instrument as understandable, easy, quick, and unambiguous in interpretation, thereby validating its usefulness. Additionally, 25 primary care physicians and 25 mental health care providers who were asked to review the instrument rated the purpose and content of the instrument as appropriate. An analysis of the psychometric properties of the questionnaire was also conducted.

The validity and the reliability of the Cardiovascular Disease Risk Factor Knowledge Questionnaire have been appropriately established, confirming the utility of its application in the present study. The three most important types of validity in instrument assessment and educational literature, content, construct, and criterion validity, were all substantiated through appropriate tests. Content validity was established by 85% inter-content agreement among both primary care physicians and mental health care providers. Construct validity was evaluated and established through factor analysis. Hierarchical linear regression was used to establish criterion validity. Additionally, the

instrument was found to significantly correlate with the other established CVD risk factor knowledge instruments that the present instrument was modeled after, thereby demonstrating the concurrent validity of the instrument. Internal consistency and instrument reliability were established by a Cronbach's Alpha of 0.853 and a Spearman-Brown split-half reliability of 0.827. Item analysis, using a point biserial correlation, found statistically significant associations ($p < 0.01$) between performance on single items and the total score.

### 3.3. Analytic Procedures

*Risk Factor Knowledge*

There were three sub-component questions that aimed to measure knowledge for each of the six CVD risk factors tested in the present study: overweightness/obesity, smoking one or more cigarettes daily on average, MI, high blood pressure, insufficient physical activity, and high cholesterol. Each of the three question types captures a unique facet of the concept of knowledge. The 'if…then' questions represent conditional knowledge. The true/false questions represent propositional or factual knowledge. Finally, the 'my likelihood…' questions represent knowledge of perceived risk and susceptibility, indicating internalized knowledge. The three knowledge sub-component questions were, again, adopted from the CVD risk factor knowledge instruments used in three previous studies that the Cardiovascular Disease Risk Factor Knowledge Questionnaire used in the present study was modeled after (Bergman et al., 2011; Awad & Al-Nafisi, 2014; McClendon, 2011). For each risk factor, the sum of the scores obtained on the three sub-component questions was used as a measure of knowledge.

*Coding Schematic*

Each of the three sub-component questions was coded as follows. Because a particular value, like "0," cannot be assigned to more than one label in SPSS, like 'strongly disagree,' although some response choices were equivalent to a score of "0," values were assigned in ascending order on SPSS. For the 'if…then' Likert-response questions (ex. If I have a mental illness, then my possibility of getting heart disease will increase) testing conditional knowledge, since the 'strongly disagree' and 'disagree' response options reflect a lack of knowledge regarding the risk factor and are equivalent to a score of 0, were scored as "1" and "2," respectively. Similarly, the 'neither agree nor disagree' response option also corresponds to a score of 0 because it does not reflect a recognition of the increased risk associated with the risk factor. However, following the pattern, it was assigned a score of "3." Both the 'high' and 'very high' response options, which represent moderate and high knowledge, respectively, were coded with a score of "4" and "5.". This scoring format was employed in the study conducted by Awad and Al-Nafisi (2014), which includes one of the questionnaires on which the survey instrument used in this study was modeled.

The objective 'true/false' questions (ex. Having a mental illness increases a person's risk for developing heart disease) testing factual knowledge were scored based on the coding framework utilized in the study by Bergman and colleagues (2011), which includes another questionnaire on which the survey instrument used in this study was modeled. As such, both the 'False' and 'I don't know' options, which are equivalent to a score of 0, were assigned a score of "1" and "2," respectively. The 'True' response option was coded with a score of "3." The 'my likelihood…' Likert-response questions (ex. My

likelihood of getting heart disease if I have a mental illness is) testing internalized knowledge were coded using the same reasoning behind the scoring for the 'if…then' questions. The 'very low' and 'low' response options were coded with a score of "1" and "2," respectively since these options reflect a lack of knowledge regarding the risk factor. Similarly, the 'medium' response option was coded with a score of "3" because it does not reflect a recognition of the increased risk for CVD associated with the risk factor. The 'high' and 'very high' response options were assigned scores of "4" and "5," respectively.

As stated earlier, the sum of the scores obtained on the three sub-component questions was used as the indicator of knowledge. Using the scheme from the Awad and Al-Nafisi (2014) study as a guide, the minimum score required to show knowledge on a risk factor is 11; a "4" on the 'if…then' question, a "3" on the 'true/false' question, and a "4" on the 'my likelihood…' question. The maximum score a participant can then receive on a risk factor is 13. Thus, summary scores between 11 and 13 will indicate that the participant knew that that particular variable was a CVD risk factor. The operational definitions of the remaining variables measured are revealed in the Cardiovascular Disease Risk Factor Knowledge Questionnaire, found in Appendix E.

*Data analysis*

Data analysis was performed using the statistical software, SPSS version 25. Statistical significance will be accepted at $p < 0.05$. For some questions, the response categories were collapsed into fewer, broader categories for analysis. This was done for two main reasons. For some questions, having enough response options for participants to answer appropriately and reduce response bias was necessary. However, analyzing all the

response categories would not produce meaningful results. For instance, for the question asking participants how much they exercise in a week, six different options were provided, ranging from less than 1hour/week to more than 3 hours/week. For data analysis, however, what matters is whether they are getting the recommended amount of physical activity required for cardiovascular health, which is more than 3hours/week. As a result, the response categories were collapsed into two categories: getting less than the recommended level of physical activity and getting the recommended amount of physical activity. The second reason is that, for some questions, the percent of responses within specific categories were too small to analyze meaningfully, and combining categories with fewer responses into larger bins produced more meaningful results. For instance, for income, making 67% to 200% of the single-person household median income in the region, $27,237, is considered middle class, with 67% to 133% being lower middle class, and 133% to 200% being upper middle class (National Association of Realtors, 2014). An income less than 67% is considered working class and an income above 200% is considered upper class. For each of the income range options provided on the survey, the midpoint of the range was calculated and this was divided by the number of individuals in the household, to obtain the single-person household income. Based on the percentages mentioned above, these incomes were then classified into working, lower middle, upper middle, and upper income classes.

Descriptive statistics and frequency analyses were conducted to analyze the demographic and personal characteristics data. Frequency analyses of the responses to each of the three sub-component questions that tested knowledge was conducted for each of the six CVD risk factors. Then the scores on the three sub-component questions for

each risk factor were summed to represent the level of knowledge of that risk factor. An analysis of variance test was used to compare the means of the sum of scores across the six risk factors. Additionally, the analysis of variance test to compare the means of the sum of scores was repeated among just the five general CVD risk factors (i.e., all the risk factors except for MI). The summary scores for each risk factor were then coded into two separate categories: a score of 11 or higher, which represents knowledge of that risk factor, and scores less than 11, which indicate a lack of knowledge about that risk factor. Then a Chi-squared test was conducted to compare knowledge across the six risk factors. Additionally, the Chi-squared test to compare knowledge was repeated among the five general CVD risk factors, which again includes all the risk factors except for MI. A paired-test was conducted to compare knowledge of MI to the average knowledge of the other five general CVD risk factors. Finally, an analysis of covariance test was used to determine whether there were any significant differences in scores based on demographics and participant characteristics.

# Chapter 4: Results

## 4.1. Sample Characteristics

A total of 163 individuals with MI between the ages of 18 and 30 were approached to participate in the study, of which 152 agreed to participate, yielding a 93.3% response rate. Five of these were dropped due to missing data. Thus, the data for 147 participants were analyzed. Demographics and participant characteristics are shown in Table 1a and Table 1b, respectively. Fairly equal proportions of male (n = 71) and female (n = 76) subjects were recruited. Additionally, because mental health care facilities that serve racially and ethnically diverse catchment populations were purposively selected, the racial and ethnic diversity of the study sample, was high, where 59.9% of participants were non-white and 13.6% were of Hispanic origin.

There was significant variation in participant age, with the mean age being 22.76 ± 3.30 years. 78.2% (n = 115) of participants had at least a high school education. The majority of participants were either working part-time (42.2%) or looking for work (38.1%). Most participants are single (74.8%) and considered middle-class, with 46.9% (n = 69) in the lower middle class and 33.3% (n = 49) in the upper middle class.

## 4.2. Mental Illness

The prevalence of the type of MI among participants was similar to the national prevalence of each type (National Institute of Mental Health, 2008). The type of MI was reported as follows: 32.0% (n = 47) had depression, 31.9% (n = 41) had anxiety, 20.4% (n = 30) had bipolar disorder, 10.9% (n = 16) had a psychotic disorder or schizophrenia, and 8.84% (n = 13) had more than one type of MI. On average, participants had been living with mental illness for 4.37 ± 1.44 years. Because participants were recruited from

mental health care facilities, all participants were currently under treatment for their MI. About equal numbers of participants were taking medication, under behavioral therapy/counseling, or both taking medication and seeking behavioral therapy/counseling. On average, participants had been under treatment for 3.96 ± 1.40 years.

### 4.3. Participant Behaviors and Lifestyle

Out of the 147 participants, 22.4% (n = 33) smoke at least one cigarette a day on average. 73.5% (n = 108) are not engaging in the recommended amount of physical activity required for the maintenance of proper cardiovascular health. Finally, their BMIs were calculated based on the heights and weights they reported on the survey. The results show that 54.4% (n = 80) of participants are above the normal weight classification. Specifically, 34.7% (n = 51) were overweight and 19.7% (n = 29) were obese.

### 4.4. Medical Diagnoses

Of the 147 participants in the study, 21.1% (n = 31) reported that they had been told by a medical professional that they were overweight or obese. Similarly, 11.6% (n = 17) of participants reported that a medical professional had diagnosed them with high blood pressure previously. 15.6% (n = 23) of participants were medically diagnosed with high cholesterol.

### 4.5. Perceptions about Health and CVD

Over half of all participants (60.5%) perceived that their current health status was good or even better. 58.5% of participants reported that they felt well-informed about CVD, with 42.9% (n = 63) indicating that they were informed ‘quite a lot’ and 15.6%

(n = 23) indicating they felt 'extremely' informed about CVD. 70.0% (n = 103) of participants also felt little to no concern about developing CVD.

Table 1a

*Participant Demographics*

| Variable | Percent (n = 147) |
|---|---|
| Sex | |
| Male | 48.3% (71) |
| Female | 51.7% (76) |
| Age | |
| 18-19 | 20.4% (30) |
| 20-21 | 17.0% (25) |
| 22-23 | 24.5% (36) |
| 24-25 | 15.6% (23) |
| 26-27 | 13.6% (20) |
| 28-29 | 8.84% (13) |
| Mean age ± S.D. | 22.76±3.30 |
| Ethnicity | |
| Hispanic/Latino | 13.6% (20) |
| Not Hispanic/Latino | 86.4% (127) |
| Race | |
| Black or African American | 30.6% (45) |
| Asian American | 22.4% (33) |
| Native Hawaiian or Pacific Islander | 2.04% (3) |
| White or Caucasian | 40.1% (59) |
| Biracial or Multiracial | 4.76% (7) |
| Marital Status | |
| Single | 74.8% (110) |
| Married or living with partner | 25.2% (37) |
| Employment Status | |
| Full-time | 18.4% (27) |
| Part-time | 42.2% (62) |
| Looking for work | 38.1% (56) |
| Disabled | 1.40% (2) |
| Highest Level of Education | |
| Elementary | 1.40% (2) |
| Some high school | 20.4% (30) |
| High school graduate | 15.0% (22) |
| GED | 12.9% (19) |
| College/technical school | 44.9% (66) |
| Graduate/professional school | 5.40% (8) |
| Income Class[a] | |
| Working | 15.6% (23) |
| Lower Middle | 46.9% (69) |
| Upper Middle | 33.3% (49) |
| Upper | 4.10% (6) |

a. Calculated and categorized based on the median income in Maryland

Table 1b

*Participant Characteristics*

| Variable | Percent (n = 147) |
|---|---|
| Mental Illness | |
| Depression | 32.0% (47) |
| Anxiety | 31.9% (41) |
| Bipolar Disorder | 20.4% (30) |
| Psychotic Disorder/Schizophrenia | 10.9% (16) |
| Two or more types | 8.84% (13) |
| Current Treatment | |
| Medication | 40.1% (59) |
| Behavioral therapy/Counseling | 29.3% (43) |
| Both | 30.6% (45) |
| Smoke 1/+ cigarettes daily | |
| No | 77.6% (114) |
| Yes | 22.4% (33) |
| Weekly Exercise | |
| Less than recommended amount | 73.5% (108) |
| Recommended amount or more | 26.5% (39) |
| Weight Classification | |
| Normal weight | 45.6% (67) |
| Overweight | 34.7% (51) |
| Obese | 19.7% (29) |
| Medical Diagnosis of Overweight/Obesity | |
| No | 78.9% (116) |
| Yes | 21.1% (31) |
| Medical Diagnosis of High Blood Pressure | |
| No | 88.4% (130) |
| Yes | 11.6% (17) |
| Medical Diagnosis of High Cholesterol | |
| No | 84.4% (124) |
| Yes | 15.6% (23) |
| General Health Status | |
| Very Poor | 12.9% (19) |
| Poor | 7.50% (11) |
| Fair | 19.0% (28) |
| Good | 28.6% (42) |
| Very Good | 23.8% (35) |
| Excellent | 8.20% (12) |
| Informed about CVD | |
| Not at all | 5.40% (8) |
| Slightly | 18.4% (27) |
| Moderately | 17.7% (26) |
| Quite a lot | 42.9% (63) |
| Extremely | 15.6% (23) |
| Concern about developing CVD | |
| Not at all | 39.5% (58) |
| Slightly | 30.6% (45) |
| Moderately | 21.1% (31) |
| Quite a lot | 5.40% (8) |
| Extremely | 3.40% (5) |

### 4.6. Knowledge of CVD Risk Factors

For each of the six CVD risk factors tested, the scores on the three sub-component questions testing conditional, factual, and internalized knowledge were summed to determine the level of knowledge of that risk factor. The average summary scores for each risk factor is provided in Table 2. An analysis of variance test was used to compare the means of the sum of scores across the six risk factors. A statistically significant difference ($F(5, 730) = 54.602$, $p < 0.0005$) was found in the means of the summary scores of the three sub-component questions across the six CVD risk factors tested. In contrast, an analysis of variance showed no significant difference ($F(4, 584) = 2.047$, $p = 0.086$) in the means of the summary scores of the three sub-component questions across the five general CVD risk factors: being overweight/obese, smoking at least one cigarette a day on average, high blood pressure, insufficient physical activity, and high cholesterol. Similarly, a Chi-squared test conducted to compare knowledge across the five general CVD risk factors, which again includes all the risk factors tested excluding MI, showed no significant difference ($\chi^2$ (4) = 1.97, $p$ = 0.742) in the percent of people with knowledge across the five CVD risk factors.

Table 2

*Average summary scores across conditional, factual, and internalized knowledge*

| Variable | Mean ± SD |
|---|---|
| Overweightness/Obesity | 11.02 ± 1.73 |
| Smoking at least one cigarette a day on average | 11.69 ± 1.53 |
| Mental illness | 7.24 ± 1.42 |
| Hypertension | 11.02 ± 1.63 |
| Insufficient physical activity | 11.46 ± 1.66 |
| Hypercholesterolemia | 11.69 ± 1.49 |

In contrast, a Chi-squared test revealed a significant difference ($\chi^2$ (5) = 13.52, $p$ = 0.019) in the percent of people who showed knowledge (i.e., had a summary score of 11 or higher) across the six CVD risk factors tested. While only 34% (n = 50) of participants knew MI was a risk factor for CVD, 82.3%, 75.5%, 70.1%, 72.8%, and 78.9% of participants knew that overweightness/obesity, smoking at least one cigarette a day, hypertension, insufficient exercise, and hypercholesterolemia were CVD risk factors, respectively (Figure 1).

The average summary score across from the three subcomponent questions for MI was 7.24 ± 1.42. The summary scores for the remaining five general CVD risk factors were averaged for each participant. The average of the summary score of the five general CVD risk factors was then calculated and found to be 11.38 ± 1.04. A paired-samples t-test was then conducted to compare the level of knowledge of MI to the average level of knowledge of the five general CVD risk factors. Subsequently, a significant difference ($t$(146) = -10.630, $p < 0.0005$) in the means of the summary scores between MI ($M$ = 7.24, $SD$ = 1.42) and the average summary score across the five general CVD risk factors ($M$ = 11.38, $SD$ = 1.04) was found. The average summary scores across the five general CVD risk factors was then recoded into expressing knowledge (average score of 11 or higher) or not expressing knowledge (average score below 11). Then a Chi-squared test was conducted to compare knowledge of MI to the average knowledge of the five general CVD risk factors. A significant difference ($\chi^2$ (1) = 5.77, $p$ = 0.016) was found between knowledge of MI and the average knowledge of the general CVD risk factors. These findings are summarized in Table 3.

Table 3

*Indication of the level of knowledge and knowledge of the CVD risk factors tested*

| Category | Sig. |
|---|---|
| Level of knowledge across all six CVD risk factors[a] | < 0.0005 |
| Level of knowledge across the five general CVD risk factors[b] | 0.086 |
| Level of knowledge of mental illness compared to the average level of knowledge of the five general CVD risk factors | < 0.0005 |
| Knowledge across all six CVD risk factors | 0.019 |
| Knowledge across the five general CVD risk factors | 0.742 |
| Knowledge of mental illness compared to the average level of knowledge of the five general CVD risk factors | 0.016 |

*Note.* The sum of the scores across the three questions testing conditional, factual, and internalized knowledge represents level of knowledge of a risk factor. A summary score of eleven or higher represents knowledge of that factor being a risk factor for CVD.

[a] Six CVD risk factors: overweightness/obesity, smoking 1/+ cigarettes, mental illness, hypertension, insufficient exercise, high cholesterol.

[b] Five general CVD risk factors: the six CVD risk factors tested excluding mental illness

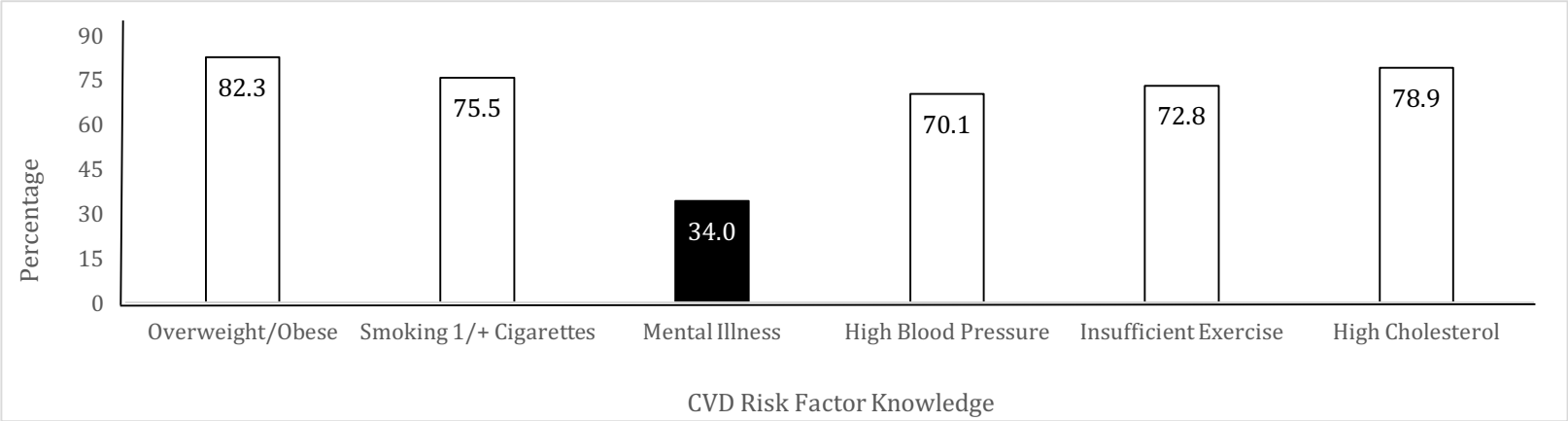


*Figure 1.* Percent of participants with knowledge of the CVD risk factors. This chart portrays the proportion of participants who scored a sum of 11 or higher across the three questions for each CVD risk factor, indicating knowledge of that CVD risk factor.

### 4.7. Variations in Scores and Knowledge

There were no significant differences in summary scores or knowledge of any of the six CVD risk factors based on differences in the demographic variables or participant characteristics listed in Table 1a and Table 1b, respectively. Of note, multinomial logistic regression analysis revealed no significant differences in knowledge of MI based on education level ($\chi^2$ (1) = 0.001, $p$ = 0.977) or how informed they perceived themselves to be about CVD ($\chi^2$ (1) = 0.108, $p$ = 0.724).

Data on smoking, exercise behavior, and overweightness/obesity were also collected. This data was used to determine if there were any significant differences in knowledge of respective CVD risk factors, namely, smoking, exercise, and overweightness/obesity and if there were any significant differences in how susceptible or concerned they reported feeling about developing CVD. An independent-samples t-test showed no significant difference ($t$(145) = 1.341, $p$ = 0.182) in the knowledge of smoking as a CVD risk factor based on whether participants smoked ($M$ = 1.67, $SD$ = 0.48) or did not smoke ($M$ = 1.78, $SD$ = 0.42). Similarly, there was no significant difference ($t$(145) = 0.420, $p$ = 0.680) in the knowledge of lack of exercise as a CVD risk factor based on whether participants exercised sufficiently ($M$ = 1.67, $SD$ = 0.49) or not ($M$ = 1.73, $SD$ = 0.45). There was also no significant difference ($t$(145) = 1.086, $p$ = 0.279) in the knowledge of overweightness/obesity as a CVD risk factor based on whether participants were overweight/obese ($M$ = 1.80, $SD$ = 0.40) or of normal weight ($M$ = 1.87, $SD$ = 0.34). Finally, as shown in Table 4, independent samples t-tests revealed no significant differences in perceived susceptibility or concern for developing CVD based on weight status (p = 0.322), smoking behavior (p = 0.089), or amount of exercise (p = 0.315).

Table 4

*Independent samples t-test: differences in perceived susceptibility to CVD*

| CVD Risk factor | Mean ± SD | df | t | Sig. |
|---|---|---|---|---|
| Weight status | | 145 | 0.993 | 0.322 |
| Overweight/Obese | 1.95 ± 1.10 | | | |
| Normal Weight | 2.13 ± 1.02 | | | |
| Smoking behavior | | 145 | 1.713 | 0.089 |
| Smoking 1/+ cigarettes a day on average | 2.16 ± 0.96 | | | |
| Non-smoker | 1.93 ± 1.08 | | | |
| Physical activity | | 145 | 1.009 | 0.315 |
| Gets less than recommended amount | 2.04 ± 1.10 | | | |
| Gets recommended amount | 1.82 ± 0.41 | | | |

# Chapter 5: Discussion

## 5.1. Summary of Central Findings

Individuals with MI are two times as likely to develop and three times as likely to die from CVD (Baker & Goldie, 2014). The purpose of the present study was thus, to determine whether individuals with MI knew that MI is a risk factor for CVD to assess the awareness of their increased risk for CVD due their MI, compared to the general population. To compare knowledge of MI, knowledge of five other general CVD risk factors was assessed. It was hypothesized that individuals with MI currently do not know that they have a higher CVD risk. The results of the present study support this hypothesis. There was a significant difference in the sum of scores on the three sub-component questions testing conditional, factual, and internalized knowledge across the six different CVD risk factors. There was also a significant difference in the percent of participants who scored a total of 11 or higher across the three sub-component questions for each variable/risk factor, indicating knowledge of that particular variable being a risk factor for CVD.

The sums of the scores for the five general CVD risk factors were also compared to determine if participants lacked knowledge on any of the other risk factors that commonly affect this population. No significant difference was found in the sums of scores across the five different CVD risk factors. There was also no significant difference in the percent of participants who scored a sum total of 11 or higher across the three sub-component questions for each of the five variables/risk factors, indicating knowledge of that variable being a risk factor for CVD. Because there was no significant difference in scores and knowledge across the five general CVD risk factors, the average summary

scores of the five general CVD risk factors were calculated and compared to the summary scores for MI. A significant difference in scores between MI and the average of the summary scores of the general risk factors was found, in terms of both level of knowledge and knowledge. In addition to this, while at least 70.0% of participants indicated knowledge (scored 11 or higher) for each of the five general CVD risk factors, only 34.0% of participants knew that MI was a CVD risk factor. Seventy percent of participants also felt little to no concern about developing CVD, despite the fact that MI doubles their CVD risk, further highlighting the lack of knowledge of MI being a risk factor for CVD among this population. The findings of this study were consistent with the results obtained from the pilot study conducted among fifty individuals with MI.

The results of the study also supported previous statistics of individuals with MI being more likely to have other CVD risk factors than the general population, increasing their CVD risk (Hert et al., 2009; Ross, 2014; Scott et al., 2012; Stapelberg et al., 2011). Compared to the 22.4% of participants that smoke, 20.7% of the general population smoke at least one cigarette a day (SAMHSA, 2017). Compared to the 73.5% of participants who are not engaging in the recommended amount of physical activity required for the maintenance of proper cardiovascular health, 48.3% of the general population did not get sufficient exercise (CDC, 2017). As such, participants in the study were more likely to smoke and less likely to get the required amount of physical activity than the general population. Therefore, it is important to increase the knowledge of this population about their higher risk for CVD, to increase their likelihood of engaging in healthy behaviors and reduce or stop unhealthy habits.

The present study was undertaken to determine whether individuals with MI need to be educated about their increased risk for CVD before trying to improve their self-efficacy and communication skills in preparation to encourage them to discuss their cardiovascular health with their providers and request necessary screenings and services. This reasoning was founded on reports of individuals with MI not being screened appropriately for CVD risk factors. This was exemplified in the present study as well. Specifically, although 54.4% of participants were overweight or obese based on their heights and weights, only 21.1% of participants were told by a medical professional that they were, in fact, overweight or obese. It is also important to note that least 21.9% of individuals with MI between the ages of 18 and 35 are expected to be hypertensive and at least 24.1% are expected to have high cholesterol (SAMHSA, 2012). Therefore, although data on the blood pressure and cholesterol levels of participants were not collected in the present study, the percent of participants who reported being medically diagnosed with blood pressure (11.6%) or cholesterol (15.6%), was very low. These results provide further justification for why the present study was needed. Additionally, it highlights the urgency for improving CVD risk factor screening rates among individuals with MI, since this population is still receiving poorer quality cardiovascular health care.

### 5.2. Implications and Directions for Future Research and Intervention

The premise behind the development and completion of the present study was to determine the next steps to improve that cardiovascular health care that individuals with MI receive and lower their risk for poor cardiovascular health outcomes. As stated previously, the results of this study have revealed that individuals with MI do not know that they are at higher risk for developing CVD than the general population. Therefore,

interventions to increase the awareness and knowledge of individuals with MI regarding their increased CVD risk associated with having a MI, is immediately warranted. Once these individuals with MI know that they are more likely to develop CVD and in turn perceive themselves to be more susceptible to developing and dying from CVD, interventions to improve their communication skills and confidence in discussing this information with their primary care providers can be implemented. This will likely increase the CVD risk factor screenings and other necessary services that this population receives, which in turn may improve their health outcomes (Adams, 2010).

While having these conversations with and asking for CVD risk factor screenings from primary care providers is likely to increase the both the quantity of appropriate services and quality of care this population receives, targeting primary care providers and the care they provide directly remains a necessity to further increase the likelihood of this population receiving appropriate medical care. Thus, it is important to design and conduct interventions to increase the knowledge of the increased CVD risk that individuals with MI have, among primary care providers and other health professionals. In addition to this, it is important to continue researching the reasons behind the stigmatizing attitudes that many health care professionals hold against individuals with MI and how best to address these attitudes. These strategies should then be applied improve on current interventions as well as develop new interventions to reduce stigma around and discriminatory practices against individuals with MI within the medical field.

Informing and educating individuals with MI about their increased risk for CVD may also increase their initiation and maintenance of healthy behaviors in behavior and lifestyle interventions conducted among this population of individuals with MI

(Middleton et al., 2013). Knowledge is a critical component in widely used behavior change models, such as the Transtheoretical Model and the Health Belief Model. As such, previously implemented lifestyle interventions that utilized these models and included knowledge components were typically more effective than interventions without a knowledge component. Therefore, there is reason to believe that including a knowledge component about the increased risk for CVD in interventions that target individuals with MI may improve the effectiveness of the intervention by increasing the practice of healthy behaviors among individuals with MI, which in turn would improve their cardiovascular health and reduce their risk for CVD. Additional research should be conducted to determine whether including the knowledge improves uptake of healthy behaviors among this population and how best to include such a component in future interventions. If interventions to improve knowledge about the increased risk for CVD among both individuals with MI and healthcare providers, encourage communication between patients and providers regarding the provision of necessary cardiovascular care, reduce stigma against MI among providers are implemented in concert with lifestyle interventions that include a knowledge component, the cardiovascular health of individuals with MI may be improved substantially.

Additionally, as explained in the limitations section below, this study could be repeated with a random sample of individuals with MI to obtain more scientifically rigorous results. In the present study, participants were asked whether they had three CVD risk factors (being overweight/obese, smoking at least one cigarette a day, and not getting the recommended amount of exercise weekly). No significant differences in CVD risk perception based on whether or not the participants had these risk factors were found

in this study. However, future studies could test additional CVD risk factors, and collect this data directly instead of using a self-report system, to determine whether having those risk factors influences the perceived risk or concern about developing CVD among this population.

### 5.3. Limitations

Limitations of this study warrant caution when interpreting the results. The study sample was not obtained randomly and was instead obtained as a convenience sample, which may not be representative of the overall population of young adults with MI. However, mental health care facilities that serve racially and ethnically diverse catchment populations in both lower and higher-income areas were selected purposively to obtain as diverse and representative of a sample as possible. Nevertheless, repeating the study with a random sample of young adults with MI may yield more scientifically rigorous results.

Another limitation is that because data were self-reported by participants, it is possible that participants may have provided socially desirable answers. However, because the survey was anonymous and no identifying information was collected from participants, participants in this study may have been more willing and comfortable with answering truthfully. Still, participant response bias cannot be ruled out in the study, especially for the lifestyle and behavior-related questions about smoking, physical activity, and weight, which was used to determine what additional CVD risk factors this population had. Therefore, collecting this data directly, through biological tests, for instance, may produce more accurate results.

Finally, while a pilot study was conducted among 50 individuals with MI between the ages of 18 and 30 previously, there are currently no known studies that have aimed to

determine knowledge of MI being a risk factor for CVD among the population of individuals with MI. However, this study thus, adds to the literature and current understanding about the associations between MI and CVD. Additionally, the present study can be used to design similar studies in the future that can then be used to corroborate the results obtained in this study.

### 5.4. Conclusion

As stated previously, individuals with MI are not screened for CVD risk factors to the extent necessary to reduce the risk of developing and dying from CVD due to a combination of lack of knowledge of MI increasing the risk of CVD, stigmatizing attitudes against individuals with MI, and the subsequent poorer quality of health care provided to this population, by healthcare providers. Interventions that involve encouraging and enabling individuals with MI to directly ask their physicians to provide the necessary services and screenings has been suggested as a way to improve both the quality of cardiovascular healthcare and quantity of related services that are provided to this vulnerable population.

However, due to time and resource limitations, it is important to determine whether individuals with MI are aware of their increased risk for CVD before developing and implementing interventions that aim to improve the communications skills and self-efficacy of these individuals to initiate these conversations with their providers. This study highlighted the limited awareness that individuals with MI have about MI being a CVD risk factor, indicating the need to educate this population about their increased risk for CVD. This, in turn, may increase their likelihood of initiating and maintaining healthy behaviors and better prepare them to have open discussions with their providers to

request necessary medical procedures pertinent to cardiovascular health. Subsequently, their risk of developing and dying from CVD may be lowered, thereby reducing the incidence of comorbid CVD and MI among this population. Not only would this result in substantial financial savings for the nation as a whole, but it would also reduce the stress, financial strain, and hardship that individuals with MI and their family members face, offering some much-needed relief to a population whose physical has been unfairly neglected for several decades.

## Appendix A

Email Providers Sent Out to Patient Base

[Greeting]

I am sending this email to let you know that a researcher from the University of Maryland, School of Public Health will be coming into the [center/facility] to administer a 15-minute survey to patients during the wait times before your appointment with me. Those of you who are between the ages of 18 and 30 are eligible to take the survey.

The survey is completely voluntary and anonymous and no information that could be used to identify you will be collected. You are under no obligation to participate in the survey and your decision to participate will not affect the care and services that you will receive currently or in the future from this or any other health care facility because your individual responses will not be shared with me or anyone else.

I would like to take this opportunity to thank you for your cooperation with the researcher. If you have any questions or concerns about this study, please do not hesitate to contact the researcher, Reshma Roy, at reshmaroy512@gmail.com or 301-267-3982.

Sincerely,
[Name]

## Appendix B

Announcement Made by Researcher on Participant Recruitment Days

Good [morning/afternoon],

My name is Reshma Roy. As stated in the email sent out to you all by your provider, Dr. [name], I am conducting a study about cardiovascular disease awareness among individuals between the ages of 18 and 30. The study involves taking a 15-minute survey while you wait here in the office. Participation in the study is completely voluntary and anonymous and you can quit the survey at any time. Your decision to participate will not affect the care and services that you will receive currently or in the future from this or any other health care facility because your individual responses are completely confidential and will not be shared with your provider or anyone else. I would like to thank you for your cooperation. I will approach you individually to determine whether you meet the eligibility criteria for the study and whether you are interested in participating in the study.

## Appendix C

Consent Form for iPad Survey

This research is being conducted through the University of Maryland, College Park to determine awareness of risk factors of heart disease of individuals between the ages of 18 and 30. The survey, which takes about 15 minutes to complete, is completely voluntary. You are not obligated to take the survey in any way. You may choose not to take part at all. If at any point during the survey, you wish to quit, you are free to do so. The survey is anonymous, meaning no identifying information will be collected.

Your decision to participate will not affect the care or services that you receive within this or any other health care facility, now or in the future, because your individual responses are completely confidential and will not be shared with your provider or anyone else. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized. No one other than the researcher will be able to see your responses. All results will be stored on a password-protected computer and deleted after use in this study.

No major risks or discomfort involving participation is anticipated. If you have any questions or concerns at this time, please raise your hand and I will come over to you to address your concerns and answer your questions.

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Please keep the separate, paper copy of this page for your personal records. If you have any questions, concerns, or complaints, please do not hesitate to contact me:

Reshma Roy
Email: reshmaroy512@gmail.com
Phone: 301-267-3982

If you have questions about your rights as a research participant, please contact:

University of Maryland College Park
Institutional Review Board Office
1204 Marie Mount Hall
College Park, Maryland, 20742
E-mail: irb@umd.edu
Telephone: 301-405-0678

This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

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**Please check one of the boxes below:**

☐ **I have read this consent form, my questions have been answered to my satisfaction, and I voluntarily agree to participate in this research study**

-If you checked this box, you may begin the survey by clicking 'next' at the bottom right of this page. Once you finish the survey, please return the iPad to me.

☐ **I do not wish to participate**

-If you checked this box, please return the iPad to me at this time.

## Appendix D

Consent Form for Paper Survey

This research is being conducted through the University of Maryland, College Park to determine awareness of risk factors of heart disease of individuals between the ages of 18 and 30. The survey, which takes about 15 minutes to complete, is completely voluntary. You are not obligated to take the survey in any way. You may choose not to take part at all. If at any point during the survey, you wish to quit, you are free to do so. The survey is anonymous, meaning no identifying information will be collected.

Your decision to participate will not affect the care or services that you receive within this or any other health care facility, now or in the future, because your individual responses are completely confidential and will not be shared with your provider or anyone else. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized. No one other than the researcher will be able to see your responses. All results will be stored on a password-protected computer and deleted after use in this study.

No major risks or discomfort involving participation is anticipated. If you have any questions or concerns at this time, please raise your hand and I will come over to you to address your concerns and answer your questions.

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Please keep the separate, paper copy of this page for your personal records. If you have any questions, concerns, or complaints, please do not hesitate to contact me:

Reshma Roy
Email: reshmaroy512@gmail.com
Phone: 301-267-3982

If you have questions about your rights as a research participant, please contact:

University of Maryland College Park
Institutional Review Board Office
1204 Marie Mount Hall
College Park, Maryland, 20742
E-mail: irb@umd.edu
Telephone: 301-405-0678

This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

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**Please check one of the boxes below:**

☐ **I have read this consent form, my questions have been answered to my satisfaction, and I voluntarily agree to participate in this research study**

-If you checked this box, you may begin the survey on the next page in this packet. Once you finish the survey, please return this packet to me.

☐ **I do not wish to participate**

-If you checked this box, please return this packet to me at this time.

## Appendix E

Cardiovascular Disease Risk Factor Knowledge Questionnaire

**Individuals between the ages of 18 and 30 are eligible to take this survey. The following survey is completely voluntary. You are under no circumstances required to complete the survey. Your decision to complete this survey will in no way affect any care or services that you receive within this or any other health care facility, now or in the future. If at any point during the survey, you wish to quit, you are free to do so. This is an anonymous survey, meaning no identifying information will be collected. Please do not hesitate to ask if you have any questions or concerns. Simply raise your hand at any time and I will come over to you to answer any questions that you may have.**

**I understand that the survey I am about to take is voluntary and anonymous. By clicking "next," I provide my consent to take the survey.**

Please select the answer that best represents your agreement to each statement.

| Statement | Strongly Disagree | Disagree | Neither agree nor disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|
| If I am or become overweight/obese, then my possibility of getting heart disease will increase | 1 | 2 | 3 | 4 | 5 |
| If I smoke one or more cigarettes a day, then my possibility of getting heart disease will increase | 1 | 2 | 3 | 4 | 5 |
| If I have a mental illness, then my possibility of getting heart disease will increase | 1 | 2 | 3 | 4 | 5 |
| If I have high blood pressure, then my possibility of getting heart disease will increase | 1 | 2 | 3 | 4 | 5 |
| If I do not exercise regularly, then my possibility of getting heart disease will increase | 1 | 2 | 3 | 4 | 5 |
| If I have high blood cholesterol, then my possibility of getting heart disease will increase | 1 | 2 | 3 | 4 | 5 |

Please select one answer for each question.

| | | | |
|---|---|---|---|
| Being overweight/obese increases a person's risk for developing heart disease. | True | False | I don't know |
| Smoking one or more cigarettes a day increases a person's risk for developing heart disease. | True | False | I don't know |
| Having a mental illness increases a person's risk for developing heart disease. | True | False | I don't know |
| Having a high blood pressure increases the person's risk for developing heart disease. | True | False | I don't know |
| Not exercising regularly increases a person's risk for developing heart disease. | True | False | I don't know |
| Having high cholesterol increases a person's risk for developing heart disease. | True | False | I don't know |

Please select one answer for each statement.

| Statement | Very Low | Low | Medium | High | Very High |
|---|---|---|---|---|---|
| My likelihood of getting heart disease if I am or become overweight/obese is | 1 | 2 | 3 | 4 | 5 |
| My likelihood of getting heart disease if I smoke one or more cigarettes a day is | 1 | 2 | 3 | 4 | 5 |
| My likelihood of getting heart disease if I have a mental illness is | 1 | 2 | 3 | 4 | 5 |
| My likelihood of getting heart disease if I have high blood pressure is | 1 | 2 | 3 | 4 | 5 |
| My likelihood of getting heart disease if I don't exercise regularly is | 1 | 2 | 3 | 4 | 5 |
| My likelihood of getting heart disease if I have high cholesterol is | 1 | 2 | 3 | 4 | 5 |

**Demographics**

Sex: ☐ Male
☐ Female

Age: _____ years old

Which race do you most closely identify with?
☐ American Indian or Alaska Native Asian
☐ Black or African American
☐ Asian American
☐ Native Hawaiian or Pacific Islander
☐ White or Caucasian
☐ Other (please specify:
_____)

Are you of Hispanic or Latino descent? □ Yes □ No

What is your marital status?
□ Married/living with partner
□ Divorced
□ Widowed
□ Single

Are you currently employed for pay?
□ Yes, full-time
□ Yes, part-time
□ No, looking for work
□ No, disabled
□ Other_____

What is your highest grade you completed in school:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Elementary: | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| High school: | 9 | 10 | 11 | 12 | | | | | |
| GED: | 12 | | | | | | | | |
| College/technical school: | 13 | 14 | 15 | 16 | | | | | |
| Graduate: | 17 or more | | | | | | | | |

Please estimate your total yearly household income:
□ Less than $10,000
□ $10,000 to $19,999
□ $20,000 to $29,999
□ $30,000 to $39,999
□ $40,000 to $49,999
□ $50,000 to $59,999
□ $60,000 to $69,999
□ $70,000 to $79,999
□ $80,000 or more

Including yourself, how many people are supported on this income? _____ people

**Personal Characteristics**
Please select one answer to each question unless indicated otherwise.

Indicate your mental illness (check all that apply):

- ☐ Depression
- ☐ Anxiety
- ☐ Bipolar Disorder
- ☐ Psychotic Disorder/Schizophrenia
- ☐ Other (please specify: _____)

How long have you been living with a mental illness?

- ☐ Less than one year
- ☐ Two years
- ☐ Three years
- ☐ Four years
- ☐ Five years
- ☐ Six or more years

Indicate whether you are currently under any of the following treatments for your mental illness (check all that apply):

- ☐ Medication
- ☐ Behavioral Therapy/Counseling
- ☐ Other (please specify: _____)

How long have you been under treatment for your mental illness?

- ☐ Less than one year
- ☐ Two years
- ☐ Three years
- ☐ Four years
- ☐ Five years
- ☐ Six or more years

Indicate your height: _____ feet _____ inches

Indicate your weight: _____ pounds

Has a medical professional ever diagnosed you with high blood pressure?

- ☐ No
- ☐ Yes

Has a medical professional ever diagnosed you with high cholesterol?

☐ No
☐ Yes

Has a medical professional ever told you that you are overweight or obese?

☐ No
☐ Yes

On average, do you smoke one or more cigarettes per day?

☐ No
☐ Yes

On average, how much do you exercise per week?

☐ Less than 1 hour/week
☐ 1 - 1.5 hours/week
☐ 1.5 - 2 hours/week
☐ 2 - 2.5 hours/week
☐ 2.5 - 3 hours/week
☐ More than 3 hours/week

Would you say that in general your health is:

□ Very Poor □ Poor □ Fair □ Good □ Very Good □ Excellent

At this point in time, how informed about heart disease do you think you are?

□ Not at all □ Slightly □ Moderately □ Quite a lot □ Extremely

At this point in time, how concerned are you about having heart disease?

□ Not at all □ Slightly □ Moderately □ Quite a lot □ Extremely

**Your responses have been recorded. Thank you for your participation!**

## Appendix F

Recruitment Steps and Procedures Followed

*IRB Approval.* Obtained June 20, 2017

IRB Approval to conduct the study was obtained from the University of Maryland Institutional Review Board on June 20, 2017.

*Rolling Recruitment.*

Once IRB approval was obtained, a rolling recruitment procedure was used to recruit participants. Based on power and sample size calculations, a sample of 146 individuals was necessary to determine a 10% difference in knowledge between the different risk factors with a power of 80% power at significance level of 0.05. In the preliminary study conducted as a pilot test among the 50 individuals with MI, 4% of surveys were incomplete and thus had to be excluded. Thus, a 4% incompletion rate was expected the present study as well and thus 152 participants were recruited. Once incomplete surveys were excluded, data from 147 participants remained.

*Facility Recruitment.* Rolling, completed by November 30, 2017

A rolling recruitment technique was utilized to recruit mental health care facilities until November 30, 2017. Preference was given to facilities that focused on serving young adults to obtain a greater number of eligible participants. Whenever possible, facilities with socioeconomically and racially and ethnically diverse catchment populations were selected to obtain samples that are more representative of the population. Health care providers of selected

facilities were contacted to explain the details of the study and ask for permission to recruit participants from their facilities.

*Recruitment Preparation.* Within one week of mental health care provider approval

Once the health care provider provided approval for use of their facility, the healthcare provider was asked to send an email (Appendix A) to their patient base explaining that in the following months, a researcher would be coming in to ask patients between the ages of 18 and 30 to complete a 10 to 15-minute survey during the wait times before their appointment.

*Participant Recruitment & Participation.* Rolling, completed by December 30, 2018

Each facility was visited during different times each week to recruit participants. Whenever possible, health care providers were asked what times were best to recruit patients between the ages of 18 and 30 to maximize the efficiency of participant recruitment. At each recruitment session, an announcement (Appendix B) was made by the researcher to explain the details of the study at each facility. Then any individual between the ages of 18 and 30 willing to participate was asked to complete the survey on iPads or on paper, based on his/her preference.

**Appendix G**

Study Recruitment Timeline

| Study Activity | June | July | Aug. | Sept. | Oct. | Nov. | Dec. |
|---|---|---|---|---|---|---|---|
| Facility Recruitment | | | | | | | |
| Participant Recruitment Email | | | | | | | |
| Participant Recruitment/ Participation | | | | | | | |

## Bibliography

Adams, R. J. (2010). Improving health outcomes with better patient understanding and education. *Risk Management and Healthcare Policy*, *3*, 61–72. http://doi.org/10.2147/RMHP.S7500

American Heart Association. (2014). Heart Health Screenings. Dallas, Texas: American Heart Association. Retrieved March 20, 2017 from http://www.heart.org/HEARTORG/Conditions/ Heart-Health-Screenings_UCM_428687_Article.jsp#.WNktCBLyu0c

American Psychiatric Association. (2014). Economic Impact of Integrated Medical-Behavioral Healthcare: Implications for Psychiatry. Denver, Colorado: Melek, S., Norris, D., & Paulus, J.

Alcalá, H. E., Albert, S. L., Roby, D. H., Beckerman, J., Champagne, P., Brookmeyer, R., ... Ortega, A. N. (2015). Access to Care and Cardiovascular Disease Prevention: A Cross-Sectional Study in 2 Latino Communities. Medicine, 94(34), e1441.

Archer, J., Bower, P., Gilbody, S., Lovell, K., Richards, D., Gask, L., . . . Coventry, P. (2012). Collaborative care for depression and anxiety problems. Cochrane Database of Systematic Reviews Reviews. doi:10.1002/14651858.cd006525.pub2

Awad, A., & Al-Nafisi, H. (2014). Public knowledge of cardiovascular disease and its risk factors in Kuwait: a cross-sectional survey. BMC Public Health, 14(2). doi:10.1186/1471-2458-14-1131

Baker, B. & Goldie, K. (2014). Mental illness linked to increased risk of heart disease. Canadian Cardiovascular Congress.

Baller, J. B., McGinty, E. E., Azrin, S. T., Juliano-Bult, D., & Daumit, G. L. (2015). Screening for cardiovascular risk factors in adults with serious mental illness: a review of the evidence. BMC Psychiatry, 15, 55. doi: 10.1186/s12888-015-0416-y

Bergman, H. E., Reeve, B. B., Moser, R. P., Scholl, S., & Klein, W. M. P. (2011). Development of a Comprehensive Cardiovascular Disease Knowledge and Risk Assessment Questionnaire. American Journal of Health Education / American Alliance for Health, Physical Education, Recreation, and Dance, 42(2), 74–87.

Björntorp, P. (1995). Neuroendocrine abnormalities in human obesity. Metabolism, 44, 38-41. doi:10.1016/0026-0495(95)90208-2

Björntorp, P., & Rosmond, R. (2000). Neuroendocrine abnormalities in visceral obesity. International Journal of Obesity, 24. doi:10.1038/sj.ijo.0801285

Board on Children, Youth, and Families, Institute of Medicine, & National Research Council. (2013). D, Background Paper: Pathways to Young Adulthood and Preventive Interventions Targeting Young Adults. Improving the Health, Safety, and Well-Being of Young Adults: Workshop Summary. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK202209/.

Burton, A., Osborn, D., Atkins, L., Michie, S., Gray, B., Stevenson, F., . . . Walters, K. (2015). Lowering Cardiovascular Disease Risk for People with Severe Mental Illnesses in Primary Care: A Focus Group Study. PLoS ONE, 10(8), e0136603. doi:10.1371/ journal.pone.0136603

Chapman, E. N., Kaatz, A., & Carnes, M. (2013). Physicians and Implicit Bias: How Doctors May Unwittingly Perpetuate Health Care Disparities. Journal of General Internal Medicine, 28(11), 1504–1510. http://doi.org/10.1007/s11606-013-2441-1

Centers for Disease Control & Prevention. (2017). Exercise or Physical Activity. Atlanta. GA.

Chauvet-Gélinier, J., Trojak, B., Vergès-Patois, B., Cottin, Y., & Bonin, B. (2013). Review on depression and heart disease. Arch Cardiovasc Dis, 106-113.

Farholm, A., & Sørensen, M. (2016). Motivation for physical activity and exercise in severe mental illness: A systematic review of cross-sectional studies. International Journal of Mental Health Nursing, 25(2), 116-126. doi:10.1111/inm.12217

Fleishhacker, W. W., Cetkovich-Bakmas, M., Hert, M. D., Hennekens, C. H., Lambert, M., Leucht, S., . . . Lieberman, J. A. (2008). Comorbid Somatic Illnesses in Patients With Severe Mental Disorders. *The Journal of Clinical Psychiatry,69*(4), 514-519. doi:10.4088/jcp.v69n0401

Gierisch, J. M., Nieuwsma, J. A., Bradford, D. W., Wilder, C. M., Mann-Wrobel, M. C., Mcbroom, A. J., . . . Williams, J. W. (2013). Interventions To Improve Cardiovascular Risk Factors in People With Serious Mental Illness. Comparative Effectiveness Review No. 105. AHRQ Publication No. 13-EHC063-EF. Rockville, MD: Agency for Healthcare Research and Quality

Glanz, K., Rimer, B.K. & Lewis, F.M. (2002). *Health Behavior and Health Education. Theory, Research and Practice.* San Fransisco: Wiley & Sons.

Goetzel, R. Z., Long, S. R., Ozminkowski, R. J., Hawkins, K., Wang, S., & Lynch, W. (2004). Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. J Occup Environ Med, 46, 398–412.

Graham, I. M., & Cooney, M. (2015). Evidence for Preventing Cardiovascular Disease. Prevention of Cardiovascular Diseases, 301-308. doi:10.1007/978-3-319-22357-5_28

Gronholm, P. C., Henderson, C., Deb, T., & Thornicroft, G. (2017). Interventions to reduce discrimination and stigma: the state of the art. Social Psychiatry and Psychiatric Epidemiology, 52(3), 249-258. doi:10.1007/s00127-017-1341-9

Hert, M. D., Dekker, J., Wood, D., Kahl, K., Holt, R., & Möller, H. (2009). Cardiovascular disease and diabetes in people with severe mental illness position statement from the European Psychiatric Association (EPA), supported by the European Association for the Study of Diabetes (EASD) and the European Society of Cardiology (ESC). *European Psychiatry,24*(6), 412-424. doi:10.1016/j.eurpsy.2009.01.005

James, J. (2013, February). Health Policy Brief: Patient Engagement. *Health Affairs.* doi: 10.1377/hpb20130214.898775

Kalarchian, M. A., Marcus, M. D., Levine, M. D., Haas, G. L., Greeno, C. G., Weissfeld, L. A., & Qin, L. (2005). Behavioral Treatment of Obesity in Patients Taking Antipsychotic Medications. The Journal of Clinical Psychiatry, 66(08), 1058-1063. doi:10.4088/jcp.v66n0815

Kisely, S. (2005). Mortality in individuals who have had psychiatric treatment: Population-based study in Nova Scotia. The British Journal of Psychiatry, 187(6), 552-558. doi:10.1192/bjp.187.6.552

Khayyam-Nekouei, Z., Neshatdoost, H., Yousefy, A., Sadeghi, M., & Manshaee, G. (2013). Psychological factors and coronary heart disease. *ARYA Atherosclerosis*, *9*(1), 102–111.

Knaak, S., Mantler, E., & Szeto, A. (2017). Mental illness-related stigma in healthcare. Healthcare Management Forum, 30(2), 111-116. doi:10.1177/0840470416679413.

Lawrence, D., Holman, C. D. J., & Jablensky, A. V. (2001). Preventable physical illness in people with severe mental Illness. Perth: The University of Western Australia.

Lawrence, D., & Kisely, S. (2010). Review: Inequalities in healthcare provision for people with severe mental illness. Journal of Psychopharmacology, 24(4 Suppl), 61-68. doi:10.1177/1359786810382058

Leggatt, M. (2002). Families and mental health workers: the need for partnership. *World Psychiatry*, *1*(1), 52–54.

Lerman, A. (2005). Endothelial Function: Cardiac Events. Circulation, 111(3), 363-368. doi:10.1161/01.cir.0000153339.27064.14

Leucht, S., Burkhard, T., Henderson, J., Maj, M., & Sartorius, N. (2007). Physical illness and schizophrenia: A Review of the Evidence. Cambridge: Cambridge University Press.

Lings, P., Evans, P., Seamark, D., Seamark, C., Sweeney, K., Dixon, M., & Gray, D. P. (2003). The doctor—patient relationship in US primary care. *Journal of the Royal Society of Medicine*, *96*(4), 180–184.

Malik, S. (2004). Impact of the Metabolic Syndrome on Mortality From Coronary Heart Disease, Cardiovascular Disease, and All Causes in United States Adults. Circulation, 110(10), 1245-1250. doi:10.1161/01.cir.0000140677.20606.0e

Marder, S. R., Essock, S. M., Miller, A. L., Buchanan, R. W., Casey, D. E., & Davis, J. M. (2004). Physical health monitoring of patients with schizophrenia. Am J Psychiat 161(8), 1334–1349

Mark, T. L., Wier, L. M., Malone, K., Penne, M., & Cowell, A. J. (2015). National Estimates of Behavioral Health Conditions and Their Treatment Among Adults Newly Insured Under the ACA. PS Psychiatric Services, 66(4), 426-429. doi:10.1176/appi.ps.201400078

McClendon, D. (2011). Perceived Susceptibility and Knowledge of Cardiovascular Disease as a Moderator of Relationships between Perceived Severity and Cardiovascular Health Promoting Behaviors. Dissertation, Georgia State University.

Mcdaid, D., & Park, A. (2014). Counting All the Costs: The Economic Impact of Comorbidity. Comorbidity of Mental and Physical Disorders Key Issues in Mental Health, 23-32. doi:10.1159/000365941

Mehta, N., Clement, S., Marcus, E., Stona, A. C., Bezborodovs, N., Evans-Lacko, S., . . . Thornicroft, G. (2015). Evidence for effective interventions to reduce mental health-related stigma and discrimination in the medium and long term: systematic review. The British Journal of Psychiatry, 207(5), 377-384. doi:10.1192/bjp.bp.114.151944

Middleton, K. R., Anton, S. D., & Perri, M. G. (2013). Long-Term Adherence to Health Behavior Change. *American Journal of Lifestyle Medicine*, *7*(6), 395–404. http://doi.org/10.1177/1559827613488867

Millar, H. (2008). Management of physical health in schizophrenia: a stepping stone to treatment success. Eur Neuropsychopharmacol, 18, S121–S128.

Miller, S., Ringeisen, H., Munoz, B., Hedden, S. L., Colpe, L. J., Rohloff, H., & Embry, V. (2016). Correlates of Mental Health Service Use Among Young Adults With Mental Illness: Results From the National Survey on Drug Use and Health. Psychiatric Services, 67(6), 642-649. doi:10.1176/appi.ps.201400486

Mitchell, R. J., & Bates, P. (2011). Measuring Health-Related Productivity Loss. Population Health Management, 14(2), 93–98. http://doi.org/10.1089/pop.2010.0014

Mo, P. K., Chong, E. S., Mak, W. W., Wong, S. Y., & Lau, J. T. (2016). Physical Activity in People With Mental Illness in Hong Kong: Application of the Health Belief Model. Journal of Sport and Exercise Psychology, 38(2), 203-208. doi:10.1123/jsep.2015-0061

National Alliance on Mental Illness. (2012). Mental Health Conditions. Bethesda, MD: National Institute of Mental Health. Retrieved March 27, 2017 from http://www.nami.org/Learn-More/ Mental-Health-Conditions

National Alliance on Mental Illness. (n.d.). Stigma and Discrimination. Bethesda, MD: National Institute of Mental Health. Retrieved March 27, 2017 from https://www.nami.org/About-NAMI/Policy-Platform/Stigma-and-Discrimination

National Association of Realtors. (2014). Median Income: Family vs. Household. Chicago, IL: Hale, D.

National Institute of Mental Health (NIMH). (2017). Integrated Care. Bethesda, MD: National Institute of Mental Health.

National Institute of Mental Health (NIMH). (2008). The Numbers Count: Mental Disorders in America. Bethesda, MD: National Institute of Mental Health.

National Institute of Mental Health. SAMHSA National Survey on Drug Use and Health. (2015). A New Look at Racial/Ethnic Differences in Mental Health. Retrieved from https://www.nimh.nih.gov/news/science-news/2015/a-new-look-at-racial-ethnic-differences-in-mental-health.shtml

Osborn, D. P. J., Levy, G., Nazareth, I., Petersen, I., Islam, A., & King, M. (2007). Relative risk of cardiovascular and cancer mortality in people with mental illness. Arch Gen Psychiatry, 64, 242–249. doi: 10.1001/archpsyc.64.2.242

Piyaratn, P. (1982). Doctors' roles in primary health care. *Trop Doct. 12*(4), 196-202.

Prochaska, J. O., & Velicer, W. F. (1997). The transtheoretical model of health behavior change. *Am J Health Promot, 12*(1), 38-48.

Rosenstock, I. M. (1974). Historical Origins of the Health Belief Model). Health Education & Behavior, 2(4), 328-335.

Ross, S. (2014). Substance Abuse and Mental Illness. The American Psychiatric Publishing Textbook of Substance Abuse Treatment. doi:10.1176/appi.books.9781615370030.mg53

Scott, D., & Happell, B. (2011). The High Prevalence of Poor Physical Health and Unhealthy Lifestyle Behaviours in Individuals with Mental Illness. Issues in Mental Health Nursing, 32(9), 589-597. doi:10.3109/01612840.2011.569846

Scott, D., Platania-Phung, C., & Happell, B. (2012). Quality of Care for Cardiovascular Disease and Diabetes Amongst Individuals with Serious Mental Illness and Those Using Antipsychotic Medications. Journal for Healthcare Quality, 34(5), 15-21. doi:10.1111/j.1945-1474.2011.00155.x

Stapelberg, N. J., Neumann, D. L., Shum, D. H., Mcconnell, H., & Hamilton-Craig, I. (2011). A Topographical Map of the Causal Network of Mechanisms Underlying the Relationship Between Major Depressive Disorder and Coronary Heart Disease. Australian & New Zealand Journal of Psychiatry, 45(5), 351-369.

Substance Abuse and Mental Health Services Administration. (2015). Results from the 2014 National Survey on Drug Use and Health: Mental Health Findings. NSDUH Series H-50, HHS Publication No. 15-4927. Rockville, MD: Substance Abuse and Mental Health Services Administration.

Substance Abuse and Mental Health Services Administration. (2017). Smoking and Mental Illness among Adults in the United States. Rockville, MD: Lipari, R. & Horn, S.

Talbott, J. (2006). Prevalence, Severity, and Comorbidity of 12-Month DSM-IV Disorders in the National Comorbidity Survey Replication. Yearbook of Psychiatry and Applied Mental Health, 2006, 131-132.

Wallace, J. E. (2010). Mental health and stigma in the medical profession. Health: An Interdisciplinary Journal for the Social Study of Health, Illness and Medicine, 16(1), 3-18. doi:10.1177/1363459310371080

World Health Organization. (2017). Addressing comorbidity between mental disorders and major noncommunicable diseases. Geneva, Switzerland: Cohen, A.

World Health Organization. (2013). Investing in Mental Health. Geneva, Switzerland: Chisholm, D.

World Health Organization. (2004). WHO definition of cardiovascular disease. Geneva, Switzerland: World Health Organization.

Zschucke, E., Gaudlitz, K., & Ströhle, A. (2013). Exercise and Physical Activity in Mental Disorders: Clinical and Experimental Evidence. Journal of Preventive Medicine and Public Health, 46(Suppl 1), S12–S21.