Fall 2018

Service Use Among Individuals with Serious Mental Illness & Physical Health Problems

Laura May Kurzban

Recommended Citation

Kurzban, L. M.(2018). *Service Use Among Individuals with Serious Mental Illness & Physical Health Problems.* (Doctoral dissertation). Retrieved from https://scholarcommons.sc.edu/etd/5092

SERVICE USE AMONG INDIVIDUALS WITH SERIOUS MENTAL ILLNESS & PHYSICAL HEALTH PROBLEMS

by

Laura May Kurzban

Bachelor of Arts
Cornell University, 2004

Master of Arts
New York University, 2010

Submitted in Partial Fulfillment of the Requirements

For the Degree of Doctor of Philosophy in

Clinical-Community Psychology

College of Arts and Sciences

University of South Carolina

2018

Accepted by:

Bret Kloos, Major Professor

Michele Burnette, Committee Member

Cheryl Armstead, Committee Member

Sara Wilcox, Committee Member

Cheryl L. Addy, Vice Provost and Dean of the Graduate School

DEDICATION

To Prudence, Joan, and Apryl, your fortitude, resilience, and generosity lit the way.

For my mother Joan, we miss you. Also, thanks for always telling me to "look it up". You have indeed created a monster.

ACKNOWLEDGEMENTS

I want to express my gratitude to the participants of the HAF and HOME research studies. Thank you for sharing your experiences with us. A very special Thank You goes to my advisor Bret Kloos – your thoughtfulness, considered and considerate approach to service, knowledge and pragmatism embody the best parts of this profession's potential to build opportunities to grow. I'm indebted to my dissertation committee for their patience, insightful feedback, and support. I'd like to thank my clinical and research supervisors, faculty, and any other professionals I've worked with closely who provided critical guidance along the way and pushed me to be better. I count myself fortunate for your attention, care, and the chance I had to work with you. All those dedicated, diligent, and driven individuals I've worked alongside in so many settings, co-workers, social workers, research assistants, nurses, lab technicians, volunteers, post-docs, other graduate and undergraduate students, clinical interns, practicum students, and those who were "on the other side" and happy to help…Y'all make the world go 'round. To those that said "You can do it too!" your caring words and gestures meant more than I can say. Much love goes out to my emotional support network, Apryl, Rhea, David, Linda, Karen, Mike, and so many others (you know who you are) – thank you so much! To those that said "You'll never" … … I did, actually. Thanks for fueling the fire. Last but not least, to all the "non-traditional" students, graduates of the school of hard knocks, and prospective students and professionals out there, you can do it too, if it's your goal. This field needs us.

ABSTRACT

Introduction: This study examined the relationship between (a) physical health problems among individuals diagnosed with serious mental illness (SMI), (b) their demographic and psychosocial characteristics which may be risk and protective factors for physical health problems, and (c) the use of mental health case management services. *Methods*: Data collected from community mental health center consumers residing in supported housing (*N* = 357) included number of self-reported physical health problems and impairment. Services use and billing data were collected on targeted case management (TCM) and mental illness management services (MIMS). *Results*: Regression models indicated that older individuals, females, those with a mental illness diagnosis of a mood or anxiety disorder, and higher levels psychological distress were more likely to endorse higher numbers of physical health problems. Crosstabs showed that African-American females, older individuals, and those with a diagnosis of a thought disorder were more likely to experience the three most common physical health problems: hypertension, other cardiovascular illnesses, and diabetes. Tests of a moderation model of the relationship between physical health problems, impairment, and service use showed that with an increase in physical health problems, total and MIMS service use increased dependent on having a high level of working alliance. *Discussion*: Results highlighted subgroups at risk for worse physical health, the importance of working alliance in treatment, and provided information which can be used in screening, prevention, and intervention efforts.

TABLE OF CONTENTS

DEDICATION……………………………………………………………………iii

ACKNOWLEDGEMENTS………………………………………………………....iv

ABSTRACT………………………………………………………………………v

LIST OF TABLES……………………………………………………………….vii

LIST OF FIGURES……………………………………………………………..viii

CHAPTER 1: INTRODUCTION…………………………………………………1

CHAPTER 2: CONCEPTUAL FRAMEWORK, LITERATURE REVIEW,
AIMS & HYPOTHESES…………………………………………………………6

CHAPTER 3: METHODS………………………………………………………48

CHAPTER 4: RESULTS……………………………………………………...70

CHAPTER 5: DISCUSSION…………………………………………………...106

REFERENCES…………………………………………………………………118

APPENDIX A: CONCEPTUAL MODELS……………………………………139

APPENDIX B: SUMMARY OF STUDY MEASURES……..……………….…………141

APPENDIX C: STUDY PROTOCOL…………………………………………144

APPENDIX D: MENTAL HEALTH SERVICE USE
DATA DICTIONARY…………………………………………………………168

APPENDIX E: DESCRIPTIVE STATISTICS
FOR THE FULL HAF STUDY SAMPLE……………………………………..173

APPENDIX F: OVERVIEW
OF AIMS 1 & 2…………………………………………………………...174

LIST OF TABLES

Table 4.1 Baseline characteristics for regression variables Wave............................73

Table 4.2 Correlation coefficients for regression predictors and outcomes………..76

Table 4.3 Types of physical health problems endorsed by the sample……………………………………………………..78

Table 4.4 Crosstabs of demographics and physical health problems by rank, most to least common………………………....80

Table 4.5 Summary of Step 4 of the multiple linear regression models for predictors of number of physical health problems and perceived physical health impairment...87

Table 4.6 Baseline characteristics tested in the model examining moderators of service use...96

Table 4.7 Correlation coefficients for moderator model predictors and outcomes……………………………………………………..97

Table 4.8 Tests of the conditional effect of number of physical health problems on total service use……………………………98

Table 4.9 The conditional effect of number of physical health problems on service use depending on levels of working alliance……………………………………………104

Table A.1 Regression model for Aim 1…………………………………………139

Table B.1 Measures used to test Aims 1-2, for the regression model and moderation model………………………..141

LIST OF FIGURES

Figure 4.1 Ranking of the most to least common physical health problems by percentage……………………………….……79

Figure 4.2 The conditional effect of physical health problems on total service use depending on low, medium, and high levels of working alliance……………………...105

Figure 4.3 The conditional effect of physical health problems on Mental Illness Management service use depending on low, medium, and high levels of working alliance……………………...105

Figure A.1 Data analysis for Aim 2. Moderation model including all measures used in the study. Moderation model of the relationships between perceived physical health problems (predictor), psychosocial variables (the moderators), and case management services use (outcome)………………................140

Figure F.1 Overview of dissertation Aims 1 and 2……………………………....174

CHAPTER 1

INTRODUCTION

Study overview and purpose

Individuals diagnosed with serious mental illness (SMI) often have poor overall physical health and several co-occurring physical health problems, such as obesity, diabetes, and cardiovascular disease (Jones et al., 2004). *Serious mental illness* is defined as a chronic mental illness resulting in a substantial effect on an individual's thinking, behavior, and relationships (Kloos, 2005). The term SMI usually includes diagnoses of schizophrenia, bipolar disorder and severe major depression. The SMI designation is used by many mental health professionals to denote the occurrence of significant impairments in functioning and psychiatric disability that may be associated with these diagnoses; SMI often requires an intensive level of intervention and supports to address individual symptoms and challenges in daily living (Kloos, 2005). The poorer physical health and worse quality of life that individuals with SMI have may also be exacerbated due to barriers in reliable access to healthcare services (Nankivell, Platania-Phung, Happell, & Scott, 2013). More work is needed to understand how co-occurring mental and physical illnesses impact individual functioning and affect the use of outpatient community mental health services.

The first aim of this study sought to understand what demographic and psychosocial characteristics were linked to subgroups at high risk for poor physical health. A regression was tested to investigate any differences between subgroups of individuals with physical health problems and physical health impairment (please see Table A.1). This study was unique in its examination of several psychosocial characteristics salient to the experience of SMI. This information may play an important role in detecting risk and protective factors and guide tailoring of interventions.

There is clear evidence that *comorbidity*, which is defined as the presence of more than one medical illness, and *multimorbidity*, which is defined as the presence of more than two medical illnesses, is the norm rather than the exception for individuals with SMI. Epidemiological estimates are that 17% of adults have comorbid mental and physical health disorders; this comorbidity is associated with higher need for healthcare services and higher healthcare costs (Druss & Walker, 2011). Mental and physical illness co-morbidity has been studied to determine factors associated with the use of emergency psychiatric services and physical health care services. Comorbidity has been associated with worse quality of life and increased use of mental health services within hospital settings (Gijsen et al., 2001). Co-occurring SMI and diabetes has been associated with worse perceived quality of life, functioning, and psychological distress (Dickerson et al., 2011). The presence of both mental and physical illness (in comparison to the presence of only one type of illness) was associated with a higher frequency of emergency department service use to address mental and physical health problems (Shim et al., 2014).

Much of the literature has focused on the impact of mental and physical illness co-morbidity on emergency department psychiatric services use, however more work is needed to understand its effect on specific types of outpatient community mental health services. The literature suggested that having a diagnosis of SMI with co-occurring medical illnesses is associated with higher frequency of community mental health case management service use to address medical and mental healthcare; however, there was a need to retest this relationship and investigate the reliability of this finding (Parks, Swinfard, & Stuve, 2010). Given the status of the existing literature, this study examined the relationship between poor physical health and the use of case management services accessed by outpatients at local community mental health centers.

The second aim of this study used a moderation model to examine the relationship between co-occurring mental and physical illnesses and the use of outpatient community mental health services (please see Figure A.1). The topic of physical health problems and physical health impairment as potential factors in the use of case management services has been poorly studied. This dissertation examined the relationship between comorbid mental and physical illnesses in the form of the *number of physical health problems* and *perceived physical health impairment*, a global, self-reported rating of the perceived level of impact that health has had on impairing daily functioning.

More specifically, the moderation model 1) Examined the relationship between the total number of physical health problems and perceived physical health impairment and the use of two types of case management services (each service separately and combined total service use), and 2) investigated whether this relationship would depend upon several psychosocial moderators. The moderators examined were: psychological distress, transportation problems, life satisfaction, social support, recovery, and the working alliance with case manager.

The *case management services* examined were the two most commonly used community mental health center services to address the functional impairment associated with SMI: mental illness case management services (MIMS) and targeted case management (TCM) services (Smith, et al., 2005; South Carolina Department of Health and Human Services, 2010). These services play a role in linking individuals with SMI to adequate inpatient and outpatient healthcare to address their mental and physical health needs (Stanhope, 2013).

Testing this moderation model was also motivated by a lack of literature regarding how co-occurring mental and physical illnesses are related to the use of community-based outpatient mental health services. Much service use literature centered on predictors of inpatient mental health services. There appeared to be fewer studies examining commonly accessed outpatient community-based mental health services, specifically case management services. Therefore, this study examined the use of two types of outpatient community mental health center case management services as the outcome to address this concern.

Overall, the moderation model was meant to clarify how mental and physical illness co-morbidity interacted with several psychosocial factors (such as perceived social support) to influence service use. It was posited that higher numbers of physical health problems and perceived physical health impairment would be associated with more frequent use of outpatient community mental health case management services. One implication of this model was that co-occurring SMI and physical illnesses were associated with an increased risk for worse functioning and pose an additional challenge to the existing community mental health system.

Understanding the ramifications of comorbid physical health problems and any associated impairment may be helpful in increasing the responsivity of outpatient community mental health centers to the high rates of co-occurring physical illnesses found in this population through case management services. The regression model in

Aim 1 described demographic and psychosocial characteristics of subgroups with poor physical health using mental health services. The goal was to provide information relevant towards guiding prevention and intervention programs. In Aim 2, the study indicated which case management services were more commonly accessed by individuals with physical health concerns. For a conceptual overview of Aims 1 and 2 of this dissertation study, please refer to Figure F.1 in Appendix F.

CHAPTER 2

CONCEPTUAL FRAMEWORK, LITERATURE REVIEW, AIMS & HYPOTHESES

Context for Aim 1: Regression model to determine predictors of poor physical health

Individuals diagnosed with SMI have high numbers of physical health problems, more years of potential life lost, and increased mortality rates comparted to the general population (Bahorik, Satre, Kline-Simon, Weisner, & Campbell, 2017; Walker, McGee, & Druss, 2015; Miller, Paschall, & Svendsen, 2006). Literature on the impact of comorbidity and multimorbidity (having two medical problems, and more than two problems, respectively) on the mental healthcare system is growing. Nonetheless, more work is needed to examine the effect of comorbidity on individual mental health, physical health, and healthcare service use (Smith, Soubhi, Fortin, Hudon, & O'Dowd, 2012). This dissertation hopes to address this gap in the literature by evaluating the association between physical health problems, physical health impairment, and mental health services use.

Community mental health centers serve a high number of individuals with SMI who present with several physical health problems (Kim, Higgins, Espositedo, & Hamblin, 2017). This mental and physical health problem multimorbidity results in individuals presenting with complex health care needs in mental health settings. It is often necessary to address physical health problems and associated physical health impairment as a part of outpatient mental health treatment (Walker, McGee, & Druss, 2015; Sokal, Messias, Dickerson, Kreyenbuhl, Brown, Goldberg, & Dixon, 2004).

Integration of physical and mental healthcare is often suggested as a strategy to deal with the public health impact that multimorbidity has at the system, provider, and patient level of care (Kim, Higgins, Espositedo, & Hamblin, 2017; Druss & Walker, 2011; Viron, & Stern, 2010). There is a growing tendency towards integration, and increasingly primary care settings are addressing patient mental health needs (Planner, Gask , & Reilly, 2014). Conversely, more mental health programs are emerging which target the physical health needs of individuals with serious mental illness in outpatient mental health settings (Smith, Soubhi, Fortin, Hudon, & O'Dowd, 2012). These programs are driven by national policies and guidelines which urge the holistic treatment of mental illness and preventable physical health problems through increased healthcare access, screening, evidence-based treatments, monitoring, and follow-up (Kim, Higgins, Espositedo, & Hamblin, 2017; Planner, Gask , & Reilly, 2014).

Identifying and classifying subgroups of individuals with SMI at higher risk for poor physical health is imperative to address the public health burden associated with multimorbidity. In particular, identifying demographic and psychosocial risk factors associated with physical health problems can guide the development of targeted outreach, screening, prevention, and treatment programs within mental health settings. Work has been done to recognize which medical indicators and health-related behaviors are associated with multimorbidity. The literature on this topic has focused on describing several possible links between SMI and physical health problems and identifying risk factors. Common risk factors cited are increased symptom burden and certain health-related behaviors, such as smoking, poor diet, and lack of exercise (Viron, & Stern, 2010). Work has also been done to ascertain which physical health parameters, such as weight, blood pressure, sleep, and caffeine intake, may place individuals with SMI at risk for worse physical health (White, Gray, & Jones, 2009). For example, the Health Improvement Profile assesses several physical health indicators to create a profile which can be used to guide the monitoring of physical health of individuals with SMI seen in primary care and mental health treatment settings (White, Gray, & Jones, 2009). Less information exists on which demographic and psychosocial factors may also be associated with increased risk for poor physical health, such as psychological distress and lack of perceived social support.

Investigating subgroups amongst individuals with SMI and poor physical health

In order to investigate what types of individuals were at high risk of poor physical health this dissertation used a regression model to understand predictive characteristics associated with physical health problems and physical health impairment. Similar methods are used in medical research to classify individuals into subgroups based on similarities in feature variables (McLachlan, 1992). For example, commonalities in a feature variable, such as physical symptoms, may be used in diagnosing someone as having or not having a medical illness, or to discover subtypes within a medical illness (SPSS Corporation, 2001). The multiple regression models were used to explore what characteristics may identify subgroups of individuals with worse health, to inform future hypotheses. This means that the types of characteristics and subgroups of individuals were not known *a priori*, before the analysis was conducted. The regression models were used to discover commonalities in demographic and psychosocial characteristics to distinguish, or classify subgroups of mental health service users (Clatworthy, Buick, Hankins, Weinman, & Horne, 2005; Henry, Tolan, & Gorman-Smith, 2005).

This dissertation hypothesized that there were demographic and psychosocial differences between groups of individuals with physical health problems and physical health impairment, compared to those with better health. This hypothesis was based on the idea that social and demographic characteristics are linked to different social statuses associated with higher or lower exposure to risks for poor physical health (please see literature review section on "double disadvantage" for detailed explanation). Due to the explanatory nature of this analysis, specific differences in characteristics were not hypothesized *a priori*. The use of regression models to understand which demographic and psychosocial characteristics were associated with groups of individuals with worse health could be helpful in identifying high-risk individuals and discerning special needs. The results of tests of the regression models provided information that can guide the tailoring of interventions based on demographic and psychosocial profiles.

Many studies done with SMI populations with physical health problems focused on populations that experienced specific types of disease comorbidity or multimorbidity. A common combination of comorbid disorders targeted was SMI and diabetes mellitus (Roberts et al., 2017). There has also been a focus on populations that have a particular diagnosis of mental illnesses, such as schizophrenia, or depression, which has also been associated with a high prevalence of physical health problems (Chwastiak et al., 2006; Katon, 2003; Dixon, Postrado, Delahanty, Fischer, & Lehman, 1999). For example, dual-diagnosis disorders (defined as those with SMI and a substance use disorder) and comorbid medical illness are a common focus (Juel, Kristiansen, Madsen, Munk-Jørgensen, & Hjorth, 2017; Watkins, 2004). These specific types of comorbidity may reflect the predominance of these patterns of comorbid and multimorbid disorders within the SMI population. This also points to information that has consistently emerged that indicated individuals with these specific types of co- and multimorbidity are vulnerable to having poor physical health.

Methods such as multiple regression and cluster analysis can be useful ways to identify subgroups within populations that experience medical complexity (Newcomer, Steiner, & Bayliss, 2011). According to Newcomer, Steiner, & Bayliss (2011) many studies use cluster analysis to find patterns of medical illness multimorbidity or focus on finding subgroups within one medical illness. There is an opportunity to use these methods to discern subgroups amongst those who experience multiple, intersecting medical disorders. Determining differences in demographic and psychosocial characteristics for subgroups of individuals dealing with multimorbidity can illustrate special considerations for treatment of these individuals in managed care settings. The composition of populations with medical multimorbidity is complex, diverse, and heterogeneous (Hopman, Schellevis, & Rijken, 2016; Newcomer, Steiner, & Bayliss, 2011). Newcomer, Steiner, & Bayliss (2011) propose that these statistical methods can help identify subgroups within these populations that face similar comorbidities, such as depression and diabetes. This information can be used to tailor healthcare management strategies relevant to particular subgroups, or to examine subgroup responsivity to treatment.

Aim 1 description. The first aim of this study addressed this gap in the literature using regression models which examined several hypothesized demographic and psychosocial characteristics potentially associated with number of physical health problems and associated physical health impairment. The demographic characteristics used to help classify individuals into subgroups were age, gender, race, ethnicity, education level, mental illness diagnosis, history of homelessness, number of days worked, income, and amount of transportation problems. The psychosocial characteristics were life satisfaction, psychological distress, recovery, social support and amount of working alliance with case manager. This information can assist with the creation of categorization systems, which include characteristics salient to the experiences individuals with SMI.

Theoretical foundation guiding identification of subgroups with worse physical health

Current theory regarding the origins, mechanisms, and consequences of poor physical health for individuals with SMI is briefly summarized here to explain the rationale for the regression models tested. Much of this theory has been derived from literature which seeks to explain the links between SMI and high risk for poor physical health. Druss & Walker (2011) define *comorbidity* within this context as the occurrence of mental and physical disorders in the same individual, regardless of the order in which the disorders occurred or the causal pathway linking the disorders. In a comprehensive literature review and policy brief, Druss & Walker (2011) summarize the current state of theory regarding medical illness comorbidity with SMI. Populations diagnosed with SMI are at a particularly high risk for comorbidity compared to the general population without SMI. They found that comorbidity is associated with increased individual symptom burden, worse functioning and overall quality of life, and increased service use costs. At the healthcare system level, lack of integration in healthcare systems, lack of collaborative care in mental health and primary care settings, barriers to health care access, high cost of healthcare, and poor healthcare quality may also play a role in comorbidity (Fagiolini & Goracci, 2009).

At the individual level, the occurrence of each disorder may also place individuals at risk for other disorders due to the exposure to risk factors which may associated with each illness (Druss & Walker, 2011). Druss & Walker (2011) describe comorbidity pathways which link mental and physical health disorders as complex and bidirectional. Comorbid disorders may or may not share similar and overlapping risk factors and origins. For example, a mental illness such as depression has been shown to be associated with higher rates of physical health problems such as cardiovascular disease; conversely the symptom burden associated with a chronic physical health problem such as diabetes or hypertension is often associated with a higher risk for having a mental illness, such as depression. Additionally, the treatments for SMI can place individuals at risk for physical health problems or exacerbate existing chronic conditions. For example, the side effects of psychotropic medication commonly include weight gain, metabolic syndrome, and increased risk for Type II diabetes. Additionally, the psychological symptoms associated with SMI such as lack of motivation and energy can be a barrier to compliance with recommended treatment regimens and worsen symptoms. Treatments for medical disorders may also be associated with side effects or risk for negative psychological symptoms (such as anxiety, depressive symptoms, or psychosis) and may also exacerbate pre-existing mental illnesses.

Druss & Walker (2011) base their comorbidity model on a model by Katon (2003), which examines a particular type of comorbidity, that between depression and medical illness. Katon's conceptual model was based on epidemiological data examining patterns of depression comorbidity. According to Katon (2003) risk factors such as genetic vulnerability, childhood adversity, and adverse life events are associated with increased incidence of mental illnesses (anxiety and depressive disorders) and chronic medical disorders (diabetes and heart disease). These risk factors and linked comorbid disorders are also associated with 1. increased bio-behavioral risk for chronic illness such as chronic stress metabolic syndrome, smoking, sedentary lifestyle, overeating, and 2. a lack of self-care for chronic medical disorders such as maintaining a healthy diet and exercise. Katon's conceptual model (2003) proposes that the consequences of this comorbidity are brain-based biological changes secondary to chronic illness, biological complications associated with comorbidity, increased symptom burden, functional impairment, and worse quality of life. Katon (2003) states that the consequences of comorbidity at the system level are increased service use and healthcare costs in mental health and primary care settings and increased mortality rates.

Druss & Walker (2011) refine Katon's (2003) model to explain the occurrence of medical and mental illness comorbidity in SMI more broadly. In addition to the risk factors by Katon (2003), they posited that factors associated with socioeconomic status, mainly experiences of poverty, poor neighborhood quality, social isolation, and lack of social support lead to increased vulnerability. These risk factors and existing mental and medical illnesses interact to increase adverse health behaviors and outcomes. Adverse outcomes include decreased self-care, increased symptom burden, higher incidence of disability, worse quality of life, and increased mortality rates.

Both Druss & Walker's (2011) and Katon's (2003) model illustrate the complex pathways that lead to increased vulnerability to comorbidity, and comorbidity's detrimental impact on individual functioning and increased healthcare service use. This dissertation study aims to investigate factors associated with physical health problem comorbidity and physical health impairment. Guided by these models, the multiple regression for Aim 1 of this dissertation included the psychosocial characteristics of life satisfaction, psychological distress, and perceived social support. In summary, these characteristics were chosen based on research that showed they were either potential risk factors for poor health or associated with the effect of comorbidity on functioning. The justification for including each of these individual demographic and psychosocial characteristics in the regression model is covered in more detail in the literature review which follows. These individual characteristics were used to describe subgroups of individuals diagnosed with SMI that endorse comorbid physical health problems and physical health impairment. The regression analysis was meant to help show the relationship between demographic, psychosocial variables, and poor physical health; and meant to investigate subgroups of individuals with SMI who may be most at risk in order to help guide healthcare interventions.

Double disadvantage theory and its implications regarding comorbidity risk for those diagnosed with SMI

Generally, negative social factors associated with SMI include stigma and discrimination, which are risk factors for poor health and associated with increased healthcare use (Corrigan et al., 2014; Grollman, 2014; Mizock, 2015). Also known as the double jeopardy hypothesis, *double disadvantage* has been traditionally used to describe how belonging to more than one socially disadvantaged group which faces social devaluation due to its stigmatized status is associated with exposure to risk factors that increase the likelihood of poor health. This risk is increased due to the negative effects compounded by having more than one disadvantaged social status. Examples of demographic characteristics which could be associated with disadvantaged status include race, ethnicity, gender, sexual identity, or age, for example (Dowd & Bengtson, 1978). The double disadvantage hypothesis can be used to help conceptualize how psychiatric and medical illness comorbidity might be associated with an increased risk for worse perceived physical health impairment and psychological distress for individuals with serious mental illness. It can also be used to illustrate how certain demographic and psychosocial characteristics associated with lower social status can constitute a disadvantage that may increase risk for poor health.

For example, a cross sectional epidemiological study found increased odds of having a mental illness were positively associated with the number of physical illnesses; this study also found associations between mental and physical illness co-occurrence and demographic characteristics, with lower socioeconomic status and age associated with greater physical and mental health multimorbidity (Barnett et al., 2012).

Literature indicated that belonging to disadvantaged social groups increases exposure to stressful conditions, which then increases the risk for comorbid illnesses (Tessler & Mechanic, 1978). There are several factors associated with having a serious mental illness that may provide examples of double disadvantages which are associated with a higher risk for physical illnesses. These risk factors include low socioeconomic status, social stigma, lack of employment, poverty, poor housing, and social isolation (Robson & Gray, 2007). Even with knowledge of appropriate health-related behaviors many individuals may experience diminished ability to engage in goal-directed health-related behaviors, which may heighten the risk for physical health problems (Happell, Stanton, Hoey, & Scott, 2014). These socioeconomic and illness–related risk factors illustrate a variety of ways that double disadvantage may be manifested.

Individuals diagnosed with serious mental illness belong to an often socially marginalized group which faces a health disparity. More work is needed to understand how sociocultural, demographic differences, and psychosocial factors, such as minority status, gender, history of homelessness, SES, and mental illness diagnosis may play a role in buffering the risk for comorbid physical health problems (Jones et al., 2004; Razzano et al, 2015). Research suggests that the impact of poor physical health may be worse for some subgroups of individuals than others, for example those with a diagnosis of depression. For example, research suggests links between specific mental illness diagnoses, such as schizophrenia, and the likelihood of having specific comorbid physical health problems like metabolic syndrome (McEvoy et al., 2005). In another study, there was some evidence that worse perceived physical health status may be associated with histories of homelessness for this population (Matejkowski et al, 2013). Results like these suggest that experiences of more than one disadvantaged status may increase the risk for poor physical health.

Understanding which subgroups are at risk: Aim 1 purpose

The purpose of the regression model is to identify what demographic and psychosocial patterns (predictors) exist in relation to numbers of comorbid physical health problems and perceived physical health impairment (outcomes). The regression was performed based on state-wide service use data collected from community mental health service users diagnosed with SMI. Due to the explanatory nature of the regression analysis, no specific hypotheses were made regarding the exact direction of the relationship between each of the predictive characteristics and outcomes. Although the regression analysis was meant to be descriptive in nature, the information gathered can generate future hypotheses.

Context for Aim 2: Physical Health Problems and Potential Links to Mental Health Service Use

Perceived physical health impairment and service use as potential consequences of comorbid physical illness

Comorbidity is a common issue in general health care and has been associated with greater loss of functioning, higher rates of hospitalizations, and longer hospital stays (Smith & O'Dowd, 2007). Awareness has increased regarding the negative consequences of co-occurring physical and mental health problems, such as poor overall health-related quality of life and impairments in functioning. Individuals with SMI and comorbid physical health problems such as arthritis, chronic lung disease, and hypertension self-reported worse health-related quality of life compared to individuals without SMI (Kennedy et al., 2005). Comorbid physical illnesses have been associated with an increased potential for disability, distress, and impairment linked to serious mental illness (Dickerson et al., 2011). For example, in one study of individuals diagnosed with SMI and diabetes, increased multimorbidity of medical conditions was a predictor strongly associated with worse perceptions of physical well-being (Dickerson et al., 2011).

In order to capture the consequences of physical illness multimorbidity on well-being, this study measured the number of physical health problems endorsed by participants and their rating of perceived physical health impairment. Brief self-report ratings of health impairment have been used in research on health-related quality of life. There has been a lack of universal definitions of health-related quality of life (HQOL) and health impairment. However, many definitions have addressed the social, psychological, and medical impacts of any disability related to having a mental or physical illness.

Definitions of HQOL have often acknowledged the importance of an individuals' experience of their specific health barrier, their perceptions of their overall physical health, and the perceived impact of illness on functioning (Oliver, 1998). Differences in how ICD and DSM systems have classified disability, the use of the term "functional impairment" interchangeably with disability, and the definition of health-related distress used for diagnostic purposes have also complicated definitions of perceived health impairment (Üstun & Kennedy, 2009). A commonality that exists in many definitions of health impairment is *the individual's perception of the impact of their health problems on their ability to engage in daily activities*. Perceived physical health impairment as it is measured in this study falls in line with previous ways that functional impairment has been measured. The measure as it was used considered the extent to which co-occurring physical illnesses may have interfered with daily activities.

This study hypothesized that higher numbers of physical health problems and worse ratings of perceived physical health impairment were associated with more use of community mental health case management services. High rates of comorbid chronic physical health problems are associated with higher use of healthcare services for those diagnosed with SMI. For example, literature indicated this multimorbidity may be associated with higher rates of hospitalization, higher health care costs, and worse functioning (Buist-Bouwman, Graaf, Vollebergh, & Ormel, 2005; Kennedy et al., 2005; Miller, Paschall, & Svendsen, 2006; Thomas, 2008).

A cross-sectional study conducted with individuals diagnosed with SMI using services at a specialty mental health provider found the number of somatic symptoms presented at intake predicted future mental health service use and health care costs (Minsky, Etz, Gara, & Escobar, 2011). Individuals with SMI and co-occurring physical health problems have more emergency department visits and longer hospital stays compared to those without SMI (Hendrie et al., 2013). Higher Medicaid healthcare expenditures were found for Veterans diagnosed with SMI, substance use disorder and co-occurring diabetes, compared to those without SMI and substance use disorder (Banerjea et al., 2008). Similar findings were found for individuals with SMI and HIV/AIDS, with higher medical and behavioral healthcare costs found for those with this comorbidity compared to those without both illnesses (Rothbard, Miller, Lee, & Blank, 2009).

Studies that examined mental and physical health problem comorbidity as a predictor of outpatient mental health service use for this population were limited. Of the works that studied the effect of this type of comorbidity, many used general healthcare service use or emergency department use as outcomes. Few examined the effect of mental and physical illness comorbidity on the use of outpatient community mental health services. According to research which will be further reviewed in the following sections there was some support for the hypothesis that comorbid physical illnesses were associated with worse overall functioning, psychological distress, and increased use of outpatient mental health care services.

Mental health service use patterns for individuals diagnosed with SMI

Much of the service utilization literature centered on understanding patterns of use and their determinants. The use of emergency department and inpatient service use has often been a focus; more work is needed to understand determinants of mental health service use in a variety of outpatient community mental health settings. This study addressed the lack of information on outpatient community mental health services, specifically different types of case management service use. The literature on patterns of emergency department and inpatient use are reviewed here to provide some context on service use patterns to inform the dissertation hypotheses.

Studies conducted with individuals diagnosed with SMI have generally found that this population constituted a small proportion of service users with a disproportionately high frequency of inpatient and outpatient mental health service use. One Canadian study of emergency department use found that 3% of users accounted for 18% of emergency room visits, and these users tended to have less social support, use antipsychotic medications, and have a dual-diagnosis (Vandyk, VanDenKerkhof, Graham, & Harrison, 2014). Studies have also found higher Medicaid expenditures, inpatient and emergency department service use, and outpatient psychiatric service use compared to the general population (Brown, Barrett, Hourihan, Caffery, & Ireys, 2015; Carr et al., 2003; Vandyk et al., 2014). Individuals with SMI also delay seeking medical care due to structural barriers such as lack of transportation, long wait times for appointments, and affordability issues; these delays were associated with worse physical health and higher use of emergency department services (Mojtabai et al., 2014). One study of individuals aged 21 to 64 diagnosed with SMI found that 23% to 39% used mental health services only through Medicaid (SSI) due to a disability (Buck, Teich, Graver, Schroeder, & Zheng, 2004).

Service use research has often focused on patterns of emergency department services and service expenditures as outcomes; however mental health consumers with SMI utilize behavioral health care resources in many settings to address their needs. Many studies have responded to reflect this increasing diversity of settings beyond the context of emergency inpatient care, through the examination of access to mental health services through general medical practitioners, specialized inpatient and outpatient psychiatric care, and other community-based health services as outcome variables.

The shift towards community-based recovery in mental health after deinstitutionalization has fueled consumer access of services through community mental health centers (Feldman, 2003). One Australian population-based study conducted by Raudino et al. (2014) examining patterns and predictors of inpatient and outpatient services found that service use had shifted to the use of more community and outpatient-based services from emergency and hospitalization services over the last decade; this study also found that less social support and worse symptom severity were associated with higher use of several types of services. Another study on determinants of outpatient service use found individual level factors such as demographic characteristics, socioeconomic status, severity of the primary mental illness diagnosis, and the occurrence of a comorbid mental illness were associated with frequent outpatient service use (Fleury, Grenier, & Bamvita, 2015).

Studies have often utilized Medicaid expenditures and other community mental health center records as indicators of patterns of public health sector service use for this population. A wide variety of types of community mental health center services were accessed. A study of Medicaid beneficiaries diagnosed with bipolar disorder and schizophrenia found the most commonly accessed community health care system services were medication management, medication monitoring and associated laboratory tests (Brown et al., 2015). Brown et al., (2015) also found that less than 5% of individuals used multiple community mental health center services concurrently, such as medication maintenance, laboratory testing, outpatient mental health care, and preventative physical health care, which would best address their health needs. Given that services that target mental and physical health disease comorbidity within community mental health centers were underutilized, this may indicate that other services, such as targeted case management and mental illness management services, may be an alternate way that individuals link to care that addresses physical illness.

The focus on patterns of service use has been guided by the notion that this information is helpful in implementing policy and planning services based on the needs of this vulnerable population (Zeber, Copeland, & Grazier, 2006). The comorbidity of psychiatric and physical illnesses and the combination of factors such as symptom severity and lack of social support create a risk for increased inpatient and outpatient mental health service use. One ramification of this disease comorbidity, decreased quality of life, and delays in access to appropriate medical care may be a high need for case management services, which may place a burden on the community mental health care system. It is a possibility that individuals may access community mental health center case management services to link to a variety of resources to address both their mental and physical health care needs.

To date no studies have examined the impact of physical health impairment on community mental health service use or specifically examined the use of mental illness management and targeted case management services as an outcome of this impairment. Determining the relationship between this type of comorbidity and these specific community mental health services is a pressing need, given the shift to integrated health care policies, which emphasize coordination of multiple services to target the complex health concerns faced by this population.

Definitions of community mental health case management services examined in this study

This dissertation examined the relationship between the total number of physical health problems, perceived physical health impairment, and the use of two specific types of community mental health case management services. These services were targeted case management (TCM) and mental illness management services (MIMS). Finding evidence that physical health problems and impairment are associated with increased use of case management services could demonstrate support for the need for more healthcare policies and practices sensitive to the physical healthcare issues of this population.

In addition, case management services were examined as an outcome as they may be an easily accessible health care resource to individuals, given that programs that primarily address the physical health problems of individuals with SMI are not currently widespread. There has been a shift towards developing programs based on health care integration models such as the patient-centered medical home, which co-locate both primary care and mental health services (Viron et al., 2014; Weinstein, LaNoue, Collins, Henwood, & Drake, 2013). Despite these advances, the physical health of clients has been under addressed due to many barriers in access to appropriate primary care. These barriers include a lack of communication between primary and secondary care providers, discontinuity of care, and client difficulty navigating the primary care system and establishing trusting relationships with service providers (Nankivell et al., 2013; Viron et al., 2014). This health disparity faced by individuals with SMI may be associated with an increased burden on the community mental health system, which may provide an accessible interface for health care in the absence of appropriate primary care to address existing medical concerns.

Studies on the determinants of the specific types of case management services examined in this study were limited. Other research has examined the effects of case management using case management as the independent variable (to investigate the efficacy of services), rather than as the dependent variable, which complicated the review of literature findings. Brief definitions of case management and the specific types of case management services examined in this study follow.

Case management services help mental health consumers with SMI to obtain needed supports, such as other services and treatments. These links to other services aid in preventing or managing crises, in promoting recovery and self-management of illnesses, and independent community living (Stanhope, 2013). In general, case management practices involve 1) assessment of client needs, and coordinating treatment and services with and for consumers, 2) advocating for consumer rights, 3) referral and linking to services, and 4) monitoring the impact of services.

Targeted case management (TCM) services are "targeted" towards a specific group of Medicaid beneficiaries or towards individuals that reside in a specific state region (South Carolina Department of Health and Human Services, 2010). Examples of targeted populations include those diagnosed with a specific mental illness or those facing a particular psychosocial situation, such as homelessness. TCM entails coordination and referral to other services such as medical, social, educational, vocational, or a wide variety of other services. The goal of TCM is coordinating services to help promote independence through case management, assessment, treatment planning (this can be in terms of case management services), referral to services, and linking and monitoring of the services received for targeted populations. TCM uses these strategies to facilitate access to other services rather than providing specific delivery of such services or the assistance that would be entailed in those services.

Mental illness management services (MIMS) provide assistance that is more therapeutic in nature than traditional case management (Smith et al., 2005). MIMS are used to help individuals manage their illness, promote self-care, recovery, and independent living, and may involve contact that is more therapeutic in nature. MIMS interventions are delivered in the community or at the mental health center. Examples of MIMS may include psychoeducation, skills training, crisis prevention/intervention, assistance in dealing with tasks of daily living, and work on interpersonal and communication skills for different life domains, such as personal or work commitments.

Generally the evidence regarding the efficacy of mental health case management services was hampered by methodological and definitional issues; however, there was some indication that intensive case management services were associated with decreased hospitalizations related to mental illness, better social functioning, and better quality of life for consumers (Parks et al., 2010). Aspects of the case management alliance that were found to be helpful were the face-to-face connection with a service provider who may provide a source of affective and tangible support and the ability to link to other social resources (Buck & Alexander, 2006). The purpose of this study is to address the current gaps in the literature on mechanisms associated with the use of specific case management services as an outcome. Given the current evidence (which will be reviewed further), this study hypothesized that higher numbers of physical health problems, more perceived physical health impairment and psychological distress were associated with higher use of MIMS, TCM, and the total combination of both MIMS and TCM case management services.

Examining physical health problems as potential predictors of service use

The shift to community-based support after deinstitutionalization led to case management being among the most common types of mental health and rehabilitation services accessed by individuals diagnosed with SMI with Medicaid coverage (Stanhope, 2013). Combinations of specific case management services, such as targeted case management (TCM) and mental illness management services (MIMS) are frequently utilized by individuals diagnosed with schizophrenia in South Carolina (Rubin, 2004).

Limited evidence suggests the use of community mental health case management services is associated with a decrease in mental health and medical illness service visits and expenditures. A study conducted by Parks, Swinfard, & Stuve, (2010) examined the impact of case management use intensity (frequency) and its effect on medical and mental health service use for individuals diagnosed with SMI and multiple co-occurring chronic medical conditions. Two-thirds of the participants surveyed used case management services; of those, most used a medium intensity level of services. Individuals with low and medium intensity services had lower hospitalization and outpatient costs than those without case management services. Interestingly, patients with high-intensity services had higher hospitalization, outpatient, and pharmacy costs compared to the other intensity levels. Parks et al. (2010) found the use of case management services decreased healthcare expenditures overall, even including the costs of providing services after an initial spike in costs after the enrollment in the program.

The study conducted by Parks et al. (2010) was the only one found in the literature review examined use of case management services for the specific population included in this dissertation. Their findings illustrate a complex relationship between intensity of case management service use and the use of other types of services to address mental and physical health problems. The results from Parks et al. (2010) imply that individuals using a high level of case management services may be in more acute need of services, and case management may facilitate access to a higher intensity of service use. The resource linking strategies used in case management may be associated with better coordinated care and increased service use for those with high need. One limitation of this study was that case management services were used as a predictor of other types of service use, whereas this dissertation examined service use as the outcome. However, the findings of Parks et al. (2010) suggest that more work is needed to gauge the impact that comorbid mental and physical health problems have on the use of CMHCM services.

Given the limited literature examining the effects of co-morbid physical health problems on the use of specific types of case management services, the scope of this review was expanded to include the use of other types of mental health services. Studies where mental health services (inpatient or outpatient) were included as either a predictor or outcome were included, in order to understand the general association between co-occurring physical health problems and the use of mental health services in different settings.

A literature review on the consequences of physical and mental disease comorbidity conducted by Gijsen et al. (2001) found that comorbidity was significantly associated with poorer functioning, worse quality of life, and higher rates of different types of mental health service use specifically within hospital settings. Regarding hospital-based mental health service use, Gijsen et al. (2001) also found that comorbidity was associated with a higher frequency of general physician visits, longer hospital stays, and increased costs.

Some evidence supported the idea that individuals diagnosed with SMI and physical health problems utilized emergency department mental health services at higher rates than those without this type of comorbidity. In a study of Medicaid beneficiaries diagnosed with SMI and co-occurring diabetes, Shim et al., (2014) found that having this combination of illnesses was associated with significant increases in emergency department service use (resulting from either medical or mental health diagnoses, or any other type of medical diagnosis) more so than having either a mental health or physical health condition alone. Overall, the evidence from this literature review suggested that physical and mental illness comorbidity were risk factors associated with use of inpatient mental health services. More information is needed to understand the effects of physical health problems on the use of outpatient services, specifically case management services, as case management services may serve as a linking mechanism to services which would prevent emergency hospitalization.

Examining psychological distress as a potential moderator of service use

Studies that examined the psychological distress of individuals with co-occurring physical health problems indicated that they were associated with a higher risk of using a variety of different types of inpatient/outpatient mental health services in the general population. A literature review found that worse self-rated health status (both physical and mental health) was associated with a variety of different types of inpatient/outpatient mental health services use for the general population (Babitsch, Gohl, & von Lengerke, 2012). Psychological distress predicted a variety of different types of mental health service use reliably in an Australian epidemiological study conducted by Mills, Van Hooff, Baur, & McFarlane (2012), which included physical health problems as a predictor. Mills et al. (2012) found that psychological distress and the number of comorbid physical health problems were associated with seeking four different types of mental health services, including 1) those provided by general practitioners, 2) mental health specialists, 3) other health service professionals, and 4) services provided by any of these practitioners.

Parallel findings regarding psychological distress and illness comorbidity as predictors of inpatient and outpatient mental health service use were found for individuals diagnosed with SMI. A study conducted with homeless youth diagnosed with mental illness found that emotional distress predicted inpatient/outpatient mental health services use to treat anxiety and depression from a variety of providers (Solorio, Milburn, Andersen, Trifskin, & Rodríguez, 2006). Solorio et al., (2006) found that distress predicted mental health service use in hospitals, mental health clinics, crisis centers, shelters, and with case managers, doctors, psychiatrists, psychologists, and family/friends. Another study conducted on the use of public mental health services of homeless individuals diagnosed with SMI found evidence that mental illness diagnosis and co-morbid mental illnesses (dual-diagnosis of substance abuse) predicted acute mental health services use (Lindamer et al., 2012). Lindamer et al., (2012) examined a variety of different types of acute service use other than hospitalizations for individuals using public mental health services, such as through emergency psychiatric unit (EPU), psychiatric emergency response team (PERT), inpatient psychiatric hospital, crisis residential, and outpatient treatment. These studies provided support for the idea that psychological distress and perceived health impairment may function as a perceived need associated with inpatient and outpatient mental health service use (Dhingra, Zack, Strine, Pearson, & Balluz, 2010). Another study found that ratings of disability and mental and physical health were the strongest predictors of VA mental health service use during a test of mental health care service use both inside and outside of the VA for individuals diagnosed with SMI (Elhai, Grubaugh, Richardson, Egede, & Creamer, 2008).

Findings by Dhingra et al. (2010) found support for high levels of psychological distress as the strongest predictor of mental health professional treatment/medication for mental health and emotional problems for individuals diagnosed with SMI. Dhingra et al. (2010) collected data in 2007 as a part of the Behavioral Risk Factor Surveillance System (BRFSS), a large, nation-wide, population-based study of 169,546 non-hospitalized, community dwelling individuals. Dhingra et al. (2010) found that the number of mentally and physically unhealthy days experienced, level of psychological distress, and lack of emotional support predicted receipt of treatment or medication from a doctor or health professional for mental health and emotional problems in the general population. Specifically, Dhingra et al. (2010) found that higher numbers of mentally and physically unhealthy days a month and less than excellent self-ratings of overall health were associated with more use of treatment/medication for mental health and emotional problems than those with less mentally/physically unhealthy days a month and excellent self-rated overall health. These findings supported the hypothesis that perceived physical health impairment and psychological distress were significantly associated with mental health professional service use.

In an Australian study of public mental health services consumers diagnosed with SMI conducted by Raudino et al. (2014), worse symptom severity predicted greater use of mental health and physical health outpatient community mental health services. Raudino et al. (2014) also found high psychosocial needs for care predicted greater use of many different types of community mental health services including: outpatient and outpatient services to address mental & physical health, psychiatric and non-psychiatric emergency service use, and also visits to general practitioners.

The literature on predictors of inpatient mental health service use pointed to mental and physical illness comorbidity and psychological distress as being related to service use. More work is needed to understand the effects of these predictors on the use of other types of mental health services other than emergency hospitalizations. The existing studies indicated a need for a variety of inpatient and outpatient mental health services sensitive to this type of comorbidity.

Other potential moderators of service use

Transportation. Most participants in this dissertation study received benefits linked to having a psychiatric disability. Due to the low SES associated with disability status, many individuals faced problems with transportation. Obtaining transportation often serves as a barrier to mental health treatment. There are many potential challenges associated with a lack of transportation, such as the need to establish eligibility for transportation services, or obtaining financial vouchers or transportation reimbursement. More examples of potential challenges include the steps needed to arrange transportation, such as obtaining rides, money, gas, making scheduling arrangements, or confirming transportation in advance. Transportation is commonly listed as a barrier to accessing preventive healthcare services for mental healthcare users (Xiong, Iosif, Culpepper, & McCarron, 2017).

Individuals diagnosed with SMI and comorbid physical health problems often have healthcare needs which require transportation to multiple locations for different appointments (Kilbourne et al., 2008). One study done with Veterans diagnosed with bipolar disorder receiving mental health services found that 21% relied on public transportation, and many needed to arrange a van provided by their treatment location in order to consistently attend their appointments. Due to the impact that transportation has on accessing services, there has been a push towards increased use of tele-mental healthcare services, especially for individuals residing in rural areas, and those that are not located near a medical center (Workman, Short, Turner, & Douglas, 1997).

An epidemiological study done with 12,840 individuals with disabilities in the U.K. who lived in independent community housing found that transportation problems were associated with a 2 – 4.3 times higher need for healthcare services; they found that lack of transportation posed a major barrier to healthcare service access (Sakellariou, & Rotarou, 2017). Another epidemiological study done with state-wide community mental health service users diagnosed with SMI by Smith, Easter, Pollock, Pope, & Wisdom (2013) found transportation problems were associated with increased risk for disengagement with mental and physical healthcare services. Based on these findings, the study authors suggest that minimizing barriers to transportation can be a crucial task in accessing treatment and increasing service engagement (Smith, Easter, Pollock, Pope, & Wisdom, 2013).

This study hypothesized that transportation problems would significantly moderate the relationship between poor physical health and mental health services use, such that more transportation problems were associated with more frequent service use. This was guided by the idea that case management services use is associated with the need for connection to community resources (such as transportation, or supported housing) over the course of mental health treatment. Therefore, in line with the finding reviewed here, it was thought that those using mental health case management services were likely to have transportation problems and a high need for community mental health services.

Life satisfaction, recovery, and service use. This dissertation study hypothesized that life satisfaction and recovery would moderate the relationship between physical health problems, physical health impairment, and service use. There appeared to be a dearth of literature related to life satisfaction and mental health recovery as determinants of service use. Many studies examined these constructs as outcomes in order to evaluate the impact of services use, whereas this dissertation study includes them as potential determinants of service use. The life satisfaction measure in this study was obtained from a larger assessment of quality of life. Though these constructs differ, the search terms for this literature review were expanded to include the relationship between quality of life and service use. This study hypothesized that individuals would use more services when there was a lower level of life satisfaction, quality of life, and worse physical health impairment. Research suggests mental health service users with SMI and physical health problems have lower health related quality of life and lower levels of life satisfaction (Wheeler et al., 2015). It follows that experiencing higher levels of life satisfaction is likely associated with less service use.

There was also a lack of studies specifically examining recovery as a determinant of service use, but many which examined this construct as an outcome in the course of evaluating the impact of mental health service use. Recovery is often defined as the process by which individuals cope with mental illness. The recovery measure used in this study theorizes that this process includes stages of anguish linked to impaired health, then a sense of hope, purpose, increased self-care, and connection with others (Jerrell, Cousins, & Roberts, 2006). Increased use of coping strategies, such as problem solving and social support, are also thought to be a part of the recovery process. Research suggests that mental health service users with higher scores on recovery factors have fewer psychiatric symptoms, better physical health, greater resources, and engage in less service use (Green et al., 2013). Therefore it was hypothesized that greater recovery would moderate the effect of physical health, and be linked to less mental health service use.

Perceived social support and service use. Perceived social support was measured here with the Interpersonal Support Evaluation Checklist (ISEL). This dissertation hypothesized that social support would moderate the link between poor physical health and case management service use. The hypothesis was guided by the thought that perceived social support in this context would serve as an enabling factor that either facilitated or hindered mental health service use.

Research on determinants of service use suggests that social support plays a very complex role. It may have the potential to serve two functions – social support may be a barrier to help-seeking and treatment or it may enable treatment, depending on the context. Social support can play a role in accessing services through referrals, and influence the initiation of treatment and client treatment expectations (Hansen, Fuentes, & Aranda, 2017). Social support may also buffer stress for individuals, decreasing the need for mental health treatment. It is also possible that low social support may compound the negative effects of physical and mental health problems, thus necessitating the need for treatment. Findings which highlight this potential dual role are summarized here.

A Canadian epidemiological study conducted by Baiden, den Dunnen, & Fallon (2017) illustrates the important role that social support from family, friends, and neighbors plays in addressing mental health. Their work found that increases in social support were linked to decreases in the *perceived need* for mental healthcare services. Interestingly, the study authors venture that more concrete measures of social support (such as frequency of social contact and size of networks) may not play as important a role as perceived social support in influencing perceived need for mental healthcare. Baiden, den Dunnen, & Fallon (2017) suggest that increased social support may lead to more information and tangible help in accessing mental health services, and it may also buffer the effect of mental health problems, decreasing the need for services.

A study examining mental health services use for individuals diagnosed with recurrent depression found that social support moderated the relationship between physical health impairment and future service use (Hansen, Fuentes, & Aranda, 2017). Hansen, Fuentes, & Aranda (2017) found that for those with varying levels of physical health impairment, service use was significantly moderated by the interaction between physical health impairment and social support. More specifically, their results showed that low to medium levels of social support were related to increased future mental health services use for individuals with high levels of physical health impairment. In this case, low social support appears to be related to more service use for individuals with poor physical health.

In a study that examined the relationship between social support and mental health service use patterns of men and women with depression, Andrea, Siegel, & Teo (2016) did find a relationship between social support and service use. The results from Andrea, Siegel, & Teo (2016) suggest that individuals with more severe levels of depression and adequate levels of social support were 40% less likely to use mental health services, with the decrease being more likely for males than females. About a third of their study participants, 36.4% used mental health services. Of those individuals, 41% classified their level of social support as inadequate, 39.6% as somewhat inadequate, and 33.6% as adequate. Their study found that higher numbers of female mental health service users rated their levels of social support as inadequate or somewhat inadequate compared to males. Given that the majority of participants using mental health services in this study had low levels of social support, this study suggests that less social support is associated with service use, and more social support is associated with less service use, particularly for males.

An epidemiological study examining the relationship between social support, social networks, and several types of service use Maulik, Eaton, & Bradshaw (2009) found that increased social contact and social support was associated with less use of specialty psychiatric services, but did not affect the use of primary care services to address physical health. This study also found that higher levels of social support from relatives were linked to a 50% decrease in the use of general medical services to address mental health needs. This study examined the impact of social support on the use of four types of services: general medical, mental health within general medical settings, specialty psychiatric services, and other human services. One limitation of applying this study's findings to this dissertation is that they did not examine the use of mental health case management services. Their results suggest that higher social support may be associated with less use of mental health services.

Again, research on social support as a determinant of service use revealed mixed findings, and suggested that low or high levels of social support may be linked to increase or decrease the use of certain types of services. These studies suggested that social support may not or may not have an impact on the frequency of primary care services use, and may decrease the use of emergency mental health services. The findings regarding the use of mental health services are inconclusive and suggest that more work is needed to clarify what levels of social support moderate mental health services use.

*Relationship with case manager***.** This study investigated if the case manager and client relationship moderated the link between physical health problems, associated physical health impairment, and mental health service use. It was hypothesized that for individuals with poor physical health, more services would be used when there was a better relationship with service providers. This idea was guided by research that indicated that the social connection between client and case manager and their work towards treatment goals reinforces continued service use and leads to better client outcomes.

The client case manager relationship was assessed in this study with a measure of working alliance, the Working Alliance Inventory. The working alliance is theorized to be based on "non-specific" components that facilitate the relationship between client and case manager, such as their bond, cooperation, and mutual understanding of goals and tasks of treatment. Although more research is needed, evidence suggests that the working alliance is as an essential component of effective treatment, and predicts better outcomes in clients with mental illness (Howgego, Yellowlees, Owen, Meldrum, & Dark, 2003). A study by Kondrat & Early (2010) which examined case management in a community mental health center setting found that length of time in treatment and higher levels of cooperation in developing treatment goals and tasks were associated with a higher working alliance. Their study also indicated potential for the working alliance to impact client levels of perceived stigma, which is often experienced by those with SMI and can be a treatment barrier (Kondrat & Early, 2010).

Dissertation Study Purpose, Aims, & Hypotheses

Individuals diagnosed with SMI have a higher incidence of physical health problems compared to the general population (Robson & Gray, 2007), and the presence of these physical health problems has been associated with increased use of inpatient and outpatient mental health services (Gijsen et al. (2001); Raudino et al. (2014)). Aim 1 of this study hoped to clarify which demographic and psychosocial characteristics distinguished groups of individuals that have physical health problems and physical health impairment. Aim 2 of this study sought to understand moderators of the relationship between physical health problems, physical health impairment, and case management service use for individuals diagnosed with SMI.

To address the first aim, this study tested a regression model to investigate which demographic and psychosocial characteristics were significant predictors of physical health problems and physical health impairment. This information was used to highlight the demographics of individuals that may be at risk for poor health. The focus on demographic and psychosocial characteristics in first aim of this study was guided by the theory of *double disadvantage*, which states that belonging to more than one socially disadvantaged group is associated with higher exposure to risk factors for poor physical health. Five blocks of variables were included in the regression to explore which of these characteristics were related to physical health problems and impairment for this sample.

The first classification block was composed of gender, age, race, ethnicity and mental illness diagnosis. The second block of characteristics examined highest education level completed, total income, number of days worked the preceding month, history of homelessness, and experience with transportation problems. The third block was a measure of psychological distress, specifically a measure of recent distress symptoms.

The fourth block examined life satisfaction, recovery, perceived social support, and working alliance with case manager as predictors of poor physical health. The fifth block of variables included in regression contained the outcomes, total number of physical health problems and perceived physical health impairment.

Aim 1: Use a multiple linear regression model to describe the demographic and psychosocial characteristics of individuals which are significantly associated with physical health problems and perceived physical health impairment.

Aim 1. The regression analysis showed what individual demographic and psychosocial characteristics were most likely to be significantly associated with subgroups of individuals with comorbid physical health problems and physical health impairment.

Preceding the regression analysis, descriptive statistics were used to investigate how to classify individuals according to their number of physical health problems and their amount of physical health impairment. Preliminary descriptive statistics on physical health problems and physical health impairment in the study sample were calculated, and the *M* and *SD* for each outcome guided a conceptual description of three levels. This resulted in classifying individuals as having "low" (below one *SD*), "moderate" (within the range of 1 *SD* above and below the *M*), or "high" (above one *SD)* numbers of physical health problems. A similar approach was taken to describe groups of individuals according to their level of physical health impairment, classifying individuals as having "low" (below one *SD*), "moderate" (within the range of 1 *SD* above and below the *M*) or "high" (above one *SD*) of levels of physical health impairment.

However, even though this classification was used as a general guide, the descriptive statistics showed that individuals formed subgroups that did not parallel this classification. For example, baseline characteristics showed the majority of individuals can be grouped into "very low" physical health impairment and "low" physical health impairment, with fewer individuals in the "moderate" or "high" physical health impairment" categories.

Hypothesis one. Due to the exploratory nature of this regression analysis, no specific hypotheses were tested regarding the exact demographic or psychosocial characteristics of groups that endorsed physical health problems and impairment. The information gathered regarding which subgroups of individuals were at higher risk for poorer physical health will inform future hypotheses.

However, the theory of *double disadvantage* could be useful in explaining the nature of the differences in demographic and psychosocial characteristics for groups that have low versus high of numbers of physical health problems and physical health impairment. The regression analysis allowed us to investigate what demographic and psychosocial characteristics are more commonly associated with co-morbid physical illnesses, and to see if these characteristics denote/signify membership in more disadvantaged groups. For example, analyses showed whether or not individuals who have a low amount of physical health impairment tended to have lower psychological distress and fewer transportation problems.

It was hypothesized that differences in demographic and psychosocial characteristics would describe groups at risk for having physical health problems and physical health impairment. In other words there would be demographic and psychosocial characteristics significantly linked to worse health, as opposed to no subgroup characteristics associated with the outcomes. The characteristics of these groups would differ based on age, gender, race, ethnicity, mental illness diagnosis, *highest education level completed, income, number of days worked the preceding month, previous history of homelessness, experience with transportation problems, life satisfaction, psychological distress, recovery, social support, and working alliance with case manager.*

H_{1a}: Demographic and psychosocial differences will characterize subgroups of individuals at risk for comorbid physical health problems.

H_{1b}: There are differences in demographic and psychosocial characteristics that will help identify individuals more likely to experience physical health impairment.

Aim 2. The second aim of this study intended to provide support for the notion that individuals diagnosed with SMI who have physical health problems are more likely to use mental health services, depending on specific psychosocial factors. A moderation model tested the relationship between physical health problems, physical health impairment, and the use of outpatient community mental health case management services depending on: life satisfaction, psychological distress, recovery, social support, perceived relationship with case manager, and transportation problems.

The moderation model that tested conditions associated with service use is shown in Figure A.1. In this type of statistical analysis, it is thought that a moderation effect exists, where a predictor variable (X) has an indirect effect on the outcome (Y), depending on its interaction with a moderating variable (Z) (Preacher, Rucker, & Hayes, 2007). In other words it is hypothesized that a conditional relationship between the total number of physical health problems and ratings of perceived physical health impairment (X) and mental health service use (Y) exists, and that the strength and/or direction of this relationship depends on levels of each moderator (Z).

One potential implication for testing each moderator is substantiating the influence that they may have in decreasing or amplifying the effects of physical health problems and physical health impairment. The moderation model postulated that the link between physical health problems, physical health impairment, and use of mental health services would depend on levels of each predictor and each moderator. The methods for testing different parts of the model are further discussed in Hypotheses 2-6 below.

Aim 2 (Hypotheses 2-6): A moderation model was tested to investigate the effects of the total number of physical health problems endorsed and perceived physical health impairment on service use. The model also tested the role of each moderator (life satisfaction, psychological distress, recovery orientation, social support, working alliance with case manager, and transportation) on the strength and direction of the relationship.

The first part of the moderation model investigated if there was a relationship between the total number of physical health problems and perceived physical health impairment (*X*) and the frequency of two types of outpatient community mental health service use (targeted case management services (TCM), use of any mental illness management services (any MIMS)) and total services use (*Y*) (total = TCM + any MIMS). This analysis addressed the gap in literature on co-morbid physical health problems and outpatient mental health case management services use.

Hypothesis two. More information is needed on the relationship between perceived physical health of individuals diagnosed with SMI and service use at outpatient community mental health settings, which serve as a common health care interface this population accesses. *It was hypothesized that there was a positive association between the total numbers of physical health problems endorsed and ratings of perceived physical* *health impairment and the frequency of service use*, even given the significant barriers to accessing appropriate physical and mental health care this population faces. The hypothesis was based on findings that indicated adverse physical health events were associated with more mental health provider visits for the general population (Yoon & Bernell, 2013). This study used Medicaid billing records to count the frequency with which participants used two types of services at the community mental health center in the 12 months preceding the research interview for Time 2. This allowed an examination of the services used in the year after the first research interview was completed. Again, the types of services examined were 1) mental illness management services, 2) targeted case management services, and 3) the total frequency of both mental illness management and targeted case management service use.

H_{2a}: Physical health problem count is positively associated with targeted case management service (TCM) use.

H_{2b} Physical health problem count is positively associated with mental illness management (any MIMS) service use.

H_{2c}: Physical health problem count is positively associated with total mental health service use (TCM & any MIMS combined).

H_{2d}: Perceived physical health impairment is positively associated with targeted case management service (TCM) use.

H_{2e}: Perceived physical health impairment is positively associated with any mental illness management (any MIMS) service use.

H_{2f}: Perceived physical health impairment is positively associated with total mental health service use (TCM & any MIMS combined).

Hypothesis three. *The hypothesis was tested that the following moderators (Z) (life satisfaction, psychological distress, recovery, perceived social support, working alliance with case manager, and transportation problems) were associated with case management services use (Y).*

H_{3a}: Higher psychological distress, transportation problems, and working alliance with case manager are associated with targeted case management (TCM) service use.

H_{3b}: The following moderators are inversely associated with targeted case management (TCM) service use: life satisfaction, social support, and recovery.

H_{3c}: Measures of psychological distress, transportation problems, and working alliance with case manager are associated with mental illness management (MIMS) service use.

H_{3d}: There is an inverse association between mental illness management (MIMS) service use and the following moderators: life satisfaction, social support, and recovery.

H_{3e}: There is a positive association between psychological distress, transportation problems, and working alliance with case manager and total mental health service use (TCM & any MIMS combined).

H_{3f}: There is an inverse association between total mental health service use (TCM & MIMS combined) and the following moderators: life satisfaction, social support, and recovery.

Hypothesis four. *The hypothesis was tested that the total number of physical health problems endorsed and perceived physical health impairment (X) would interact (X*Z) with the following potential moderators to affect service use (Y): life satisfaction,* *psychological distress, recovery, social support, working alliance with case manager, and transportation problems (Z).*

H_{4a}: Total physical health problem count is inversely associated with the following potential moderators: life satisfaction, recovery, and social support.

H_{4b}: Total physical health problems count is positively associated with the following potential moderators: psychological distress, working alliance with case manager, and transportation problems.

H_{4c}: Perceived physical health impairment is inversely associated with the following potential moderators: life satisfaction, recovery, and social support.

H_{4d}: Perceived physical health impairment is positively associated with the following potential moderators: psychological distress, and transportation problems, and working alliance with case manager.

Hypothesis five. *A moderation model was hypothesized with total numbers of physical health problems endorsed and perceived physical health impairment as predictors (X), TCM, MIMS, and total case management service use as outcomes (Y), and with life satisfaction, psychological distress, recovery, social support, working alliance with case manager, and transportation problems (Z) moderating the relationship between the predictors (X) and outcomes (Y)* (see Figure A.1).

H_{5a}: Life satisfaction, psychological distress, recovery orientation, perceived social support, working alliance with case manager, and transportation problems moderate the relationship between total number of physical health problems and targeted case management (TCM) service use such that higher numbers of physical health problems are associated with a higher use of TCM services, depending on the previously hypothesized levels of each moderator (see Hypotheses 3 and 4 for the interaction between *Z* and *X* and *Z* and *Y*).

H_{5b}: Life satisfaction, psychological distress, recovery orientation, perceived social support, working alliance with case manager, and transportation problems moderate the relationship between total number of physical health problems and any mental illness management service use (any MIMS), such that higher numbers of physical health problems are associated with a higher use of MIMS services, depending on the previously hypothesized levels of each moderator (please see Hypotheses 3 and 4).

H_{5c}: Life satisfaction, psychological distress, recovery orientation, perceived social support, working alliance with case manager, and transportation problems moderate the relationship between total number of physical health problems and total mental health service use (TCM & MIMS combined) such that higher numbers of physical health problems are associated with a higher use of total case management services (TCM & MIMS combined), depending on the previously hypothesized levels of each moderator (see Hypotheses 3 and 4).

H_{5d}: Life satisfaction, psychological distress, recovery orientation, perceived social support, working alliance with case manager, and transportation problems moderate the relationship between perceived physical health impairment and targeted case management (TCM) service use such that worse perceived physical health impairment is associated with a higher use of TCM services, depending on the previously hypothesized levels of each moderator (see Hypotheses 3 and 4).

H_{5e}: Life satisfaction, psychological distress, recovery orientation, perceived social support, working alliance with case manager, and transportation problems moderate the relationship between perceived physical health impairment and mental illness management (MIMS) service use such that worse perceived physical health impairment is associated with a higher use of MIMS services, depending on the previously hypothesized levels of each moderator (see Hypotheses 3 and 4).

H_{5f}: Life satisfaction, psychological distress, recovery orientation, perceived social support, working alliance with case manager, and transportation problems moderate the relationship between perceived physical health impairment and total mental health service use (TCM & MIMS combined) such that worse perceived physical health impairment is associated with a higher use of total case management services (TCM & MIMS combined), depending on the previously hypothesized levels of each moderator (see Hypotheses 3 and 4).

CHAPTER 3

METHODS

Participants

Participants (*N* = 357) were recruited as a part of a research study examining housing environments and their impact on adaptive functioning (the HAF Lab study) for individuals diagnosed with serious mental illness (SMI) from February 2004 – March 2006. Two waves of data were collected (Time 1 & 2), with one year in between each assessment. These project data came from the larger HAF study that included *N* = 533 at Time 1, and *N* = 424 at Time 2. Of these participants, data was available for *N* = 357 individuals who consented to have their mental health service use data released and participated in the study for both Times 1 and 2. The service use data which was the basis for this dissertation study constituted 67% of Wave 1 participants and 84% of Wave 2 participants. Descriptive statistics for the dissertation study sample are presented in Table 4.1 and described in the results for Aim 1.

Outpatient mental health consumers who resided in supported housing sites in the state of South Carolina (99 sites total) were recruited from 17 different community mental health centers. All individuals were supported by a housing subsidy (such as Section 8 and other HUD support) and lived in housing affiliated with the South Carolina Department of Mental Health (SC DMH).

The community mental health centers (CMHCs) operated by SC DMH serve a large proportion of individuals needing mental health services within state catchment areas that are often underserved by other traditional behavioral health resources. Priority is given to individuals with serious and persistent mental illness and those facing psychological emergencies. The goal of the CMHCs is to support the stabilization and recovery of people diagnosed with mental illness and to facilitate their productive living in the community. The CMHC services provided towards this aim include case management, psychological medication management and nursing, outpatient therapy, homelessness outreach, and peer support (South Carolina Department of Mental Health, 2012).

Participant recruitment occurred as a part of a population-based study targeting individuals who were representative of the state population diagnosed with SMI and using CMHC supported housing services for all state catchment areas. Eligibility criteria for participants were that individuals were over the age of 18, were not in acute crisis at the time of recruitment, and had received mental health services at the CMHC as their primary mental health provider. Eligible individuals were also required to hold a lease for DMH-affiliated supported housing, have received a rent subsidy, and lived in their residence for 3 months or more at the time of the interview. The final sample of 533 participants from Wave 1 represented 66% of eligible individuals receiving CMHC services living in DMH affiliated supported housing. Descriptive statistics for the full HAF study sample are presented in Appendix E.

Procedure

The archival data used for this dissertation came from the Housing and Adaptive Functioning study, which received IRB approval from the South Carolina Department of Mental Health and University of South Carolina IRB. The HAF study aimed to recruit as many eligible individuals as possible who received outpatient mental health services at state community mental health centers. Eligible participants were recruited by their case managers through letters sent from each CMHC site. Individuals interested in the study signed an authorization to be contacted by research staff after discussing the study with their case managers. There was a $20 incentive offered for participation.

Voluntary consent was obtained after the purpose and procedures of the study were explained to participants. Consent was also obtained to allow the study to access records from SC DMH and case managers about participant functioning, mental illness diagnosis, and community mental health center service use. Participants were given a copy of the consent form for their records, which included contact information for research study staff.

During Wave 1 and 2, research interviews were conducted by trained graduate students and research staff at individual homes, mental health centers, or at other affiliated sites (such as psychosocial rehabilitation programs) in a private setting, according to participant preference. The average length of the research interview was 1.5 hours. Interviewers read survey questions to participants from a visible computer laptop screen, which allowed participants to follow along with the prompts, ask questions about the prompts, and see the recorded answers. Participants were also asked to review answers recorded for open-ended qualitative prompts.

During the interview participants were asked questions about their housing and neighborhood environment, social experience, and experience receiving mental health services. The measures included in the   study were a part of a larger research interview that included participant demographic information and these measures of: housing environments, neighborhood environments and overall perceptions of functioning, experiences of stressful events, social support, experiences with substance use, ratings of psychological distress, physical health problems and level of perceived physical health impairment, coping strategies, hoped-for selves, perceived alliance with mental health care service providers, and sense of recovery from mental illness. The specific measures used in this study are described below.

Measures

Study design. Data used in the dissertation study was collected as a part of the larger HAF study that investigated variables that influenced the functioning and well-being of individuals with serious mental illness who used outpatient community mental health services and resided in DMH-affiliated, supported housing. The HAF study collected data at two time points 12 months apart in order to make predictions about housing environments and residential tenure. The data collected during Time 1 was used to test the moderation model to predict service use outcomes at Time 2. During the research interview, the measures used here were collected in the following order: demographic information, Life Satisfaction, history of homelessness (Residential Follow-Back Calendar), psychological distress (Brief Symptom Inventory), perceived physical health impairment (Health and Daily Living Form), transportation problems (one item as a part of the Stressful Life Events Checklist), Recovery Questionnaire, and the Working Alliance Inventory. Data was obtained on participant diagnosis of mental illness and service use from SC DMH after data collection was completed.

Demographic questionnaire. A brief demographic instrument (a 40-item measure) assessed individual background characteristics through self-report. Participant gender, age, race, ethnicity, education level, income level, number of days worked in the last month, and benefits received (such as Medicaid/Medicare, TANF, and SSI/SSDI) were recorded. The following categories were coded for race: European-American, African-American, Native-American / Alaskan Native, Asian-American, and Other. Ethnicity was coded as whether participants were or were not Hispanic. Within health psychology research, there are differences in how race and ethnicity are defined; these may not reflect the way that categories were coded in this study. It is important to note the role that culture plays in terms of risk and protective factors for physical health and health-related behaviors (Singer, Dressler, & George, 2016). These categories (i.e. race and ethnicity) as they are defined do not necessarily denote the influence of cultural factors which may contribute to any health disparities for each group.

Transportation. Transportation problems were assessed using one item which was a part of a modified version of the Stressful Life Events & Situations Checklist (Almeida, Wethington, & Kessler, 2002). The Stressful Life Events & Situations Checklist is a 15-item measure which assesses the frequency of stressful events in the past 6 months. Broadly, the types of stressors covered in the Stressful Life Events & Situations Checklist were interpersonal, financial, and stressors involving threat and loss. Cronbach's alpha for the scale has been reported in ranges from .71 to .89 (Almeida, Wethington, & Kessler, 2002). The prompt for transportation issues asks: *"How often have you had a problem getting or doing something because of a problem with transportation over the last 6 months?"* The response options were *never* = 0, *rarely* = 1, *sometimes* = 2, and *often* = 3. Higher scores indicated more impact on daily activities due to transportation problems.

Diagnosis of mental illness. Participant diagnosis of mental illness was obtained through SC DMH records. Primary diagnosis was recorded in participant charts at the time outpatient mental health services were received at the community mental health center and were utilized for billing purposes. Diagnoses were recorded by service providers based on DSM-IV or ICD-9 codes. These diagnoses were recoded into broad groupings (e.g., schizophrenia cluster disorders, affective disorders, posttraumatic stress disorder, anxiety disorders, substance abuse).

History of homelessness. The Residential Timeline Follow-Back Inventory is a structured self-report of residential history during the 6 months preceding the research interview (Bebout, Drake, Xie, McHugo, & Harris, 1997; New Hampshire-Dartmouth Psychological Research, et al., 2001; Tsemberis, McHugo, Wereiams, Hanrahan, & Stefancic, 2007). High test-retest reliability has been reported, with ranges from 0.80 to 0.91 (Tsemberis, McHugo, Wereiams, Hanrahan, & Stefancic, 2007, Goering et al., 2011). The Follow-Back Inventory records the amount of time participants were stably housed in each residence and the reasons for moving. It also assessed the number of instances and amount of time spent institutionalized and spent homeless. History of homelessness was assessed with one item at the end of the questionnaire which asked "*Have you ever been homeless?*" that elicited a Yes or No response.

General life satisfaction. A one-item measure of global Life Satisfaction was administered. The item was originally a part of the Quality of Life Interview (QOLI) (Lehman, 1983*a*; Lehman, 1983*b*; Lehman, 1988). The prompt asks participants "How do you feel about your life overall right now?" Participants rate their satisfaction on a seven-point scale. Scale responses are as follows: *terrible* = 1, *unhappy* = 2, *mostly dissatisfied* = 3, *mixed* = 4, *mostly satisfied* = 5, *pleased* = 6, and *delighted* = 7. Higher scores indicated more life satisfaction. This question was asked as a part of the demographic interview. Research indicated the QOLI has good construct validity and responsivity to changes in global quality of life for individuals with SMI (Wasserman, et al., 2006; Corrigan, 2004). Internal consistency for the full QOLI has been reported between 0.79 and 0.88 (Lehman, Postrado, & Rachuba, 1993).

Total number of physical health problems endorsed. The total number of physical health problems for each participant was assessed with an item selected from the Health and Daily Living (HDL) Form, a structured assessment that evaluates physical health, social functioning, and life stressors for patient and community populations based on self-report (Moos, Cronkite, Billings, Finney, 1988). The chosen item indicated health-related factors and perceptions of their impact on community functioning. Participants provided an open-ended response to the question "*Do you have any physical health problems? If so, please describe them.*" Responses were transcribed and checked by participants at the time of the research interview. The total number of physical health problems endorsed by each participant and the type of health problems were coded by conducting a frequency count of each type of health problem listed in qualitative answers to this prompt.

Perceived physical health impairment. This was assessed using an item selected from the Health and Daily Living (HDL) Form, a structured assessment that evaluates physical health, social functioning, and life stressors for patient and community populations based on self-report (Moos, Cronkite, Billings, Finney, 1988). The amount of perceived impairment due to physical health was rated using a five point Likert scale (1= *not at all;* to 5 = *extremely*) in response to the prompt "*During the last month, to what extent has your physical health interfered with your activities?*" Higher scores indicated worse functioning associated with health-related impairment. Although this is a single item measure, there is support for brief measures of health status as instruments with good reproducibility, test-retest reliability, and concurrent and discriminant scale performance (DeSalvo, Fisher, Tran, Bloser, Merrill, & Peabody, 2006).

Psychological distress. The Brief Symptom Inventory (BSI) is a 53-item self-report symptom inventory (Derogatis & Thomas, 2012). Individuals were asked to respond to the prompt "*In the past month, how much were you distressed by….*" and rate the severity of distress experienced due to different symptoms within the last 30 days according to a 5-point Likert scale (0 = *not at all*; 4 = *extremely*). The final item of the BSI assessed mental health impairment with the prompt "*During the past month, to what extent has your emotional health interfered with your daily activities?*" which was rated according to a 5-point Likert scale (1 = *not at all*; 5 = *extremely*). The BSI uses nine primary symptom dimensions and three global indices to measure distress. The Global Severity Index (GSI) is an overall indicator of psychological symptom status and distress due to the nine symptom dimensions (it is an average of all scale items). The GSI score was used here, with higher scores indicating more overall psychological distress. Other research has found the internal reliability for the BSI to range from .70 to .88 with individuals seeking counselling (Broday & Mason, 1991). Cronbach's alpha for this sample was .95, which indicated excellent reliability.

Recovery process. Recovery process was measured with a modified version of the Recovery Process Inventory (RPI) (Jerrell, Cousins, & Roberts, 2006). The 27-item scale assesses the following domains thought to be a part of the recovery process: anguish, connection with others, confidence and purpose, help and care from others, good living situation, and hopeful stance and self-care. The prompt states, *"I would like to ask you what you think about recovery and about the treatment and care you receive"*. Participants are asked how much they agree or disagree with each item. Responses are rated on a five-point Likert scale: *strongly disagree* = 1, *disagree* = 2, *neutral* = 3, *agree* = 4, and *strongly agree* = 5. Higher scores indicated higher levels of recovery. The scale has been shown to have good internal consistency and fair to moderate test–retest reliability (Jaeger, Konrad, Rueegg, & Rabenschlag, 2013; Jerrell, Cousins, & Roberts, 2006). Cronbach’s alpha for the RPI in this sample was .87, which indicated good internal reliability.

Social Support. The Interpersonal Support Evaluation List – short form (ISEL-12) is a 12-item measure of perceived social support (Cohen & Hoberman, 1983; Cohen et al., 1985). The ISEL has three domains which are measured with four items each. The domains are appraisal support (the perceived ability to talk to someone about personal problems, i.e. the ability to share worries with others), tangible support (the amount of material aid available through others, i.e. the ability of others to help move into a residence, if needed), and belonging support (the perceived availability of others to do activities, i.e. going to the movies together). The prompt asks participants to read *“a list of statements each of which may or may not be true about you”*, and then to rate each statement on the level of truthfulness of each statement. The response options are *definitely true* = 3, *probably true* = 2, *probably false* = 1, and *definitely false* = 0. The scale has been found to have internal consistency and test-retest reliability (Cohen et al., 1985). Cronbach’s alpha for the ISEL-12 was .80, which indicated good internal consistency.

Relationship with case manager. A modified version of the Working Alliance Inventory (WAI) - Short Form revised was used (Hatcher & Gillaspy, 2006; Horvath & Greenberg, 1989). The WAI examines non-specific techniques thought to enable successful alliance between client and therapist. It is conceptualized as having three components, bonds, goals, and tasks. Modifications were made to the WAI-SR to enable assessment of the client – case manager alliance within community mental health settings (Chinman, Symanski, Johnson, & Davidson, 2002; Neale & Rosenheck, 1995). The version of the WAI used in this study was a seven-item measure of therapeutic alliance with case manager. The prompt asks participants to rate how much they disagree or agree with statements about their work with their case manager over the past 6 months. There are five response options: *strongly disagree* = 1, *disagree* = 2, *neither agree nor disagree* = 3, *agree* = 4, and *strongly agree* = 5. Mean scores where used, with lower total scores indicating less alliance and higher scores indicating a stronger alliance. Research indicated good consistency and reliability for the WAI-C (Hatcher & Gillaspy, 2006; Horvath & Greenberg, 1989). The internal consistency for the WAI was .90, which indicated excellent reliability.

Service use. Data on community mental health center (CMHC) service use was accessed through SC DMH records and the Client Information System (CIS). The CIS is a database used by state-funded participating CMHCs to track enrollment and service-based encounters for the purpose of service monitoring, accountability, and billing. The total number of times individuals received any type of service from any staff at the CMHC during the 12 months prior to the research interview was assessed. The frequency of two specific types of services, case management (TCM) and mental illness management (MIMS) were also be assessed for that period. At the time of service, the date and type of service provided was recorded by CMHC staff for billing purposes and internal accounting. The data obtained from CIS was merged with existing participant data collected as a part of the HAF study. Data on service use preceding Wave 1 data collection was used in the regression analysis for Aim 1. The moderation analysis in Aim

2 used service use data collected during Wave 2. A frequency count was performed on the dataset obtained from SC DMH for the total number of times individuals received targeted case management (TCM) and *any* mental illness management (any MIMS) (coded as 1 = *case management*, and 2 = *any mental illness management services*). The any MIMS category was created to account for the very low frequency of MIMS use in the sample. Any MIMS is defined as the total number of services used (TCM and MIMS) for those individuals that used MIMS as a part of their treatment. A frequency count was done for the total number of services used (regardless of service type) (coded as 0 = *no service used*, 1 = *yes*) as well. This count of services paralleled other literature documenting service use for this population, and examined total service use as well as the frequency of the most commonly used types of services within a setting (Matejkowski, Lee, & Han, 2014).

Data Analysis Procedures

Power analysis Aim 1. Our sample size (N = 351) was sufficiently powered to detect significant small to medium, medium, and large effects for a multiple regression model. The power to detect a significant effect depends on the alpha criterion set for significance, the number of participants, and the size of the effect. A common way to classify effect sizes is by using f^2, which ranks effect sizes as small = .02, medium = .15, and large = .35 (Cohen, 1988). An a priori power analysis was conducted with G*Power to investigate the appropriate sample size, given the regression used to test Aim 1. A total number of 15 predictors were entered into G*Power. These consisted of the main outcomes of physical health problems and physical health impairment (Y) and the predictors in Blocks 1-5 of the model (X) entered as Steps in the regression. The conventions of completing an alpha level of .05 (two-tailed), with Power of .80 were used. The sample size needed to detect an effect size of $f^2 = .06$ is $N = 327$, which means this study was powered to detect most small, medium, and large effects.

Power analysis Aim 2. Another a priori power analysis was conducted using G*Power to find the appropriate sample size for the moderation, which was based on a regression framework. A total number of 9 predictors were entered into G*Power. These consisted of the main predictors of physical health problems and physical health impairment (X) and the moderators (Z) in the model thought to interact with (X): transportation, life satisfaction, a measure of psychological distress, social support, recovery, and working alliance. These predictors also included where mental health services were received, which was a covariate. Again, the conventions of using an alpha level of .05 (two-tailed), with Power of .80 were used. The sample size needed to detect an effect size of $f^2 = .04$ was $N = 277$, which means the analysis was powered to detect most small, medium, and large effects.

Aim 1 analysis procedures

Variables were examined for distribution normality, skew, kurtosis, and outliers. A square root transformation was applied to the distribution for physical health impairment; a log transformation was applied to the distribution for monthly number of days worked. These transformations were conducted in order to reduce positive skew. Analyses were conducted to assess missing data. Please refer to the results for Aim 2 for a detailed description of the procedures used to evaluate missing data and the treatment of outliers. Descriptive statistics and regression analyses were conducted for the resulting $N = 351$. Please refer to Table 4.1 for sample baseline characteristics for variables used in Blocks 1-5 of the regression model.

Physical health problem coding. The qualitative data for physical health was coded and grouped based on ICD 10 categories. The number of physical health problems endorsed by each participant was coded into a simple count variable and a separate the physical health impairment variable was created. Then physical health problems were grouped into larger categories for data coding based on the ICD 10 system. The ICD 10 provides a standardized system to refer to medical illnesses, which promotes diagnostic utility, communication, and billing across medical specialties and healthcare settings. The ICD 10 codes are often grouped based on the category of illness, the part of the body affected (i.e. blood disorders, orthopedic issues), and usually overlap with the medical specialty for treatment of these illnesses.

The coding of physical health problems was guided by the ICD 10 system. First each physical health problem was labelled and coded. Then these problems were grouped based on similarity of illness type, the part of the body affected, and further grouped categories which overlap with medical specialty for treatment. Within each broad category of illness, individual disorders were placed into separate categories if a high frequency of that response warranted it. For example, “high blood pressure” was originally grouped under the Cardiovascular category, and was mentioned with such high frequency it was coded as a separate category, i.e. Hypertension / High Blood Pressure. A comprehensive list of the broad categories of physical health problems and their individual illnesses was drafted based on each physical health problem mentioned in the qualitative responses to guide the final coding. The number of individuals that have each physical health problem, percentage of the sample, and a rank of the most to least common physical health problems is presented in Table 4.3 and Figure 4.1. Crosstabs were performed to determine demographic information for each of the most common physical health problems (please see Table 4.4).

Regression data preparation and tests of regression assumptions. A multiple regression analysis was used due to its ability to describe the amount of variance in the outcomes attributed to each of the demographic and psychosocial characteristics. The assumptions of regression were tested. Regression analysis performs optimally when variable distributions are assumed to be normally distributed and independent (limiting multicollinearity). Other assumptions of regression are a linear relationship between predictors and outcomes and homoscedasticity. It is also important to assess the presence of outliers.

Boxplots and stem and leaf diagrams were checked for each variable. However, cases that were considered outliers were removed based on a calculation of Mahalanobis distance. Skew and kurtosis were checked for each variable. Transformations were applied to variables as needed to reduce skew and kurtosis for non-normally distributed variables with the aim of meeting the criterion of within +2 and -2 for skew and kurtosis.

In order to assess multicollinearity, variance inflation factor (VIF) scores were obtained. For this study, a $VIF < 2$ was found for all variables included in the regression (a criterion of $VIF \geq 10$ indicates lack of multicollinearity). Scatterplots revealed a linear relationship. A plot of the residuals for the predictors and outcomes was examined, which revealed that the assumption of homoscedasticity was not met, as the scatterplot revealed a slightly cone shaped distribution. However, the regression analysis was deemed robust to the amount of heteroscedasticity present.

The variables were grouped into five Blocks of analysis based on research supporting block composition and the hypothesized similarity of impact on the outcomes in the regression analysis. A multiple regression analysis was used due to its ability to perform well with a combination of categorical and continuous variables. The continuous variables included in the regression were age, education level, monthly income, monthly days worked, frequency of transportation problems, life satisfaction, psychological distress, social support, working alliance, number of physical health problems and amount of physical health impairment. The categorical variables included in the regression model were gender, race, ethnicity, mental illness diagnosis, and history of homelessness. Preceding the regression analysis the continuous variables were mean centered to help with interpretation of the results. The categorical variables were dummy-coded with the largest subgroup used as the reference group.

Multiple linear regression analysis for Aim 1. In order to investigate the relationship between each of the demographic and psychosocial characteristics and physical health, a multiple linear regression was used. Two regressions were performed, the first to predict number of physical health problems and the second to predict perceived physical health impairment as the outcome. A description of the blocks of demographic and psychosocial variables included in each step of the regression model follows.

Block one. A multiple regression was performed with the social and demographic variables in this block entered into Step 1 of the regression. The variables in this block were age, gender, race, ethnicity, and mental illness diagnosis.

Block two. The variables in this block were level of education completed, total income, number of days worked in the last month, history of homelessness, and level of impact transportation problems had on activities. These were entered into Step 2.

Block three. Step 3 of the regression was conducted with psychological distress (measured by the Brief Symptom Inventory).

Block four. Step 4 of the regression included the variables of life satisfaction, recovery, level of perceived social support, and working alliance with case manager.

Block five. The variables in this block are measures of physical health which were outcomes in the regression model. This block consisted of the total number of physical health problems and amount of perceived physical health impairment.

Multiple regression analysis for all blocks (Blocks 1 - 5). To test Hypothesis 1_a and 1_b, a multiple linear regression was conducted which included variables in all five blocks of the analysis.

Aim 2 analysis procedures

Data preparation for Aim 2 (Hypotheses 2-6). The moderation model investigated the effect of total number of physical health problems and perceived physical health impairment (the predictors) on three types of service use (the outcomes) controlling for the hypothesized moderators (Z). The moderators were life satisfaction, psychological distress, transportation problems, social support, recovery, and working alliance.

The moderation analysis was conducted using the PROCESS macro in SPSS 24. As both predictor and moderator variables were continuous, the observed least squares (OLS) method for creating confidence intervals at 95 % was used. Before tests of the moderation model in Hypotheses 2-6 were conducted descriptive statistics for the variables in the model were obtained and tests of the assumptions of regression which applied to this analysis were checked. Each variable was checked for normality and skew, scatter plotted and checked for linear relationships and outliers. Variables were automatically mean centered by the PROCESS macro during the tests of the moderation model.

The assumptions of linear relationships and independent observations in particular applied to interaction effects. In order to test linear relationships, scatterplots were used to plot the dependent variable (three types of service use) against the moderators to evaluate the amount of linearity in the plot and to investigate if any transformations to variables were necessary. The test of independent observations was done to investigate if there were any variables that would cause clustering, such as mental health center site.

Outliers. Outliers were removed as appropriate to limit their potential impact on calculated confidence intervals. If there are outliers, this may result in increasing the standard error and the confidence interval width (Xu & Yuan, 2010; Bollen & Stine, 1990). Outliers can reduce power and increase Type I error (Salibián-Barrera, Van Aelst, & Wereems, 2008). To assess outliers, interview data such as open-ended and quantitative survey responses and contingent coding were reviewed in case of data coding or collapsing decision error, which could lead to an uncharacteristic response.

The default for detecting outliers in SPSS is plus or minus 3.5 standard deviations, which is conservative and not robust to finding outliers (Kenny, 2013). Values can also be categorized as extreme outliers if they are more than three times the interquartile range of the variable (Tukey, 1977). The Mahalanobis distance was used to detect multivariate outliers with high influence and leverage beyond a cutoff point based on a chi-square distribution for the data (Tabachnick, & Fidell, 2001). The Mahalanobis distance calculated a Euclidian distance for transformed data that was unit-less, accounted for data scale. The distance represented how many standard deviations away a point was from a mean of a distribution while accounting for the variance and covariance of the variables.

Missing data. Multiple imputation was used to account for missing data as a part of the analyses for the HAF original study. Of the original sample of 525 participants, 69% were not missing any data. The remaining participants had less than 25% of scale items missing on any scale. SAS PROCMI and PROC MIANALYZE were used to obtain parameter estimates, standard errors, and degrees of freedom for the imputed data.

The percentage of any remaining data missing for this dissertation was examined. Participant demographic information, potential covariates, and variables included in the theoretical model were considered. Missing values were examined to investigate if data were missing at random, if missing data were accounted for by a covariate in the model, and if there were any associations between missing data and the theoretical model. The PROCESS macro assumed complete data and excluded cases with any missing data on any of the variables before conducting the moderation.

Data analysis for Hypothesis two. A "piecemeal" approach to moderation analysis can be used to explain conceptually how each part of the model was tested before testing the full integrated moderation model (Baron & Kenny, 1986; Hayes, 2013; Edwards & Lambert, 2007). To test the main effect of (*X*) on (*Y*), hierarchical regression analyses were used to investigate if the total number of physical health problems and perceived physical health impairment (*X*) were positively associated with three types of mental health service use (*Y*). To test H_{2a}, H_{2b}, and H_{2c} the hierarchical linear regression controlled for any covariates in step one and (a) added total number of physical health problems as a predictor in step two and (b) included targeted case management service use as the outcome. To further test H_{2a}, H_{2b}, and H_{2c}, two more regressions were performed with the same steps listed for H_{2a}, H_{2b}, and H_{2c}, except predicting any mental illness management service use or predicting total mental health service use as outcomes. The same procedure was followed to test H_{2d}, H_{2e}, and H_{2f}, instead using perceived physical health impairment as a predictor for each regression. In addition, the main effect of total number of physical health problems and perceived physical health impairment on each type of service use (H_{2a} - H_{2f}) was calculated as a part of tests of the moderation model described in the data analysis for Hypothesis 5.

Data analysis for Hypothesis three. To test hypotheses $H_{3\ a\text{-}f}$, hierarchical linear regressions were performed to investigate if each of the moderators (*Z*) predicted higher levels of TCM, any MIMS, and total case management service use *(Y*).

It was hypothesized ($H_{3a,c,e}$) that higher levels of psychological distress, more transportation problems, and higher working alliance with case manager (*Z*) would predict higher service use (*Y*).

It was hypothesized ($H_{3b,d,f}$) that lower levels of life satisfaction, lower scores on the recovery questionnaire, and social support (*Z*) would predict higher service use (*Y*).

To test $H_{3a\text{-}f}$, separate hierarchical regression analyses were performed, which controlled for covariates in step one and each moderator in step two to predict the outcomes of any mental illness management services used, targeted case management, and total mental health services.

Data analysis for Hypothesis four. The models and procedures proposed by (Hayes, 2013) guided the tests of the hypothesized moderation models for this study. The moderation model hypothesized that the effect of (*X*) on (*Y*) was conditional, or dependent on certain levels of each predictor (*X*) interacting with certain levels of each moderator (*Z*). A term was created (*X*) *(*Z*) by the PROCESS macro to account for the interaction between the predictors (*X*) and moderators (*Z*). In moderation, each moderator has the potential to strengthen, weaken, or reverse the nature of a relationship between (*X*) and (*Y*).

It was hypothesized (4_{b-d}) that a higher total number of physical health problems and higher levels of perceived physical health impairment (*X*) would interact with higher levels of transportation problems, psychological distress, and working alliance with case manager (*Z*) to predict higher frequency of each type of service use (*Y*).

It was hypothesized (4_{a-c}) that a higher total number of physical health problems and higher levels of perceived physical health impairment (*X*) would interact with lower levels of these moderators: life satisfaction, lower scores on the recovery questionnaire, and social support (*Z*) to predict higher frequency of each type of service use (*Y*).

To test the hypotheses 4_{a-b}, hierarchical linear regressions were performed with the selected covariates added in step one, and the interaction term with number of physical health problems (*X*) in step two to predict any MIMS, TCM, and total service use (*Y*).

To test the hypotheses 4_{c-d}, hierarchical linear regressions were performed with the selected covariates added in step one, and the interaction term with perceived physical health impairment (*X*) in step two, to predict any MIMS, TCM, and total service use (*Y*).

Data analysis for Hypothesis five. The PROCESS macro tested the main effect and interaction effects while controlling for the selected covariates (Preacher, Rucker, & Hayes, 2007). The main effects of total numbers of physical health problems and perceived physical health impairment (*X*) on service use (*Y*) and the interaction effect accounting for the moderators (Z) were examined using this procedure. Hierarchical linear regressions and OLS were used to generate confidence intervals.

The moderation helped clarify if higher levels of psychological distress and transportation problems, and lower levels of life satisfaction, lower scores on the recovery questionnaire, and working alliance with case manager measure (*Z*) interacted with (*X*) to moderate the relationship between physical health problems, physical health impairment (*X*), two types of service use (any MIMS and TCM), and total service use (*Y*). For each test of moderation, only one independent variable, dependent variable, one moderator, and all potential covariate were included in the model at a time.

In other words, hypotheses H_{5a} – H_{5f} were tested to investigate if and how each psychosocial characteristic moderated: 1. the relationship between total number of physical health problems and frequency of TCM, any MIMS, and total service use, and 2. the relationship between perceived physical health impairment and frequency of TCM, any MIMS, and total service use.

The option to mean center the predictors and moderators included in the analysis was chosen. Mean centering used the sample mean ± 1 *S.D.* of the moderator (Z) as a default. This affected the interpretation of the estimates of conditional effects described. The plot option was chosen to help visualize the interactions. This plot represented the estimated values of each service use outcome (*Y*) for various values of physical health predictors (X) and the moderators (*Z*). Conditional effects and simple slopes were generated for the moderation, and two-way interactions were probed. The results were evaluated for the values of service use at which the effect of physical health problems and impairment on each moderator transitioned from being statistically significant to n.s.

The PROCESS macro calculated the main effect of the total number of physical health problems and perceived physical health impairment on the three types of service use. The interaction (conditional effect of the moderator) and the main effects of (*X*) on

(*Y*) and the impact of interaction that results given the effect of the moderator (Z) were examined in detail. The regression coefficients, standard errors, t- and p-values, and model summary information are reported in the results chapter.

CHAPTER 4

RESULTS

Aim 1 sample characteristics

Demographic characteristics were examined for variables included in the multiple linear regression models, as well as service use frequency for Wave 1 (see Table 4.1). There were similar proportions of female (*N* = 183, 52%) and male participants (*N* = 167, 48%). The average age of all participants was *M* = 46.58, *SD* = 10.18. African-Americans comprised 50% of study participants (N =176), European-Americans 43%, Asian-Americans and individuals of Native American and Native Alaskan < 1% each, respectively. Most individuals were not Hispanic (*N* = 344, 98%). In terms of education, 29% of participants had some high school education, 28% were high school graduates, 5% completed a GED, and 17% completed 2 years of college or had a 2-year college degree. Most study participants received SSDI, with the average income reported *M* = $651.38, *SD* = 224.69. The average number of days worked in the preceding month was *M* = 2.57, *SD* = 6.25.

In terms of service use characteristics, the average frequency of total service use over the preceding year for Wave 1 participants was *M* = 47.89, *SD* = 72.84, the average TCM service use was *M* = 16.34, *SD* = 18.16, and the average frequency of MIMS was *M* = 31.54, *SD* = 69.52. The most common mental illnesses were thought disorder diagnoses (70%), followed by mood (24%), anxiety (3%), and other disorders (2%). A substantial proportion of study participants had a history of homelessness (43%). The average amount of psychological distress reported was low, *M* = 0.91 *SD* = 0.71. Interestingly, many individuals reported rarely experiencing transportation problems which reduced their ability to be involved in activities (47%). The remaining 51% of individuals reported that they rarely, sometimes, or often experienced transportation problems. Life satisfaction ratings averaged around having “mixed” to “mostly satisfied” feelings of life satisfaction (*M* = 4.35, *SD* = 1.04). Overall, participants reported moderate levels of mental illness recovery (*M* = 3.81, *SD* = 0.46), moderate amounts of perceived social support (*M* = 2.91, *SD* = 0.54), and moderate to high levels of working alliance with their case manager (*M* = 3.59, *SD* = 0.25).

Physical health baseline characteristics. The average number of physical health problems experienced was *M* = 2.26, *SD* = 1.80 (*range* = 0 – 8), and the average level of perceived physical health impairment was *M* = 5.94, *SD* = 7.08 (*range* = 0 – 35). This indicated that overall study participants had a low number of physical health problems and low perceived physical health impairment.

Qualitative coding was conducted on an open-ended response asking individuals to state what physical health problems they experienced. The types of physical health problems, N and % were ranked from most to least common problems. In addition, crosstabs were calculated to illustrate what demographic characteristics were associated with each of the most prevalent physical health problems. The crosstabs calculation included each of the most commonly ranked physical health problems as columns and the demographic variables in Blocks 1-2 as rows. The percentage of individuals within the study sample that endorsed each physical health problem according to each demographic characteristic was calculated. These results indicated that individuals who were non-Hispanic, women, those around 50 years old, and individuals with a diagnosis of a thought disorder were more likely to experience hypertension, other types of cardiovascular disease, diabetes, musculoskeletal illness, gastrointestinal illness, and neurological problems (Table 4.4). Half of the study participants that reported gastrointestinal and musculoskeletal illness had a history of homelessness.

The most common physical health problems participants reported were (ranked in descending order by *N* and %: hypertension (26%), other cardiovascular problems (24%), diabetes (22%), musculoskeletal disorders (14%), gastrointestinal illnesses (14%), neurological problems (13%), arthritis (11%), orthopedic (11%), and pulmonary illnesses (10%). Please refer to the full results of this analysis reported in Table 4.3 and Figure 4.1.

Correlations among variables in the regression model

Pearson's bivariate correlation coefficients were calculated for all variables tested in the regression model. The outcome variables were number of physical health problems and amount of perceived health impairment. The predictors were: age, gender, race, ethnicity, mental illness diagnosis, education level, monthly income, monthly days worked, history of homelessness, transportation problems, psychological distress, life satisfaction, recovery, social support, and working alliance. All variables were included from Wave 1.

Correlations revealed significant positive associations between number of physical health problems and perceived physical health impairment, age, gender, race, mental illness diagnosis, transportation problems, and psychological distress. There was an inverse relationship between number of physical health problems, number of days worked, and life satisfaction.

There were significant positive correlations between the amount of perceived physical health impairment and age, gender, race, mental illness diagnosis, transportation problems, and psychological distress. There were significant inverse correlations between perceived physical health impairment and number of days worked, life satisfaction, social support, and recovery. Please see Table 4.2 for a full correlation matrix.

Table 4.1.
Baseline characteristics for regression variables Wave 1 (N = 351)

Regression Step 1

Block 1	*M (SD)*	*N* (%)	Range
Age	46.58 (10.18)		19-87
Gender			
Male		167 (48)	
Female		183 (52)	
Race			
European-American		149 (43)	
African-American		176 (50)	
Native-American / Native-Alaskan		2 (<1)	
Asian-American		2 (<1)	
Other Race		8 (2)	
Ethnicity			
Not Hispanic		344 (98)	
Hispanic		6 (2)	
Mental illness diagnosis			
Thought Disorder		248 (70)	
Mood Disorder		85 (24)	
Anxiety Disorder		9 (3)	
Other Mental Illness		8 (2)	

Table 4.1. continued

Baseline characteristics for regression variables Wave 1 (N = 351)

Regression Step 2

Block 2	*M (SD)*	*N* (%)	Range
Education level			
8th grade or less		21 (6)	
Some high school		104 (29)	
Finished high school		99 (28)	
Completed GED		18 (5)	
Vocational / Trade / Business school		22 (6)	
Some college or 2 year degree		59 (17)	
Finished 4 year degree		21 (6)	
Master's degree or equivalent		6 (2)	
Monthly income	651.38 (224.69)		0 – 1627.00
Days worked last month	2.57 (6.25)		
History of homelessness			
No		201 (57)	
Yes		149 (43)	
Transportation problems		1.06 (1.14)	
Never		163 (47)	
Rarely		51 (14)	
Sometimes		82 (23)	
Often		51 (14)	
Regression Step 3			
Block 3			
Psychological Distress	0.91 (0.71)		
Regression Step 4			
Block 4			
Life Satisfaction	4.35 (1.04)		
Recovery	3.81 (0.46)		
Social Support	2.91 (0.54)		
Working Alliance	3.59 (0.25)		
Regression Outcomes			
Block 5			
Physical Health Problems	2.26 (1.80)		0 – 8
Physical Health Impairment	5.94 (7.08)		0 – 35

Note. Transportation problems assessed its interference with activities for the preceding 6 months. Psychological distress responses ranged from 0 = *not at all* to 4 = *extremely*. Social support measure response options were *definitely true* = 3, *probably true* = 2, *probably false* = 1, and *definitely false* = 0. Recovery responses ranged from *strongly disagree* = 1 to *strongly agree* = 5. Working alliance response options were *strongly disagree* = 1 to *strongly agree* = 5. Perceived physical health impairment = total count of physical health problems x amount of interference in activities (with interference in activities ranging from 1= not at all to 5 = extremely).

Aim 1 Results

Regression analysis for Aim 1

A multiple linear regression model was used to investigate what demographic and psychosocial variables were associated with reporting physical health problems and perceived physical impairment. Variables in Blocks 1-4 correspond with Steps 1-4 of the regression model tested, with Step 4 including all Blocks. Please refer to Table 4.5 for overall regression findings from Step 4 of each model.

All continuous variables were mean centered and categorical variables were dummy coded. In most cases, the reference group for dummy coded variables referred to the subgroup of individuals with the smaller N. For example, since the majority of participants were female (dummy code = 0) the reference group referred to males (dummy code = 1). The only exception to this system of dummy coding was applied to the variable of mental illness diagnosis, where a diagnosis of thought disorder was used as a reference group (dummy code = 1), despite that subgroup having a larger N. This decision was made based on research indicating high levels of comorbidity between mood, anxiety, and other mental illnesses; conceptually, grouping these three categories together grouping these three categories together (dummy code = 0) results in a better statistical comparison and a way to differentiate between the different contributions each type of mental illness has in predicting outcomes.

Table 4.2.

Correlation coefficients for regression predictors and outcomes (N = 351)

Predictors	1	2	3	4	5	6	7	8	9	10
Block 1										
1. Age	1	.226**	.004	-.049	.060	-.033	.024	-.165**	.015	-.053
2. Gender		1	-.042	-.006	.129*	.071	-.209*	-.122*	-.068	.173**
3. Race			1	.031	.166**	.078	.052	-.057	.105*	.037
4. Ethnicity				1	-.006	.066	-.018	.069	.064	-.046
5. Mental Illness Diagnosis					1	.007	-.092	-.035	.053	.114*
Block 2										
6. Education Level						1	.115*	.097	.009	.086
7. Monthly Income							1	.248**	-.028	-.183**
8. Monthly Days Worked								1	.031	-.014
9. Homelessness History									1	.098
10. Transportation Problems										1
Block 3										
11. Psychological Distress	-.087	.132*	.152**	.041	.276*	.062	-.013	-.065	.088	.374**
Block 4										
12. Life Satisfaction	-.036	-.150**	-.100	-.045	-.206**	-.098	-.044	.071	-.035	-.166**
13. Recovery	-.025	-.054	-.130*	-.038	-.902	-.019	-.009	.019	-.119*	-.271**
14. Social Support	.054	-.096	-.084	-.202	-.004	-.033	.071	.080	-.094	-.374**
15. Working Alliance	.017	.031	-.192**	.030	-.100	.033	-.044	.007	-.039	-.105
Block 5										
16. # Physical Health Problems	.246**	.336**	.154**	-.032	.212**	.057	-.058	-.162**	.024	.183**
17. Physical Health Impairment	.182**	.291**	.198**	.004	.254**	.077	-.054	-.120*	.064	.283**

*correlation is significant at the .05 level (2-tailed).
**correlation is significant at the .01 level (2-tailed).

Table 4.2. continued

Correlation coefficients for regression predictors and outcomes (N = 351)

Predictors	11	12	13	14	15	16	17
Block 3							
11. Psychological Distress	1	-.478**	-.488**	-.415**	-.207**	.269**	.371**
Block 4							
12. Life Satisfaction		1	.443**	.370**	.255**	-.177**	-.239**
13. Recovery			1	.561**	.514**	-.049	-.114*
14. Social Support				1	.257**	-.073	-.108*
15. Working alliance					1	-.009	-.060
Block 5							
16. # Physical Health Problems						1	.859**
17. Physical Health Impairment							1

*correlation is significant at the .05 level (2-tailed).

**correlation is significant at the .01 level (2-tailed).

The most common physical health problems and sample characteristics

Table 4.3.

Types physical health problems endorsed by the sample (Wave 1) (*N* = 351)

Block 1	*N* (%)	Rank (most–least common)
Hypertension	92 (26)	1
Cardiovascular	85 (24)	2
Diabetes	76 (22)	3
Gastrointestinal	50 (14)	4
Musculoskeletal problems	50 (14)	4
Neurological	45 (13)	5
Arthritis	40 (11)	6
Orthopedic	38 (11)	7
Pulmonary	35 (10)	8
Endocrine issues	29 (8)	9
Otolaryngeal	23 (7)	10
Eye problems	22 (6)	11
Genitourinary	21 (6)	12
Asthma	18 (5)	13
Allergies	17 (5)	14
Infectious illness	13 (4)	15
Kidney problems	9 (3)	16
Obesity	12 (3)	16
Sleep	12 (4)	16
Cancer	9 (3)	17
Pain, chronic pain	9 (3)	18
Other, unspecified	8 (2)	19
Blood disorders	5 (1)	20
Cognitive	4 (1)	21
Dermatological	4 (1)	21
Dental	3 (<1)	22

Note. The ranking is based on *N* not %. Multiple physical health problems may have the same rank. The cardiovascular illnesses category does not include hypertension, which is a separate category. The endocrine illness category does not include diabetes mellitus, which is a separate category, The other, unspecified category included illnesses such as “fever”, “dizziness” which were unspecified, or physical health problems which could not be classified in the other categories.

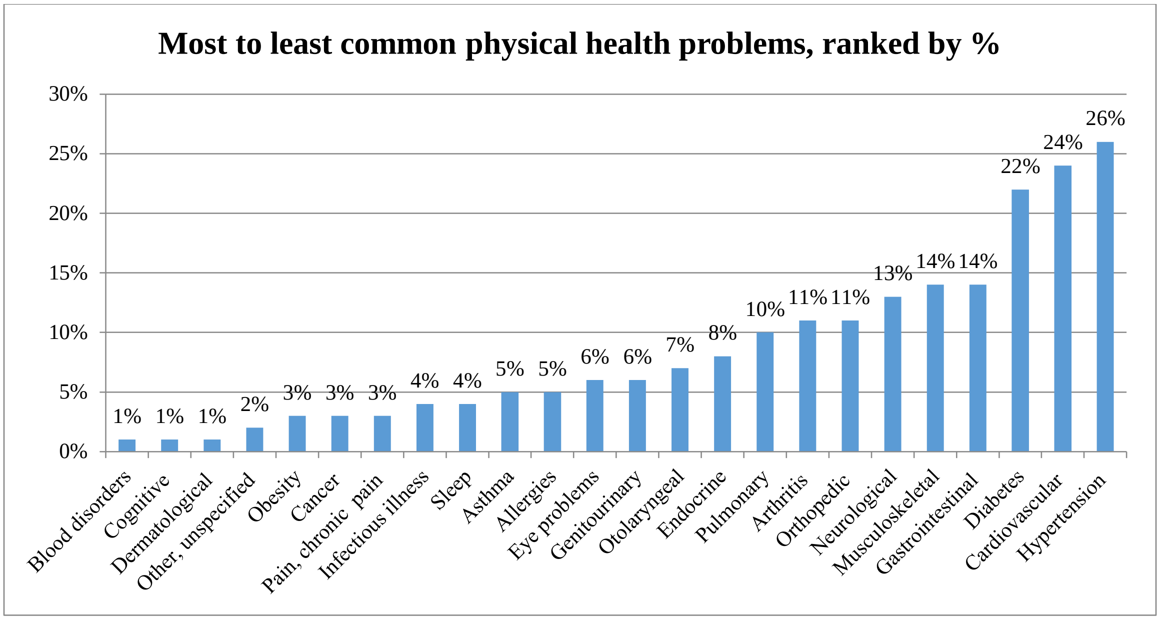

Figure 4.1. *Ranking of the most to least common physical health problems by percentage.*

Block 1 regression results. Regression analysis of Block 1 variables was comprised of participant demographic characteristics of age, gender, race, ethnicity, and mental illness diagnosis. This model was significant in predicting number of physical health problems $F(5, 302) = 13.080$, $p < .001$, $R^2 = .178$). In this model age (β = .201) and gender (β = -.250) were significant predictors of number of physical health problems, with the standardized beta coefficients indicating that reports of higher numbers of physical health problems were more likely for women, and positively associated with age. This model also significantly predicted perceived physical health impairment, $F(5, 302) = 15.210$, $p < .001$, $R^2 = .201$). For Step 1, age (β = .191), gender (β = -.244), and mental illness diagnosis (β = -.246) were significant predictors of physical health impairment. The standardized beta coefficients showed a relationship between older age, female gender, and a diagnosis of mood, anxiety and other mental illnesses and more perceived physical health impairment.

Table 4.4.

Crosstabs of demographics and physical health problems by rank, most to least common (Wave 1) (N = 351*)*

	Health Problem *N* (%)					
	Hypertension 92 (26)		Cardiovascular 85 (24)		Diabetes 76 (22)	
Demographic Information	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)
Block 1						
Age	49.63 (9.74)		49.79 (10.5)		50.00 (9.56)	
Gender						
Male		37 (22)		37 (22)		29 (17)
Female		55 (30)		48 (26)		47 (26)
Race						
White		25 (11)		36 (16)		27 (12)
African American		61 (23)		45 (17)		46 (17)
Other races		6 (50)		4 (33)		3 (25)
Ethnicity						
Not Hispanic		90 (26)		84 (24)		72 (21)
Hispanic		2 (33)		1 (17)		4 (67)
Mental illness diagnosis						
Thought Disorder		66 (27)		51 (21)		54 (22)
Mood Disorder		20 (23)		27 (31)		20 (23)
Anxiety Disorder		2 (22)		4 (44)		1 (11)
Other		4 (50)		3 (38)		1 (13)

Table 4.4, continued

Crosstabs of demographics and physical health problems by rank, most to least common (Wave 1) (N = 351)

	Health Problem					
	Hypertension 92 (26)		Cardiovascular 85 (24)		Diabetes 76 (22)	
Demographic Information	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)
Block 2						
Education level						
8th grade or less		9 (43)		7 (33)		7 (33)
Some high school		26 (25)		30 (29)		28 (27)
Finished high school		25 (25)		23 (23)		20 (20)
Completed GED		2 (11)		2 (11)		3 (17)
Vocational / Trade / Business school		8 (36)		6 (27)		4 (18)
Some college or 2 year degree		12 (20)		10 (17)		10 (17)
Finished 4 year degree		8 (38)		5 (24)		3 (14)
Master's degree or equivalent		2 (33)		2 (33)		1 (17)
Monthly income	655.30 (230.87)		659.60 (236.50)		641.42 (202.19)	
Days worked last month	2.02 (5.47)		2.67 (6.42)		2.04 (5.70)	
Transportation problems						
Never		42 (26)		36 (22)		34 (21)
Rarely		16 (31)		10 (20)		14 (28)
Sometimes		20 (24)		21 (26)		21 (26)
Often		14 (28)		18 (35)		7 (14)
History of homelessness						
No		61 (30)		47 (23)		52 (26)
Yes		31 (21)		38 (26)		24 (16)

Table 4.4, continued

Crosstabs of demographics and physical health problems by rank, most to least common (Wave 1) (N = 351)

	Health Problem *N* (%)					
	Gastrointestinal 50 (14)		Musculoskeletal 50 (14)		Neurological 45 (13)	
Demographic Information	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)
Block 1						
Age	47.98 (7.38)		48.02 (9.51)		47.49 (8.92)	
Gender						
Male		15 (9)		22 (13)		16 (10)
Female		35 (19)		28 (15)		29 (16)
Race						
White		25 (11)		21 (9)		20 (9)
African American		21 (8)		23 (9)		21 (8)
Other races		4 (33)		6 (50)		4 (33)
Ethnicity						
Not Hispanic		50 (15)		50 (15)		45 (13)
Hispanic		0 (0)		0 (0)		0 (0)
Mental illness diagnosis						
Thought Disorder		26 (11)		34 (14)		26 (11)
Mood Disorder		18 (21)		15 (17)		14 (16)
Anxiety Disorder		5 (55)		1 (11)		3 (33)
Other		1 (13)		0 (0)		2 (25)

Table 4.4, continued

Crosstabs of demographics and physical health problems by rank, most to least common (Wave 1) (N = 351)

	Health Problem Gastrointestinal	50 (14)	Musculoskeletal	50 (14)	Neurological	45 (13)
Demographic Information	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)	*M* (*SD*)	*N* (%)
Block 2						
Education level						
8th grade or less		4 (19)		4 (19)		1 (5)
Some high school		16 (15)		16 (15)		14 (14)
Finished high school		10 (10)		9 (9)		15 (15)
Completed GED		2 (11)		1 (6)		2 (11)
Vocational / Trade / Business school		6 (27)		3 (14)		5 (23)
Some college or 2 year degree		9 (15)		12 (20)		3 (5)
Finished 4 year degree		2 (10)		5 (24)		5 (24)
Master's degree or equivalent		1 (17)		0 (0)		0 (0)
Monthly income	598.57 (246.97)		613.09 (205.78)		638.75 (187.90)	
Days worked last month	0.82 (3.19)		1.70 (5.41)		1.51 (3.99)	
Transportation problems						
Never		17 (10)		25 (15)		22 (13)
Rarely		11 (22)		2 (4)		3 (6)
Sometimes		11 (13)		16 (20)		10 (12)
Often		11 (22)		7 (14)		10 (20)
History of homelessness						
No		25 (12)		25 (12)		21 (10)
Yes		25 (17)		25 (17)		24 (16)

Blocks 1-2 regression results. Block two was comprised of education level, income, monthly days worked, homelessness history, and amount of transportation problems. This model resulted in a significant regression equation to predict number of physical health problems $F(10, 297) = 7.764$, $p < .001$, $R^2 = .207$. For Step 2 of this model age ($\beta = .196$), gender ($\beta = -.222$), mental illness diagnosis ($\beta = -.175$), and transportation problems ($\beta = .145$) were significantly associated with the outcome. Standardized beta coefficients showed reports of higher numbers of physical health problems were more likely for females, those with a diagnosis of mood, anxiety and other disorders. There was also a positive association between number of physical health problems, age, and higher reports transportation problems.

Perceived physical health impairment was also significantly predicted by this model, $F(10, 297) = 9.597$, $p < .001$, $R^2 = .244$; $R^2\Delta = .043$, $p < .01$). $R^2\Delta$ with the addition of Block 2 was not significant, $R^2\Delta = .029$. In Step 2, there was a positive association with age ($\beta = .191$) and transportation problems ($\beta = .179$). Women ($\beta = -.208$) and those with a mental illness diagnosis of mood, anxiety and other disorders ($\beta = -.236$) were more likely to report physical health impairment.

Regression results for Blocks 1-3. The only variable included in Block 3 was psychological distress, which was added to Step 3 of the multiple regression model. Overall, this model significantly predicted number of physical health problems $F(11, 296) = 8.728$, $p < .001$, $R^2 = .235$; $R^2\Delta = .028$, $p < .001$. In this model age ($\beta = .213$), gender ($\beta = -.212$) and mental illness diagnosis ($\beta = -.131$) remained significantly associated with number of physical health problems, as well as psychological distress ($\beta = .190$).

This model was significantly predicted the amount of physical health impairment, $F(11, 296) = 11.421$, $p < .001$, $R^2 = .298$; $R^2\Delta = .054$, $p < .001$. For Step 3, age ($\beta = .214$), gender ($\beta = -.194$) and mental illness diagnosis ($\beta = -.175$) remained significantly associated with physical health impairment, as well as psychological distress ($\beta = .263$).

Blocks 1-4 regression results. The final step of the multiple regression model included Block 4 variables of life satisfaction, recovery, social support, and working alliance in addition to Blocks 1-3.

This model resulted in a regression equation that significantly predicted number of physical health problems, $F(15, 292) = 6.408$, $p < .001$, $R^2 = .248$; $R^2\Delta = .012$. The addition of Step 4 did not result in a significant $R^2\Delta$. The four variables in Block 4 were not significantly associated with the reported number of physical health problems. Age ($\beta = .222$), gender ($\beta = -.208$), mental illness diagnosis ($\beta = -.119$), and psychological distress ($\beta = .242$) remained significant predictors of number of physical health problems in the final model. Standardized beta coefficients indicated a positive relationship between age and number of physical health problems. Women, individuals with diagnoses of mood, anxiety and other mental illnesses, and those with higher levels of psychological distress were more likely to report higher numbers of physical health problems.

In the model predicting perceived physical health impairment the variables in Blocks 1-4 accounted for 31% of the variance in the outcome. The overall model was significant, $F(15, 292) = 8.752$, $p < .001$, $R^2 = .310$; $R^2\Delta = .012$, the addition of Block 4 variables did not result in a significant $R^2\Delta$. Age ($\beta = .222$), gender ($\beta = -.190$), mental illness diagnosis ($\beta = -.160$), psychological distress ($\beta = .303$) and recovery ($\beta = -.144$) were significant predictors of physical health impairment. Standardized beta coefficients indicated a positive association between age, female gender, psychological distress and physical health impairment. There was a negative association between recovery and physical health impairment.

Aim 2 Results

Aim 2 moderation analyses

Service use data for Wave 2 was merged with Wave 1 information on hypothesized predictors and moderators. Each variable was assessed for skew, kurtosis, and outliers, descriptive statistics, tests of distribution normality, and scatter and box plots were examined. Transformations were applied as appropriate to reduce positive skew. A square root transformation was applied to the distributions for total service use, TCM use, MIMS use, and to the physical health impairment distribution. A criterion of within ±2 for skew and kurtosis guided transformation of variable distributions.

For a description of the multiple imputation method originally used on the archival data, please see the methods section. The amount of currently missing data was assessed, and Little’s test was performed to determine if data was missing at random. Additionally, Mahalanobis distance was calculated to evaluate potential outliers. This procedure includes an examination of patterns of participant responses across all variables to determine if any cases exhibit an unusual pattern compared to the rest of the sample. Little’s tests and calculation of Mahalanobis distance led to the removal of four cases resulting in $N = 353$ for tests of the moderation model.

Table 4.5

Summary of Step 4 of the multiple linear regression model for predictors of number of physical health problems (N = 351)

	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 1					.178**	
Age	.039	.010	.222	4.096**		
Gender						
Male versus Female	-.749	.203	-.208	-3.694**		
Race						
European-American versus Other races	-.049	.192	-.014	-0.258		
Ethnicity						
Hispanic versus non-Hispanic	-.220	.717	-.016	-0.308		
Mental Illness Diagnosis						
Thought Disorder versus Mood, Anxiety, & Other Disorders	-.472	.222	-.119	-2.123*		
	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 2					.207	.029
Education Level	.031	.051	.031	0.596		
Monthly Income	<.01	<.01	.031	0.556		
Monthly Days Worked	-.335	.223	-.087	-1.593		
Homelessness History	.071	.189	.020	0.377		
Transportation Problems	.150	.093	.095	1.614		
	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 3					.235	.028*
Psychological Distress	.613	.170	.242	3.614**		

Table 4.5 continued

Summary of Step 4 of the multiple linear regression model for predictors of number of physical health problems (N = 351)

	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 4				.	.248	.012
Life Satisfaction	-.050	.109	-.029	-0.459		
Recovery	.545	.296	.138	1.842		
Social Support	.046	.220	.014	0.210		
Working Alliance	-.147	.432	-.020	-0.341		
Step 4 Model						
F-statistic for tests of final Model with Blocks 1-4	6.048**					

Note. All continuous variables were mean centered. Gender, race, ethnicity, and mental illness diagnosis were represented with dummy variables, with male gender, European-American race, Hispanic ethnicity, and thought disorder diagnoses serving as the reference groups.

*p < .05 level. **p< .01 level

Table 4.5 continued

Summary of Step 4 of the multiple linear regression model for predictors of perceived physical health impairment (N = 351)

	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 1						.201**
Age	.031	.007	.222	4.279**		
Gender						
Male versus Female	-.551	.156	-.190	-3.532**		
Race						
European-American versus Other races	-.111	.147	-.038	-0.754		
Ethnicity						
Hispanic versus non-Hispanic	.074	.551	.007	0.134		

Table 4.5 continued

Summary of Step 4 of the multiple linear regression model for predictors of perceived physical health impairment (N = 351)

	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Mental Illness Diagnosis						
Thought Disorder versus Mood, Anxiety, & Other Disorders	-.509	.171	-.160	-2.975		

	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 2					.244	.043**
Education Level	.042	.040	.054	1.063		
Monthly Income	<.01	<.01	.012	0.222		
Monthly Days Worked	-.257	.171	-.079	-1.500		
Homelessness History	.109	.146	.037	0.750		
Transportation Problems	.130	.072	.102	1.808		

	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 3					.298	.054**
Psychological Distress	.617	.130	.303	4.726**		

	B	*SE(B)*	β	*t*	R^2	$R^2\Delta$
Block 4					.310	.012
Life Satisfaction	-.066	.084	-.048	-0.793		
Recovery	-.458	.227	-.144	2.013*		
Social Support	.033	.169	.012	0.193		
Working Alliance	-.034	.332	-.052	-0.915		

Table 4.5 continued
Summary of Step 4 of the multiple linear regression model
for predictors of perceived physical health impairment (N = 351)

Step 4 Model	
F-statistic for tests of final Model with Blocks 1-4	8.752**

Note. All continuous variables were mean centered. Gender, race, ethnicity, and mental illness diagnosis were represented with dummy variables, with male gender, European-American race, Hispanic ethnicity, and thought disorder diagnoses serving as the reference groups.
*p < .05 level. **p< .01 level..

To test the assumption of independence of variables, examine multicollinearity, and to evaluate potential covariates, regression analyses and bivariate correlations were conducted. Regression analyses revealed mental health center site where services were received as a covariate. Regression models examining mental health center site as predictors of each type of service use were significant, with mental health center site explaining 2%, 7%, and 1.5% of the total variance in total service use, TCM use, and MIMS use respectively ($p <. 05$). Furthermore, correlations between the demographic characteristics of gender, age, race, ethnicity, mental illness diagnosis, education level, total monthly income, number of days worked, and history of homelessness, predictor and outcome variables were done to discover potential covariates. This analysis revealed an inverse correlation between total monthly income and the outcomes of total service use (r (329) = -.110, $p < .05$) and MIMS use (r (329) = -.121, $p < .05$), indicating that lower monthly income was associated with more use of each type of service. Therefore total monthly income was included as a covariate along with mental health center site in step two in each test of the moderation model.

Tests of the assumptions of moderation were performed in which linear relationships, homogeneity of variance, homoscedasticity, and multicollinearity were assessed. A plot of residuals for predictors and outcomes was examined to see if the assumptions of homogeneity of variance and homoscedasticity were met. A test of linear relationships for each predictor and outcome was done by obtaining scatterplots. Visual examination of these revealed a linear relationship between each predictor and moderator, and between each moderator and outcome. Tests of multicollinearity for variables in the OLS regression model were within acceptable limits. Please see Table 4.7 for a correlation matrix of all variables tested in the moderation. Descriptive statistics were calculated for each of the variables included in the moderation model after a test of the assumptions of moderation was completed.

Aim 2 baseline characteristics

Descriptive statistics for each of the predictors, moderators, and outcomes tested in the moderation model are presented in Table 4.6. Wave 2 service use data was used for N = 353 participants. The number of times individuals used services over the last 12 months was calculated. Individuals reported accessing case management services an average of 23 times over the 12 months preceding the Wave 2 interview (total case management service use = TCM and MIMS combined, M = 23.76, SD = 43.54). Individuals used mental illness management services an average of 20 times in the preceding year (M = 20.60, SD = 42.39). There was a lower frequency of targeted case management services use compared to MIMS at Wave 2, with individuals reporting that they used TCM services an average of three times (M = 3.17, SD = 4.69). Study participants reported an average of two physical health problems, and low levels of perceived physical health impairment (M = 5.92, SD = 7.08).

Interestingly, the majority of individuals reported little interference in daily activities due to transportation problems over the preceding six months (47% of participants). With regard to life satisfaction, almost equal numbers of participants reported having mixed feelings, feeling pleased, or delighted (23, 24, and 24 % respectively). The average level of life satisfaction was *M* = 4.85, *SD* = 1.50. Most reported relatively low levels of psychological distress due to experiencing negative mental health symptoms over the preceding month (*M* = .911, *SD* = .711). Moderate levels of recovery, social support, and working alliance were reported by participants.

Correlations among variables in the moderator model

Pearson's bivariate correlation coefficients were calculated for all variables tested in the moderation model (see Table 4.7). The predictor variables of number of physical health problems and amount of perceived health impairment and the six psychosocial moderators, transportation problems, life satisfaction, psychological distress, recovery, social support, and working alliance were included from Wave 1. Three types of service use, total service use, TCM and MIMS were included for Wave 2.

There were significant positive correlations between the number of physical health problems, amount of perceived physical health impairment, transportation problems, and psychological distress. There was a significant inverse correlation between number of physical health problems and life satisfaction, with a higher number of physical health problems associated with lower life satisfaction ratings. There were significant negative correlations between higher levels of perceived physical health impairment and lower levels of life satisfaction, recovery, and social support.

Transportation problems were significantly negatively correlated with life satisfaction, recovery, and social support. Transportation problems were significantly positively correlated with psychological distress. Lower levels of life satisfaction were significantly associated with higher levels of psychological distress. Life satisfaction was positively correlated with higher levels of recovery and social support. There were significantly negative correlations between psychological distress, recovery, social support, and working alliance, indicating that higher levels of psychological distress were associated with lower ratings of recovery, social support, and working alliance. Higher levels of recovery were significantly associated with higher perceived social support and better working alliance with case manager. There were positive correlations for the use of three types of service examined, total service use, TCM, and MIMS. However, there were no significant correlations between either type of service use and the other variables included in the moderation model.

Tests of the moderation model for Aim 2

Moderation analyses of the effect of the number of physical health problems on mental health service use depending on the level of working alliance were conducted using the PROCESS macro. The moderation was based on an observed least squares (OLS) regression model. In each test of Hypotheses 3, 4, and 5, the predictors of the total number of physical health problems and perceived physical health impairment were included in step one, covariates in step two, and the moderators and the interaction term in step three, and service use included as the outcome (total service use, TCM, and MIMS). Each test of the moderation model was conducted with only one predictor, moderator, interaction term, and outcome included. Please refer to Table 4.8 for the full results of tests of the moderation model, where the unstandardized regression coefficients, 95% CI for each finding, and significance are reported.

Analyses revealed little support for the moderation models. The tests of moderation revealed no significant main effects of the predictors, physical health impairment and total number of physical health problems on either type of service use. The models tested showed no significant main effect of any of the moderators, transportation problems, life satisfaction, psychological distress, recovery, social support, or working alliance on the frequency of either type of service use.

Tests of the conditional effect of each predictor on each type of service use revealed only two significant interactions. The first showed that total service use varied depending on the number of physical health problems and level of working alliance. There was also a conditional effect on MIMS use depending on the interaction between the number of physical health problems endorsed and the level of working alliance. These results indicated a significant relationship between the number of physical health problems and service use depending on the level of working alliance with the case manager. In both cases, there was a significant interaction effect without any significant main effect for the predictor and moderator. In conclusion, high levels of working alliance were significantly associated with increased total service use and MIMS use with increasing numbers of physical health problems. A detailed description of this interaction follows (please see Table 4.9 and Figures 4.2 and 4.3).

Moderation of the effect of number of physical health problems on service use by working alliance

The moderation model was based on OLS regression, which included the predictor of number of physical health problems in step one, the covariates of total monthly income and mental health center site in step two, and the interaction between physical health problems and the working alliance in step three, with each type of service used as the outcome. This regression model predicted 4.5% of the variance in the outcome of total service use $F(5, 296) = 2.81$, $p < .05$, $R^2 = .045$. This model predicted 4.4% of the variance in the frequency of MIMS use $F(5, 296) = 2.75$, $p < .05$, $R^2 = .044$. The main effects for the number of physical health problems and working alliance were not significant. However, there was a significant interaction between number of physical health problems and working alliance for the outcomes of total service use ($b = .052$, t $(296) = 2.46$, $p < .05$) and MIMS service use ($b = .055$, t $(296) = 2.56$, $p < .05$).

To further describe the interaction between working alliance and physical health problems, simple slopes were calculated for the moderator of working alliance. Three categories of working alliance were created, “low”, “medium”, and “high” levels, based on mean centering (with the mean for the moderate level, and ± 1 *SD* for high and low levels). Examination of the conditional effect of three categories of working alliance (please see Table 4.9) showed a significant effect on total service use at high levels of working alliance, $b = .347$, t $(296) = 2.302$, $p < .05$, 95% CI range = .0502 to .6430. There was also a significant effect on MIMS use at high levels of working alliance, $b = .380$, t $(296) = 2.387$, $p < .05$, 95% CI range = .0632 to .6569.

Plots of the interaction between working alliance and number of physical health problems were evaluated to clarify its effect on total service use and MIMS use (please see Figures 4.2 and 4.3). The main effects of number of physical health problems and working alliance were not significant. However, plots indicated that low levels of working alliance were related to a decrease total service use with increasing levels of physical health problems. Moderate levels of working alliance appeared to result in relatively consistent rates of service use regardless of the number of physical health

Table 4.6.

Baseline characteristics tested in the model examining moderators of service use (N = 353)

Moderators (Wave 1)	*M (SD)*	*N* (%)
Transportation problems	1.05 (1.14)	
Never		166 (47)
Rarely		51 (14)
Sometimes		82 (23)
Often		51 (14)
Life Satisfaction	4.85 (1.50)	
Terrible		10 (3)
Unhappy		24 (7)
Mostly dissatisfied		17 (5)
Mixed		82 (23)
Mostly satisfied		86 (24)
Pleased		87 (24)
Delighted		45 (13)
Psychological Distress	0.91 (0.71)	
Recovery	3.81 (0.46)	
Social Support	2.91 (0.54)	
Working Alliance	3.59 (0.25)	

Predictors (Wave 1)	*M (SD)*	Range:
Physical health problems	2.26 (1.80)	0 – 8
Physical health impairment	5.92 (7.08)	0 – 35

Table 4.6. continued

Baseline characteristics tested in the model examining moderators of service use (N = 353)

Outcomes (Wave 2)	*M (SD)*	Range:
Total Service Use	23.76 (43.54)	0 – 242
TCM	3.17 (4.69)	0 – 28
MIMS	20.60 (42.39)	0 – 239

Note. Transportation problems assessed its interference with activities for the preceding 6 months. Psychological distress responses ranged from 0 = *not at all* to 4 = *extremely*. Social support measure response options were *definitely true* = 3, *probably true* = 2, *probably false* = 1, and *definitely false* = 0. Recovery responses ranged from *strongly disagree* = 1 to *strongly agree* = 5. Service use was a frequency count of the number of times services were used in the preceding year based on billing encounters. Working alliance response options were *strongly disagree* = 1 to *strongly agree* = 5. Perceived physical health impairment = total count of physical health problems x amount of interference in activities (with interference in activities ranging from 1= not at all to 5 = extremely).

Table 4.7.

Correlation coefficients for moderator model predictors and outcomes (N = 353)

Predictors	1	2	3	4	5	6	7	8	9	10	11
1. # Physical Health Problems	1	.909*	.176**	-.195**	.269**	-.053	-.077	-.002	.054	.020	.054
2. Physical Health Impairment		1	.224**	-.271**	.350**	-.117*	-.115*	-.058	.030	.016	.028
3. Transportation Problems			1	-.162**	.358**	-.278**	-.374**	-.095	.053	.018	.051
4. Life Satisfaction				1	-.476**	.437**	.392**	.249**	-.064	-.057	-.065
5. Psychological Distress					1	-.471**	-.420**	-.184**	.000	.029	.004
6. Recovery						1	.569**	.490**	-.019	-.027	-.023
7. Social Support							1	.250**	-.074	-.038	-.086
8. Working Alliance								1	.053	.074	.038
9. Total Service Use									1	.538**	.981**
10. TCM Service Use										1	.387**
11. MIMS Use											1

*correlation is significant at the .05 level (2-tailed).
**correlation is significant at the .01 level (2-tailed).

Table 4.8.

Tests of the conditional effect of number of physical health problems on total service use

	Moderator variable model (DV = Total Service Use)					
Predictor	*B*	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.9426	.6483	6.0810		2.6668	5.2184
Transportation Problems	.1976	.1642	1.2030	.2299	-.1256	.5208
Number of Physical Health Problems	.0834	.1033	.8077	.4199	-.1198	.2866
Transportation Problems x Number of Physical Health Problems	-.1357	.0870	-1.5588	.1201	-.3069	.0356
Constant	3.9524	.6377	6.1982		2.6977	5.2072
Life Satisfaction	-.1147	.1223	-.9373	.3493	-.3554	.1260
Number of Physical Health Problems	.0723	.1036	.6979	.4858	-.1315	.2760
Life Satisfaction x Number of Physical Health Problems	.0544	.0653	.8324	.4059	-.0741	.1829
Constant	4.1403	.6571	6.3006		2.8471	5.4336
Psychological Distress	-.0611	.2687	-.2275	.8202	-.5899	.4677
Number of Physical Health Problems	.1224	.1091	1.1219	.2628	-.0923	.3372
Psychological Distress x Number of Physical Health Problems	-.1091	.1418	-.7695	.4422	-.3883	.1700
Constant	4.1189	.6940	5.9346		2.7525	5.4852
Recovery	-.0105	.0182	-.5760	.5651	-.0463	.0254
Number of Physical Health Problems	.0855	.1087	.7864	.4323	-.1285	.2996
Recovery x Number of Physical Health Problems	.0141	.0100	1.3996	.1628	-.0057	.0338
Constant	3.9208	.6691	5.8596		2.6037	5.2380
Social Support	-.0412	.0327	-1.2601	.2087	-.1056	.0232
Number of Physical Health Problems	.0757	.1085	.6979	.4858	-.1379	.2893
Social Support x Number of Physical Health Problems	.0080	.0181	.4413	.6593	-.0276	.0436
Constant	3.9923	.6546	6.0993		2.7042	5.2805
Working Alliance	.0246	.0364	.6760	.4996	-.0470	.0963
Number of Physical Health Problems	.0815	.1028	.7924	.4288	-.1209	.2839
Working Alliance x Number of Physical Health Problems	.0524*	.0213	2.4608	.0144	.0105	.0944

*significant at the .05 level
**significant at the .01 level

Table 4.8. continued

Tests of the conditional effect of number of physical health problems on TCM service use

	Moderator variable model (DV = TCM Service Use)					
Predictor	*B*	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	1.0502	.2425	4.3314		.5731	1.5273
Transportation Problems	.0292	.0614	.4753	.6349	-.0917	.1501
Number of Physical Health Problems	.0079	.0386	.2041	.8384	-.0681	.0839
Transportation Problems x Number of Physical Health Problems	-.0456	.0325	-1.4015	.1621	-.1097	.0184
Constant	1.0314	.2378	4.3376		.5635	1.4993
Life Satisfaction	-.0530	.0456	-1.1623	.2460	-.1428	.0367
Number of Physical Health Problems	-.0040	.0386	-.1039	.9173	-.0800	.0720
Life Satisfaction x Number of Physical Health Problems	.0066	.0244	.2720	.7858	-.0413	.0545
Constant	1.0852	.2422	4.4806		.6086	1.5619
Psychological Distress	.0514	.0990	.5190	.6041	-.1435	.2463
Number of Physical Health Problems	.0126	.0402	.3124	.7549	-.0666	.0917
Psychological Distress x Number of Physical Health Problems	-.0002	.0003	-.6041	.3302	-.0008	.0004
Constant	1.0189	.2463	4.1361		.5340	1.5038
Recovery	-.0039	.0057	-.6938	.4884	-.0151	.0072
Number of Physical Health Problems	-.0088	.0387	-.2268	.8208	-.0850	.0674
Recovery x Number of Physical Health Problems	-.0031	.0030	-1.0314	.3032	-.0091	.0028
Constant	.0143	.2404	4.2183		.5411	1.4875
Social Support	-.0084	.0108	-.7812	.4353	-.0297	.0128
Number of Physical Health Problems	-.0010	.0389	-.0263	.9790	-.0776	.0756
Social Support x Number of Physical Health Problems	-.0022	.0061	-.3701	.7166	-.0142	.0097
Constant	1.0294	.2444	4.2124		.5485	1.5104
Working Alliance	.0115	.0136	.8491	.3965	-.0152	.0383
Number of Physical Health Problems	-.0060	.0384	-.1559	.8762	-.0815	.0696
Working Alliance x Number of Physical Health Problems	.0024	.0080	.3020	.7629	-.0133	.0181

*significant at the .05 level

**significant at the .01 level

Table 4.8. continued

Tests of the conditional effect of number of physical health problems on MIMS service use

	Moderator variable model (DV = MIMS Service Use)					
Predictor	*B*	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.6084	.6500	5.5512		2.3293	4.8876
Transportation Problems	.1897	.1647	1.1521	.2502	-.1343	.5137
Number of Physical Health Problems	.0803	.1035	.7761	.4383	-.1234	.2841
Transportation Problems x Number of Physical Health Problems	-.1289	.0873	-1.4778	.1405	-.3006	.0427
Constant	3.6203	.6391	5.6650		2.3628	4.8778
Life Satisfaction	-.1013	.1226	-.8264	.4092	-.3425	.1399
Number of Physical Health Problems	.0722	.1038	.6955	.4873	-.1320	.2764
Life Satisfaction x Number of Physical Health Problems	.0570	.0654	.8709	.3845	-.0718	.1858
Constant	3.8133	.6576	5.7985		2.5191	5.1076
Psychological Distress	-.0665	.2689	-.2472	.8050	-.5956	.4627
Number of Physical Health Problems	.1164	.1092	1.0652	.2876	-.0986	.3313
Psychological Distress x Number of Physical Health Problems	-.0949	.1419	-.6684	.5044	-.3742	.1845
Constant	3.8061	.6728	5.6570		2.4817	5.1305
Recovery	-.0022	.0155	-.1398	.8889	-.0327	.0284
Number of Physical Health Problems	.0907	.1057	.8578	.3918	-.1175	.2989
Recovery x Number of Physical Health Problems	.0087	.0083	1.0517	.2938	-.0076	.0250
Constant	3.6430	.6529	5.5793		2.3579	4.9280
Social Support	-.0357	.0294	-1.2154	.2252	-.0934	.0221
Number of Physical Health Problems	.0803	.1057	.7600	.4478	-.1277	.2883
Social Support x Number of Physical Health Problems	.0016	.0165	.1002	.9203	-.0308	.0341
Constant	3.6597	.6555	5.5827		2.3696	4.9499
Working Alliance	.0203	.0365	.5579	.5773	-.0514	.0921
Number of Physical Health Problems	.0841	.1030	.8167	.4147	-.1186	.2868
Working Alliance x Number of Physical Health Problems	.0546*	.0213	2.5570	.0111	.0126	.0965

*significant at the .05 level

**significant at the .01 level

\Table 4.8. continued

Tests of the conditional effect of number of physical health problems on total service use

	Moderator variable model (DV = Total Service Use)					
Predictor	*B*	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	4.0899	.6584	6.2122		2.7943	5.3854
Transportation Problems	.2192	.1678	1.3067	.1923	-.1109	.5494
Physical Health Impairment	-.0328	.1352	-.2428	.8084	-.2989	.2332
Transportation Problems x Physical Health Impairment	-.1260	.1158	-1.0877	.2776	-.3539	.1019
Constant	3.9272	.6388	6.1482		2.6703	5.1841
Life Satisfaction	-.1277	.1251	-1.0210	.3081	-.3738	.1184
Physical Health Impairment	-.0107	.1315	-.0815	.9351	-.2695	.2481
Life Satisfaction x Physical Health Impairment	0012	.0812	.0149	.9881	-.1586	.1610
Constant	4.1764	.6597	6.3304		2.8780	5.4748
Psychological Distress	-.0157	.2785	-.0564	.9551	-.5637	.5323
Physical Health Impairment	.0905	.1413	.6404	.5224	-.1876	.3685
Psychological Distress x Physical Health Impairment	-.1880	.1694	-1.1100	.2679	-.5213	.1453
Constant	4.0816	.6744	6.0525		2.7541	5.4090
Recovery	-.0035	.0156	-.2252	.8220	-.0343	.0272
Physical Health Impairment	.0163	.1328	.1230	.9022	-.2451	.2778
Recovery x Physical Health Impairment	-.0004	.0102	-.0400	.9681	-.0204	.0196
Constant	3.9403	.6520	6.0431		2.6570	5.2236
Social Support	-.0332	.0295	-1.1248	.2616	-.0912	.0249
Physical Health Impairment	.0126	.1312	.0961	.9235	-.2457	.2709
Social Support x Physical Health Impairment	-.0064	.0203	-.3153	.7527	-.0464	.0336
Constant	4.0094	.6587	6.0866		2.7130	5.3058
Working Alliance	.0204	.0370	.5519	.5814	-.0525	.0934
Physical Health Impairment	.0307	.1284	.2392	.8111	-.2220	.2834
Working Alliance x Physical Health Impairment	.0445	.0262	1.6991	.0904	-.0070	.0960

*significant at the .05 level
**significant at the .01 level

Table 4.8. continued

Tests of the conditional effect of perceived physical health impairment on TCM service use

	Moderator variable model (DV = TCM Service Use)					
Predictor	*B*	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	1.0369	.2436	4.2573		.5577	1.5162
Transportation Problems	.0271	.0621	.4368	.6626	-.0951	.1494
Physical Health Impairment	.0086	.0487	.1775	.8592	-.0871	.1044
Transportation Problems x Physical Health Impairment	-.0334	.0400	-.8359	.4038	-.1121	.0452
Constant	1.0257	.2378	4.3140		.5578	1.4935
Life Satisfaction	-.0533	.0466	-1.1451	.2531	-.1449	.0383
Physical Health Impairment	-.0119	.0489	-.2434	.8089	-.1082	.0844
Life Satisfaction x Physical Health Impairment	-.0097	.0302	-.3210	.7485	-.0692	.0498
Constant	1.0847	.2432	4.4600		.6061	1.5634
Psychological Distress	.0481	.1027	.4684	.6398	-.1539	.2501
Physical Health Impairment	.0191	.0521	.3663	.7144	-.0834	.1216
Psychological Distress x Physical Health Impairment	-.0485	.0624	-.7769	.4379	-.1714	.0744
Constant	1.0132	.2458	4.1217		.5293	1.4970
Recovery	-.0041	.0057	-.7269	.4679	-.0154	.0071
Physical Health Impairment	-.0161	.0484	-.3320	.7402	-.1114	.0792
Recovery x Physical Health Impairment	-.0057	.0037	-1.5325	.1265	-.0130	.0016
Constant	1.0126	.2400	4.2185		.5402	1.4851
Social Support	-.0080	.0109	-.7331	.4641	-.0293	.0134
Physical Health Impairment	-.0024	.0483	-.0494	.9606	-.0975	.0927
Social Support x Physical Health Impairment	-.0065	.0075	-.8658	.3873	-.0212	.0082
Constant	1.0362	.2445	4.2387		.5551	1.5174
Working Alliance	.0120	.0137	.8739	.3829	-.0150	.0391
Physical Health Impairment	-.0033	.0477	-.0699	.9443	-.0971	.0905
Working Alliance x Physical Health Impairment	-.0016	.0097	-.1634	.8703	-.0207	.0175

*significant at the .05 level

**significant at the .01 level

Table 4.8. continued

Tests of the conditional effect of perceived physical health impairment on MIMS service use

	Moderator variable model (DV = MIMS Service Use)					
Predictor	*B*	*SE*	*t*	*p*	*LLCI*	*ULCI*
Constant	3.5714	.6531	5.4681		2.2861	4.8566
Transportation Problems	.2084	.1666	1.2506	.2120	-.1195	.5362
Physical Health Impairment	.0059	.1305	.0451	.9641	-.2509	.2627
Transportation Problems x Physical Health Impairment	-.1138	.1072	-1.0616	.2892	-.3247	.0971
Constant	3.5955	.6402	5.6163		2.3358	4.8553
Life Satisfaction	-.1165	.1254	-.9297	.3533	-.3632	.1301
Physical Health Impairment	-.0189	.1318	-.1434	.8861	-.2783	.2405
Life Satisfaction x Physical Health Impairment	.0044	.0814	.0535	.9573	-.1558	.1645
Constant	3.8483	.6603	5.8280		2.5488	5.1479
Psychological Distress	-.0124	.2787	-.0445	.9645	-.5609	.5361
Physical Health Impairment	.0716	.1414	.5065	.6129	-.2067	.3499
Psychological Distress x Physical Health Impairment	-.1728	.1695	-1.0195	.3088	-.5065	.1608
Constant	3.7835	.6750	5.6056		2.4549	5.1121
Recovery	-.0027	.0156	-.1745	.8616	-.0335	.0281
Physical Health Impairment	.0119	.1330	.0896	.9287	-.2498	.2736
Recovery x Physical Health Impairment	.0012	.0102	.1212	.9036	-.0188	.0213
Constant	3.6220	.6531	5.5457		2.3366	4.9074
Social Support	-.0362	.0295	-1.2249	.2216	-.0943	.0219
Physical Health Impairment	.0025	.1315	.0192	.9847	-.2562	.2613
Social Support x Physical Health Impairment	-.0046	.0203	-.2260	.8213	-.0446	.0354
Constant	3.6767	.6599	5.5713		2.3779	4.9754
Working Alliance	.0157	.0371	.4235	.6722	-.0573	.0888
Physical Health Impairment	.0242	.1287	.1885	.8506	-.2289	.2774
Working Alliance x Physical Health Impairment	.0471	.0262	1.7966	.0734	-.0045	.0987

*significant at the .05 level
**significant at the .01 level

problems. In contrast, high levels of working alliance were associated with a significant increase in total service use with increasing numbers of physical health problems.

Plots showed a similar effect on MIMS use for the interaction between number of physical health problems and high levels of working alliance. High levels of working alliance were associated with a significant increase in MIMS use for those with increasing numbers of physical health problems. Medium levels of working alliance were linked to relatively stable use of MIMS with increasing physical health problems, and low levels of working alliance with a decrease in MIMS for those with more physical health problems – however these trends in service use at moderate and low levels of working alliance were not statistically significant.

Table 4.9.
The conditional effect of number of physical health problems on service use depending on levels of working alliance

	Moderator variable model (DV = Total Service Use)					
Levels of Working Alliance	*B*	*SE*	*t*	*p*	*LLCI*	*ULCI*
Low	-.184	.147	-1.247	.213	-.4735	.1062
Medium	.082	.103	.792	.499	-.1209	.2839
High	.347*	.151	2.302	.022	.0502	.6430
	Moderator variable model (DV = MIMS Service Use)					
Low	-.192	.148	-1.300	.195	-.4821	.0985
Medium	.084	.103	.817	.415	-.1186	.2868
High	.360*	.151	2.387	.018	.0632	.6569

*significant at the .05 level.
**significant at the .01 level.

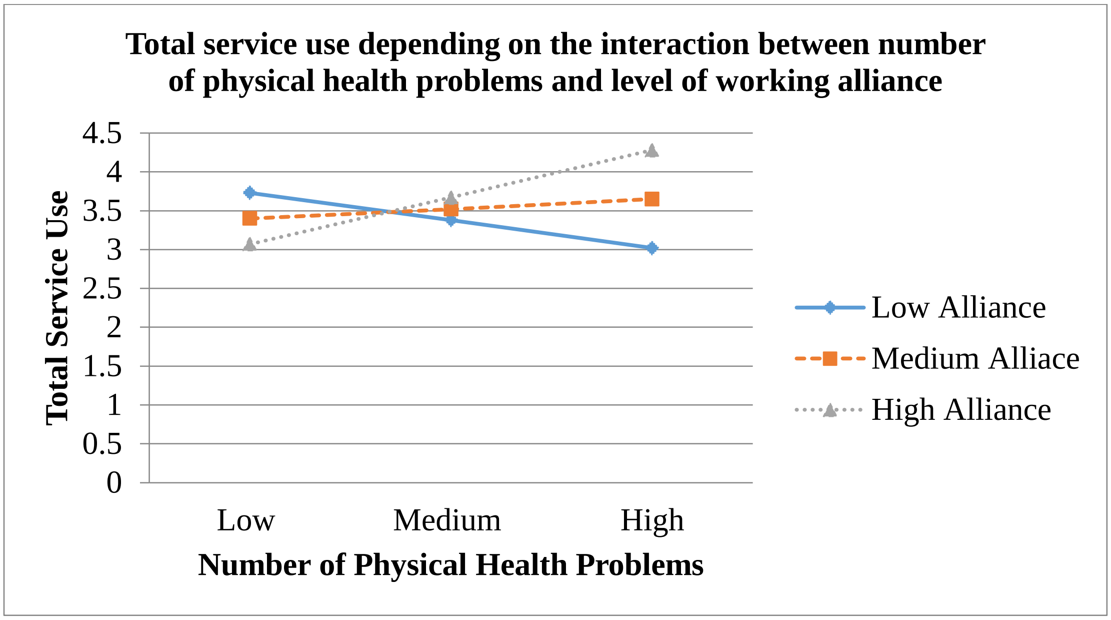

Figure 4.2. *The conditional effect of physical health problems on total service use depending on low, medium, and high levels of working alliance.*

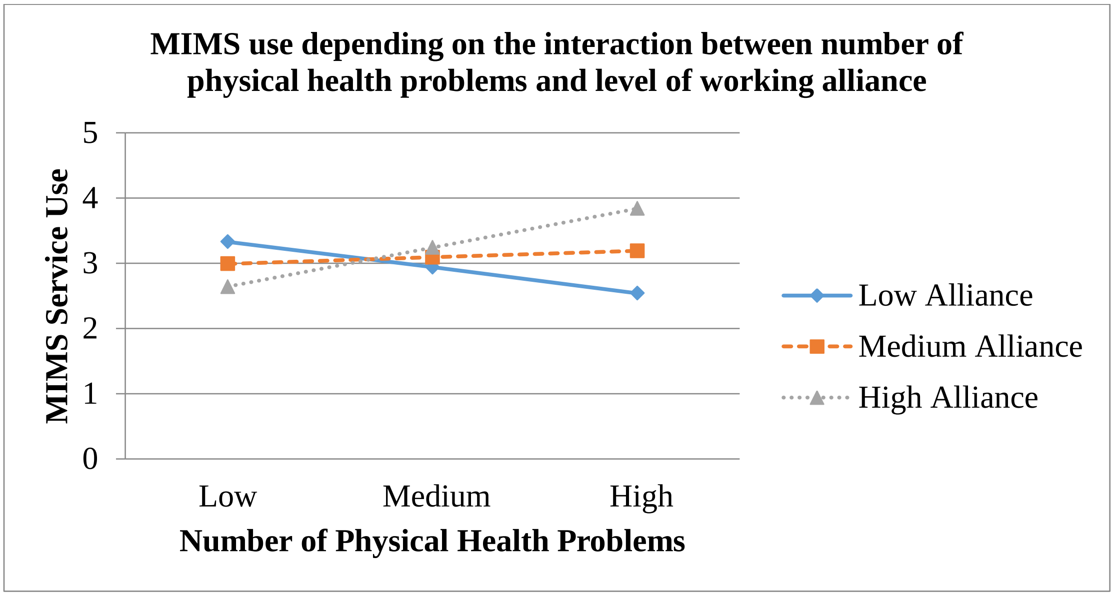

Figure 4.3. *The conditional effect of physical health problems on Mental Illness Management service use depending on low, medium, and high levels of working alliance.*

CHAPTER 5

DISCUSSION

Brief review of study purpose, aims, and results. Research indicated that individuals diagnosed with SMI that use community mental health services are at higher risk for poor physical health compared to the general population. The purpose of this study was to (a) understand what factors are associated with a higher risk for poor physical health, and to (b) investigate what patterns of mental health service use may be associated with individuals diagnosed with SMI and comorbid physical health problems.

Baseline sample characteristics showed that the majority of participants had an average of a low to moderate frequency of mental health service use, an average of two physical health problems, and low perceived physical health impairment. Crosstabs further indicated that particular subgroups of mental health service users were at higher risk for experiencing the most common physical health problems in the study sample: hypertension (26%), other forms of cardiovascular disease (24%), and diabetes (22%). Within this sample higher proportions of African-Americans, non-Hispanic females, those around 50 years of age, and those with a diagnosis of a thought disorder were more likely than their counterparts to experience hypertension, cardiovascular disease, and diabetes.

In line with this dual purpose, this study had two aims. The first study aim used a multiple linear regression model to determine what individual characteristics and mental health service use characteristics were associated with number of physical health problems and perceived physical health impairment. Regression models indicated that age, gender, mental illness diagnosis were associated with number of physical health problems. Regression models predicting physical health impairment showed that age, gender, psychological distress, and recovery were significantly related to impairment. Further evaluation of these predictors indicated that individuals of older age and women were more likely to report higher numbers of physical health problems and physical health impairment; they also showed that having a diagnosis of a mood, anxiety, or other type of mental illness was significantly related to reporting higher numbers of physical health problems.

The second study aim used a moderation model to investigate the relationship between physical health problems, perceived physical health impairment, and mental health service use. It was hypothesized that this relationship would depend on several factors: transportation problems, life satisfaction, psychological distress, recovery, social support, and the working alliance with case manager. Overall, the results did not support this hypothesis, and there were no direct effects of physical health problems or physical health impairment on mental health service use. However, service use did depend on an interaction between working alliance and number of physical health problems. This interaction showed that for individuals with increasing numbers of physical health problems, a high working alliance with their case manager was associated with an increase in MIMS and total mental health service use.

Overview of the following discussion. The next sections are a review of the results for Aims 1 and 2 followed by a brief description of the implications these results may have for mental health service users and staff. Then study limitations and suggestions for future research are discussed.

Summary of results for Aim 1. The use of regression models furthered this topic of study by examining how demographic and psychosocial characteristics are related to physical health. This study also added to the existing literature by testing a model of potential moderators of mental health service use, while accounting for the physical health problems which are common for individuals diagnosed with SMI. One of the first goals of Aim 1 was to understand which physical health problems were most common for study participants. Our findings support research which shows a high prevalence of preventable chronic illness in mental health service users, namely that of cardiovascular disease and diabetes.

The prevalence of physical health problems for mental health users is also in line with theories related to double-disadvantage (Dowd & Bengtson, 1978) and risk factors for comorbidity (Druss & Walker, 2011) in SMI. These theories point to the likelihood that circumstances related to the experience of serious mental illness (i.e. lack of social support, lower SES associated with receiving SSDI) may have in increasing the exposure to risk factors potentially related to poor physical health. For example, 62% of study participants had a high school education or below, many had low numbers of days worked per month, and 51% of individuals reported experiencing transportation problems that impacted their ability to complete wanted activities.

These statistics imply that these are common issues mental health service users face, which may pose additional challenges associated with the experience of SMI and which are linked to poor health. These examples of potential disadvantage also present additional considerations for mental health staff working with clients (for example, the need to assist with transportation problems) in holistically addressing client health.

The results of the regression models of predictors of physical health problems and physical health impairment pointed to specific subgroups of individuals that may be at more risk for the most common physical health problems. In particular, crosstabs revealed that female mental health service users, individuals with a diagnosis of a thought disorder, and individuals with histories of homelessness constitute distinct subgroups of mental health service users more likely to have higher rates of certain physical health problems and health impairment compared to other service users.

In addition, the regression model also confirmed that that gender differences play a role in the experience of mental and physical health problem comorbidity, with female participants and individuals around 50 years of age more likely than males to experience the six most common physical health problems.

These findings provide support for the literature indicating increased risks for physical health impairment depending on differences in age, gender, psychological distress, and mental health recovery. This information can guide screening efforts within mental health centers to reach out to individuals (for example, those with a particular mental illness diagnosis) who may be more likely to have disproportionate numbers of physical health problems. Information on these demographic differences can also be used to tailor intervention efforts to specific subgroups of individuals with SMI and physical health problems.

Summary of results for Aim 2. This study also adds to the existing literature on determinants of service use by accounting for specific types of mental health service use and testing potential moderators of service use relevant to the experience of SMI. Significant correlations between life satisfaction, psychological distress, transportation problems, working alliance, physical health problems and perceived physical health impairment did indicate a relationship between the hypothesized moderators and predictors. They also provide potential treatment targets for mental health staff working with individuals faced with comorbid mental and physical health problems.

Correlational analysis did not reveal a significant relationship between the three types of mental health service use examined here and the psychosocial moderators. Overall, moderation analyses did not support the hypothesized relationship between poor physical health and mental health service use. However, the tests of the moderation models did reveal the role of working alliance, and showed an increase in service use for those with a high number of physical health problems and high levels of working alliance. This finding held for MIMS and total service use, but not TCM services. This result for service type could be interpreted as being due to the more intensive and therapeutic nature of MIMS services compared to TCM services, as TCM services are often geared towards obtaining instrumental and practical needs. The results related to increases in total service use dependent on this interaction may also be influenced by the number of MIMS services included in the calculation of total service use.

The role of working alliance in treatment. These results illustrate the role that mental health services, and in particular the working alliance between staff and mental health service users, may have in lessening the impact that physical health problems may have on client quality of life. Working alliance theorizes that critical elements in the relationship between client and case manager are an interpersonal bond based on trust, shared goals, and work on goal-related tasks. The results reported here are in line with research on the importance of "non-specific" factors in treatment (Howgego, Yellowlees, Owen, Meldrum, & Dark, 2003) that cut across different treatment modalities and settings, such as empathy and a collaborative approach towards working on treatment goals.

The results found in this study indicate that working alliance is a core component mental health treatment and case management interventions related to service use. A study conducted by Björkman & Hansson (2000) which examined the impact of several types of Swedish case management interventions on service use for clients diagnosed with SMI. Their results showed a significant decrease in the use of psychiatric inpatient services, and less use of psychiatric outpatient care services. The study by Björkman & Hansson (2000) did not look specifically at the working alliance, but their results suggest that these interventions ultimately led to decreased service use. Over the course of treatment, initially there would be more frequent service use as goals and tasks are established, which would decrease as treatment goals are attained. Descriptive statistics on patterns of service use in this study showed that participants used less total, TCM, and MIMS services from Wave 1 to Wave 2, which is in line with this idea.

The moderation results further showed increases in MIMS service use for individuals with a high number of physical health problems and high levels of working alliance. A study of service use patterns of individuals with SMI found that service accessibility, continuity of care, and having a case manager enabled service use, and were significant predictors of increased service use (Fleury, Grenier, Bamvita, & Caron, 2011). The results found in this dissertation study provided further indication of the influence working alliance has on service use.

These findings showed the potential that these factors have in maintaining client treatment engagement despite the barriers that individuals with SMI and physical health problems face. These elements of working alliance can be seen as representing core components to guide effective treatment, even given the complexity of presenting problems encountered in community mental health settings.

Study limitations and suggestions for future research. There are factors related to the study sample and study design which influence the interpretation and generalizability of results which warrant mention here. Study participants resided in supported housing, which may make them a unique population and may also limit generalizability of results. Residing in supported housing may be linked to receiving additional social support (i.e. programs and case management support tied to housing). These various forms of social support may not have been accounted for in this study, and may have had an influence on the findings. For example, many participants reported rarely experiencing transportation problems (49%) that affected their ability to engage in activities. This result was surprising given research which indicates that transportation problems are prevalent for this population. The lack of transportation problems for study participants may be linked their residing in supported housing. It may be that transportation was addressed as a part of the broader process of receiving case management services to link to needed resources such as housing. These factors may represent nested sources of support which limit generalizability.

The study sample reflected characteristics of community mental health service users in the Southeastern region of the U.S. Most study participants were African-American, non-Hispanic, and had a diagnosis of a thought disorder. The composition of study participants may limit generalizability of the findings to other race, ethnic backgrounds, or regions of the U.S. In addition, there was little variability within certain demographic indicators, for example, with regard to employment and income, with that majority of participants receiving SSDI and reporting a low number of days worked per month.

On the other hand these characteristics reflect the demographics of individuals in this sample of community mental health service users who consented to release their service use data. One implication is that the regression model was limited to identifying predictors of physical health issues for subgroups of individuals that reflected the majority of this sample of mental health service users; the results may not reflect risk factors for those groups underrepresented in the study sample (i.e. Asian-Americans, those that identified as Other in terms of race).

Based on the study findings, further work could be done focusing specifically on underserved or at-risk subgroups (i.e. female mental health users in this study, or individuals with histories of homelessness). This might involve retesting the model from Aim 2 on preselected subgroups, such as examining service use patterns for those with mood or anxiety disorders, or those with high numbers of physical health problems.

This study is based on archival data, therefore there is the possibility that the assessments used to measure the characteristics of focus for this study may not reflect the most direct, or effective way of measuring this information. For example, qualitative information gathered on physical health was used to label common physical health problems, to determine the number of physical health problems, and was used to calculate perceived physical health impairment. It may have been more effective to use HQOL measures, patient medical records, or detailed physical health problem assessments to assess participant physical health problems. It could have been beneficial to avoid the use of compound measures (such as the perceived physical impairment calculation) to measure study constructs related to physical health. However, the strength of using a qualitative, open-ended measure of physical health was that it allowed for a variety of responses related perceived physical health issues. While this may not always be in line with traditional ways of measuring physical health problems, it allowed for an alternate and arguably comprehensive way to understand participant perceptions of their physical health and its impact on their functioning.

It may also be possible that using single item measures for these constructs limited the accuracy of their measurement. The measures of physical health, perceived physical health impairment, life satisfaction and transportation were all single-item measures. The item for transportation was taken from a larger measure, the purpose of which was not a sole focus on measuring transportation. While there is support for using single item measures such as life satisfaction, the use of single item measures for physical health may have limited reliability of measurement, and not provided an adequate measure for the hypothesized predictors. Future research could include assessments such as medical records, longer self-report measures related to HQOL, or detailed checklists of physical health problems appropriate for a mental health service use context.

There are important considerations related to the study design that may pose limitations in light of the findings from Aim 2. Overall, the moderation hypotheses regarding the relationship between physical health and service use were not supported. This indicated that the theoretical model may need to be re-conceptualized. It was found during the literature review that many of the studies examined physical health as an outcome related to the use of mental health services, in an attempt to evaluate interventions. Further research could test a revised model, where the placement of independent and dependent variables, or the direction of the model is reversed, i.e. one in which service use examined as a predictor, rather than as an outcome. It is also possible that there may be other covariates in addition to mental health center site and income level, or other factors related to physical health problems and service use which were not accounted for in this model.

Given the result that working alliance between case manager and client was related to service use for those with poor physical health, this may indicate that including alternate measures related to mental health service use within the model may better account for service use as an outcome. For instance, many of the hypothesized moderators included here were individual level factors (such as psychological distress and recovery). Future studies could include measures of facilitative factors (such as housing supports, components of case management interventions) or individual factors more specific to treatment (such as expectations or attitudes towards mental health service use) which may also potentially account for service use.

Conclusion. Investigations of the relationship between physical health and service use showed that on average study participants were low utilizers of mental health services with a low number of physical health problems. Overall, there was a lack of support for the model hypothesizing that higher rates of physical health problems and perceived physical health impairment were related to higher rates of mental health service use. Even though the main effects of physical health and perceived physical health impairment on service use were not significant, interestingly, a significant interaction between number of physical health problems and working alliance was found. This emphasized the potential for moderation as a method to reveal how combinations of contextual factors interact to affect service use.

Implications for individual level intervention. These results support the potential role that mental health services have in addressing the overall health and well-being of individuals with serious mental illness and comorbid physical health problems. Tasks associated with this role include the ability to identify individuals using mental health services that may be at particular risk for the most common physical health problems, and using this information to facilitate targeted screening, case management, and behavioral health interventions. Results of this study illustrate the diverse and heterogeneous needs related to physical health of individuals with serious mental illness.

Our results indicated that for study participants, women with thought disorders around 50 years of age may be at particular risk for hypertension, other forms of cardiovascular illness, and diabetes; they may also be lower utilizers of mental health services. With more comorbid physical health problems, total service use and MIMS mental service use increased depending on having a high level of working alliance.

These findings illustrate the importance that the working relationship between mental health service users and staff has towards treatment of mental and physical health problems. These results also suggest that mental health interventions targeting psychological distress, and that work towards increasing recovery, social support, and life satisfaction may be helpful in reducing the impact that comorbid physical health problems have on the overall quality of life of community mental health service users.

Implications for agency level intervention. Individuals diagnosed with serious mental illness face disparities in access to care within traditional primary care settings to address their physical health concerns (Nankivell, Platania-Phung, Happell, & Scott, 2013). Research suggests that due to the disparity in receiving appropriate primary care, there may be an additional burden placed on community mental health system services, which do not primarily address these physical health concerns. Even though some community mental health settings may address mental health client's physical health directly through specialized interventions such as behavioral health homes (Scharf et al., 2013) or through case management approaches, individuals diagnosed with SMI have generally been found to receive a low level of treatment for physical health conditions (Razzano et al., 2015). One study that assessed state Medicaid claim data for beneficiaries diagnosed with bipolar disorder and schizophrenia indicated that only 11% received a physical health examination or health behavior counselling at the community mental health center (Brown, 2015).

This study aimed to highlight the growing need for community healthcare services responsive to the physical health problem comorbidity, perceived health impairment, and worse health-related quality of life faced by this population. The information gathered here could also indicate ways to tailor commonly accessed outpatient community mental health services to address these issues.

REFERENCES

Abraham, K.M., Miller, C.J., Birgenheir, D.G., Lai, Z., & Kilbourne, A.M. (2014). Self-efficacy and quality of life among people with bipolar disorder. *J Nerv Ment Dis*. Aug; 202 (8): 583-8. doi: 10.1097/NMD.0000000000000165. PubMed PMID: 25010107; PubMed Central PMCID: PMC4133989.

Albert, M., Becker, T., McCrone, P., & Thornicroft, G. (1998). Social networks and mental health service utilisation: A literature review. *International Journal of Social Psychiatry*, 44(4), 248-266.

Alegria M., Jackson J.S., Kessler R.C., Takeuchi D. (2003). National Comorbidity Survey Replication (NCS-R), 2001–2003. Ann Arbor: *Inter-university Consortium for Political and Social Research*, 2003. https://www.icpsr.umich.edu/icpsrweb/ICPSR/studies/20240

Almeida, D. M., Wethington, E., & Kessler, R. C. (2002). The Daily Inventory of Stressful Events: An interview-based approach for measuring daily stressors. Assessment, 9(1), 41-55. doi:10.1177/1073191102009001006

Amirkhan, J. H. (1990). A factor analytically derived measure of coping: The Coping Strategy Indicator. *Journal of Personality and Social Psychology*, 59(5), 1066-1074. doi:10.1037/0022-3514.59.5.1066

Andersen, R. M. (1995). Revisiting the Behavioral Model and Access to Medical Care: Does it Matter? *Journal of Health and Social Behavior*, *36*(1), 1. http://doi.org/10.2307/2137284

Andersen, R. M., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *Milbank Quarterly*, 51, 95–124.

Andrade, L. H., Benseñor, I. M., Viana, M. C., Andreoni, S., & Wang, Y.-P. (2010). Clustering of psychiatric and somatic illnesses in the general population: multimorbidity and socioeconomic correlates. *Brazilian Journal of Medical and Biological Research*, 43(5), 483–491.

Andrea, S. B., Siegel, S. A., & Teo, A. R. (2016). Social support and health service use in depressed adults: Findings from the National Health and Nutrition Examination Survey. General Hospital Psychiatry, 3973-79. doi:10.1016/j.genhosppsych.2015.11.009

Arokiasamy, P., Uttamacharya, U., Jain, K., Biritwum, R.B., Yawson, A.E., Wu, F., Guo, Y., Maximova, T., Espinoza, B.M., Rodríguez, A.S., Afshar, S., Pati, S., Ice, G., Banerjee, S., Liebert, M.A., Snodgrass, J.J., Naidoo, N., Chatterji, S., & Kowal, P. (2015). The impact of multimorbidity on adult physical and mental health in low- and middle-income countries: what does the study on global ageing and adult health (SAGE) reveal? *BMC Med*. Aug 3; 13:178. doi: 10.1186/s12916-015-0402-8. PubMed PMID: 26239481; PubMed Central PMCID: PMC4524360.

Aschbrenner, K. A., Mueser, K. T., Bartels, S. J., & Pratt, S. I. (2011). Family contact and health status among older adults with serious mental illnesses. *Psychiatric Rehabilitation Journal*, 34(4), 295-303. doi:10.2975/34.4.2011.295.30

Babitsch, B., Gohl, D., & von Lengerke, T. (2012). Re-revisiting Andersen's Behavioral Model of Health Services Use: A systematic review of studies from 1998–2011. *GMS Psycho-Social-Medicine*, 9.

Bajor, L.A., Gunzler, D., Einstadter, D., Thomas, C., McCormick, R., Perzynski, A.T., Kanuch, S.W., Cassidy, K.A., Dawson, N.V., & Sajatovic, M. (2015). Associations between comorbid anxiety, diabetes control, and overall medical burden in patients with serious mental illness and diabetes. *Int J Psychiatry Med*. 49 (4): 309-20. doi: 10.1177/0091217415589307. Epub 2015 Jun 9. PubMed PMID: 26060262; PubMed Central PMCID: PMC4698974.

Bahm, A., & Forchuk, C. (2009). Interlocking oppressions: The effect of a comorbid physical disability on perceived stigma and discrimination among mental health consumers in Canada. *Health & Social Care in the Community*, 17 (1), 63-70. doi:10.1111/j.1365-2524.2008.00799.x

Bahorik, A. L., Satre, D. D., Kline-Simon, A. H., Weisner, C. M., & Campbell, C. I. 2017). Serious mental illness and medical comorbidities: Findings from an integrated health care system. *Journal of Psychosomatic Research*, 10035-45. doi:10.1016/j.jpsychores.2017.07.004

Baiden, P., den Dunnen, W., & Fallon, B. (2017). Examining the independent effect of social support on unmet mental healthcare needs among Canadians: Findings from a population-based study. *Social Indicators Research*, 130 (3), 1229-1246. doi:10.1007/s11205-015-1224-y

Banerjea, R., Sambamoorthi, U., Smelson, D., & Pogach, L. M. (2008). Expenditures in Mental Illness and Substance Use Disorders among Veteran Clinic Users with Diabetes. *The Journal of Behavioral Health Services & Research*, *35*(3), 290–303.

Barnes, A. L., Murphy, M. E., Fowler, C. A., & Rempfer, M. V. (2012). Health-Related Quality of Life and Overall Life Satisfaction in People with Serious Mental Illness. *Schizophrenia Research and Treatment*, 245103. http://doi.org.pallas2.tcl.sc.edu/10.1155/2012/245103

Barnett, K., Mercer, S. W., Norbury, M., Watt, G., Wyke, S., & Guthrie, B. (2012). Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *The Lancet*, *380*(9836), 37–43.

Baron, R. M., & Kenny, D. A. (1986). The moderator–moderator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51(6), 1173-1182.

Bebout, R. R., Drake, R. E., Xie, H., McHugo, G. J., & Harris, M. (1997). Housing status among formerly homeless dually diagnosed adults. *Psychological Services*, 48(7), 936-941.

Bengtsson-Tops, A., & Hansson, L. (2001). Quantitative and Qualitative Aspects of the Social Network in Schizophrenic Patients Living in the Community. Relationship To Sociodemographic Characteristics and Clinical Factors and Subjective Quality of Life. *International Journal of Social Psychiatry*, *47*(3), 67–77.

Björkman, T., & Hansson, L. (2000). How does case management for long-term mentally ill individuals affect their use of health care services? An 18-month follow-up of 10 Swedish case management services. *Nordic Journal of Psychiatry*, 54(6), 441-447. doi:10.1080/080394800750061441

Blixen, C., Perzynski, A., Kanuch, S., Dawson, N., Kaiser, D., Lawless, M. E., … Sajatovic, M. (2015). Training peer educators to promote self-management skills in people with serious mental illness (SMI) and diabetes (DM) in a primary health care setting. *Primary Health Care Research & Development*, 16(02), 127–137.

Bobo, W. V., Yawn, B. P., St. Sauver, J. L., Grossardt, B. R., Boyd, C. M., & Rocca, W. A. (2016). Prevalence of combined somatic and mental health multimorbidity: Patterns by age, sex, and race/ethnicity. *The Journals of Gerontology: Series A: Biological Sciences and Medical Sciences*, 71(11), 1483-1491. doi:10.1093/gerona/glw032

Bollen, K. A., & Stine, R. (1990). Direct and indirect effects: Classical and bootstrap estimates of variability. *Sociological Methodology*, 20, 115–140.

Buist-Bouwman, M., Graaf, R., Vollebergh, W., & Ormel, J. (2005). Comorbidity of physical and mental disorders and the effect on work-loss days. *Acta Psychiatrica Scandinavica*, *111*(6), 436–443.

Breckenridge, J. N. (2000). Validating cluster analysis: Consistent replication and symmetry. *Multivariate Behavioral Research*, 35(2), 261-285. doi:10.1207/S15327906MBR3502_5

Broday, S. F., & Mason, J. L. (1991). Internal consistency of the Brief Symptom Inventory for counseling-center clients. *Psychological Reports*, 68(1), 94.

Brown, J. D., Barrett, A., Hourihan, K., Caffery, E., & Ireys, H. T. (2015). State variation in the delivery of comprehensive services for Medicaid beneficiaries with schizophrenia and bipolar disorder. *Community Mental Health Journal*, 51, 523–534. http://dx.doi.org/10.1007/s10597-015-9857-5

Buck, J. A., Teich, J. L., Graver, L., Schroeder, D., & Zheng, D. (2004). Utilization of Public Mental Health Services by Adults with Serious Mental Illness. *Administration and Policy in Mental Health*, 32(1), 3–15.

Carr, V. J., Johnston, P. J., Lewin, T. J., Rajkumar, S., Carter, G. L., & Issakidis, C. (2003). Patterns of service use among persons with schizophrenia and other psychotic disorders. *Psychiatric Services*, 54(2), 226–235.

Chinman M.J., Symanski J., Johnson A., Davidson L. (2002). The Connecticut Mental Health Center Patient Profile Project: Application of a service need index. International Journal of Health Care Quality Assurance, 15, 29-39.

Chwastiak, L. A., Rosenheck, R. A., McEvoy, J. P., Keefe, R. S., Swartz, M. S., & Lieberman, J. A. (2006). Interrelationships of Psychiatric Symptom Severity, Medical Comorbidity, and Functioning in Schizophrenia. *Psychiatric Services*, 57(8), 1102-1109. doi:10.1176/appi.ps.57.8.1102

Chronister, J., Chou, C.-C., Kwan, K.-L. K., Lawton, M., & Silver, K. (2015). The meaning of social support for persons with serious mental illness. *Rehabilitation Psychology*, *60*(3), 232–245.

Clark, K. K., Bormann, C. A., Cropanzano, R. S., & James, K. (1995). Validation evidence for three coping measures. *Journal of Personality Assessment*, 65(3), 434-455. doi:10.1207/s15327752jpa6503_5

Clatworthy, J., Buick, D., Hankins, M., Weinman, J., & Horne, R. (2005). The use and reporting of cluster analysis in health psychology: A review. *British Journal of Health Psychology*, 10(3), 329-358. doi:10.1348/135910705X25697

Cohen, J. (1988). Statistical power analysis for the behavioral sciences. 2nd ed.. Hillsdale, NJ: Erlbaum.

Cohen, S., Hawkley, L. C., Thisted, R. A., Masi, C. M., & Cacioppo, J. T. (2010). Interpersonal Support Evaluation List--12-Item Scale. *Psychology and Aging*, 25(1), 132-141.

Cohen, S., & Hoberman, H. (1983). Positedive events and social supports as buffers of life change stress. *J. Appl. Soc. Psychol.*, 58, pp. 304-309.

Cohen, S., Mermelstein, R., Kamarck, T., & Hoberman, H. M. (1985). Measuring the functional components of social support. In I. G. Sarason & B. R. Sarason (Eds.), Social support: Theory, research, and applications (pp. 73–94). The Hague, Holland: Martinus Nijhoff.

Cohen, S., & Wereiamson, G. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health: Claremont Symposium on Applied Social Psychology* (p. 31-67). Newbury Park, CA: Sage.

Corrigan, P. W., Mittal, D., Reaves, C. M., Haynes, T. F., Han, X., Morris, S., & Sullivan, G. (2014). Mental health stigma and primary health care decisions. *Psychiatry Research*, *218*(1-2), 35–38.

Corrigan, P. W., Salzer, M., Ralph, R. O., Sangster, Y., & Keck, L. (2004). Examining the Factor Structure of the Recovery Assessment Scale. Schizophrenia Bulletin, 30(4), 1035-1041. doi:10.1093/oxfordjournals.schbul.a007118

Cradock-O'Leary, J., Young, A. S., Yano, E. M., Wang, M., & Lee, M. L. (2002). Use of general medical services by VA patients with psychiatric disorders. *Psychiatric Services*, 53(7), 874-878. doi:10.1176/appi.ps.53.7.874

Cui, R., Tate, S. R., Cummins, K., Skidmore, J. R., & Brown, S. A. (2015). Chronic Physical Health Problems Moderate Changes in Depression and Substance Use Among Dual Diagnosed Individuals During and After Treatment. *Substance Use & Misuse*, 50(2), 174–183.

DeSalvo, K. B., Fisher, W. P., Tran, K., Bloser, N., Merrill, W., & Peabody, J. (2006). Assessing measurement properties of two single-item general health measures. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation*, 15(2), 191-201.

Derogatis, L. R., & Thomas, M. L. (2012). Brief Symptom Inventory. *Psychological Assessment*, 24(1), 101-113.

Dhingra, S., Zack, M., Strine, T., Pearson, W., & Balluz, L. (2010). Determining Prevalence and Correlates of Psychiatric Treatment With Andersen's Behavioral Model of Health Services Use. *Psychiatric Services*, *61*(5).

Dickerson, F., Wohlheiter, K., Medoff, D., Fang, L., Kreyenbuhl, J., Goldberg, R., … Dixon, L. (2011). Predictors of quality of life in type 2 diabetes patients with schizophrenia, major mood disorder, and without mental illness. *Quality of Life Research*, *20*(9), 1419–1425.

Dickerson, F., Brown, C.H., Fang, L., Goldberg, R.W., Kreyenbuhl, J., Wohlheiter, K,. Dixon, L. (2008). Quality of Life in Individuals with Serious Mental Illness and Type 2 Diabetes. *Psychosomatics*, vol. 49, no. 2.

Dickerson, F. B., McNary, S. W., Brown, C. H., Kreyenbuhl, J., Goldberg, R. W., & Dixon, L. B. (2003). Somatic healthcare utilization among adults with serious mental illness who are receiving community psychiatric services. *Medical Care*, *41*(4), 560-570. doi:10.1097/00005650-200304000-00011

Dixon, L., Postrado, L., Delahanty, J., Fischer, P. J., & Lehman, A. (1999). The association of medical comorbidity in schizophrenia with poor physical and mental health. *Journal of Nervous and Mental Disease*, 187(8), 496-502. doi:10.1097/00005053-199908000-00006

Dowd, J. J., & Bengtson, V. L. (1978). Aging in Minority Populations an Examination of the Double Jeopardy Hypothesis. *Journal of Gerontology*, *33*(3), 427–436. http://doi.org/10.1093/geronj/33.3.427

Druss, B. G., & Walker, E. R. (2011). Mental disorders and medical comorbidity (Research Synthesis Project Report No. 2). Retrieved from *Robert Wood Johnson Foundation Research and Publications* website: arch/2011/02/mental-disorders-and-medical-comorbidity.html

Dyer, J. G., & McGuinness, T. M. (2008). Reducing HIV risk among people with serious mental illness. *Journal of Psychosocial Nursing and Mental Health Services*, 46(4), 27–34.

Edwards, J. R., & Lambert, L. S. (2007). Methods for integrating moderation and moderation: A general analytical framework using moderated path analysis. *Psychological Methods*, 12(1), 1-22.

Egede, L.E. (2007). Major Depression in Individuals with Chronic Medical Disorders: Prevalence, Correlates and Association with Health Resource Utilization, Lost Productivity and Functional Disability. *General Hospital Psychiatry*, vol. 29, no. 5.

Elhai, J., Grubaugh, A., Richardson, J., Egede, L., & Creamer, M. (2008). Outpatient medical and mental healthcare utilization models among military veterans: Results from the 2001 National Survey of Veterans. *Journal of Psychiatric Research*, *42*(10), 858–867.

Epstein, S. A., Gonzales, J. J., Stockton, P., Goldstein, D. M., & Green, B. L. (1996). Functioning and well-being of patients in a consultation-liaison psychiatry clinic. *General Hospital Psychiatry*, 18(1), 3-7.

Fagiolini A., & Goracci A. (2009). The effects of undertreated chronic medical illnesses in patients with severe mental disorders. *J Clin Psychiatry*, 70 Suppl 3:22-9. doi: 10.4088/JCP.7075su1c.04. Review. PubMed PMID: 19570498

Feldman, S. (2003). Reflections on the 40th anniversary of the US Community Mental Health Centers Act. *Australian and New Zealand Journal of Psychiatry*, *37*(6), 662–667.

Fleury, M.J., Grenier, G., & Bamvita, J.M. (2015*a*). Predictive typology of subjective quality of life among participants with severe mental disorders after a five-year follow-up: a longitudinal two-step cluster analysis. *Health and Quality of Life Outcomes*, 13, 150. http://doi.org.pallas2.tcl.sc.edu/10.1186/s12955-015-0346-x

--------. (2015*b*). Predictors of frequent recourse to health professionals by people with severe mental disorders. *Canadian Journal of Psychiatry. Revue Canadienne De Psychiatrie*, *60*(2), 77–86.

Fleury, M., Grenier, G., Bamvita, J., & Caron, J. (2011). Mental health service utilization among patients with severe mental disorders. *Community Mental Health Journal*, 47(4), 365-377. doi:10.1007/s10597-010-9320-6

Fleury, M., Ngui, A., Bamvita, J., Grenier, G., Caron, J. (2014). Predictors of healthcare service utilization for mental health reasons. *Int J Environ Res Public Health*. Oct 15;11(10):10559-86. doi: 10.3390/ijerph111010559. PubMed PMID: 25321874; PubMed Central PMCID: PMC4210995.

Fleury, M., Grenier, G., Bamvita, J., Perreault, M., & Caron, J. (2011). Typology of adults diagnosed with mental disorders based on socio-demographics and clinical and service use characteristics. *BMC Psychiatry*, 11doi:10.1186/1471-244X-11-67

Fortin, M., & Bravo, G., Hudon, C., Lapointe, L. (2006). Psychological Distress and Multimorbidity in Primary Care. *The Annals of Family Medicine*, 4(5), 417–422.

Fortin, M., Lapointe, L., Hudon, C., Vanasse, A., Ntetu, A. L., & Maltais, D. (2004). Multimorbidity and quality of life in primary care: a systematic review. *Health & Quality of Life Outcomes*, *2*, 51–12.

Fraley, C., & Raftery, A.E. (1998). How Many Clusters? Which Clustering Method? – Answers via Model-Based Cluster Analysis. *The Computer Journal*, 41, 578-588.

Fritz, M. S., & MacKinnon, D. P. (2007). Required sample size to detect the mediated effect. *Psychological Science*, 18(3), 233-239.

Gamma, A. & Angst, J. (2001). Concurrent psychiatric comorbidity and multimorbidity in a community study: gender differences and quality of life. *European Archives of Psychiatry and Clinical Neuroscience*, 251 Suppl 2II43-II46.

Gijsen, R., Hoeymans, N., Schellevis, F. G., Ruwaard, D., Satariano, W. A., & van den Bos, G. A. M. (2001). Causes and consequences of comorbidity. *Journal of Clinical Epidemiology*, *54*(7), 661–674.

Gleason, H., Hobart, M., Bradley, L., Landers, J., Langenfeld, S., Tonelli, M., & Kolodziej, M. (2014). Gender differences of mental health consumers accessing integrated primary and behavioral care. *Psychology, Health & Medicine*, 19(2), 146-152. doi:10.1080/13548506.2013.793371

Goering P.N., Streiner, D.L., Adair, C., Aubry, T., Barker, J., Distasio, J., Hwang, S.W., Komaroff, J., Latimer, E., Somers, J., Zabkiewicz, D.M.. (2011). The At Home/Chez Soi trial protocol: a pragmatic, multi-site, randomised controlled trial of a Housing First intervention for homeless individuals with mental illness in five Canadian cities. *BMJ Open.* Nov 14;1(2):e000323. doi: 10.1136/bmjopen-2011-000323.

Goldberg, R. W., Hackman, A., Medoff, D. R., Brown, C., Fang, L. J., Dickerson, F., & ... Dixon, L. (2008). Physical wellness and employment status among adults with serious mental illness. *Community Mental Health Journal*, 44 (4), 245-251. doi:10.1007/s10597-008-9124-0

Goldberg, R. W., Rollins, A. L., & Lehman, A. F. (2003). Social network correlates among people with psychiatric disabilities. Psychiatric Rehabilitation Journal, 26(4), 393–402.

Golden, R. N. (2016). Disrupting the adverse interplay between psychiatric and medical illnesses. *Psychosomatic Medicine*, 78(3), 271-280. doi:10.1097/PSY.0000000000000331

Gourash, N. (1978). Help-seeking: A review of the literature. *American Journal of Community Psychology*, 6(5), 413-423.

Green, C. A., Perrin, N. A., Leo, M. C., Janoff, S. L., Yarborough, B. H., & Paulson, R. I. (2013). Recovery from serious mental illness: Trajectories, characteristics, and the role of mental health care. *Psychiatric Services*, 64(12), 1203-1210. doi:10.1176/appi.ps.201200545

Grollman, E. A. (2014). Multiple disadvantaged statuses and health: The role of multiple forms of discrimination. *Journal of Health and Social Behavior*, 55(1), 3-19.

Gunzler, D., Sajatovic, M., McCormick, R., Perzynski, A., Thomas, C., Kanuch, S., & ... Dawson, N. (2017). Psychosocial features of clinically relevant patient subgroups with serious mental illness and comorbid diabetes. *Psychiatric Services*, 68 (1), 96-99. doi:10.1176/appi.ps.201500554

Hansen, M. C., Fuentes, D., & Aranda, M. P. (2017). Re-engagement into care: The role of social support on service use for recurrent episodes of mental health distress among primary care patients. *The Journal of Behavioral Health Services & Research*, doi:10.1007/s11414-016-9545-4

Hatcher, R. L., & Gillaspy, J. A. (2006). Development and validation of a revised short version of the Working Alliance Inventory. *Psychotherapy Research*, 16(1), 12-25. doi:10.1080/10503300500352500

Happell, B., Galletly, C., Castle, D., Platania-Phung, C., Stanton, R., Scott, D., … Furness, T. (2015). Scoping review of research in Australia on the co-occurrence of physical and serious mental illness and integrated care: Review of Physical and Mental Illness. International *Journal of Mental Health Nursing*, n/a–n/a.

Happell, B., Stanton, R., Hoey, W., & Scott, D. (2014). Knowing is not doing: The relationship between health behaviour knowledge and actual health behaviours in people with serious mental illness. *Mental Health and Physical Activity*, 7(3), 198–204.

Happell, B., Davies, C., & Scott, D. (2012). Health behaviour interventions to improve physical health in individuals diagnosed with a mental illness: A systematic review: Health behavior for physical health.. *International Journal of Mental Health Nursing*, *21*(3), 236–247.

Happell, B., Scott, D., & Platania-Phung, C. (2012). Perceptions of Barriers to Physical Health Care for People with Serious Mental Illness: A Review of the International Literature. *Issues in Mental Health Nursing*, *33*(11), 752–761.

Hatcher, R. L., & Gillaspy, J. A. (2006). Development and validation of a revised short version of the Working Alliance Inventory. *Psychotherapy Research*, 16(1), 12-25. doi:10.1080/10503300500352500

Hayes, A. F. (2009). Beyond Baron and Kenny: Statistical moderation analysis in the new millennium. *Communication Monographs*, 76(4), 408-420.

--------. (2013). Introduction to moderation, moderation, and conditional process analysis: A regression-based approach. New York, NY, US: Guilford Press.

Hendrie, H. C., Lindgren, D., Hay, D. P., Lane, K. A., Gao, S., Purnell, C., … Callahan, C. M. (2013). Comorbidity Profile and Healthcare Utilization in Elderly Patients with Serious Mental Illnesses. *The American Journal of Geriatric Psychiatry*, *21*(12), 1267–1276.

Henry, D. B., Tolan, P. H., & Gorman-Smith, D. (2005). Cluster Analysis in Family Psychology Research. *Journal of Family Psychology*, 19(1), 121-132. doi:10.1037/0893-3200.19.1.121

Herman, S. E., & Mowbray, C. T. (1991). Client typology based on functioning level assessments: Utility for service planning and monitoring. *Journal of Mental Health Administration*, 18(2), 101-115. doi:10.1007/BF02518604

Hewitt, J. (2007). Critical evaluation of the use of research tools in evaluating quality of life for people with schizophrenia. *International Journal of Mental Health Nursing*, 16 (1), 2-14. doi:10.1111/j.1447-0349.2006.00438.x

Hopman, P., Schellevis, F. G., & Rijken, M. (2016). Health-related needs of people with multiple chronic diseases: Differences and underlying factors. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care & Rehabilitation*, 25(3), 651-660. doi:10.1007/s11136-015-1102-8

Horvath A.O., & Greenberg L. (1989). Development and validation of the Working Alliance Inventory. *Journal of Counseling Psychology*,36: 223-233.

Howgego, I. M., Yellowlees, P., Owen, C., Meldrum, L., & Dark, F. (2003). The therapeutic alliance: The key to effective patient outcome? A descriptive review of the evidence in community mental health case management. *Australian & New Zealand Journal of Psychiatry*, 37(2), 169-183. doi:10.1046/j.1440-1614.2003.01131.x

Hultman, C. M., Wieselgren, I.-M., & Ohman, A. (1997). Relationships Between Social Support, Social Coping and Life Events in the Relapse of Schizophrenic Patients. *Scandinavian Journal of Psychology*, 38(1), 3–13.

Jaeger, M., Konrad, A., Rueegg, S., & Rabenschlag, F. (2013). Measuring recovery: Validity of the 'Recovery Process Inventory' and the 'Recovery Attitudes Questionnaire'. *Psychiatry Research*, 210(1), 363-367. doi:10.1016/j.psychres.2013.06.002

Jerrell, J. M., Cousins, V. C., & Roberts, K. M. (2006). Psychometrics of the Recovery Process Inventory. *The Journal of Behavioral Health Services & Research*, 33(4), 464-473. doi:10.1007/s11414-006-9031-5

Johnson, E. H. (1989). Psychiatric morbidity and health problems among Black Americans: A national survey. *Journal of the National Medical Association*, 81(12), 1217-1223.

Jones, D. R., Macias, C., Barreira, P. J., Fisher, W. H., Hargreaves, W. A., & Harding, C. M. (2004). Prevalence, severity, and co-occurrence of chronic physical health problems of persons with serious mental illness. *Psychological Services*, 55(11), 1250-1257.

Joshi, K., Kumar, R., & Avasthi, A. (2003). Morbidity profile and its relationship with disability and psychological distress among elderly people in Northern India. *International Journal of Epidemiology, 32*(6), 978–987.

Juel, A., Kristiansen, C. B., Madsen, N. J., Munk-Jørgensen, P., & Hjorth, P. (2017). Interventions to improve lifestyle and quality-of-life in patients with concurrent mental illness and substance use. *Nordic Journal of Psychiatry*, 71(3), 197-204. doi:10.1080/08039488.2016.1251610

Kang, S. H., Wallace, N. T., Hyun, J. K., Morris, A., Coffman, J., & Bloom, J. R. (2007). Social Networks and Their Relationship to Mental Health Service Use and Expenditures Among Medicaid Beneficiaries. *Psychiatric Services*, 58(5), 689–695.

Karlin, B. E., Duffy, M., & Gleaves, D. H. (2008). Patterns and predictors of mental health service use and mental illness among older and younger adults in the United States. *Psychological Services*, 5(3), 275-294.

Katon, W., Lin, E. B., & Kroenke, K. (2007). The association of depression and anxiety with medical symptom burden in patients with chronic medical illness. *General Hospital Psychiatry*, 29(2), 147-155. doi:10.1016/j.genhosppsych.2006.11.005

Katon, W. J. (2003). Clinical and health services relationships between major depression, depressive symptoms, and general medical illness. *Biological Psychiatry*, 54(3), 216-226. doi:10.1016/S0006-3223(03)00273-7

Kelley, K. (2005). The effects of nonnormal distributions on confidence intervals around the standardized mean difference: bootstrap and parametric confidence intervals. *Educational and Psychological Measurement*, 65(1), 51-69.

Kenny, D.A. (2013, April 19). Moderation macro. Retrieved from http://davidakenny.net/dtt/mediate.htm’

Kennedy, C., Salsberry, P., Nickel, J., Hunt, C., & Chipps, E. (2005). The Burden of Disease in Those With Serious Mental and Physical Illnesses. *Journal of the American Psychiatric Nurses Association*, 11(1), 45–51.

Kilbourne, A.M., Post, E.P., Nossek, A., Sonel, E., Drill, L.J., Cooley, S., Bauer, M.S. (2008). Service delivery in older patients with bipolar disorder: a review and development of a medical care model. *Bipolar Disord*. Sep; 10 (6): 672-83. doi: 10.1111/j.1399-5618.2008.00602.x. PubMed PMID: 18837861.

Kim, J. Y., Higgins, T. C., Espositedo, D., & Hamblin, A. (2017). Integrating health care for high-need medicaid beneficiaries with serious mental illness and chronic physical health conditions at managed care, provider, and consumer levels. *Psychiatric Rehabilitation Journal*, 40 (2), 207-215. doi:10.1037/prj0000231

Kloos, B. (2005). Creating new possibilities for promoting liberation, well-being, and recovery: Learning from experiences of psychiatric consumers / survivors. In G. Nelson, & I. Prilleltensky, (Eds.) Community psychology: In pursuit of well-being and liberation (pp. 426-447). London: MacMillan.

Kondrat, D. C., & Early, T. J. (2010). An exploration of the working alliance in mental health case management. *Social Work Research*, 34(4), 201-211. doi:10.1093/swr/34.4.201

Lam, J. A., & Rosenheck, R. (1999). Social support and service use among homeless persons with serious mental illness. *International Journal of Social Psychiatry*, 45(1), 13-28.

Lehman, A.F. (1988). A Quality of Life Interview for the chronically mentally ill. *Evaluation and Program Planning*, ll (l):51-62.

Lehman, A. F. (1983a). The effects of psychiatric symptoms on quality of life assessments among the chronic mentally ill. *Evaluation and Program Planning*, 6 (2), 143-151. doi:10.1016/0149-7189(83)90028-9

-------. (1983b). The well-being of chronic mental patients: Assessing their quality of life. *Archives of General Psychiatry*, 40:369-373.

Lehman, A. F., Postrado, L. T., & Rachuba, L. T. (1993). Convergent validation of quality of life assessments for persons with severe mental illnesses. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 2(5), 327–333

Lemming, M. R., & Calsyn, R. J. (2004). Utility of the Behavioral Model in Predicting Service Utilization by Individuals Suffering from Severe Mental Illness and Homelessness. *Community Mental Health Journal*, 40(4), 347-364.

Lemieux, C. M., Richards, K. N., Hunter, D. R., & Kasofsky, J. (2015). Interrelationships among physical health, health-related, and psychosocial characteristics of persons receiving integrated care in community mental health settings. *Journal of Social Service Research*, 41(5), 561-583. doi:10.1080/01488376.2015.1072760

Lindamer, L. A., Liu, L., Sommerfeld, D. H., Folsom, D. P., Hawthorne, W., Garcia, P., … Jeste, D. V. (2012). Predisposing, Enabling, and Need Factors Associated with High Service Use in a Public Mental Health System. *Administration and Policy in Mental Health and Mental Health Services Research*, *39*(3), 200–209.

Luanaigh, C. Ó., & Lawlor, B. A. (2008). Loneliness and the health of older people. *International Journal Of Geriatric Psychiatry*, 23 (12), 1213-1221. doi:10.1002/gps.2054

Lynch, C.P., Gebregziabher, M., Zhao, Y., Hunt, K.J., Egede, L.E. (2014). Impact of medical and psychiatric multi-morbidity on mortality in diabetes: emerging evidence. *BMC Endocr Disorders*. Aug 20; 14:68. doi: 10.1186/1472-6823-14-68. PubMed PMID: 25138206; PubMed Central PMCID: PMC4144689

Matejkowski, J., Lee, S., & Han, W. (2014). The association between criminal history and mental health service use among people with serious mental illness. *Psychological Quarterly*, 85(1), 9-24.

Matejkowski, J., Lee, S., Henwood, B., Lukens, J., & Weinstein, L. C. (2013). Perceptions of health intervene in the relationship between psychological symptoms and quality of life for individuals in supportive housing. *The Journal of Behavioral Health Services & Research*, 40(4), 469-475.

Maulik, P. K., Eaton, W. W., & Bradshaw, C. P. (2009). The role of social network and support in mental health service use: Findings from the Baltimore ECA study. *Psychological Services*, 60(9), 1222-1229.

McEvoy, J. P., Meyer, J. M., Goff, D. C., Nasrallah, H. A., Davis, S. M., Sullivan, L., & ... Lieberman, J. A. (2005). Prevalence of the metabolic syndrome in patients with schizophrenia: Baseline results from the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) schizophrenia trial and comparison with national estimates from NHANES III. *Schizophrenia Research*, 80(1), 19-32.

MacKinnon, D. P., Lockwood, C. M., & Wereiams, J. (2004). Confidence Limits for the Indirect Effect: Distribution of the Product and Resampling Methods. *Multivariate Behavioral Research*, 39(1), 99-128.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test moderation and other intervening variable effects. *Psychological Methods*, 7(1), 83-104.

McKibbin C.L., Lee, A., Glaser, D., Kanuch, S., Cassidy, K., Thomas, C., Gunzler, D., McCormick, R., Dawson, N.V., & Sajatovic, M. (2018). Functional health status of adults with serious mental illness and diabetes mellitus: A latent profile analysis. *International Journal of Psychiatry Med*. Aug 4: 91217418791437. doi: 10.1177/0091217418791437.

McLachlan, G.J. (1992). Cluster analysis and related techniques in medical research. *Stat Meth Med Res*, 1: 27–48.

Merz, E. L., Roesch, S. C., Malcarne, V. L., Penedo, F. J., Llabre, M. M., Weitzman, O. B., & ... Gallo, L. C. (2014). Validation of Interpersonal Support Evaluation List-12 (ISEL-12) scores among English- and Spanish-speaking Hispanics/Latinos from the HCHS/SOL Sociocultural Ancillary Study. *Psychological Assessment*, 26(2), 384-394.

Miller, B. J., Paschall, C. B., & Svendsen, D. P. (2006). Mortality and Medical Comorbidity Among Patients With Serious Mental Illness. *Psychiatric Services*, 57(10), 1482–1487.

Mills, V., Van Hooff, M., Baur, J., & McFarlane, A. C. (2012). Predictors of Mental Health Service Utilisation in a Non-Treatment Seeking Epidemiological Sample of Australian Adults. *Community Mental Health Journal*, 48(4), 511–521.

Minsky, S., Etz, R. S., Gara, M., & Escobar, J. I. (2011). Service use among patients with serious mental illnesses who presented with physical symptoms at intake. *Psychological Services*, 62(10), 1146-1151.

Mizock, L. (2015). The double stigma of obesity and serious mental illnesses: Promoting health and recovery. *Stigma and Health*, *1*(S), 86–91. http://doi.org/10.1037/2376-6972.1.S.86

Mojtabai, R., Cullen, B., Everett, A., Nugent, K. L., Sawa, A., Sharifi, V., … Eaton, W. (2014). Reasons for Not Seeking General Medical Care Among Individuals With Serious Mental Illness. *Psychiatric Services*, *65*(6), 818–821.

Moos, R.H., Cronkite, A., Billings, G., Finney, J.W. (1988). Health and Daily Living Form Manual. Social Ecology Lab, Department of Psychiatry, Stanford University.

Morgan, V. A., Waterreus, A., Carr, V., Castle, D., Cohen, M., Harvey, C., & ... Jablensky, A. (2017). Responding to challenges for people with psychotic illness: Updated evidence from the Survey of High Impact Psychosis. *Australian and New Zealand Journal of Psychiatry*, 51(2), 124-140. doi:10.1177/0004867416679738

Morgan, V.A., Waterreus, A., Jablensky, A., Mackinnon, A., McGrath, J.J., Carr, V., Bush, R., Castle, D., Cohen, M., Harvey, C., Galletly, C., Stain, H.J., Neil, A.L., McGorry, P., Hocking, B., Shah, S., & Saw, S. (2012). People living with psychotic illness in 2010: the second Australian national survey of psychosis. *Aust N Z J Psychiatry*. Aug; 46(8):735-52. doi: 10.1177/0004867412449877. Epub 2012 Jun 13. PubMed PMID: 22696547.

Mplus. (2015, June 12). Mplus user's guide examples. Chapter 11: Missing data modeling and Bayesian estimation. Retrieved from https://www.statmodel.com/download/usersguide/Chapter11.pdf

Nankivell, J., Platania-Phung, C., Happell, B., & Scott, D. (2013). Access to physical health care for people with serious mental illness: A nursing perspective and a human rights perspective-common ground? *Issues in Mental Health Nursing*, 34(6), 442-450.

Neale, M. S., & Rosenheck, R. A. (1995). Therapeutic alliance and outcome in a VA intensive case management program. *Psychiatric Services*, 46 (7), 719-723. doi:10.1176/ps.46.7.719

Newcomer, S.R., Steiner, J.F., Bayliss, E.A. (2011). Identifying subgroups of complex patients with cluster analysis. *Am J Manag Care*. Aug; 17(8):e324-32.

New Hampshire-Dartmouth Psychological Research, Conrad, K., Yagelka, J., Matters, M., Rich, A., Wereiams, V., & Buchanan, M. (2001). Residential Follow-Back Calender. *Mental Health Services Research*, 3(3), 141-153.

Norušis, M. J. (2009). PASW Statistics 18 statistical procedures companion. Upper Saddle River, NJ: Prentice Hall.

Oliver, M. (1998). Theories of disability in health practice and research. *BMJ : British Medical Journal*, *317*(7170), 1446–1449.

Oosthuizen, P., Carey, P., & Emsley, R. (2008). Psychological disorders and general medical conditions: Implications for the clinician. *African Journal of Psychiatry*, 11(1), 18-22.

Parks, J., Swinfard, T., & Stuve, P. (2010). Mental Health Community Case Management and Its Effect on Healthcare Expenditures. *Psychiatric Annals*, *40*(8), 415–419.

Perrucci, R., & Targ, D. B. (1982). Network Structure and Reactions to Primary Deviance of Mental Patients. *Journal of Health and Social Behavior*, *23*(1), 2.

Pirraglia, P. A., Biswas, K., Kilbourne, A. M., Fenn, H., & Bauer, M. S. (2009). A prospective
study of the impact of comorbid medical disease on bipolar disorder outcomes. *Journal of Affective Disorders*, 115(3), 355-359. doi:10.1016/j.jad.2008.09.020

Planner C, Gask L, & Reilly S. (2014). Serious mental illness and the role of primary care. *Curr Psychiatry Rep*. Aug; 16 (8):458. doi: 10.1007/s11920-014-0458-8.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple moderator models. *Behavior Research Methods*, 40, 879–891.

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated moderation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research*, 42(1), 185-227.

Raudino, A., Carr, V. J., Bush, R., Saw, S., Burgess, P., & Morgan, V. A. (2014). Patterns of service utilisation in psychosis: findings of the 2010 Australian national survey of psychosis. *The Australian and New Zealand Journal of Psychiatry*, *48*(4), 341–351.

Razzano, L. A., Cook, J. A., Yost, C., Jonikas, J. A., Swarbrick, M. A., Carter, T. M., & Santos, A. (2015). Factors associated with co-occurring medical conditions among adults with serious mental disorders. *Schizophrenia Research*, 161(2-3), 458-464.

Roberti, J. W., Harrington, L. N., & Storch, E. A. (2006). Further Psychometric Support for the 10-Item Version of the Perceived Stress Scale. *Journal of College Counseling*, 9(2), 135-147.

Roberts, E., Jones, L., Blackman, A., Dewhurst, T., Matcham, F., Kan, C., & ... Price, H. (2017). The prevalence of diabetes mellitus and abnormal glucose metabolism in the inpatient psychiatric setting: A systematic review and meta-analysis. *General Hospital Psychiatry*, 4576-84. doi:10.1016/j.genhosppsych.2017.01.003

Robson, D., & Gray, R. (2007). Serious mental illness and physical health problems: A discussion paper. International Journal of Nursing Studies, 44(3), 457–466.

Rothbard, A., Miller, K., Lee, S., & Blank, M. (2009). Revised Cost Estimates of Medicaid Recipients With Serious Mental Illness and HIV-AIDS. *Psychiatric Services*, *60*(7).

Rubin, M. (2004). Multiple interventions and outcome in schizophrenia (Ph.D.). University of South Carolina, United States -- South Carolina. Retrieved from http://search.proquest.com/docview/305117963/abstract/8A248A5EA4AA4B6EPQ/3

Rush, A. J., Zimmerman, M., Wisniewski, S. R., Fava, M., Hollon, S. D., Warden, D., & ... Trivedi, M. H. (2005). Comorbid psychiatric disorders in depressed outpatients: Demographic and clinical features. *Journal of Affective Disorders*, 87(1), 43-55. doi:10.1016/j.jad.2005.03.005

Saha S, Chant D, & McGrath J. (2007). A systematic review of mortality in schizophrenia: Is the differential mortality gap worsening over time? *Archives of General Psychiatry*, 64(10), 1123–1131.

Sakellariou, D. & Rotarou, E.S. (2017). Access to healthcare for men and women with disabilities in the UK: secondary analysis of cross-sectional data. *BMJ Open*. Sep 11; 7 (8): e016614. doi: 10.1136/bmjopen-2017-016614. PubMed PMID: 28893735; PubMed Central PMCID: PMC5629679.

Salibián-Barrera, M., Van Aelst, S., & Wereems, G. (2008). Fast and robust bootstrap. *Statistical Methods and Applications*, 17(1), 41-71.

Scharf, D. M., Eberhart, N. K., Schmidt, N., Vaughan, C. A., Dutta, T., Pincus, H. A., & Burnam, M. A. (2013). Integrating primary care into community behavioral health settings: Programs and early implementation experiences. *Psychological Services*, 64(7), 660-665.

Selig, J. P., & Preacher, K. J. (2009). Moderation models for longitudinal data in developmental research. *Research in Human Development*, 6(2-3), 144-164.

Shrout, P. E., & Bolger, N. (2002). Moderation in experimental and nonexperimental studies: New procedures and recommendations. *Psychological Methods*, 7(4), 422-445.

Shim, R. S., Druss, B. G., Zhang, S., Kim, G., Oderinde, A., Shoyinka, S., & Rust, G. (2014). Emergency department utilization among Medicaid beneficiaries with schizophrenia and diabetes: The consequences of increasing medical complexity. *Schizophrenia Research*, *152*(2-3), 490–497.

Simo, B., Bamvita, J., Caron, J., & Fleury, M. (2018). Patterns of health care service utilization by individuals with mental health problems: A predictive cluster analysis. *Psychiatric Quarterly*, doi:10.1007/s11126-018-9568-5

Singer, M. K., Dressler, W., & George, S. (2016). Culture: The missing link in health research. Social Science & Medicine, 170, 237–246. https://doi-org.pallas2.tcl.sc.edu/10.1016/j.socscimed.2016.07.015

Smith, G., Kennedy, C., Knipper, S., O'Brien, J., O'Keeffe, J., & U.S. Department of Health and Human Services. (2005). *Using Medicaid to Support Working Age Adults with Serious Mental Illnesses in the Community: A Handbook*. Research Triangle Institute. Retrieved from https://aspe.hhs.gov/legacy-page/using-medicaid-support-working-age-adults- serious-mental-illnesses-community-handbook-142751

Smith S.M., Soubhi H., Fortin M., Hudon C., O'Dowd T. (2012). Managing patients with multimorbidity: systematic review of interventions in primary care and community settings. *BMJ*. Sep 3;345:e5205. doi: 10.1136/bmj.e5205. Review. PubMed PMID: 22945950; PubMed Central PMCID: PMC3432635.

Smith, T.E., Easter, A., Pollock, M., Pope, L.G., & Wisdom, J.P. (2013). Disengagement from care: perspectives of individuals with serious mental illness and of service providers. Psychiatr Serv. Aug 1; 64(8):770-5. doi: 10.1176/appi.ps.201200394. PubMed PMID: 23632442.

Smith, S., & O'Dowd, T. (2007). Chronic diseases: what happens when they come in multiples? *Br J Gen Pract*, *57*(537), 268–270.

Sokal, J., Messias, E., Dickerson, F. B., Kreyenbuhl, J., Brown, C. H., Goldberg, R. W., & Dixon, L. B. (2004). Comorbidity of Medical Illnesses Among Adults With Serious Mental Illness Who Are Receiving Community Psychiatric Services. *Journal of Nervous & Mental Disease*, 192(6), 421-427. doi:10.1097/01.nmd.0000130135.78017.96

Solorio, M. R., Milburn, N. G., Andersen, R. M., Trifskin, S., & Rodríguez, M. A. (2006). Emotional Distress and Mental Health Service Use Among Urban Homeless Adolescents. *The Journal of Behavioral Health Services & Research*, 33(4), 381–393.

South Carolina Department of Health and Human Services. (2010). *Targeted Case Management Provider Manual*. Retrieved from http://www.state.sc.us/dmh/peedee/tcm_manual.pdf

South Carolina Department of Mental Health (Spring, 2012). Community mental health center profiles: Columbia area mental health center. Retrieved from http://www.state.sc.us/dmh/profiles/columbia_area.pdf

SPSS Corporation. (2001). The SPSS Two-Step Cluster Component: A scalable component enabling more efficient customer segmentation. Technical Report. Chicago: SPSS Inc.

Stanhope, V. (2013). *Case Management in Mental Health in the United States*. Retrieved from http://www.oxfordbibliographies.com/display/id/obo-9780195389678-0096

Stein, M.B., Cox, B.J., Afifi, T.O., Belik, S.L., Sareen, J. (2006). Does Co-Morbid Depressive Illness Magnify the Impact of Chronic Physical Illness? A Population-Based Perspective. *Psychological Medicine*, vol. 36, no. 5.

Suetani, S., Waterreus, A., Morgan, V., Foley, D. L., Galletly, C., Badcock, J. C., & ... McGrath, J. J. (2016). Correlates of physical activity in people living with psychotic illness. *Acta Psychiatrica Scandinavica*, 134(2), 129-137. doi:10.1111/acps.12594

Swartz, J. A., & Jantz, I. (2014). Association between nonspecific severe psychological distress as an indicator of serious mental illness and increasing levels of medical multimorbidity. *American Journal of Public Health*, 104 (12), 2350-2358. doi:10.2105/AJPH.2014.302165

Sweeney, S., Air, T., Zannettino, L., & Galletly, C. (2015). Psychosis, Socioeconomic Disadvantage, and Health Service Use in South Australia: Findings from the Second Australian National Survey of Psychosis. *Frontiers of Public Health*. Nov 20; 3:259. doi: 10.3389/fpubh.2015.00259. eCollection 2015. PubMed PMID: 26636059; PubMed Central PMCID: PMC4653578.

Tabachnick, B., & L. Fidell. (2001). Using Multivariate Statistics, 4nd ed. New York: Boston and Bacon.

Tessler, R., & Mechanic, D. (1978). Psychological Distress and Perceived Health Status. *Journal of Health and Social Behavior*, 19(3), 254.

Theeke, L.A., & Mallow J. (2013). Loneliness and quality of life in chronically ill rural older adults. *Am J Nurs*. Sep; 113(9):28-37; quiz 38. doi: 10.1097/01.NAJ.0000434169.53750.14. PubMed PMID: 23958674; PubMed Central PMCID: PMC4323171

Thoemmes, F., MacKinnon, D. P., & Reiser, M. R. (2010). Power analysis for complex moderational designs using Monte Carlo methods. *Structural Equation Modeling*, 17(3), 510-534.

Thomas, P. (2008). Psychosocial and economic issues related to physical health in psychiatric illness. *European Neuropsychopharmacology*, 18, S115–S120.

Tripp, J. C., Skidmore, J. R., Cui, R., & Tate, S. R. (2013). Impact of Physical Health on Treatment for Co-occurring Depression and Substance Dependence. *Journal of Dual Diagnosis*, 9(3), 239–248.

Tsemberis, S., McHugo, G., Wereiams, V., Hanrahan, P., & Stefancic, A. (2007). Measuring homelessness and residential stability: The Residential Time-Line Follow-Back Inventory. *Journal of Community Psychology*, 35(1), 29-42.

Tukey, J.W. (1977). Some thoughts on clinical trials, especially problems of multiplicity. *Science*, 198, 679–684.

Tyack, Z., Frakes, K., Barnett, A., Cornwell, P., Kuys, S., & McPhail, S. (2016). Predictors of health-related quality of life in people with a complex chronic disease including multimorbidity: a longitudinal cohort study. *Quality of Life Research: An International Journal of Quality of Life Aspects of Treatment, Care and Rehabilitation*, 25(10), 2579-2592. doi:10.1007/s11136-016-1282-x

Üstun, B., & Kennedy, C. (2009). What is "functional impairment"? Disentangling disability from clinical significance. *World Psychiatry*, *8*(2), 82–85.

Valderas, J. M., Starfield, B., Sibbald, B., Salisbury, C., & Roland, M. (2009). Defining Comorbidity: Implications for Understanding Health and Health Services. *The Annals of Family Medicine*, 7(4), 357–363.

Vandyk, A. D., VanDenKerkhof, E. G., Graham, I. D., & Harrison, M. B. (2014). Profiling Frequent Presenters to the Emergency Department for Mental Health Complaints: Socio-Demographic, Clinical, and Service Use Characteristics. *Archives of Psychiatric Nursing*, *28*(6), 420–425.

Vázquez, C., Rahona, J. J., Gómez, D., Caballero, F. F., & Hervás, G. (2015). A national representative study of the relative impact of physical and psychological problems on life satisfaction. *Journal of Happiness Studies*, 16 (1), 135-148. doi:10.1007/s10902-014-9501-z

Viron, M., Zioto, K., Schweitzer, J., & Levine, G. (2014). Behavioral Health Homes: An opportunity to address healthcare inequities in people with serious mental illness. *Asian Journal of Psychiatry*, 10, 10–16.

Viron, M. J. & Stern, T. A. (2010). The impact of serious mental illness on health and healthcare. *Psychosomatics: Journal of Consultation and Liaison Psychiatry*, 51(6), 458-465. doi:10.1016/S0033-3182(10)70737-4

Walker, E. R., & Druss, B. G. (2017). Cumulative burden of comorbid mental disorders, substance use disorders, chronic medical conditions, and poverty on health among adults in the U.S.A. *Psychology, Health & Medicine*, 22(6), 727-735. doi:10.1080/13548506.2016.1227855

Walker, E. R., McGee, R. E., & Druss, B. G. (2015). Mortality in mental disorders and global disease burden implications: A systematic review and meta-analysis. *JAMA Psychiatry*, 72(4), 334-341. doi:10.1001/jamapsychiatry.2014.2502

Wardian, J., Thaller, J., & Urbaeva, Z. (2015). The Accumulation of Multiple Sources of Psychosocial Disadvantage and Their Correlation to Reported Overall Health: Establishing a Threshold. *Social Work*, 60(1), 45–54.

Wasserman, D. A., Sorensen, J. L., Delucchi, K. L., Masson, C. L., & Hall, S. M. (2006). Psychometric evaluation of the quality of life interview, brief version, in injection drug users. *Psychology of Addictive Behaviors*, 20(3), 316-321. doi:10.1037/0893-164X.20.3.316

Watkins, K. E., Hunter, S. B., Wenzel, S. L., Tu, W., Paddock, S. M., Griffin, A., & Ebener, P. (2004). Prevalence and Characteristics of Clients with Co-Occurring Disorders in Outpatient Substance Abuse Treatment. *The American Journal of Drug and Alcohol Abuse*, 30(4), 749-764. doi:10.1081/ADA-200037538

Watson, D., & Pennebaker, J. W. (1989). Health complaints, stress, and distress: Exploring the central role of negative affectivity. *Psychological Review*, 96(2), 234–254.

Weinstein, L. C., LaNoue, M., Collins, E., Henwood, B. F., & Drake, R. E. (2013). Health Care Integration for Formerly Homeless People With Serious Mental Illness. *Journal of Dual Diagnosis*, 9(1), 72–77.

Wheeler, A., McKenna, B., Madell, D., Harrison, J., Prebble, K., Larsson, E., & ... Nakarada-Kordic, I. (2015). Self-reported health-related quality of life of mental health service users with serious mental illness in New Zealand. *Journal of Primary Health Care*, 7(2), 117-123.

White, J., Gray, R., & Jones, M. (2009). The development of the serious mental illness physical Health Improvement Profile. *Journal of Psychiatric and Mental Health Nursing*, 16(5), 493-498. doi:10.1111/j.1365-2850.2009.01375.x

Woodhead, C., Ashworth, M., Schofield, P., & Henderson, M. (2014). Patterns of physical co- / multi-morbidity among patients with serious mental illness: a London borough-based cross-sectional study. *BMC Fam Pract*. 2014 Jun 11;15:117. doi: 10.1186/1471-2296-15-117. PubMed PMID: 24919453; PubMed Central PMCID: PMC4062514.

Workman, E.A., Short, D., Turner, R., & Douglas, W. (1997). A 30-year progress report on a VA satellite psychiatric clinic program. *Psychiatr Serv*. Dec; 48(12):1582-3. PubMed PMID: 9406268.

Xiong, G.L., Iosif, A.M., Culpepper, N.H., & McCarron, R.M. (2017). Use of Preventive Health Services in People With Serious Mental Illness: Consumer Perspectives on Barriers and Solutions. *Prim Care Companion CNS Disord*. Jan 5; 19 (1). doi: 10.4088/PCC.16m02042. PubMed PMID: 28102976.

Yoon, J., & Bernell, S. L. (2013). The role of adverse physical health events on the utilization of mental health services. *Health Services Research*, 48(1), 175-194.

Zeber, J. E., Copeland, L. A., & Grazier, K. L. (2006). Serious mental illness, aging, and utilization patterns among veterans. *Military Medicine*, *171*(7), 619–626.

Zu, J., & Yuan, K.H. (2010). Local influence and robust procedures for moderation analysis. *Multivariate Behavioral Research*, 45, 1-44.

APPENDIX A

CONCPEPTUAL MODELS

Table A.1. *Regression Model for Aim 1.*

What demographic and psychosocial variables are most likely to characterize subgroups of individuals that have physical health problems and physical health impairment?

Demographic & psychosocial characteristics **Predictors** (15 total)	**Physical health characteristics** **Outcomes** (2 total)
Time 1 Block 1 ▪ Age ▪ Gender ▪ Race ▪ Ethnicity ▪ Mental illness dx Block 2 ▪ Education level completed ▪ Total income ▪ # days worked in the last month ▪ History of homelessness (Yes or No) ▪ Transportation problems in the last month Block 3 • Psychological Distress Block 4 • Life satisfaction • Recovery • Social Support • Working Alliance	Time 1 **Total # of physical health problems** A simple count of physical health problems **Amount of physical health impairment** This is the total number of physical health problems * the amount of interference in daily life.

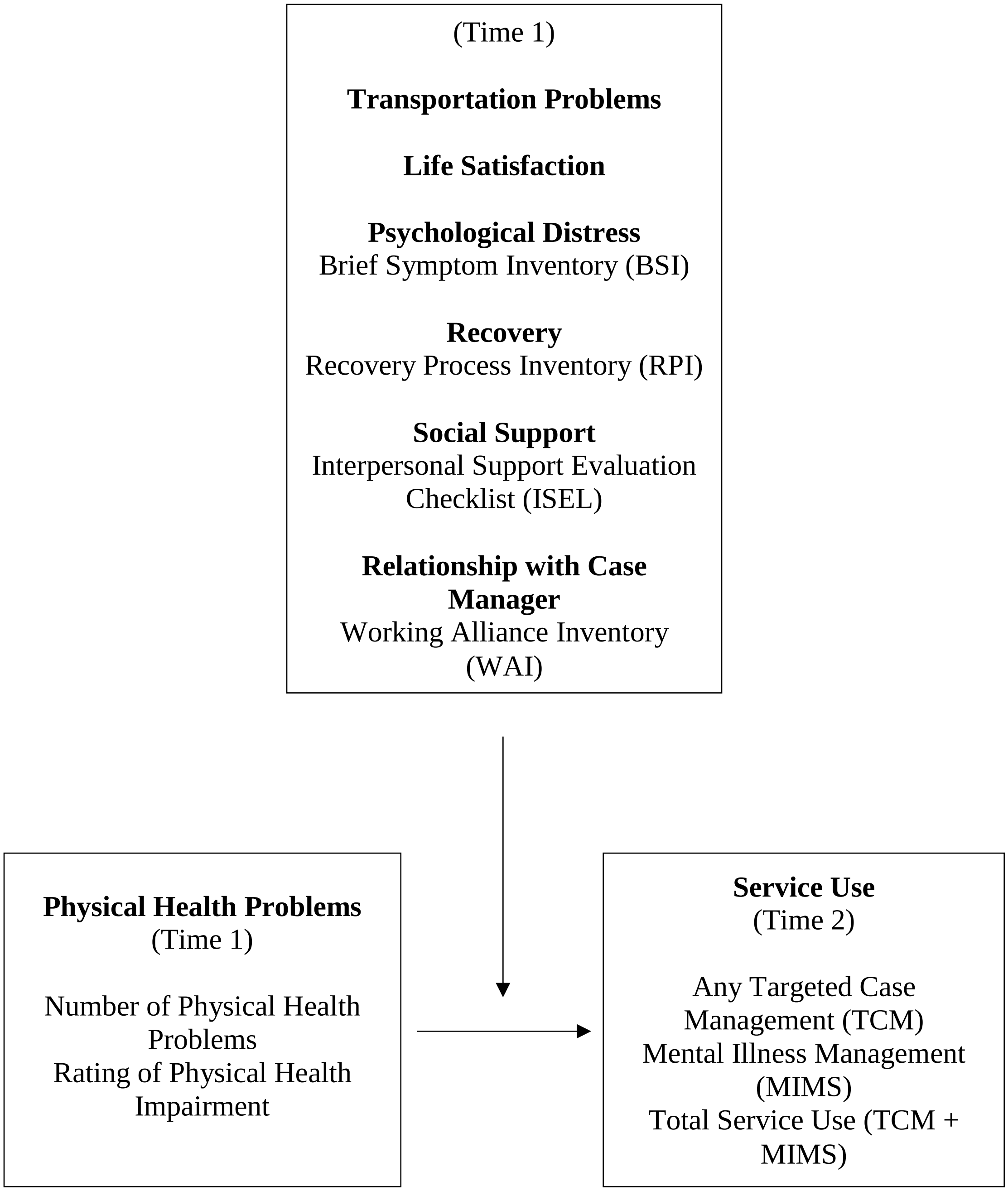

Figure A.1. Data analysis for Aim 2. Moderation model including all measures used in the study. Moderation model of the relationships between perceived physical health problems (predictor), psychosocial variables (the moderators), and case management services use (outcome).

APPENDIX B
SUMMARY OF STUDY MEASURES

Table B.1. *Measures used to test Aims 1-2, for the regression model and moderation model.*

Construct	Measured variable	Instrument	Number of items / response format
Demographic characteristics	Demographic information ☐ Age, gender, race, ethnicity, education level, total income, number of days worked ☐ Transportation problems (one item from the Stressful Events & Situations Checklist)	Demographic Questionnaire\\ Stressful Events & Situations Checklist	40 items with mixed response types (circle yes/no; fill in the blank, checklist, Likert scale) 27-item measure with a three-point Likert scale
Homelessness	Lifetime history of homelessness and number of times homeless	Residential Followback Calendar (Bebout, et al., 1997)	5 items, circle yes/no, fill in the blank for frequency
Mental illness diagnosis	Primary mental illness diagnosis	DSM-IV or ICD-9 codes in mental health center (MHC) Client Information Systems billing records	MHC billing code
Physical Health Problems	Qualitative variable = number of physical health problems in response to an open-ended prompt (see measures)	Physical Health Checklist (Moos, Cronkite, Billings, & Finney, 1988)	1 item, fill in the blank, qualitative response

Construct	Measured variable	Instrument	Number of items / response format
Perceived Physical Health Impairment	Amount of interference health problems have on completing daily activities (see measures)	Physical Health Checklist (Moos, Cronkite, Billings, & Finney, 1988)	1 item, Likert scale (1= *not at all;* to 5 = *extremely*) (Number of physical health problems * amount of perceived impairment)
Psychological Distress	Psychiatric distress	Brief Symptom Inventory (BSI) (Derogatis, 1993)	53 items, Likert scale. Level of distress experienced due to each symptom in last 30 days (0 = *not at all* to 4= *extremely*)
Life Satisfaction	Life Satisfaction and Quality of Life	Quality of Life Interview (QOLI) (Lehman, 1983*a*; Lehman, 1983*b*; Lehman, 1988)	One item, Likert scale. Feeling about life overall (1 = *terrible*, 7 = *delighted*)
Recovery	Recovery process	Recovery Process Inventory (RPI) (Jerrell, Cousins, & Roberts, 2006).	27 items, Likert scale. Thoughts about recovery and treatment (*strongly disagree* = 1, *strongly agree* = 5)
Social Support	Perceived social support	Interpersonal Support Evaluation List (ISEL-12) (Cohen & Hoberman,	12 items, Likert scale. Agreements with statements which may or

Construct	Measured variable	Instrument	Number of items / response format
		1983; Cohen et al., 1985)	may not be true (*definitely true* = 3, *definitely false* = 0)
Relationship with case manager	Working alliance	Revised version of the Working Alliance Inventory – short form (WAI) (Hatcher & Gillaspy, 2006; Chinman, Symanski, Johnson, & Davidson, 2002; Neale & Rosenheck, 1995; Horvath & Greenberg, 1989)	Five items, Likert scale. Level of agreement about work with case manager (*strongly disagree* = 1, *strongly agree* = 5)
Mental Health Service Use	Frequency of three types of service use: ☐ Any mental illness management services ☐ Targeted case management services ☐ Total frequency of mental illness management services and targeted case management services	Mental health center (MHC) Client Information Systems billing records	MHC billing code identifying service type, obtained from medical records and billing claims made for services rendered

APPENDIX C

STUDY PROTOCOL

Recruitment letter sent to Department of Mental Health Columbia Area Mental Health Center clients

UNIVERSITY OF
SOUTH CAROLINA

DEPARTMENT OF PSYCHOLOGY

June 17, 2004

Dear Supported Housing Tenant:

I am writing to invite you to participate in a research study of supported housing in South Carolina. A team of researchers from the University of South Carolina is interested in learning about your views on what it is like living in your neighborhood and how you are doing now. We are contacting you because you receive supported housing services connected with the SC Department of Mental Health. Participating in the interview is completely voluntary and were in no way affect your housing or the services you receive. We plan to use the results of the study to improve the housing programs and supportive services for persons with mental illness in SC and across the county.

What does the study involve?

If you agree to participate, you will be asked to take part in an interview that were last about 2 hours. We were also ask for your consent to let us review records of the mental health and substance abuse services you have used and to ask staff how you are doing. If you decide to participate, you were receive $20 for completing the interview.

This is a study about how housing environments can affect a person’s functioning, activities, and quality of life. You will be asked what you think about your apartment and your experiences in the neighborhood. Other questions ask about your relationship with landlord and neighbors, your regular activities, and how you handle stressful concerns. Finally, we were ask what you think about the services you may use from mental health and substance abuse providers, symptoms you may experience, and your hopes for the future. We would like to do the face-to-face interview at your apartment. If you do not want to do the interview at your apartment, we can make arrangements to do the interview at a community center or another place connected with your housing program.

With your permission, we want to review records of your service use to see whether certain kinds of services tend to be more or less helpful for persons living in supported housing. We also want to ask staff about how you have been doing to understand what they think is important for success in housing. Please remember that participation in the study is completely voluntary and confidential. You should know that we make every effort to protect research participants' privacy.

If you have any questions, you may reach me or Annie Wright at the University of South Carolina, 803-777-8408. Please feel free to contact us if you are undecided about participating and want to get more information.

If you are interested in the study, please sign the attached form and give to your case manager or clinician so that we can contact you to arrange for a time to meet. Thank you for considering participating in the study.

Sincerely,

Bret Kloos, Ph.D.

Principal Investigator

Authorization letter to release client mental health service use information

THE UNIVERSITY OF SOUTH CAROLINA

HOUSING, ADAPTIVE FUNCTIONING, & SERIOUS MENTAL ILLNESS STUDY

Authorization for Columbia Area CMHC
to release my contact information

I authorize the Columbia Area CMHC to release my name, address, phone number, and email contact information to the Bret Kloos, Ph.D. for the sole purpose of arranging a meeting to discuss whether I might participate in the University of South Carolina *Housing, Adaptive Functioning, and Serious Mental Illness* study.

I understand that I can revoke this authorization at any time by writing to Dr. Kloos or my Columbia Area CMHC case manager. I also understand that I can decline to participate in the study and decline to sign this authorization. Once Columbia Area MHC releases my contact information, it is no longer under the control of these CACMHC, but is subject to federal research guidelines regarding confidentiality. This authorization expires 27 months from the date of my signature.

Participant____________________________________

Witness ________________________________

Date ____

MY CONTACT INFORMATION

Name	
Address	
Phone number(s)	
E-mail	
Suggested times to contact me	

Informed consent form for participants

CONSENT FOR PARTIPATION IN A RESEARCH PROJECT

UNIVERSITY OF SOUTH CAROLINA

Title: Housing, Adaptive Functioning and Serious Mental Illness
Principal Investigator: Bret Kloos, Ph.D.

Funding Source: National Institute of Mental Health

Invitation to Participate and Description of Project

You are invited to participate in a research study about the importance of housing for people who live in their own apartment and participate in mental health treatment at a Community Mental Health Center (CMHC). The study offers the opportunity to participate in two interviews 12 months apart. Bret Kloos, Ph.D. and his assistants from the Department of Psychology at the University of South Carolina are conducting the study.

Purpose of the Study

We are contacting you because you participate in supported housing program connected with a CMHC. We are interested in knowing more about how the apartment and neighborhood where you live can affect your functioning, your activities, and your quality of life. We were use information from the interviews with people across South Carolina to improve services and housing policies.

Description of Study Procedures

If you agree to participate, you will be asked to take part in an individual interview and give us permission to analyze information about the services you use and your current functioning. The interview will be done by research staff member at your apartment or, if you prefer, in another place such as a CMHC office, at a social service agency, or a housing program office. The interview were last about 2 hours. You were also have the opportunity to participate in a follow-up interview 12 months after completing the first one.

In both interviews, you will be asked about the condition of the housing where you live, your perspective about the neighborhood, your relationship with landlord and neighbors, your regular activities, and problems you may encounter in your neighborhood. We were ask about stressful experiences and situations that you may have had. Examples of these questions include losing a friend, getting into a fight, having legal trouble, or recent abuse by other people. We were ask about how you handle stressful situations, about support you receive from other people, about your relationships with family and friends, and your views about the future. Finally, we were also ask about health symptoms you may have, services that you use, what you think about your services, and your life satisfaction. With this research, we want to identify parts of housing environments that can be improved to help people reach their goals in rehabilitation and recovery from episodes of serious mental illness.

With your permission, we want to analyze information about the services you use and your current functioning. We would like to ask the SC Department of Mental Health (DMH) and Department of Alcohol and Other Drug Abuse Services (DAODAS) about (a) which services you have used in the last 12 months and (b) how often you used these services. We want to study whether certain kinds of services tend to be more or less helpful for persons living in supported housing. We were group all research participants' records together and not identify any one individual. Also with your permission, we want to ask your supported housing case manager his/her views about your functioning and participation in services in the last six months to understand what they think is important for success in housing. Examples of these questions include how well you are doing in your apartment, problems you may have had in community living, and how well you and the case manager work together.
Finally, with your consent, the researchers will be gathering information that were allow them to compare your neighborhood with those of other people in South Carolina. First, they were make brief ratings about the conditions of your neighborhood and your building. Second, they were use information from the U.S. Census Bureau to compare your neighborhood to the neighborhoods of other people who participate in the study. Examples of this information include (a) whether your neighborhood is considered urban, suburban, or rural, (b) the number of people who work in your neighborhood, and (c) rates of employment.

To review, if you agree to participate in this study, you are asked to:

- ☐ participate in an individual interview as described above
- ☐ agree to allow the researchers to contact you for a follow-up interview next year
- ☐ grant the researchers permission to analyze information from SC-DMH about services you have used in the past 12 months and how often you used them
- ☐ grant the researchers permission to analyze information from SC-DAODAS about which services you have used during the past 12 months and how often
- ☐ grant the researchers permission to ask your supported housing case manager about your current functioning
- ☐ have a researcher make brief ratings about the conditions of the neighborhood and your building

Risks of Participation

The interview questions are similar to those used by DMH staff, clinicians, case managers, or housing program staff when they met you for the first time. Although the interview is not intended to be upsetting in any way, you may feel uncomfortable or embarrassed when you are asked questions related to your housing, participation in treatment, social activities, stressful experiences or symptoms. At any time, you can decide not to answer a particular question, take a break from the interview, or end the interview.

Benefits of Participation

Your participation has potential to improve supported housing programs for yourself and for others in the future. Information about what you find supportive for apartment living, or helpful in having positive experiences in your neighborhood, were assist the design of new programming. We hope the study were help to identify the parts of housing environments that promote adaptive functioning, reduce the effect of stressors, and prevent problems related to living in your neighborhood. It could be that this study may have no direct benefit to you.

Payment

You were receive $20 for this interview.

Confidentiality of Records

Your answers to the interview are completely confidential. They were not be part of your mental health record and they were not be reported to staff. At all times, every effort will be made to protect your privacy. In all records of the study, only a code number were identify you and only the researchers were know your name. No information from you will be shared without your permission with anyone outside of this study, including staff members currently providing you service. To help us further protect your privacy, we have obtained a Certificate of Confidentiality from the National Institutes of Health. With this Certificate, the researchers cannot be forced to disclose information that may identify you, even by a court subpoena, in any federal, state, or local civil, criminal, administrative, legislative, or other proceedings. The researchers were use the Certificate to resist any demands for information that would identify you, except as explained below.

There are two exceptions for which we could not maintain confidentiality. First, if we have reason to believe you might harm yourself, might harm others or might be harmed by others, we would report this information to protect you and others. Second, even with this Certificate of Confidentiality, research records can be reviewed by federal agencies and the university to make sure that the research is being done responsibly. For this study, staff from the National Institute of Mental Health, the study sponsor, the University of South Carolina Institutional Review Board, or the South Carolina Department of Mental Health's Institutional Review Board may inspect research records to evaluate the study as part of their role overseeing federally funded projects.

You should understand that a Certificate of Confidentiality does not prevent you or a member of your family from voluntarily releasing information about yourself or your involvement in this research. If an insurer, employer, or other person obtains your written consent to receive research information, then the researchers may not use the Certificate to withhold that information.

Contact Persons

If you have further questions about this project or if you have a research-related problem, you may contact:

Bret Kloos, Ph.D.
Director of the USC Housing & Adaptive Functioning Study
Department of Psychology
University of South Carolina
Columbia, SC 29208
Phone: (803) 777-2704

If you have any questions concerning your rights as a research subject, you may contact:

Tommy Coggins
Office of Research Compliance
University of South Carolina
Columbia, SC 29208
Phone: (803) 777-7095

Voluntary Participation

Participation in this study is voluntary. You are free not to participate or withdraw at any time, for whatever reason. You are also free to refuse to answer any question in the interview. If you choose not to participate, it were not affect your relationship with the research staff members or any service you may be receiving at mental health center, a housing program, or any other service provider. In the event that you do withdraw from this study, the information that you have already provided will be kept in a confidential manner.

Questions

Before you sign the form on the following page, please ask any questions about any aspect of this study that is unclear to you. You may take as much time as necessary to think this over.

Authorization:

I have read (or have had read to me) the contents of this form and have been encouraged to ask questions. I have received answers to my questions. I give consent to participate in this study. I understand that I am free to refuse to participate in this study or withdraw my consent at any time. I have received (or were receive) a copy of this form for my records and future reference.

I hereby authorize the disclosure of information by SC DMH and SC DAODAS about the type and amount of services I have used during the past 12 months to Bret Kloos, Ph.D., the research director for this study. Additionally, I authorize my supported housing case manager to report on my current functioning to the research director for this study. I understand that these data will be held confidentially by the researcher and used only for research purposes. I also understand that once SC DMH and SC DAODAS disclose information about my service use and current functioning to the researcher, the information is no longer under the control of these agencies, but is subject to federal research guidelines regarding confidentiality. This consent expires 18 months from the date of my signature.

Signature:____
Date: _________________________

If appropriate, obtain signature of Research Participants' Legal Representative

Legally Authorized Representative: _____________________________
Date: _____________

____ ____________________
Signature of Primary Investigator Phone

or

____ ____________________
Signature of Person Obtaining Consent Phone

If you have further questions about this project or if you have a research-related problem, you may contact Bret Kloos, Ph.D. (803) 777-2704. If you have any questions concerning your rights as a research subject, you may contact the University of South Carolina's Office of Research Compliance at (803) 777-7095.

THIS FORM IS NOT VALID UNLESS THE FOLLOWING BOX
HAS BEEN COMPLETED IN THE USC OFFICE OF RESEARCH COMPLIANCE

THIS FORM IS VALID ONLY UNTIL: _________________________

ORC PROTOCOL #: _______________________

INITIALED:________________________________

Research protocol and measures

Demographic Characteristics

University of South Carolina

Housing & Adaptive Functioning Study

Note: This is a printed version of the protocol adapted from the computer administered version we were use for the study. It comes in six blocks that are organized thematically.

Block One

Interviewer ID __ __

Participant ID __ __ __

Center ID __ __

Site ID __ __

Setting Location: Participant Residence Common Area in Complex

Mental Health Center Other_________

Date __ __ / __ __ / __ __ __ __ mm / dd / yyyy

Start Time __ __ : __ __ hh : mm

Now I think that we are ready to begin. I am interested in what your life is like, your health, what you do from day to day, and how you feel about things. Sometimes I were ask you about the last 30 days, sometimes about the last 6 months, and sometimes about things that had happened during your lifetime. I were try to be clear. Please ask me if you are not sure about the time period involved.

I am going to read you a set of questions exactly as they are worded so that each person participating in the study is asked the same thing. In some cases, you'll be asked to *choose an answer that is best for you. Please take your time. Feel free to ask me questions if you are not sure what is wanted. Remember, your answers are confidential.*

There are several breaks during the interview. However, you can let me know if you want to stop. Do you have any questions before we begin?

Well then, I were start with some questions about your background.

1. Are you . . . MALE or FEMALE?

2. How old are you? __ __

For the next question, I would like you to answer YES or NO.

3. Do you consider yourself Hispanic or Latino? YES NO

4. Which of the following best describes your racial background (you may select more than one category) . . .

White	Black	Alaskan Native/Native American	Asian	Other
1	2	3	4	5

4a. If you chose other, please specify: ____________________________

5. What is the highest level of schooling you have completed?

☐ 8th Grade or Less

☐ Some High School

☐ Finished High School

☐ Completed GED

☐ Voc/Trade/Business School

☐ Some College or 2 year degree

☐ Finished 4 year degree

☐ Master's degree or equivalent

☐ Other Advanced degree

Now I am going to ask you some questions about your relationships.

17. How would you describe your marital status?

    ☐ Married or living with someone in a marital-like relationship

    ☐ Never married & never lived with someone in a marital-like relationship

    ☐ Separated

    ☐ Divorced or formerly lived with someone in a marital like relationship

    ☐ Widowed

18. How many children do you have? __ __ (if 0 skip next question)

19. How many of your children are under age 18? __ __ (if 0 skip next question)

20. How many of your children under age 18 are living with you? __ __

Next I am going to ask about the money you got during the past month. I were read a list of possible sources of money. Remember, the information you give me is confidential and were not affect your housing, any services, or money that you currently receive. First tell me how much you received from each source.

Do you receive money from . . .

21. Employment Income $__ __ __ __

22. Supplemental Security Income (SSI) $__ __ __ __

23. Social Security Disability Income (SSDI) $__ __ __ __

24. Veteran Benefits $__ __ __ __

25. Unemployment Benefits $__ __ __ __

26. Other income (e.g. child support, TANF, SS Retirement, from your family)

    $__ __ __ __

26a. Please Specify:______________________________________

27. Do you have someone who handles your money for you, such as a payee, conservator, guardian, or someone else?

YES NO

Do you receive assistance or benefit from:

28. Medicare or Medicaid YES NO

29. Private Health Insurance YES NO

30. Food Stamps YES NO

31. Other assistance sources $__ __ __ __

31a. Please Specify: ______________________________________

Block Two

Now I were ask you some questions about work and activities.

1. In the past 30 days, how many days did you work for pay? __ __

(if answer is 00, skip to question 5)

1a. If 00; If you are not working, are you currently looking for work?

YES NO Already Working

2. What work did you do in the past 30 days?_________________________

3. How many hours did you typically work **per week** during the past 30 days?

__ __

4. What was your average rate of pay (hourly wage) for the hours you worked during the past 30 days?

$__ __.__ __ /hour

5. In past 12 months, how would you describe your work situation?

☐ ☐ Full time – Regular (35+ hr/wk for more than 6 mo/yr)
☐ ☐ Full time – Irregular (35+ more hr/wk for less than 6 mo/yr)
☐ ☐ Several Part time jobs - Regular (35+ hr/wk for more than 6 mo/yr)

☐ ☐ Several Part time jobs – Irregular (35+ hrs/week for less than 6 mo/yr)
☐ ☐ Part time – Regular (Less than 35 hr/wk for more than 6 mo/yr)
☐ ☐ Part time – Irregular (Less than 35 hr/wk for less than 6 mo/yr)
☐ ☐ Retired
☐ ☐ Unemployed
☐ ☐ Disability

6. How much do you agree or disagree with the following statement: I see myself holding a paying job in the next year.

Strongly Disagree	Disagree	Neither Disagree or Agree	Agree	Strongly Agree
1	2	3	4	5

7. Are you currently in vocational training? YES NO

8. Are you currently doing volunteer work? YES NO

9. During the past 6 months, did you attend any educational classes (e.g. GED, community college, etc.)? YES NO

Homelessness

Residential Follow-Back Calendar

Now I'm going to ask you some questions about any experiences you've had with homelessness.

53. Have you ever been homeless? (By homeless, I mean you didn't have a place to stay every night, or stayed in shelter or on the streets)

YES NO (if NO, skip to 6)

54. How old were you when you first became homeless? __ __

55. In your entire life, what is the total number of times you have been homeless? __

56. In your entire life, what is the total amount of time you have been homeless?
__ __ Years __ __ Months

57. When was the last time you were homeless? __ __ / __ __ __ __ (mm / yyyy)

Number of Physical Health Problems and Perceived Physical Health Impairment

Physical Health

Thank you for answering all of those questions. Now I would like to ask you about any health problems you may have.

75. Do you have any health problems? If so, please describe them. ________________
____
____
____
____

76. During the past month, to what extent has your physical health interfered with your daily activities?

Not at all	Slightly	Moderately	Quite a bit	Extremely
1	2	3	4	5

Life Satisfaction

How do you feel about your life overall right now?

Terrible	Unhappy	Mostly Dissatisfied	Mixed	Mostly Satisfied	Pleased	Delighted
1	2	3	4	5	6	7

Psychological Distress

Brief Symptom Inventory (BSI)

Next, I were read a list of problems that people sometimes have. I were ask you how much they bother you. When I read a question, please select the answer that best describes how much you were distressed by each one during the past 30 days, including today.

In the past month, how much were you distressed by . . .	0 = Not At All 1 = A Little Bit 2 = Moderately 3 = Quite A Bit 4 = Extremely

In the past month, how much were you distressed by . . .	0 = Not At All 1 = A Little Bit 2 = Moderately 3 = Quite A Bit 4 = Extremely				
21. Nervousness or shakiness inside	0	1	2	3	4
22. Faintness or dizziness	0	1	2	3	4
23. The idea that someone else can control your thoughts	0	1	2	3	4
24. Feeling others are to blame for most of your troubles	0	1	2	3	4
25. Trouble remembering things	0	1	2	3	4
26. Feeling easily annoyed or irritated	0	1	2	3	4
27. Pains in heart or chest	0	1	2	3	4
28. Feeling afraid in open spaces or on the streets	0	1	2	3	4
29. Thoughts of ending your life	0	1	2	3	4
30. Feeling that most people cannot be trusted	0	1	2	3	4
31. Poor appetite	0	1	2	3	4
32. Suddenly scared for no reason	0	1	2	3	4
33. Temper outbursts that you could not control	0	1	2	3	4
34. Feeling lonely even when you are with people	0	1	2	3	4
35. Feeling blocked in getting things done	0	1	2	3	4
36. Feeling lonely	0	1	2	3	4
37. Feeling blue	0	1	2	3	4
38. Feeling no interest in things	0	1	2	3	4
39. Feeling fearful	0	1	2	3	4
40. Your feelings being easily hurt	0	1	2	3	4
41. Feeling that people are unfriendly or dislike you	0	1	2	3	4

In the past month, how much were you distressed by . . .	0 = Not At All 1 = A Little Bit 2 = Moderately 3 = Quite A Bit 4 = Extremely				
42. Feeling inferior to others	0	1	2	3	4
43. Nausea or upset stomach	0	1	2	3	4
44. Feeling that you are watched or talked about by others	0	1	2	3	4
45. Trouble falling asleep	0	1	2	3	4
46. Having to check and double-check what you do	0	1	2	3	4
47. Difficulty making decisions	0	1	2	3	4
48. Feeling afraid to travel on buses, subways, or trains	0	1	2	3	4
49. Trouble getting your breath	0	1	2	3	4
50. Hot or cold spells	0	1	2	3	4
51. Having to avoid certain things, places, or activities because they frighten you	0	1	2	3	4
52. Your mind going blank	0	1	2	3	4
53. Numbness or tingling in parts of your body	0	1	2	3	4
54. The idea that you should be punished for your sins	0	1	2	3	4
55. Feeling hopeless about the future	0	1	2	3	4
56. Trouble concentrating	0	1	2	3	4
57. Feeling weak in parts of your body	0	1	2	3	4
58. Feeling tense or keyed up	0	1	2	3	4
59. Thoughts of death or dying	0	1	2	3	4
60. Having urges to beat, injure, or harm someone	0	1	2	3	4

In the past month, how much were you distressed by . . .	0 = Not At All 1 = A Little Bit 2 = Moderately 3 = Quite A Bit 4 = Extremely				
61. Having urges to break or smash things	0	1	2	3	4
62. Feeling very self-conscious with others	0	1	2	3	4
63. Feeling uneasy in crowds, such as shopping or at a movie	0	1	2	3	4
64. Never feeling close to another person	0	1	2	3	4
65. Spells of terror or panic	0	1	2	3	4
66. Getting into frequent arguments	0	1	2	3	4
67. Feeling nervous when you are left alone	0	1	2	3	4
68. Others not giving you proper credit for your achievements	0	1	2	3	4
69. Feeling so restless that you couldn't sit still	0	1	2	3	4
70. Feelings of worthlessness	0	1	2	3	4
71. Feeling that people were take advantage of you if you let them	0	1	2	3	4
72. Feelings of guilt	0	1	2	3	4
73. The idea that something is wrong with your mind	0	1	2	3	4

74. During the past month, to what extent has your emotional health interfered with your daily activities?

Not at all	Slightly	Moderately	Quite a bit	Extremely
1	2	3	4	5

Transportation Problems

<u>Stressful Events & Situations Checklist</u>
(only item 27 was used)

I were read a list of experiences you may or may not have had. In the past six months, how often did you have these experiences?

How often have you experienced. . .	0 = Never 1 = Rarely 2 = Sometimes 3 = Often			
1. Trouble with friends or family	0	1	2	3
2. Feeling less close to friends or family	0	1	2	3
3. The possibility of losing benefits (e.g., Medicaid, housing support).	0	1	2	3
4. A break-up with a romantic partner	0	1	2	3
5. Death of a friend or a family member that you felt close	0	1	2	3
6. Trouble with boss at work	0	1	2	3
7. Being assaulted	0	1	2	3
8. Being forced to move from where you live	0	1	2	3
9. A person unexpectedly moving in with you (e.g., friend, family)	0	1	2	3
10. Owing someone money	0	1	2	3
11. Loss of a job	0	1	2	3
12. Wanting to move to another place but not being able to	0	1	2	3
13. A person moving out of your home against your wishes	0	1	2	3
14. Moving to a worse home or neighborhood	0	1	2	3
15. Loss of a home through a fire, flood, or other disaster	0	1	2	3
16. Having your home broken into	0	1	2	3

How often have you experienced. . .	0 = Never 1 = Rarely 2 = Sometimes 3 = Often			
17. Something being stolen from you	0	1	2	3
18. Loss of a personal item because of debt (e.g., repossession of furniture, car)	0	1	2	3
19. Being unable to get medical treatment	0	1	2	3
20. Problems getting along with coworkers	0	1	2	3
21. Unwanted sexual advances or attention	0	1	2	3
22. Trouble with a friend or family member that has an alcohol or drug problem	0	1	2	3
23. Negative side effects of medication	0	1	2	3
24. A sexual problem	0	1	2	3
25. Job discrimination because of your mental illness	0	1	2	3
26. Being treated unfairly because of your skin color	0	1	2	3
27. Had a problem getting or doing something because of a problem with transportation?	**0**	**1**	**2**	**3**

Perceived Social Support

Interpersonal Support Evaluation Checklist (ISEL-12)

These next questions ask about relationships with other people. I were read a list of statements, each of which may or may not be true about you. For each statement choose "definitely true" if you are sure it is true about you and "probably true" if you think it is true but are not absolutely certain. Similarly, you should choose "definitely false" if you are sure that statement is false and "probably false" if you think it is false but are not absolutely certain.

	1 = Definitely False 2 = Probably False 3 = Probably True 4 = Definitely True			
28. If I wanted to go on a trip for a day (for example, to the park or the lake), I would have a hard time finding someone to go with me.	1	2	3	4
29. I feel that there is no one I can share my most private worries and fears with.	1	2	3	4
30. If I were sick, I could easily find someone to help me with my daily chores.	1	2	3	4
31. There is someone I can turn to for advice about handling problems with my family.	1	2	3	4
32. If I decide one afternoon that I would like to go to a movie that evening, I could easily find someone to go with me.	1	2	3	4
33. When I need suggestions on how to deal with a personal problem, I know someone I can turn to.	1	2	3	4
34. I don't often get invited to do things with others.	1	2	3	4
35. If I had to go out of town for a few weeks, it would be difficult to find someone who would look after my house or apartment (the plants, pets, etc.).	1	2	3	4
36. If I wanted to have lunch with someone, I could easily find someone to join me.	1	2	3	4
37. If I was stranded from home (too far to walk), there is someone I could call who could come and get me.	1	2	3	4
38. If a family crisis arose, it would be difficult to find someone who could give me good advice about how to handle it.	1	2	3	4
39. If I needed some help in moving to a new house or apartment, I would have a hard time finding someone to help me.	1	2	3	4

Therapeutic Alliance

Working Alliance Inventory (WAI)

(modified version)

The next questions ask about ways that people might think or feel about their case manager. Pease think about your experiences with your case manager over the past 6 months. Tell me how much you agree with each statement.

	1=Strongly Disagree 2=Disagree 3=Neither Agree nor Disagree 4=Agree 5=Strongly Agree
29. My case manager has a clear idea of what my goals are	1 2 3 4 5
30. My work with my case manager is important to me	1 2 3 4 5
31. My case manager and I have reached a good understanding of the kinds of changes that would be good for me	1 2 3 4 5
32. My case manager and I are working toward goals that we both agree on	1 2 3 4 5
33. I feel sure that my case manager is able to help me	1 2 3 4 5
34. My relationship with my case manager is very important to me	1 2 3 4 5
35. My case manager and I trust one another	1 2 3 4 5

Recovery Orientation

Recovery Questionnaire

For these last questions, I would like to ask you what you think about recovery and about the treatment and care you receive. Please indicated how much you agree or disagree with the following statements.

	1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree
67. I understand what the medication(s) prescribed for my mental illness do	1 2 3 4 5
68. I understand my diagnosis	1 2 3 4 5
69. I'm given choices about the treatment I receive	1 2 3 4 5
70. The services I have received have helped to reduce my symptoms	1 2 3 4 5

	1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree
71. I feel discriminated against or excluded from my community because of my mental illness	1 2 3 4 5
72. I believe that I am in recovery	1 2 3 4 5
73. I feel lost and hopeless much of the time	1 2 3 4 5
74. The services I have received from the mental health center are helping me to recover from mental illness	1 2 3 4 5
75. I feel isolated and alone when I am with my family	1 2 3 4 5
76. I find places and situations where I can make friends	1 2 3 4 5
77. There is meaning and purpose to my life	1 2 3 4 5
78. I have a good safe place to live	1 2 3 4 5
79. I don't take care of myself in any way	1 2 3 4 5
80. I ask for help from others when I need it	1 2 3 4 5
81. Fear does not stop me from living the way I want to	1 2 3 4 5
82. I spend time with my family to feel connected and better about myself	1 2 3 4 5
83. I know the kind of work that best suits me	1 2 3 4 5
84. I feel isolated and alone much of the time	1 2 3 4 5
85. I am living in the kind of place I like	1 2 3 4 5
86. I can be with people at church, temple or a prayer meeting who understand my journey to recovery	1 2 3 4 5
87. I don't think I were ever find the kind of place where I want to live	1 2 3 4 5

	1=Strongly Disagree 2=Disagree 3=Neutral 4=Agree 5=Strongly Agree
88. I have a positive outlook on life	1 2 3 4 5
89. No one would hire me to work for them	1 2 3 4 5
90. I trust myself to make good decisions and positive changes in my life	1 2 3 4 5
91. Even when I don't care about myself, other people do	1 2 3 4 5
92. I feel more isolated when people around me pray for help	1 2 3 4 5
93. I spend time with other people to feel connected and better about myself	1 2 3 4 5

List of community mental health centers participating in the HAF study and DMH codes

DMH Facility

3A = GREENVILLE MHC
3B = CHARLESTON MHC
3C = SPARTANBURG MHC
3D = COLUMBIA AREA MHC
3E = PEE DEE MHC
3F = SANTEE WATEREE MHC
3G = CATAWBA MHC
3H = ANDERSON MHC
3J = BECKMAN MHC
3K = AIKEN-BARNWELL MHC
3M = COASTAL EMPIRE MHC
3N = TRI-COUNTY MHC
3P = WACCAMAW MHC
3R = ORANGEBURG MHC
3S = PIEDMONT MHC
3T = LEXINGTON MHC
3W = BERKELEY MHC
54 = HALL INSTITUTE **

*MHC = mental health center
**Hall Institute = child and adolescent psychiatric facility, not included in the HAF study

List of services available at mental health centers participating in the HAF study

Services

001 = Crisis Management
002 = Assessment-MHP
003 = Individual Therapy
004 = Family Therapy
005 = Group Therapy
006 = Rehab. Psychosocial Therap.
007 = Rils-Adult
008 = Non-Hospital Intensive Care
009 = Medicaition Compl. Grp
010 = Injectable Medi. Admin.
011 = Medication Monitoring
012 = Psy/Med Assessment
013 = PMA/ARRN
015 = Ind. Living Skills
017 = Trtmnt Plan Form. Staffing
018 = Intnsv In-home Service
020 = Mental Illness Mngmnt Serv.
021 = Psychiatric Nursing
022 = Mult. Family Grp Therapy
026 = School based Services
030 = Trgted Case Mngmnt – Youth
031 = Trgted Case Mngmnt-Adult
032 = Case Consultation
033 = Care Consultation
034 = Treatment Planning
035 = Report Preparation
036 = Caregiver Group
037 = Proviso Intr-Agency Staf
040 = Your Crisis Treatment (Pee Dee CMHC)
041 = Diag Pre-School Prog.
046 = Childrens Day Trtmnt
047 = Rils - Youth
050 = Rural Behavioral Health Service
070 = Wrap Around Services
100 = RWJ-Managed Care
110 = Invalid
777 = Misc. Charge
888 = Medication Charge
997 = Trnsfr from Balance
999 = Balance brought forward
1001 = Hospital Liasion Activites (non-billable)
1101 = Voc. Rehab. Assessments (non-billable)
9999 = Payment on Account

APPENDIX D
MENTAL HEALTH SERVICE USE DATA DICTIONARY

Statistics File Data Dictionary

The Statistics files are located in /mh/data/mhop/ and follow the following naming conventions: DMH*yr*Q*qrtr*. For example Quarter 1 of 1997 would be listed as dmh97q1 , Quarter 2 of 1997 would be dmh97q2 , and so on.

Variable Name	Variable Description (Label)	Variable Format	Var. Length	Format Name	Values	Comments
ADMD	Admission Date	Numeric	8		SAS Date	Missing 14.97% of the time
ADMNO	Admission Number – Admission Sequence Identifier	Numeric	6			
ADMTYPE	Admission Type	Character	2	$vadmtyp	1=Inpatient 2=Outpatient	Missing 99% of the time
ADVOC1	Administrative Vocation (DMH Employee Codes)	Character	4	The data set named: advoc01 in **/mh/programs/ formats/** Contains the formatting for ADVOC1-ADVOC15 This file is linkable by using the ADVOC variable	See **Error! Reference source not found.** for example	Missing 0.4% of the Time
ADVOC2		Character	4			In 1999 – Missing 67.81%
ADVOC3		Character	4			In 1999 – Missing 79.76%
ADVOC4		Character	4			In 1999 – Missing 87.02%
ADVOC5		Character	4			In 1999 – Missing 91.54%
ADVOC6		Character	4			In 1999 – Missing 94.68%
ADVOC7		Character	4			In 1999 – Missing 97.61%
ADVOC8		Character	4			In 1999 – Missing 99.51%
ADVOC9		Character	4			In 1999 – Missing 99.89%
ADVOC10		Character	4			In 1999 – Missing 99.96%
ADVOC11		Character	4			In 1999 – Missing 100%
ADVOC12		Character	4			In 1999 – Missing 100%
ADVOC13		Character	4			In 1999 – Missing 100%
ADVOC14		Character	4			In 1999 – Missing 100%
ADVOC15		Character	4			In 1999 – Missing 100%
AGE	Client Age in Years	Numeric	3		Integer Ages	Missing or invalid 6% of the time
CARRCOD1	Insur. Carrier Code	Character	3		Calculated – similar to UB92 carrier codes.	Missing 5.81% of the time
CARRCOD2	Insur. Carrier Code	Character	3		Calculated – similar to UB92 carrier codes.	In 1999 – Missing 69.64%
CARRCOD3	Insur. Carrier Code	Character	3			In 1999 – Missing 92.19%

Variable Name	Variable Description (Label)	Variable Format	Var. Length	Format Name	Values	Comments
CARRCOD4	Insur. Carrier Code	Character	3			In 1999 – Missing 99.89%
CARRCOD5	Insur. Carrier Code	Character	3			In 1999 – Missing 99.99%
CHG001	Total Charge	Numeric	8		Amount in Dollars	Missing 49.14% of the time
CID	Client ID - UNIQUE 1	Numeric	8			
CITY	City of Residence	Character	1		Free Text – not consistent	Missing 85.6% of the time
COUNTY	County of Residence	Character	3	$vcnty	See **Error! Reference source not found.**	Missing 1.3% of the time
CSMG	***Case Manager***	Character	4		- Have requested coding for CSMG	Missing 16% of the time
CTYADMIS	County of Admission	Character	2	$vcnty	See **Error! Reference source not found.**	Missing 20.4% of the time
DIAGDAT	Diagnosis Date	Numeric	8		**SAS Date**	Missing 86.01% of the time
DISD	Discharge Date	Numeric	8		SAS Date	Missing 96 % of the time
DISP	Dispositedion Code	Character	2	$vdisp	See **Error! Reference source not found.**	Missing 80% of the time
DMHFACIL	DMH Facility Code - UNIQUE 3	Character	3	$vdmhfcl	See **Error! Reference source not found.**	Complete
DOB	Client DOB	Numeric	8		SAS Date	Missing 8% of the time
DSMTYPE	DSM4 Classification?	Character	2	$vdtype	A=Admission D=Discharge	Missing 83% of the time
EDUC	Education Level	Character	2	$veduc	See **Error! Reference source not found.**	Missing 5.2% of the time
EMPDAT	Employment Date	Numeric	8		SAS Date	Missing 88.8% of the time
GEO	Geographic location of facility	Numeric	3	vgeo	1=Anderson/Greenville/ Greenwood 2=Spartanburg 4=Aiken/Lexington/ Richland/York 5=Florence/Horry/ Marlboro/Sumter 6=Beaufort/Berkeley/ Charleston/Orangeburg	Complete
HCTY	County of Service	Numeric	3	vhcty	See **Error! Reference source not found.**	Complete
HIC_NO1	Insur. Carrier Code	Character	15		These contain the Medicaid Num, Medicare Num, Chavanum, or Insurer SSN.	In 1999 – Missing 73.66%
HIC_NO2	Insur. Carrier Code	Character	15			In 1999 – Missing 87.79%
HIC_NO3	Insur. Carrier Code	Character	15			In 1999 – Missing 99.67%
HIC_NO4	Insur. Carrier Code	Character	15			In 1999 – Missing 99.98%
HIC_NO5	Insur. Carrier Code	Character	15			In 1999 – Missing 99.99%

Variable Name	Variable Description (Label)	Variable Format	Var. Length	Format Name	Values	Comments
HSEHOLD	Household Type	Character	1	$vhsehld	0=Missing 1=Lives Alone 2=Lives w/family,rel. 3=Lives w/Sig. Other 4=Group/Inst. Living 5=Not appropriate 6=Not reported	Missing 10.3% of the time
INCIND	***Income Incident***	Character	1	$vincind	A=Annually B=Bi-Weekly M=Monthly S=Semi-monthly W=Weekly	Missing 8.1% of the time
INCOME	Self-reported income	Numeric	8		Amount in Dollars	Missing 86.98% of the time
INDG1	***Family Income***	Numeric	8		Amount in Dollars	Missing 7% of the time
LIVARNGE	Living Arrangement	Character	2	$vlive or $vrlive (new)	See **Error! Reference source not found.** for both possibilities	Missing 10.6% of the time
LOCAT	**Location of Service**	Character	5		See **Error! Reference source not found.** for description of LOCAT linker file	Missing 4.7% of the time – Used in Conjunction with DMHFACIL
LOG	ORS assigned variable when inputted	Character	5			
MSTAT	Marital Status	Character	1	$mstat	1=Never Married 2=Married 3=Divorced/annulled 4=Widowed 5=Separated 6=Unknown 7=Other	Missing 5.17% of the time
PAYOR1	Payor Classification 1 – translated to UB	Numeric	3	vpay	See **Error! Reference source not found.**	Missing .41% of the time
PAYOR2	Payor Classification 2 – translated to UB	Numeric	3	vpay	See **Error! Reference source not found.**	* The PAYOR variables use the CARRCOD and the PMTTP and the DMHFACIL to assign a UB92 compatible PAYOR
PAYOR3	Payor Classification 3 – translated to UB	Numeric	3	vpay	See **Error! Reference source not found.**	
PAYOR4	Payor Classification 4 – translated to UB	Numeric	3	vpay	See **Error! Reference source not found.**	
PAYOR5	Payor Classification 5 – translated to UB	Numeric	3	vpay	See **Error! Reference source not found.**	
PDIAG	Primary Dx - ICD9 Code	Character	5		DSMIV Codes (similar to ICD9)	Missing 56% of the time
PHYS	Admitting Physician Code	Character	4		- Have requested coding for PHYS	Missing 81.4% of the time
PINCS	***Patient income source***	Character	1	$vpincs	1=Wages/salary 2=Retirement 3=Secondary Supp. 4=SSI 5=SSDI 6=Other Pub. Assist. 7=Other (Invest inc.)	Missing 5.9% of the time

Variable Name	Variable Description (Label)	Variable Format	Var. Length	Format Name	Values	Comments
					8=None 9=Not Reported	
PLCESERV	Place of Service	Character	3	$vplace	11=Office 12=Home 21=Inpatient Hosp. 22=Outpatient Hosp. 23=ER-Hosp. 51=Inpat. Psych. Fac. 53=CMHC 99=Other	Complete
PRESPHYS	Physician Prescribing Injections (Code 010)	Character	4		* Only present when service code is 010	Missing 99.3% of the time
PROBLEM1	***Related problem codes***	Character	1	$vprob	0=Psychiatric 1=Substance 2=Psych/Sub. 3=Psych./MR 4=Psych/Sub./MR 5=Sub/MR 6=All Other	Missing 36.58% of the time
PROBLEM2		Character	1	$vprob		In 1999 – Missing 99.96%
PROBLEM3		Character	1	$vprob		In 1999 – Missing 100%
PROBLEM4		Character	1	$vprob		In 1999 – Missing 100%
PROBLEM5		Character	1	$vprob		In 1999 – Missing 100%
PROG	Program Code	Character	4	$vprog	K=Emergency Stabil. M=Comm. Support N=Outpatient Y=Spec. Projects	Missing 32% of the time
RACE	Client Ethnicity	Character	1	vrace	1=White 2=afro-amer 3=span-amer 4=asian-amer 5=amer indian 6=other 7=unknown	Missing 3.77% of the time
REFCODE	Referral Code	Character	2	vrefcde	See **Error! Reference source not found.**	Complete
REFSRC	referral Source	Character	4	$vrfsrc	See **Error! Reference source not found.**	Missing 6.8% of the time
RELAT1	Relation to Patient	Character	1	$vrelat	See **Error! Reference source not found.**	Missing 95.7% of the time
RELAT2	Relation to Patient	Character	1	$vrelat	See **Error! Reference source not found.**	Missing 97.9% of the time
SDIAG1	Secondary Dx 1 - ICD9 Code	Character	5		DSMIV Codes (similar to ICD9)	Missing 80.78% of the time
SDIAG2	Secondary Dx 2 - ICD9 Code	Character	5		DSMIV Codes (similar to ICD9)	Missing 94.9% of the time
SDIAG3	Secondary Dx 3 - ICD9 Code	Character	5		DSMIV Codes (similar to ICD9)	Missing 99.03% of the time
SDIAG4	Secondary Dx 4 - ICD9 Code	Character	5		DSMIV Codes (similar to ICD9)	Missing 99.51% of the time
SEX	Client Gender	Character	1	$vsex	M=Male ; F=Female	Missing 1.89% of the time
SRV1	Service 1	Character	3	$vsrv	See **Error! Reference source not found.**	Complete
SRVDATE	Date of Service	Numeric	8		SAS Date	Complete
SRVDTE2	Date of Service – Second	Numeric	8		SAS Date	Complete
STATE	State of Residence	Character	2	$vstate	See **Error! Reference source not found.**	Missing 86% of the time
STIME1	Time of Service	Numeric	4		Time in minutes	Complete
STIME2		Numeric	4			Missing 67.81%

Variable Name	Variable Description (Label)	Variable Format	Var. Length	Format Name	Values	Comments
						of the time
STIME3		Numeric	4			Missing 79.96% of the time
STIME4		Numeric	4			Missing 87.02% of the time
STIME5		Numeric	4			Missing 91.54% of the time
STIME6		Numeric	4			Missing 94.68% of the time
STIME7		Numeric	4			Missing 97.61% of the time
STIME8		Numeric	4			Missing 99.50% of the time
STIME9		Numeric	4			Missing 99.89% of the time
STIME10		Numeric	4			Missing 99.96% of the time
STIME11		Numeric	4			Missing 100% of the time
STIME12		Numeric	4			Missing 100% of the time
STIME13		Numeric	4			Missing 100% of the time
STIME14		Numeric	4			Missing 100% of the time
STIME15		Numeric	4			Missing 100% of the time
TRREASON	Reason for Transfer	Character	2	$vtran	See **Error! Reference source not found.**	Missing 99% of the time
UNITS	Units of Service	Numeric	8			Complete
UPIN	Physician UPIN Number	Character	10			Missing 96.67% of the time

APPENDIX E

DESCRIPTIVE STATISTICS FOR THE FULL HAF STUDY SAMPLE

Data for the original sample of 533 individual (Wave 1) follows. The proportion of participants of each gender was almost evenly distributed (with 52% Female and 48% Male). The age range of participants was 19 – 87 years old, with an average age of 46 years old (*SD* = 10.72). The majority of participants identified as Black (51%), 43% identified as White, 3% as Multiracial, 2% as Other, and less than one percent each identified as Alaskan Native / Native American or as Asian. A minority of individuals (less than 3%, *N* = 13) identified as Hispanic. In terms of education: 36% had less than a high school education, 32% completed high school or obtained a GED, and 32% had at least some college education. A substantial portion of individuals stated that they had histories of homelessness (42%). Most participants were receiving Supplemental Security Income or Social Security Disability (94%) at the time of the interview. Medicare or Medicaid recipients comprised 92% of the sample. Most participants, 78%, had used SC DMH services for 6 years or more (20% used services for 1-5 years, and 2% of participants used services for less than one year). Mental illness diagnoses based on SC DMH service records are as follows: psychotic disorders (64%), affective disorders (23%), anxiety disorders (4%), with 10% having an unknown mental illness diagnosis.

APPENDIX F

OVERVIEW OF AIMS 1 & 2

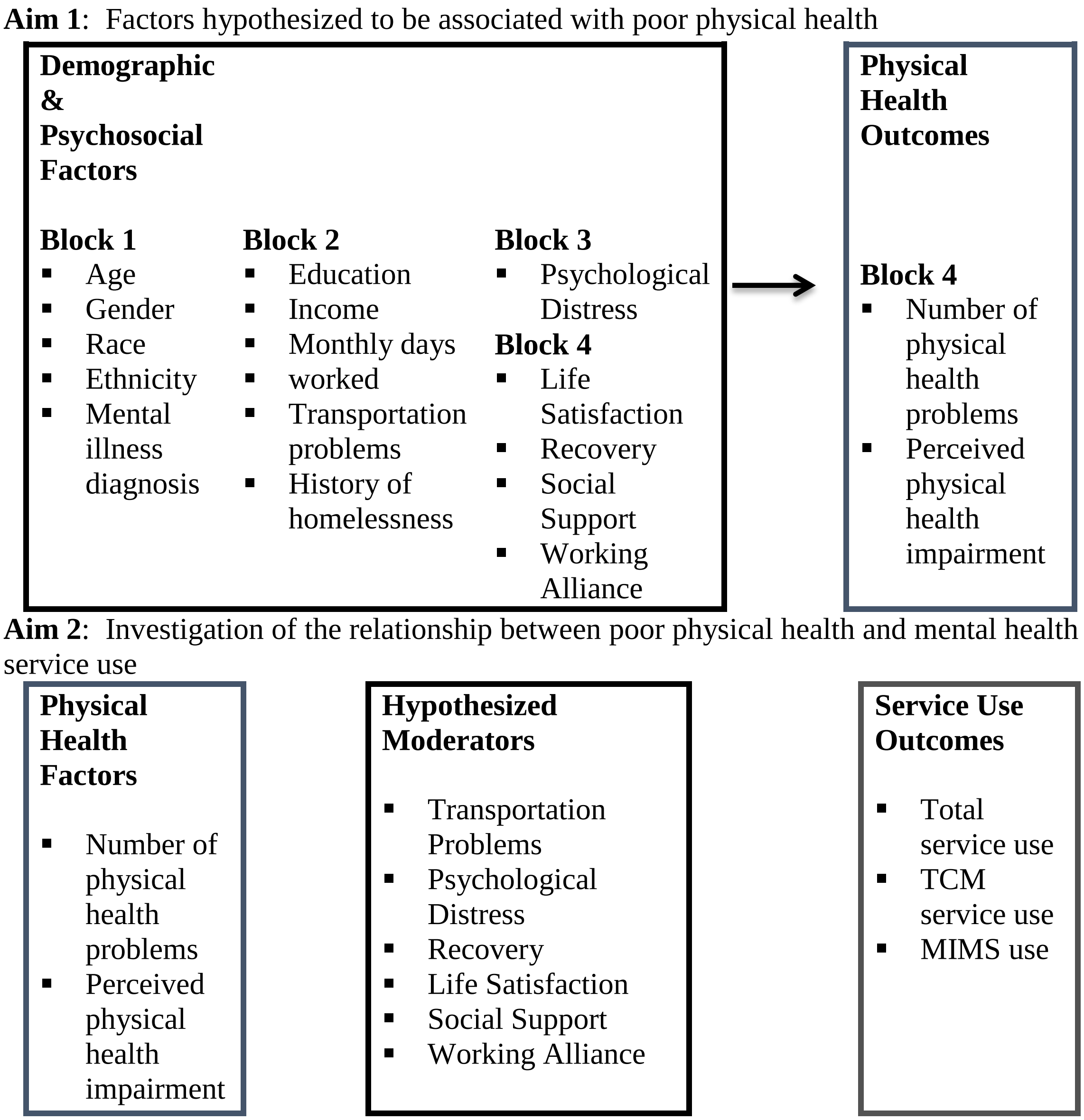

Figure F.1. *Overview of dissertation Aims 1 and 2.*