Differences in Patient-Reported Outcomes among Persons with Serious Mental Illness Receiving Integrated Primary and Behavioral Healthcare in Community Mental Health Centers

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Abstract of Dissertation

Differences in Patient-Reported Outcomes among Persons with Serious Mental Illness Receiving Integrated Primary and Behavioral Healthcare in Community Mental Health Centers

This study examined heterogeneity in treatment effects across subgroups, among individuals with serious mental illness receiving integrated primary and behavioral healthcare in Community Mental Health Centers. The primary objectives were to (1) assess the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes; (2) assess the influence of comorbid substance use disorders and post-traumatic stress on the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes; and (3) assess the influence of the type of services received on the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes.

The Adult Consumer Outcome Measures for Discretionary Programs data from 2009 to 2015 were analyzed for this study. Data were collected from mental health services consumers aged 18 or older, diagnosed with a serious mental illness, and receiving integrated primary and behavioral healthcare in Community Mental Health Centers. The study population was followed for 6 months to 42 months. Multivariate logistic regression was used to analyze the associations between the demographic, clinical, and treatment outcome variables.

For mental health functioning, there were statistically significant differences in treatment effects for race or ethnicity, gender, and age. Black consumers, Asian consumers, and Alaska Native consumers were less likely than non-Hispanic Whites

to report improved mental health functioning. For some races, Asians and American Indians, this association was mediated by comorbid Substance Use Disorders, and post-traumatic stress. Older consumers were more likely to report improved mental health functioning compared to 18-25 year olds, and this association was not mediated by comorbidity or the type of services received. Women were also more likely to report improved mental health functioning, compared to men, and this association was not mediated by comorbidity or the type of service received.

For overall health, there were statistically significant differences in treatment effects for race or ethnicity, gender, and age; but none of these associations were mediated by comorbidity or the type of services received. Black consumers, Native Hawaiian consumers, and Alaska Native consumers were more likely compared to non-Hispanic Whites, to report improved overall health. Hispanic consumers were less likely, compared to non-Hispanic Whites to report improved overall health. Older consumers were more likely to report improved overall health compared to 18-25 year olds, and women were less likely than men to report improved overall health.

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CHAPTER 1: INTRODUCTION

Identifying and reducing health disparities has been a focus of the Department of Health and Human Services' *Healthy People* Initiative for the past two decades. *Healthy People 2020* defines a health disparity as:

> "A particular type of health difference that is closely linked with social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion." (US DHHS, p.28)

While health disparities research in the United States has largely focused on racial or ethnic disparities (Kawachi, Daniels & Robinson, 2005), disparities can exist across many demographic categories including: race or ethnicity; sex or gender; sexual identity; age; disability; socioeconomic status; and geographic location. The Agency for Healthcare Research and Quality (AHRQ) defines disparities as any statistically significant difference among populations that is at least 10 percent different than the reference population (AHRQ, 2006).

Escarce & Kapur (2003) argue that while health disparities may be widespread, they are not inevitable, and that addressing disparities requires a multifaceted approach that includes changes in healthcare delivery systems. Franks & Fiscella (2008) view

healthcare disparities as a mismatch between the care received and the care needed--that is associated with membership in a disadvantaged group. This perspective characterizes health disparities as a deficit in the quality of healthcare (Fiscella, Franks, Gold & Clancy, 2000), and there is evidence suggesting that improvements in the quality of care may be associated with reduced racial disparities. Quality of care improvement initiatives for Medicare managed care plans have resulted in reduced racial disparities for process measures across a wide range of health issues (Trivedi, Zaslavsky, Schneider & Ayanian, 2005). However, The Institute of Medicine (IOM) (2002) suggests that while disparities in healthcare processes may be decreasing, there continues to be a need for research on disparities in health outcomes.

Disparities in mental healthcare were identified as a high-priority research area in the 2015 National Institute of Mental Health (NIMH) Strategic Plan for Research. The NIMH (2015) suggests that addressing questions related to the effectiveness of health interventions on patient-centered outcome measures, and accounting for differences in key subpopulations (race/ethnicity, gender, age, and comorbidity) is imperative, if we hope to bring promising mental and behavioral health interventions to scale, and improve the quality of mental healthcare.

The IOM (2006) strategy for improving the quality of care for people with mental health conditions is designed to achieve greater clinical and health system integration between service providers and systems, a strategy that is also endorsed by the President's New Freedom Commission on Mental Health (2003), and is a key component of healthcare reform (Katon and Unutzer, 2013). It is expected that integrated primary and

behavioral healthcare will address many of the clinical and health system issues that are associated with disparities for adults with serious mental illness (SMI) (Mauer, 2006).

In 2008, AHRQ's, Evidence-Based Practice Center (EPC) Program published a systematic review of research on integration of mental health and substance abuse treatment (behavioral health) with primary care. AHRQ's EPC Program was authorized by Congress to develop evidence reports that could be used to improve healthcare quality by providing comprehensive, empirical information on innovative approaches to health services delivery for common, costly health conditions (Butler et al., 2008).

The systematic review explored literature in six key areas: (1) models of integration; (2) the impact of integrated care on different populations; (3) barriers to successful integration; (4) the extent to which integrated programs make use of health information technology; (5) the financial and reimbursement structure used in integrated programs; and (6) the key elements of effective integrated programs. The authors found substantial evidence indicating improved outcomes for persons receiving integrated care, but much of the evidence was for individuals treated in primary care settings, who were diagnosed with depression. Of the 33 randomized controlled trials that examined the effects of integrating mental healthcare into primary care settings, 26 of these studies focused on consumers diagnosed with depression. The sample populations also tended to be older, and to include a large proportion of racial and ethnic minorities. The authors identified few studies that examined the effects of integrated care in specialty mental health settings (Butler, et al, 2008). Specialty mental health services are provided by a mental health professional or a mental health service agency and are not performed as part of a primary care provider's office visit.

The 2008 AHRQ review also identified research gaps and limitations of the existing body of literature related to integrated primary and behavioral healthcare. The most significant gaps identified included: the effects of integration for populations with chronic conditions other than depression (including SMI); the effects of integrated care on younger populations; and the effects of integrated care when primary care is integrated into mental health settings (Butler, et al., 2008).

In 2013, Carey et al., published a follow-up article which built upon the 2008 AHRQ systematic review by identifying high-priority research needs related to integrated primary and behavioral healthcare. The research team conducted a scan of the literature on integrated care published since the initial AHRQ systematic review. Their findings indicated that future research on integrated primary and behavioral healthcare should focus on (1) examining the effects of integrating primary healthcare into specialty mental health settings, (2) examining the effects of integrated primary and behavioral healthcare for individuals with conditions other than depression, and (3) examining the effects of integrated primary and behavioral healthcare for younger populations with comorbid substance use disorders.

Carey et al., 2013 also discussed potential research designs, methods, and variables that could be used in future research studies on integrated care. Secondary data analyses of large datasets were identified as an efficient and cost-effective way to examine the effects of integrated care for persons with SMI and other chronic conditions. Patient-reported outcomes, including symptom severity, quality of life, and patient satisfaction, were identified as potential variables that require further study.

As the burden of comorbidity and the challenges of providing high-quality healthcare continue to grow, the national health policy agenda is increasingly focused on addressing gaps in the quality of care through healthcare delivery system reform. A number of recent initiatives at the federal level, have provided funding to support testing, development, and implementation of models of integrated care. In addition, new models of integrated care have been introduced through the Affordable Care Act (e.g., Medicaid health homes, accountable care organizations) to promote more integrated delivery systems (Crowley and Kirschner 2015). Integrated care has become increasingly important in healthcare policy as a means to address a growing list of health demands.

The remainder of Chapter One includes background information that summarizes what we already know about this topic, and what we need to know about this topic. The Background of the Study is followed by the Statement of the Problem and Purpose of the Study. The Conceptual Framework is then described, followed by the specific research objectives that are addressed in this dissertation, discussion of the assumptions of the study, definitions and descriptions of key terms used in this dissertation, a summary of Chapter 1, and a description of the organization of the remainder of the study.

Background of the Study

Persons with SMI—mental health diagnoses including psychotic disorders, major depressive disorder, bipolar disorder, and serious anxiety disorders—are predominantly seen in specialty mental health settings such as Community Mental Health Centers (CMHCs), but this population often has significant comorbid primary healthcare issues such as obesity, diabetes, and hypertension (Nasrallah et al., 2006), that can go untreated

in specialty mental health settings. The Substance Abuse and Mental Health Services Administration (SAMHSA, 2017) reports that approximately 4% of the United States population has a SMI, and some studies have indicated that people with serious mental illness die 15-20 years earlier than people without this condition (Thorncroft, 2011). This excess mortality is due primarily to physical illnesses (De Hert, et al., 2011). In addition to the increased mortality risk, having multiple chronic comorbidities is also associated with high spending among Medicaid and Medicare consumers with mental health disorders (Frank & Epstein, 2014). High-cost healthcare services, including inpatient hospitalizations with long stays and Emergency Department visits, are common among consumers with SMI (Heslin & Weiss,2015).

The integration of mental health and substance abuse treatment (behavioral health) with primary healthcare is one approach to increasing access to primary healthcare for persons with SMI and comorbid primary healthcare issues. AHRQ describes integrated care as distinct from traditional models of care--which may include consultation and referral among providers--because integrated care involves a systematic linkage between providers that requires consistent and routinized coordination and collaboration to address the patient's whole health needs (Carey et al., 2013). The linkages between providers may vary in implementation and protocols, but to be considered integrated, clinical integration must occur along with integration at the administrative level, i.e., linking the processing of claims, financing, and other administrative functions that occur at the systems or organizational level (Institute of Medicine, 2006).

As indicated previously, much of the prior research on integrated primary and behavioral healthcare has focused on integrating behavioral health into primary care settings. Of the 33 randomized controlled trials identified in AHRQ's systematic review of research on integration of primary and behavioral healthcare, only three of those trials examined the integration of primary care into specialty mental health settings (Butler et al., 2008). Each of the three trials reported improvement in access to medical care, quality of care, and patient outcomes (Butler et al., 2008). However, results for persons with SMI or comorbid substance use issues were not broken down by age, gender, or ethnicity. Butler et al. (2008) argue that additional research is needed to understand the client-level factors, such as ethnicity, age, and gender that may influence outcomes of integrated care in specialty mental health settings, as well as the effects of comorbidities. Carey et al., (2013) also indicate that the most significant gap in research on integrating primary care into behavioral healthcare settings is for patients with SMI.

The randomized controlled trials that have examined integrating primary care into behavioral healthcare settings were all conducted in large health systems. Butler et al. (2008) suggest that organizations of this type have significant advantages to implementing integrated care because of pre-existing co-located services and common administrative systems. Free-standing community-based clinics might encounter additional obstacles to implementing integrated care. Additional research is needed to determine whether integrated care in CMHCs achieves similar positive outcomes as those observed in large health systems.

Statement of the Problem

Much of the prior research on the effects of integrated care has examined study

populations that were older and not substantially ethnically diverse (Carey et al., 2013). There is a need for additional studies that examine the effects of integrated care for individuals with SMI and younger populations with comorbid Substance Use Disorders (SUDs). In addition, more research is needed to examine the impact of integrated care for different subpopulations (Carey et al., 2013) to determine which subpopulations are most likely to benefit from integrated care.

The Patient Protection and Affordable Care Act (ACA) emphasizes quality of care for consumers with SMI and provides financing structures for integrated care demonstrations (Barry & Huskamp, 2011; Druss & Mauer, 2010; SAMHSA 2014). ACA funding (beginning in FY10) was used by the Substance Abuse and Mental Health Services Administration (SAMHSA) to support the development of the Primary and Behavioral Health Care Integration (PBHCI) Program. The first cohort of PBHCI grantees was funded through Section 330 of the Public Health Service Act. PBHCI was designed to improve the overall health status and wellness of people with SMI through the provision of coordinated and integrated healthcare through the co-location of primary care medical services in CMHCs and other community-based behavioral health settings (SAMHSA, 2014).

As federal health policies continue to fund integrated care demonstration programs, it important to use the data from the demonstration projects to build the evidence base and help stakeholders understand how integrated care programs perform in terms of improving health outcomes. In addition, as healthcare payment models move toward reimbursement of providers based on quality rather than the quantity of services provided (Burwell, 2015) it will be important for this process to be informed

by studies that examine health and well-being outcomes of the structure, processes, and settings of the mental healthcare system, for different patients and populations.

Community Mental Health Centers (CMHCs) serve as the primary provider of healthcare for a majority of consumers with SMI. For this reason, CMHCs are an important setting in which to study the effects of integrated primary and behavioral healthcare (Kilbourne et al., 2008; Manderscheid & Kathol, 2014). The use of collaborative approaches to patient care is common in CMHCs. Case managers coordinate and share information among the treatment team, engage patients in their treatment planning, encourage adherence to treatment plans, and monitor progress (Norquist, 2014). Yet, few studies have examined the effects of integrated care within community mental health settings (Collins et al., 2010; Gerrity, 2015) and the studies that have assessed the effects of integrated care within behavioral health settings have primarily focused on the Veterans Health Administration (VHA), with mixed results (Kilbourne et al., 2008; Kilbourne et al., 2011).

Purpose of the Study

This study examines heterogeneity in treatment effects across subgroups, among individuals with serious mental illness receiving integrated primary and behavioral healthcare in Community Mental Health Centers.

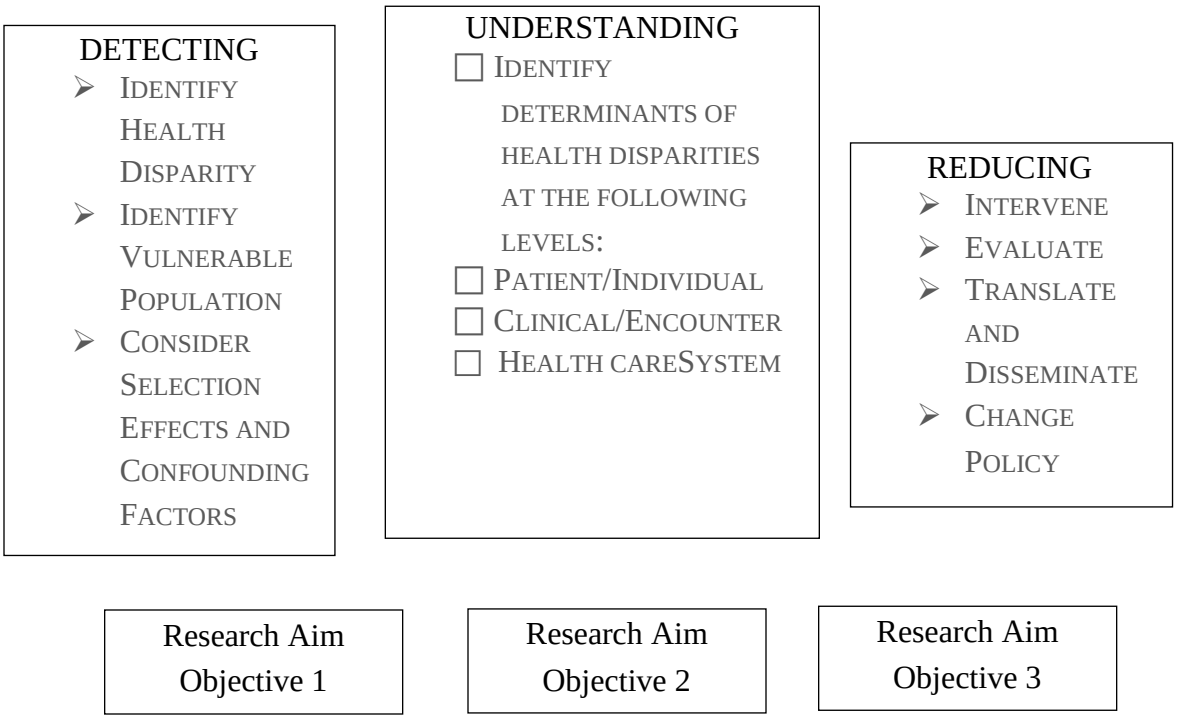
Conceptual Framework

Roberts (2004) describes a conceptual framework as the "lens through which your research problem is viewed" (p. 129). The conceptual framework is used to array the factors, constructs or relationships to be studied. This study employs a framework for health disparities research which outlines a three phase process: (1) detecting health

disparities; (2) understanding the factors that underlie health disparities; and (3) identifying and implementing interventions that reduce or eliminate health disparities (Kilbourne, Switzer, Hyman, & Crowley-Matoka, 2006). The Kilbourne et al. framework is rooted in epidemiology, the study of the distribution and determinants of health problems, and the application of these findings to the control of health problems.

Figure 1 depicts the phases of health disparities research, the key issues and challenges that should be considered during each phase, and the progressive nature of health disparities research. Phase 1: Detection, involves defining health disparities (determining or identifying the essential qualities of health disparities), identifying vulnerable populations, and developing valid measures for studying health disparities and the populations impacted by them. Phase 2: Understanding, involves identifying factors that explain gaps in health outcomes or healthcare, between vulnerable populations and less-vulnerable populations. Phase 3: Reducing Disparities, involves the development, implementation and evaluation of interventions that may address health disparities. Kilbourne et al. (2006) assert that the framework provides a roadmap for moving health disparities research forward.

Figure 1: The Three Phases of Health Disparities Research (Adopted from Kilbourne et al., 2006)



The Kilbourne et al. health disparities research framework focuses specifically on research within the healthcare system because this is the context that provides the greatest opportunities for policymakers, providers and healthcare researchers to reduce or eliminate disparities by improving the quality of care (Kilbourne et al., 2006). This framework also emphasizes understanding and examining how health disparities may be influenced by individual, provider or system-level factors, as well as the importance of examining whether observed differences can be attributed to selection effects, or differences in the severity of illness between populations.

Kilbourne et al., (2006) assert that while most health disparities research has focused on the role of individual factors, that it is also important to examine factors associated with the clinical encounter, including provider-level factors, organizational culture, and the type of services received. The framework suggests researchers undertake comprehensive examination of determinants of health disparities, including factors that may mediate or moderate associations between vulnerable groups and differences in outcomes.

Phase 3: Reducing Disparities is the area that is least represented in the existing body of health disparities research. Four key objectives are identified for Phase 3 research: (1) developing effective intervention strategies, especially for community-based settings which may serve more vulnerable populations; (2) evaluating interventions; (3) determining whether intervention strategies are ready to be brought to scale; and (4) developing strategies that facilitate policy change based on evidence-based interventions.

This study is designed to address objectives that apply to all three phases of disparities research identified in Kilbourne et al.'s framework (2006). The specific research objectives for this study are described below.

Research Objectives

1. Assess the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes among individuals with SMI receiving integrated primary and behavioral healthcare in CMHCs;
2. Assess the influence of comorbid substance use disorders and post-traumatic

stress on the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes, among individuals with SMI receiving integrated primary and behavioral healthcare in CMHCs; and

3. Assess the influence of the type of services received on the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes, among individuals with SMI receiving integrated primary and behavioral healthcare in CMHCs.

Research Objective 1 examines the likelihood of consumers reporting improved mental health functioning and improved overall health as a function of race or ethnicity, age, and gender; adjusting for covariates. This aligns with the objectives of Kilbourne et al.'s health disparities research framework Phase 1: Detecting, which prioritizes measuring disparities in vulnerable populations. This analysis is also aligned with Phase 2: Understanding, because it focuses on examining the influence of individual-level factors (race or ethnicity, age, and gender) on patient-reported outcomes.

Research Objective 2 is also aligned with Phase 1 because it entails analyzing the influence of potential mediators (comorbid SUD and post-traumatic stress) on individual determinants. Research Objective 3 is aligned with Phase 2 because of its focus on the clinical encounter (type of services received), and Phase 1 because it entails testing for potential mediators. Finally, all of the research objectives for this study require measuring the effectiveness of integrated care in addressing disparities in mental health and overall health outcomes in CMHCs, controlling for covariates. Evaluation of interventions is a key objective of Phase 3: Reducing, and this study contributes to the

existing literature on the effectiveness of integrated care by examining an understudied population: consumers with SMI treated in CMHCs.

Assumptions

Roberts (2004) describes "Assumptions" as "what you take for granted relative to your study" (p. 130). The major assumption of this study is that the secondary data received from the CMHCs are valid, and accurately reflect care patterns and outcomes of consumers at CMHCs. This is a reasonable assumption to make, given that the original purpose of these data was to guide care for consumers of theCMHCs.

The accuracy of information reported by the consumers is another potential assumption of this study. However, a growing body of research suggests that patients are a valuable and authoritative source of information on outcomes related to quality of life, functional status, symptoms and health behaviors (Dang & Mendon, 2015).

Definition and Description of Terms

Community Mental Health Centers are designed to promote and implement decentralized (moving from a hospital-focused system towards a more community-oriented one) mental healthcare, or other services, for people with mental illnesses; and to supplement and decrease the need for costly inpatient mental healthcare typically delivered in institutions. Community Mental Health Centers are expected to increase access to mental healthcare and to be more responsive to the needs of the population they serve because they are based in the community (Druss et al., 2006).

A consumer is defined as a person who is actively in treatment receiving mental health services.

Integrated Primary and Behavioral Healthcare is defined as the mental health sector and medical health sector working together within a single entity. Clients are treated by a team composed of clinicians in the fields of behavioral health and medical health, using a holistic client-centered approach. The care consists of mental health and primary healthcare services.

Patient-reported outcomes are any report of the status of a patient's health condition that comes directly from the patient, without interpretation of the patient's response by a clinician or anyone else.

Serious mental illness is defined as a serious functional impairment that substantially interferes with or limits one or more major life activities for a period greater than 12-months (Kessler et al., 2003)**.** The most common disorders under the category of serious mental illness include major depressive disorder, schizophrenia, and bipolar disorder. Obsessive-Compulsive disorder (OCD), panic disorder, post-traumatic stress disorder (PTSD), and borderline personality disorder may also be considered SMIs. To receive a diagnosis of SMI, an individual must be experiencing functional impairment that results in moderate to severe debilitation in functioning in the areas of thinking, mood, family and interpersonal relationships, self-care, or other major life activities. In 2016 the National Survey on Drug Use and Health (NSDUH) reported that 10.4 million adults in the United States were diagnosed with a severe and persistent form of mental illness. This represents 4% of the United States adult population (SAMHSA, 2017).

Major depressive disorder is a mood disorder characterized by a disturbance in mood associated with symptoms of sadness, despair, anxiety, and discouragement. Cognitive impairments are also present in the form of loss of interests and pleasure, and thoughts of death and suicide, as well as physical symptoms such as changes in appetite and body aches and fatigue (American Psychiatric Association, (APA) 2013).
While the diagnostic criteria described in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5), has not undergone significant changes compared to previous editions of the DSM, the Fifth Edition does emphasize that symptoms of depression may vary significantly in duration and severity. The various depression spectrum diagnoses treated in CMHCs range from unspecified depression to major depressive disorder, and can vary in intensity and duration, and can occur with or without psychotic features.

Bipolar disorder is classified as a mood disorder according to the DSM-5 (APA, 2013). Bipolar disorder is characterized by dramatic shifts in mood, energy, activity levels, and the ability to carry out day-to-day tasks (APA, 2013). Symptoms associated with bipolar disorder can be observed in an individual's mood, behavior, and level of energy. A severe shift in energy levels, often referred to as the ups and downs, is distinct from those experienced in ordinary life. There are 4 types of bipolar disorder: (1) bipolar I disorder in which people have experienced one or more episodes of mania that last at least seven days, or is so severe that hospitalization is required; (2) bipolar II disorder in which people experience depressive episodes shifting back and forth with hypomanic episodes; (3) cyclothymia in which people experience hypomania and mild depression for at least two years; and (4) bipolar disorder unspecified which is used when a person does not meet the criteria for bipolar I, II or cyclothymia, but has still experienced

periods of clinically significant abnormal mood elevation (APA, 2013). The various bipolar disorder diagnoses treated in CMHCs typically range from bipolar disorder I, with or without psychotic features to bipolar disorder II and bipolar disorder Unspecified.

Schizophrenia and other psychotic disorders are characterized by the presence of both positive and negative symptoms. Positive symptoms are psychotic behaviors not generally seen in healthy people and include delusions, hallucinations, and disorganized speech and behaviors. Negative symptoms are associated with disruptions to normal emotions and behaviors and include loss of interest in completing daily activities such as grooming and bathing, feeling out of touch with reality, lack of emotional responsiveness, and anhedonia (APA, 2013). Psychotic disorders affect people differently and symptom severity can vary significantly. The various classifications of psychotic disorders treated in CMHCs include schizophrenia, schizophreniform disorder and schizoaffective disorder.

Summary

This study examines heterogeneity in treatment effects across subgroups, among individuals with serious mental illness receiving integrated primary and behavioral healthcare in Community Mental Health Centers. The primary objectives were to (1) assess the effects of race or ethnicity, age, and gender on mental health and overall health outcomes; (2) assess the influence of comorbid substance use disorders and post-traumatic stress on the effects of race or ethnicity, age, and gender, on mental health and overall health outcomes; and (3) assess the influence of the type of services received on the effects of race or ethnicity, age, and gender, on mental health and

overall health outcomes. This dissertation has implications for identifying individual-level factors that may impact treatment outcomes and the quality of care, and for addressing questions about the effectiveness of integrated primary and behavioral healthcare for addressing health disparities.

Organization of the Remainder of the Study

Chapter Two presents a review of the literature related to the study. Chapter Three presents a description of the methodology used in this study, including the study design, instrumentation, and statistical analyses conducted. Chapter Four presents the findings of the study, and Chapter Five presents a discussion of the findings, implications for policy and practice, conclusions, and recommendations for future research.

CHAPTER 2: LITERATURE REVIEW

Chapter Two provides a review and analysis of the relevant literature in the key areas related to this research which are: SMI and comorbidities; the Community Mental Health Care System; models of integrated primary and behavioral healthcare, and their effectiveness; health disparities; and patient-reported outcomes. A brief summary of the literature review is provided at the end of the chapter.

SMI and Comorbidities

Serious mental illness is the second leading cause of disability among 15- to 44-year olds nationwide (NIMH, 2015). Higher mortality rates among individuals with SMI, compared to the general population, have been well-documented throughout the literature (Brown et al., 2011; Felker et. al., 1996;

Harris & Barraclough, 1998). Several factors have been shown to contribute to this observed phenomenon, including medication side-effects and lack of access to primary healthcare (Lawrence & Kisely, 2010). While the same chronic health conditions that contribute to early mortality rates among the general population tend to affect persons with SMI, for example, cardiovascular disease (Jemal et al., 2008), diabetes (Brown et al., 2010), obesity (Brown et al., 2000; Dickerson et al., 2006), and hypertension (Barnett et al., 2012); these trends occur at disproportionately higher rates among persons with SMI (Colton &, Manderscheid, 2006; Druss et al., 2011).

Type 2 Diabetes, or insulin resistant diabetes, is the most common form of diabetes diagnosed in both the general population and among individuals with SMI. Factors such as biological predisposition for mental illness, lifestyle choices, e.g., diet, tobacco use, limited physical activity, and psychotropic medications may contribute to a higher occurrence of excessive weight gain and metabolic imbalances in persons with SMI (Coulson, 2012).

Obesity has been on the rise in both the general and SMI population since the 1980s, which is strongly correlated with the rise in diabetes (Brown et al., 2011). Hypertensive heart disease, an elevation in blood pressure that damages the structure of the heart over time, is also associated with early mortality among persons with SMI, with almost 40% of individuals with bipolar disorder and 48% of individuals with major depressive disorder experiencing hypertension, compared with just 30% of the general population (Liu et al., 2017).

Comorbid physical illnesses, in general, are very common among consumers with SMI, with authors of one study finding that 74% of consumers with SMI had at

least one chronic medical condition, while half were diagnosed with at least two chronic medical conditions (Jones et al., 2004). As previously discussed, side effects of psychiatric medication and unhealthy lifestyles may contribute to these conditions. However, lack of access to preventative and routine primary health may also play a role. Several studies indicate low rates of screening for cardiovascular risk factors, and lack of access to care for physical health conditions in the SMI population (De Hert et al., 2011; Mitchell & Lawrence, 2011; Thorncroft, 2011). Druss et al. (2009) found that just 21% of consumers with SMI received recommended levels of primary care. Inadequate levels of screening for physical health conditions, such as Pap tests and mammograms, have also been documented in other studies (De Hert et al., 2011; Salsberry et al., 2005). Research conducted using a sample population from the VHA, demonstrated that among the VHA population, the presence of a mental health disorder alone, or co-occurring with a substance use disorder, decreased the likelihood of those individuals receiving preventive services (Druss et al., 2002).

Consumers with SMI may also be less likely to receive appropriate hospital-based care for physical health conditions, or to receive prescription medication for physical health complaints. Scott et al., (2012) found that consumers with SMI were less likely to receive hospital-based care for cardiovascular disease or diabetic complications, or to receive prescription medications to treat conditions with metabolic origins (Scott et al., 2012). In addition, consumers with SMI have a poorer prognosis when experiencing cardiac events. Research has shown that consumers with mental illness had fewer coronary interventions after serious cardiac events, but an increased likelihood of death from those events than people without mental illness (Scott et al., 2012). However,

when the results were adjusted to control for indicators of quality of care (defined as the degree to which the treatment delivered complied with established guidelines), this association was no longer significant (Scott et, al., 2012), which could indicate that the quality of care received by consumers with SMI is a factor associated with the excess mortality in this population (Druss et al., 2001; Mitchell & Lawrence, 2011).

While it is well-established that the use of antipsychotic medication is associated with side effects, including diabetes, obesity, and hyperglycemia (Nasrallah & Newcomer, 2004; Newcomer, 2007), authors of one study examining metabolic screening among those taking antipsychotics found that less than 30% of consumers with SMI were screened for weight or metabolic indicators before or during treatment with antipsychotics (Scott et al., 2012). When guidelines were issued to reinforce the need for metabolic screening for individuals prescribed antipsychotics, implementation of these guidelines was temporary (Scott et al., 2002). Connolly et al. (2015) also found that provider adherence to metabolic screening guidelines for youth prescribed antipsychotics was inconsistent. Metabolic screening rates increased for youth prescribed antibiotics shortly after the 2004 American Diabetes Association guidance was issued, but screening returned to pre-guidance levels within four years.

The impact of chronic physical health conditions and other primary care issues on the mortality rate of persons with SMI cannot be overstated. Authors of a recent meta-analysis assessing mortality rates for persons with mental disorders found the relative risk of death due to both natural and unnatural causes, from mental disorders was 2.22, compared to persons without SMI, with a potential of 10 years of life lost (Walker et al., 2015).

When looking at SMI as a subset of all mental disorders, the data are even more alarming. Men with SMI die on average 20 years younger than those without SMI, and women die approximately 15 years earlier (Thorncroft, 2011). In several studies, the risk of premature death was found to be 3 to 3.5 times greater for consumers with schizophrenia and two times higher for consumers with bipolar disorder compared to the general population (Khan et al., 2013; Medici et al., 2015; Olfson et al., 2015; Perkins, 2015).

Comorbid health conditions among persons with SMI are not limited to chronic physical health issues. While chronic physical health conditions are believed to be the primary contributors to the excess mortality among persons with SMI, researchers have also found that rates of death due to unintended injuries and suicide are also higher in the population of consumers with schizophrenia than the general population (Perkins, 2015). Also, other health conditions that may not typically be considered to be chronic, such as cancer, influenza, and pneumonia contribute to elevated morbidity rates among consumers with schizophrenia (Olfson et al., 2015).

In addition to chronic and acute primary health conditions that contribute to early mortality among persons with SMI, about half of the SMI population has substance use disorders (SUDs) (Drake, Mueser, Brunette, & McHugo 2004). Analyses of the United States Collaborative Psychiatric Epidemiology Surveys found that approximately 51% of individuals with any lifetime substance use disorder also met criteria for at least one other psychiatric disorder (Alegria et al. 2016). SAMHSA (2017) reports that approximately three million adults in the United States have a SMI and a co-occurring substance use disorder. Comorbid SMI and SUD is associated with increased severity of

substance use (Ford, Gelernter, DeVoe, Zhang, & 2009), and increased severity of SMI symptoms (Cacciola, Alterman, McKay, & Rutherford, 2001; Compton, Thomas, Conway, & Colliver, 2005; Mills, Teesson, Ross, & Darke, 2007). Among individuals with schizophrenia, SUDs have been found to be associated with increased medication non-adherence (Fenton, Blyler, & Heinssen, 1997), exacerbation of symptoms (Drake, Osher, & Wallach, 1989; Pristach & Smith, 1990), and increased hospitalizations (Leon, Lyons, Christopher, & Miller 1998).

Community Mental Health Centers

Community Mental Health Centers (CMHCs) are the largest providers of mental health services in the US (Centers for Medicaid & Medicare Services, CMS, 2011). CMHCs are non-profit organizations that were designed to provide services in the community to all persons regardless of their ability to pay.

Through the Community Mental Health Act of 1963, the federal government aimed to transform mental healthcare by shifting the primary location of treatment from state institutions to community-based care. This change in policy helped to move many individuals with SMI from inpatient state hospitals to outpatient community services. As a result, demand for services from CMHCs increased. CMHCs offer a wide variety of treatment modalities and services, including psychiatric services, crisis stabilization, substance abuse treatment, and case management (White, 2008).

The complexity of treating SMI in CMHCs has posed numerous challenges for both healthcare providers and consumers of mental health services (Brundtland, 2000). These challenges include identification and implementation of evidence-based practices,

(Rosenberg & Rosenberg, 2017), increased mortality rates, limited funding and resources, and comorbid substance use disorders and primary care conditions (Brundtland, 2000). These challenges have led to mental health services offered in community-based settings becoming even more comprehensive to address the array of chronic health issues that may present when treating individuals with SMI.

The mental health treatment provided in community-based settings has evolved in three distinct ways: pharmacological, psychosocial, and rehabilitative (Drake et al., 2003). Pharmacological treatment, or medication management, particularly second-generation antipsychotics such as Risperidone and Olanzapine, has produced a significant reduction in symptoms associated with psychosis, with fewer side effects than first-generation medication. However, some studies have indicated that the second-generation antipsychotics may cause other unwanted side-effects, such as excessive weight gain and diabetes (Drake et al., 2003).

Psychosocial treatments are focused on collaboration, education, cognitive behavioral strategies, and utilization of peer supports (Drake et al., 2003), and are built upon the foundation of a strong therapeutic alliance. Psychosocial interventions emphasize collaboration and sharing of information regarding an individual's mental health diagnosis to facilitate person-centered planning which allows the consumer to make informed decisions regarding their treatment in a collaborative process. Cognitive-behavioral interventions (CBI) are particularly useful in training persons with SMI to manage their symptoms. Other CBI tools include relapse prevention and development of a coping-skills repertoire.

Community mental healthcare providers have also increasingly recognized the

importance of engaging family members in the treatment process. Family engagement in the treatment process has been demonstrated to help individuals with SMI to better manage their condition, and equip families to adequately address crisis incidents involving loved ones with SMI (Dixon et al., 2001).

Rehabilitative services focus on improving an individual's overall functioning and quality of life, rather than focusing on symptomology (Drake et al., 2003). This perspective promotes the idea that individuals with SMI can live productive and satisfying lives through acquisition of skills and established supports (Anthony et al., 2002). Rehabilitative services focus on activities associated with daily living, independence, interpersonal relationships, employment, housing, and leisure (Drake et al., 2003). Individuals with SMI have shown marked improvement in functioning and independent living when pharmacological, psychosocial, and rehabilitative services are offered in a clinically integrative approach (Bond et al., 2001).

Being recovery-focused, client-centered, and having a holistic orientation are essential tenets of high-quality mental healthcare. Transforming the scope of community mental health to focus on comprehensive services through an integrated approach to addressing comorbid disorders, such as substance use and primary healthcare for individuals with SMI, may improve the quality of health outcomes and the care.

Integrated Primary and Behavioral Healthcare

Integrated healthcare has been in existence since the 1980s (Caton, 1981); however, as previously discussed, the initial focus was primarily on co-occurring mental

illness and SUDs, due to poorer health outcomes for individuals with co-occurring SUDs and mental illness who received substance abuse treatment only (Ridgely et al., 1989).

The increased burden associated with comorbid disorders among individuals with SMI continued to garner attention throughout the 1980s (Caton, 1981). Between 1980 and 1985, approximately 48% of persons with schizophrenia and 56% of persons with bipolar disorder had comorbid SUDs (Regier et al., 1993). More recent research suggests that this trend of high rates of comorbid SUDs among individuals with SMI has continued (Chow, 2013). Prior research has also demonstrated poorer outcomes on individuals' well-being and functioning for individuals with comorbid SMI and primary healthcare conditions (Colton & Manderscheid, 2006; Druss et al., 2011; Manderscheid & Kathol, 2014). Evidence of poor outcomes has led to increasing calls for healthcare delivery systems to provide more integrated care. Expansion of funding for integrated care programs was a key provision of the ACA, and proponents of healthcare reform touted a decrease in health disparities as one of its anticipated benefits.

In the late 1980s, the National Institute of Mental Health began providing funding to support the integration of Assertive Outreach Teams (AOT) and SUD treatment for individuals with mental health disorders. AOTs are specialty mental health services for people over 18 years of age with ongoing complex mental health needs. Some of the early research examining the effects of interventions such as AOT demonstrated promising findings. Drake (1998) examined 13 community support programs that served a total of 1,157 adults with co-occurring SMI and SUDs. Their findings suggest that integration of treatment into existing mental health services was

feasible, and that motivational interviewing (a counseling approach that works on facilitating and engaging intrinsic motivation within the client in order to change behavior) with this population was effective (Drake, 1998). In addition, improved outcomes were also observed in the form of reduced hospitalizations and substance use (Drake, 1998).

Integration of services reduces perceived and actual barriers (Clement et al. (2015) to care by reducing stigma surrounding mental illness (Shim & Rust, 2013), lowering costs, and reducing mortality rates among persons with chronic comorbid SMI and primary healthcare needs (Pearsall et al., 2014).

However, there are various models of integrated care that may result in differential client and service provider outcomes. The various models of integrated care are briefly described in the following section.

Models of Integrated Care

Blount (2003) described a continuum of service integration among providers of behavioral health and primary healthcare services that included services that are coordinated, provided in co-located settings, or offered in a fully integrated system. Coordinated services are generally offered in distinctly separate settings. Service providers may rely on a referral- or consultation-based system built on collaborative relationships (Westheimer et al., 2008).

In co-located systems of care, service providers offer an array of services in the same treatment setting (Blount, 2003). The lack of a geographical barrier is a significant strength of this model. The co-location of all of the providers allows for a greater degree of collaboration and coordination among services providers. In a fully integrated

system of care, service providers work as part of a coordinated team. They share a physical location, contribute to a single treatment plan, and utilize the same information database and billing system (Blount, 2003; Westheimer et al., 2008). The categories along the continuum of integrated care: coordinated, co-located, and integrated are not mutually exclusive. Healthcare systems may have aspects of each of these categories (Blount, 2003).

The models of integrated care examined in this study range from co-location to fully integrated systems of care that utilize a treatment team of service providers, including both mental health clinicians and primary care providers, as well as the same electronic health records and billing systems. The CMHCs that participated in the PBHCI program were required to, at a minimum, implement co-located services.

Heath et al., (2013) described six levels of integrated care, ranging from minimal collaboration to fully integrated care (Heath et al., 2013). Traditional models of treating consumers with physical and behavioral health conditions have primarily relied on referrals and consults between separate care settings (Level 1), or periodic communication about shared consumers (Level 2) (Heath et al., 2013; Manderscheid & Kathol, 2014). These forms of collaboration have often proved ineffective because consumers rarely acted on the referral (Manderscheid & Kathol, 2014). Historical patterns of service use have suggested that mental health and primary care providers typically treat different consumer populations, and the mental health, and primary health systems of care have evolved in different ways over time (Thiejke et al., 2007). However, high quality of care is contingent upon the different components of the healthcare delivery system working collaboratively to achieve improved health

outcomes.

Co-located models in which physical and mental health providers are physically located in the same facility are the third level of collaborative care within Heath's model. Level 3 involves basic collaboration in which behavioral and physical health providers see the same consumers, but develop separate treatment plans and have periodic discussions about shared consumers (Heath et al., 2013). Level 4 occurs when physical and behavioral healthcare practitioners share clinical practice space, and some clinical information is available in the other's systems (Heath et al., 2013). Co-located care has been identified as an advancement in treating physical and mental health conditions (Powell et al., 2012). Researchers assessing co-located models have typically focused on integration of behavioral health in primary care facilities for consumers with depression or other less serious mental health issues, and have found positive outcomes (Druss et al., 2001; Pomerantz et al., 2010; Solberg et al., 2013; Thiejke et al., 2007). SMI, however, has rarely been a focus of these studies, and integrated care that would be categorized as Level 4 or 5 according to Health's model has also rarely been the focus of research (Gerrity, 2015).

Level 5 care, as described by Health et al. (2013) requires development and implementation of collaborative treatment planning between co-located physical and behavioral healthcare providers. The providers work collaboratively and act as a team, but system integration at the infrastructure level, i.e., billing and electronic health records, is lacking. Level 6 integrated care fosters and facilitates collaborative treatment planning for all consumers within a fully integrated system (Heath et al., 2013).

Researchers have found that fully integrated systems allow for better

communication among providers and sustained care for consumers (Malm et al., 2014; Pincus et al., 2015). Research has also indicated that high-quality chronic care is supported by multidisciplinary teams with delegation of responsibilities to the appropriate team members, and a lack of barriers between sectors (Grol et al., 2013; Wagner et al., 2001).

Much of the research examining models of integration has focused on models of integration within primary care settings, and some studies have found that integration within a primary care setting may not be effective for individuals with SMI (Mandersheid & Kathol, 2014). Mandersheid and Kathol (2014) identified three primary factors that they believe may explain this finding: (1) integrated care in primary care settings may be more likely to maintain separate healthcare delivery systems forphysical and behavioral health, and simply use a referral and consultation process. Ideally, each consumer with SMI would have a behavioral health provider and a physical health provider who work collaboratively, but, this is unlikely in the physical healthcare setting, and may be more likely to succeed in a behavioral health setting (Manderscheid & Kathol, 2014); (2) primary care settings may be more likely to maintain separate payment systems for behavioral health conditions (Manderscheid & Kathol, 2014); and (3) stigma related to behavioral health conditions may hinder client engagement. Stigma may be less likely to occur in behavioral health settings compared to physical health clinics where mental health issues may not be treated as often, particularly SMI (Manderscheid & Kathol, 2014).

Effectiveness of Integrated Care

The New Hampshire-Dartmouth Integrated Dual Disorders Treatment Model, for treating individuals with comorbid mental illness and substance use disorders, demonstrated that more integrated approaches to treatment yield better client outcomes when compared to less integrated approaches (Rosenberg & Rosenberg, 2006). Similarly, Barrowclough et al. (2001) conducted a randomized, single blind study with persons diagnosed with comorbid schizophrenia and SUD, comparing routine care with an integrated program involving routine care, motivational interviewing, Cognitive Behavioral Therapy (a psychosocial intervention that focuses on the development of personal coping strategies that target solving current problems and changing unhelpful patterns in cognitions, behaviors, and emotional regulation), and a caregiver intervention. Barrowclough et al.'s findings indicated that the integrated approach resulted in improved outcomes in general functioning, as well as a reduction in positive symptoms, such as hallucinations and delusions, and increased periods of abstinence from substances over a 12-month period.

With growing awareness of the increased likelihood of co-occurring SUDs for individuals with SMI, as well as greater awareness of the impact of social determinants of health such as housing, employment and trauma, the focus of integrated care programs has begun to shift from SMI and co-occurring SUD to SMI, SUD and comorbid primary healthcare issues. Much of the research in this area is focused on the integration of behavioral healthcare into primary healthcare settings, testing different models of integration (e.g., Everett et al., 2014; Manderscheid & Kathol, 2014); or is more conceptual in nature, outlining the various pathways, barriers, and cost associated

with primary healthcare needs (e.g., Brown & Schulberg, 1998; Dickerson et al., 2003; Goldberg et al., 2007; Leigh et al., 2006). Some consumer outcomes including empowerment, quality of life, satisfaction, and health economic measures (e.g., Stierlin et al., 2014) have also been examined, and there have been several promising findings.

Funderburk et al. (2012) assessed patient satisfaction with services and provider satisfaction with behavioral health screening within a university clinic setting utilizing an integrated behavioral and primary healthcare model. Fifteen providers completed a provider satisfaction questionnaire and 79 patients completed a patient satisfaction questionnaire. Providers reported satisfaction with screening measures, and the integrated program. Patients reported satisfaction with the services received and their interactions with behavioral health providers.

Ray-Sannerud et al. (2012) examined the global mental health outcomes of patients receiving care from behavioral health consultants in a primary care facility at a United States Air Force family medicine clinic, which provided services to active duty members, retirees, and their families. The findings indicate that patients improved from their first to their final behavioral health consultant appointment. In addition, patients maintained therapeutic gains on average two years post-treatment.

While the existing body of research on integrating behavioral healthcare into primary care settings is promising, research regarding implementation of integrated healthcare in behavioral health settings is lacking. Given that the majority of individuals with SMI receive mental health treatment in CMHCs, and CMHCs are often their sole source of healthcare, this represents a significant gap in the research.

Some studies have indicated that CMHCs may be the most appropriate setting for

implementing integrated care programs serving consumers with SMI (Kilbourne et al., 2008; Manderscheid & Kathol, 2014). Authors of a recent study using Missouri Medicaid data revealed that youth and adult consumers with SMI were more likely to receive guideline-based metabolic screening in CMHCs than in other settings of care (Nicol et al., 2015). However, the results may have been skewed due to a specific CMHC-focused program implemented by Missouri Medicaid prior to the study (Nicol et al., 2015).

Use of collaborative approaches to patient care based on the Chronic Care Model are also more common in CMHCs, in which care managers play a significant role compared to primary care settings. Care managers in CMHCs play a significant role in the treatment process and may help communicate information among members of the treatment team, ensure patients are engaged in treatment, encourage adherence to treatment plans, track outcomes, and monitor progress (Norquist, 2014).

Much of the research assessing the effects of integrated care within a behavioral health setting have taken place within the Veterans Health Administration (VHA) system. The VHA offers a healthcare system which addresses physical and mental health of veterans in the United States (Veterans Health Administration, 2015). The VHA is the largest integrated healthcare system in the country, comprised of 152 hospitals, 800 outpatient clinics, and 126 nursing homes (Perlin et al., 2004; Veterans Health Administration, 2015).

The VHA implemented an Electronic Medical Record system in 1997, which allows for coordination of care across its sites and is also used for research purposes (Perlin et al., 2004). Mental healthcare within the VHA, like CMHCs, is focused on

recovery, and providers have implemented coordinated care models and provide evidence-based care (Veterans Health Administration, 2015).

Several large studies using VHA administrative data, patient surveys, and chart reviews have been conducted to assess the effects of integrated care on delivery of guideline-concordant care, physical health screening tests, and Emergency Department utilization (Kilbourne et al., 2008; Kilbourne et al., 2011; Druss et al., 2001; Pirraglia et al., 2012; Randall et al., 2014). Results of these studies were mixed, with improvement in some, but not all, measures of physical health screening tests. Compared to consumers without mental health issues, consumers with mental health issues were less likely to receive guideline-concordant care (Kilbourne et al., 2008; Kilbourne et al., 2011).

Researchers within the VHA system have also assessed the impact of integrated care on healthcare service utilization. A randomized controlled trial was conducted to assess differences in service utilization, cost, and health status associated with integrated care. Consumers with SMI (n=120) were randomized to receive primary healthcare either at primary care clinics or integrated in mental health clinics. Researchers found that consumers randomized to integrated care within the mental health clinics had statistically significant increases in primary care visits, decreases in Emergency Department utilization, improvements in physical health status, and a greater likelihood of receiving guideline-concordant screening tests than consumers randomized to general medical care (Druss et al., 2001).

In 2012, a cohort study was conducted using chart review data from 97 veterans with SMI in the VHA to assess whether enrollment in an integrated primary care clinic

within a behavioral health setting impacted goal attainment for several physical health measures and Emergency Department utilization (Pirraglia et al., 2012). Enrollment in integrated primary care was associated with positive results for attainment of goals in blood pressure, low density lipoprotein cholesterol, triglyceride level, and body mass index. However, enrollment in integrated primary care was not associated with positive results for attainment of high density lipoprotein cholesterol or hemoglobin A1C goals. The number of primary care visits increased significantly, but there was no significant difference in Emergency Department utilization (Pirraglia et al., 2012).

Randall et al. 2014 conducted a cohort study within the VHA system to assess the association between patient-aligned care teams (PACT) and utilization of healthcare services by veterans with posttraumatic stress disorder (PTSD). PACT was implemented within the VHA to improve care coordination, management of chronic disease, preventive care, and access to medical specialists (Randall et al., 2014). Researchers investigated one-year pre- and post-PACT periods from 2009 to 2012 using medical records for 696,379 veterans with PTSD. Of the total number, 336,123 had PTSD in both time periods (Randall et al., 2014). The researchers found that PACT was associated with reduced inpatient admissions and use of specialty services, and increased primary care visits. However, PACT was not associated with changes in mental health visits, Emergency Department visits, or urgent care visits (Randall et al., 2014).

While the findings from the VHA studies are mixed, they indicate potential areas for future research on integrated care in behavioral health settings. The Pirraglia study did not detect a difference in Emergency Department service utilization for veterans receiving integrated care, however, the sample size in this study was small, and may

have been insufficiently powered to detect a difference in this indicator (Pirraglia et al., 2012). However, the Randall et al. (2014) study, which was presumably sufficiently powered, with an initial sample size of 696,379 veterans with PTSD, also did not find a significant difference in Emergency Department visits. It may be significant to note that Randall et al. (2014) describe the PACT services as specific care teams within VA physical health clinics that include mental health providers as part of the care team, rather than integrated care within the behavioral health clinic setting (Randall et al., 2014; Veterans Health Administration, 2015).

Generalizability of the findings from the VHA studies to other populations may be limited. The VHA serves a select group of consumers, who may not be reflective of the general United States population in terms of demographic characteristics, including gender, race, or age (Goulet et al., 2007; Pirraglia et al., 2012). This dissertation examines the effects of integrated care in community mental health centers that likely includes consumers who are more reflective of the general population. This dissertation examines co-located and fully integrated models of integrated care that coordinate physical and mental health treatment in mental health settings.

Gerrity (2015) suggests that fully integrated models of integration, rather than co-location or collaboration models, may provide the highest quality of care for consumers with SMI. Initiatives at the federal level, including new health policies and grant programs, have brought the issue of integrated care to the forefront, as greater emphasis is placed on quality of care for consumers with SMI, along with the provision of financing structures for integrated care pilots (Barry & Huskamp, 2011; Druss & Mauer, 2010; SAMHSA, 2014).

The Patient Protection and Affordable Care Act (ACA) strengthened mental health parity laws and provided additional funding for primary and behavioral healthcare co-located programs (Davis, 2010; Druss & Mauer, 2010; Golberstein & Busch, 2013; Mechanic, 2012). Since 2009, SAMHSA's PBHCI program has provided funding to support pilot programs that integrate primary and specialty medical care services in community-based behavioral healthcare settings.

Researchers from the RAND Corporation reviewed 56 programs funded by SAMHSA under the PBHCI grant program. The researchers described the challenges faced with integrated care models in which physical health is co-located in behavioral health settings including issues such as organizational culture differences, space, consent to treatment and information sharing, maintenance of health records, and referral processes (Schaps & Post, 2015). Despite these barriers, the programs demonstrated a 42% reduction in Emergency Department visits and increases in screening for Hypertension and diabetes (Schaps & Post, 2015).

Health Disparities

Health disparities, or clinically and statistically significant differences in health outcomes or healthcare use, between vulnerable and less vulnerable groups can be caused or influenced by patient, provider or system-level factors that result in differences in treatment, or by societal inequities (Kilbourne et al., 2006). It is important to study health disparities because they may reflect gaps in the quality of care, including underperformance of treatments or processes of care that are considered to be best practices or evidence-based. As healthcare administrators and policy-makers

increasingly embrace and promote evidence-based treatment, it is important to conduct disparities research that aims to identify and address gaps in the quality of care. It is also important that disparities research—to the greatest extent possible—address selection effects in studies which may confound any observed differences in in healthcare quality or outcomes for different groups.

Much of the prior research on health disparities has focused on the role of individual-level factors, including race/ethnicity, culture, education and socioeconomic status (SES). There is an increasing body of research indicating that racial health disparities persist, across all levels of SES (Braveman, et al. 2010; Williams, et al. 2010). Shonkoff et al. (2009) explain that health is affected by exposure to adverse events throughout the life-course, in addition to being influenced by current SES, and for this reason, race still matters for health after SES is considered.

Kilbourne et al. (2006) suggest that, while both individual and provider-level factors are important focal points for understanding disparities, it is also important to examine the role of fundamental aspects of the healthcare system, such as the type of organization, financing and delivery. Disparities research focusing on healthcare organizational factors has primarily examined factors that may be determinants of disparities in outcomes and healthcare use, such as care coordination, continuity of care, and comprehensiveness of the services provided. The Medical Outcomes Study (MOS) was one of the first studies to examine the role of healthcare system factors (Tarlov et al., 1989). Tarlov et al., assessed whether differences in the type of healthcare system (fee-for-service or managed care) were associated with variations in processes and outcomes of care (1989). The type of healthcare system was found to be associated with variations

in patient healthcare use and health outcomes (Ware, Bayliss, Rogers, & Kosinski, 1996). Prior research has also demonstrated differences in the receipt of preventive care between Blacks and Whites that were attributed to organizational characteristics, including resources, location and complexity of the practice or clinic (Kilbourne et al., 2006).

Few studies have examined racial differences in health outcomes in equal-access healthcare settings (Jha, Shlipak, Hosmer, & Frances, 2001). However, the provision of healthcare coverage to all active duty and retired military personnel, as well as their dependents, through the US military healthcare system's TRICARE insurance plan, has presented a unique opportunity to explore the potentially mitigating effects of equal access, on health disparities across racial lines (Haider, Scott, Rehman, & Velopulos, (2013). Health disparities are often attributed to socioeconomic issues, including lack of healthcare coverage, which can impede access to healthcare services. Consumers without adequate healthcare coverage may be reluctant to attend outpatient visits, which can lead to poorer outcomes and more costly treatment later (Hisam, Zogg, & Chaudhary, 2005). Studying disparities in equal-access settings may provide more information about the role of access in health disparities (Pierre-Louis, Moore, & Hamilton, 2015). While some studies have demonstrated that equal-access healthcare systems eliminate disparities for Black individuals (Chaudhary et al., 2018), much of the prior research in this area has focused on disparities related to mortality, hospital readmission, or healthcare utilization. Prior research on disparities in community mental health settings, in particular, has largely focused on disparities in process measures, such as adherence to treatment and consumer engagement. However, there is a growing body of evidence that indicates that disparities in

process measures may be diminishing relative to disparities in outcome measures, suggesting that a greater focus on equality of health outcomes rather than just healthcare processes is needed (Asch, Kerr, Keesey, & Malik, 2006).

Patient-Reported Outcomes

One of the provisions of the Patient Protection and Affordable Care Act was the establishment of the Patient-Centered Outcomes Research Institute (PCORI) (Kinney, 2011). PCORI emphasizes the importance of research that assesses outcomes that are meaningful to patients. Assessing the effects of interventions on patient-reported outcome measures, such as symptom severity, functional status, and quality of life, in real-world clinical settings is considered to be an imperative objective of Patient-Centered Outcomes Research (Price-Haywood, 2015).

AHRQ identified patient-reported outcomes research for people with SMI as an area with significant unmet need (Jonas, Mansfield, Curtis, & Gilmore, et al., 2012). This gap is significant, as research focusing on patient-reported outcomes may be likely to have an impact on reducing variation and uncertainty of treatment outcomes. In 2012, AHRQ convened a group of stakeholders to assist with establishing priorities to guide PCOR on mental health. Several priorities were identified: (1) identifying differences in treatment response that may inform treatment planning for specific demographic groups, including, by age, race or ethnicity, and comorbidities; (2) examining patient-reported outcomes across different treatment settings and service delivery systems to compare variations across settings, systems, and states; (3)targeting priority populations such as people with SMI and comorbid medical illness or SUDs, and specific ethnic and racial communities to identify and offer potential reasons for

disparities in health outcomes (Jonas, Mansfield, Curtis, & Gilmore, et al., 2012).

Summary

Prior research indicates that consumers with SMI have shorter lifespans than the general population and higher rates of comorbid physical illness due to lifestyle, side effects from antipsychotic medication, suboptimal screening rates, and poor care of physical illnesses (De Hert et al., 2011; Mitchell & Lawrence, 2011; Thorncroft, 2011). Intensive healthcare resource utilization by consumers with SMI and comorbid primary healthcare issues is common (Boaz et al., 2013; Heslin & Weiss, 2015). Researchers have also demonstrated that multiple chronic conditions are associated with high spending by Medicaid and Medicare dual eligible beneficiaries with mental health disorders (Frank & Epstein, 2014).

Integrating behavioral and physical healthcare may help improve care of consumers with SMI (Druss et al., 2001; Frank & Epstein, 2014), but the degree of coordination or integration matters. Heath and colleagues (2013) described six levels of care, moving from minimal collaboration defined by a simple referral process, to fully integrated care defined by creation of joint treatment plans and shared medical records (Heath et al., 2013). Traditional models of care for consumers with both physical and behavioral health conditions have relied on referrals and consults only, and prove ineffective because consumers often do not attend appointments at the referral sites (Heath et al., 2013; Manderscheid & Kathol, 2014).

Co-located models in which physical and behavioral healthcare providers share facility space are an improvement over referral models because providers have a greater

degree of collaboration. Researchers assessing these care models have typically focused on integration of behavioral health within primary care facilities to treat depression or other less serious mental health issues. These studies have demonstrated some positive outcomes in consumers with depression (Druss et al., 2009; Solberg et al., 2013; Thiejke et al., 2007); however consumers with SMI have rarely been a focus of studies examining the effects of co-located or fully-integrated healthcare (Gerrity, 2015).

Since most consumers with SMI utilize CMHCs as their primary care setting, further study of the effects of integrated care in these settings is needed (Manderscheid & Kathol, 2014). Authors conducting a review of the literature identified several studies that assessed the impact of co-located care in behavioral healthcare settings on access to care, quality of life, and service utilization (Druss et al., 2001; Kilbourne et al., 2011; Pirraglia et al., 2011). However, these studies were generally conducted within the VHA and therefore may not be generalizable to populations outside of the VHA. This dissertation assesses the effects of co-located integrated care programs with integrated treatment planning, on mental health outcomes and overall health, for consumers with SMI within a community-based setting.

Findings from this study may help policymakers identify opportunities for improvement and variables that need to be addressed for optimal implementation of integrated care. The findings may also provide evidence to better inform decisions prior to investing resources during implementation. As integrated care models become more common, assessments of their effectiveness in various settings will improve the level of evidence available to inform optimal care for vulnerable populations. The next chapter describes the methods used in this dissertation.

CHAPTER 3: METHODOLOGY

In Chapter Three an overview is provided of the study methodology, including the research design, data source, study population, instrumentation, data collection procedures, data analyses, and limitations of the study. A description of the research design, and a detailed overview of the study data sources are provided, key variables are defined, and the statistical methods are described.

Research Design

A retrospective longitudinal cohort design using quantitative research methodology was used to identify the extent to which the effects of integrated care vary by race/ethnicity, age group, and gender, and the influence of comorbid substance use disorders post-traumatic stress and the type of services received, among adults with SMI seen in CMHCs. Quantitative research is appropriate for this study because it allowed for an examination of the relationship between variables, while controlling for alternative explanations (Creswell, 2009). The longitudinal design allows for assessing changes in health status of the consumers, over time.

This dissertation employs secondary data analysis of an existing government-supported dataset to address the research objectives. Analysis of existing data is a cost-efficient way to make use of data that have already been collected to address potentially important new research questions. Using secondary data can also mitigate time constraints and maximize sample size.

Data Sources

The Adult Consumer Outcome Measures for Discretionary Programs, also referred to as the National Outcome Measures (NOMs) dataset was used to address the three research objectives. The data were collected by granteesparticipating in SAMHSA's PBHCI Grant Program. The purpose of this grant program is to establish integrated primary and behavioral healthcare by co-locating these services in community-based behavioral health settings. The grantees and the study population are described below.

Study Population

Eligibility for the PBHCI grants was limited to qualified community-based behavioral health programs as defined under section 1913(b)(1) of the Public Health Service Act. Eligibility to receive services that were funded by the grant was limited to persons with diagnoses of serious and persistent mental illness. Between fiscal year 2009 (when PBCHI was launched) and FY14, 58 grants were awarded to community-based behavioral health programs in 27 states. The total population of individuals entering treatment through the PBHCI program during this period was 60,182. The study population for this study included individuals served through the PBHCI program who were: 1) aged 18 or older; and 2) had a primary psychiatric diagnosis of schizophrenia or other psychotic disorder, bipolar disorder, or major depressive disorder.

All consumers receiving services through the PBHCI program had SMI diagnoses which were diagnosed or confirmed by the CMHC clinicians, and were typically based

on the International Classification of Diseases 9th Revision (ICD-9) or DSM-V codes for schizophrenia and other psychotic disorders, Depressive Disorders, Bipolar and other Mood Disorders. Consumers who presented for treatment with mental illnesses other than those listed above, were not eligible to receive services through the PBHCI program.

Instrumentation

PBHCI grantees were required to assess and report client outcomes using a uniform Office of Management and Budget (OMB) approved data collection tool. Client outcomes were assessed at baseline and at 6-month intervals post-baseline using the *NOMs Client-Level Measures for Discretionary Programs Providing Direct Services Tool for Adult Programs* (OMB No. 0930-0285). The NOMs Tool has 12 sections or domains in which data are collected or recorded. A brief overview of the intent and focus of each of these sections is provided in Table 1. The variables that are included in the analysis, are in bold font.

Table 1: NOMs Tool Data Collection Domains

SECTION	DOMAIN & VARIABLES	DESCRIPTION
RECORD MANAGEMENT	IDENTIFICATION	This section pertains to the collection of the consumer's identification information, the grantee information, and consumer's interview information. The Record Management Section is not asked of the consumer, but is supplied by the interviewer. The Record Management information must be filled in for each interview, regardless of whether an interview was conducted.
A	DEMOGRAPHIC DATA • **Gender** • Hispanic/Latino • **Race)** • DOB • **Age group**	This section pertains to consumer demographic information. These questions are only asked at baseline. While some of the information may seem apparent, interviewers are trained to ask all questions for verification, rather than completing a response based on the consumer's appearance. If the consumer refuses to answer a question, interviewers may check "REFUSED" and go to the next question.
B	FUNCTIONING • **Overall Health** • **Mental Health Functioning** • **Psychological Distress** • **Substance Use** • Global Assessment of Functioning • **Trauma**	This section pertains to issues of physical, emotional/mental health, and substance use. The scales in this section ask the consumer to report on their perception of their current general health (physical and emotional), daily functioning, and use of tobacco, alcohol, and other substances. For many of the functioning measures, the NOMs Tool uses scales that have been previously validated, and widely used in published

		peer-reviewed studies. The "overall health" scale is adapted from the World Health Organization's Health and Performance Questionnaire (Kessler, 2003). The mental health functioning scale is taken from the Mental Health Statistics Improvement Program Consumer Survey. The "psychological distress" scale was taken from the Kessler Psychological Distress Scale. The trauma questions are taken from the Primary Care Post-traumatic Stress Disorder Screen (PC-PTSD) (Prins, 2003).
C	STABILITY IN HOUSING • Nights Homeless • Housing Situation	This section pertains to the consumer's housing situation in the past 30 calendar days. The intent of these questions is to determine the consumer's ability to maintain life within the community during the past 30 days. The housing question was taken from the National Survey on Drug Use and Health. This section also assesses the number of Emergency Department visits due to emotional or psychiatric issues in the past 30 days.
D	EDUCATION AND EMPLOYMENT • **Education Level Attained** • **Employment** • Competitive Employment	This section pertains to the respondent's education and employment status. The intent is to determine whether the consumer is currently involved in any educational or job training program, and to ascertain basic information about the consumer's formal education.
E	CRIME AND CRIMINAL JUSTICE STATUS	This section asks basic information about the

	(See Appendix A for variables/items)	consumer's involvement with the criminal justice system, including information about arrests. The questions must be asked during the clinical interviewer even if the consumer is court mandated to participate in treatment.
F	PERCEPTION OF CARE (See Appendix A for variables/items)	This section pertains to the consumer's perception of the services he/she received during the past 30 calendar days. The intent is to ascertain information about the consumer's perception of care for services recently received. The scale used to assess this domain was adapted from the Mental Health Statistics Improvement Program Consumer Survey (Jerrell, 2006) survey.
G	SOCIAL CONNECTEDNESS	This section pertains to the consumer's recent social support by persons other than his/her mental healthcare providers. The source of these questions is the MHSIP Consumer Survey.
H	PHYSICAL HEALTH INDICATORS	This section pertains to the consumer's physical health outcome indicators. Weight, height, BMI, blood glucose, blood pressure, and lipid profiles are assessed for all enrolled consumers.
I	ADMINISTRATIVE DATA RELATED TO REASSESSMENT	This section pertains to the consumer's status 6-months (180 calendar days) after the baseline interview or subsequent reassessment interview(s). This information is only completed at reassessment, and is reported by the grantee staff without asking the consumer. This

		information is required regardless of whether a reassessment interview was conducted with the consumer.
J	ADMINISTRATIVE DATA RELATED TO DISCHARGE	The information in this section pertains to the consumer's clinical discharge status and is reported by the grantee without asking the consumer. This information is required regardless of whether a clinical discharge interview was conducted with the consumer.
K	CORE SERVICES RECEIVED • Screening • Assessment • Treatment Planning or Review • **Psychopharmacological Services** • Mental Health Services • **Co-Occurring Services** • **Case Management** • **Trauma-specific Services**	This section describes the services provided to the consumer since his/her last interview. The services recorded in this section should include those funded or not funded by this PBHCI grant. This information is not asked of the consumer, but filled in by the grantee. This information is required regardless of whether a reassessment or clinical discharge interview was conducted with the consumer.

Data Collection Procedures

This dissertation analyzed client outcome data that were collected by CMHC staff as part of required reporting for SAMHA's Discretionary Grant Programs that provide direct services. Clients were assessed biannually for the duration of their treatment episode on outcomes including mental health functioning, traumatic stress, education and employment, perception of care, social connectedness, and physical health indicators. The NOMs Tool also includes questions on key demographic variables, such as age, race, and gender, for all consumers receiving services. The NOMs Tool race categories

include Black, White, Asian/Pacific Islanders, American Indian, Other, and Unknown. The NOMs Tool gender categories are male, female, transgender, and unknown.

Consumers were administered the NOMs Tool during clinical interviews, using either paper or web-based administration, by trained clinical interviewers. The clinical interviewer would read the questions from the NOMs tool, as they were written, to the consumer. Clinical interviewers adhered to the following guidelines for data collection: (1) interviews must be conducted in-person; (2) clinicians should not read any of the response categories listed; (3) for sensitive issues such as substance use and psychological distress, clinicians should reassure consumers that their answers are confidential and are linked only to a code that does not identify them; (4) data collection is required for all consumers receiving services through the PBHCI program; and (5) data collection is required at baseline or entry into services, at 6-month intervals for reassessment, and at clinical discharge. Baseline assessments were required to be conducted within seven calendar days of the consumer enrolling in the program, and reassessments were required to be conducted within 30 calendar days of six months (180 calendar days) from entry into services.

Table 2 describes the data collection protocols for the clinical interviews including the Data Collection Time Points (baseline, six-month reassessment, 12-month reassessment, etc.); which sections of the NOMs tool must be assessed for each time point, and the time period in which the data must be collected.

Table 2: NOMs Tool Data Collection Protocol

Data Collection Points	Record Management	Section A	Sections B, C, D, E, & G (and H, when applicable)	Section F	Section I	Section J	Section K	Data Collected
Baseline Assessment (Required for all consumers, except those who refuse or do not provide consent)	X	X	X					Complete interview within 7 calendar days of a consumer entering treatment
Reassessment	X		X	X	X		X	Interview conducted every 180 calendar days from the Baseline interview date for the duration of the consumer's treatment Timeframe for completing the interview is 30 calendar days before and after interview due date If reassessment interview was conducted within 30 calendar days of a Clinical Discharge, no Clinical Discharge Interview is needed
Clinical Discharge	X		X	X		X	X	Conduct interview same day

Data Analyses

Data were initially inspected using descriptive statistics and frequencies. Chi-square analyses for categorical variables were conducted to compare the distribution of demographic variables and comorbid SUD and post-traumatic stress across the two dependent variables: mental health functioning and overall health. Multivariate logistic regression was used to assess the effect of race or ethnicity (reference: non-Hispanic White), age group (reference: aged 18-25 years), and gender (reference: men) on improved mental health functioning and improved overall health.

A series of three multivariate logistic regression models were used to examine the effects of age, race or ethnicity, and gender on mental health functioning and overall health, controlling for psychological distress, education level, and employment status. In Model 2, comorbid SUD and post-traumatic stress were added to the model, and in Model 3, the type of services received were added to the model.

The final multivariate logistic regression model (Model 3) examined the effects of race or ethnicity, age, and gender on mental health functioning and overall health, controlling for psychological distress, education level, employment status, comorbid SUD, post-traumatic stress and the type of services received. Analyses were conducted using STATA 12. The p-values listed are from two-sided tests with a 5% significance level.

Potential Limitations

There are several potential limitations of this study which must be considered in interpreting the findings. Selection Bias, sometimes referred to as the selection effect, can occur when a study population was not randomly selected, which means generalizability may be limited. The study population used for this study was not randomly selected. All participants were consumers seeking treatment in CMHCs funded through the PBHCI grant who consented to sharing their data. Information about individuals who sought or received treatment, but declined to consent to sharing their data, is not available, and thus, it is not possible to determine whether there may be differences in the groups of consumers with SMI for whom data are not available.

Attrition bias is a kind of selection bias caused by attrition, or loss of participants, due to dropouts, nonresponse, withdrawal and non-adherence to treatment protocols. Discounting participants who do not complete treatment can yield biased results, when the attrition rate is significantly different between groups that are being compared. In this study, up to 44% of the baseline cohort were lost to follow-up by the 6-month reassessment date. For this reason, the 2nd time point used in the analyses was the first 6 month assessment. While 6-months is a relatively short timeframe, prior research using the PBHCI data has indicated that the 6-month reassessment showed the greatest change in outcomes from the baseline measurement (Scharf, Hackbarth, Eberhart & Pincus, 2016).

Another potential limitation of this study is that while the study population was followed for between 6 months to 42 months, differences that may be attributed to the duration of treatment or time since the baseline assessment were not examined in this

study. The primary reason for this was due to the increasing attrition rate for successive time points.

It was also not possible to test the effects of the independent variables for specific SMI diagnosis. All participants had a diagnosis of SMI, but the dataset does not include information about specific diagnoses The dataset also does not include information about insurance coverage for the consumers served, which may be a potential limitation since prior research has suggested that insurance coverage may impact access and health outcomes.

Since the objectives of this study were to examine heterogeneity in treatment effects for a specific population (consumers with SMI) in a particular setting (CMHCs), this study does not include an external comparison group (for example, Community Health Centers that do not specialize in mental health). This limits the applicability of the findings for determining whether integration care provided in behavioral health settings leads to better outcomes.

Finally, this study did not examine the impact of comorbid physical health issues or social determinants of health such as stable housing. The dataset did not include summary measures for physical health status. While there are many advantages to secondary data analysis, one of the potential disadvantages is that the available data were not collected to address the particular research question, thus it is not uncommon that some variables may not be available for the analysis.

Summary

A retrospective longitudinal cohort research design was used to examine

heterogeneity in treatment effects across the study population. Secondary data analysis provided a cost-efficient way to make use of data that had already been collected to address new research objectives. Data from the Adult Consumer Outcome Measures for Discretionary Programs dataset were analyzed for this dissertation. The data were collected by grantees participating in SAMHSA's PBHCI Grant Program using the *NOMs Client-Level Measures for Discretionary Programs Providing Direct Services Tool for Adult Programs*. The total population of individuals served between FY09-FY14 was 60,182 in 27 states. The data were initially inspected using descriptive statistics and frequencies. A series of three logistic regression models were used to examine the effects of age, race or ethnicity, and gender on mental health functioning and overall health. Several potential limitations of the findings from this study were discussed including selection bias and attrition.

CHAPTER 4: RESULTS

As stated earlier, the purpose of this study is to examine heterogeneity in treatment effects as a function of consumer demographic and clinical characteristics, and services received, for patient-reported outcomes among persons with SMI receiving integrated primary and behavioral healthcare in CMHCs. Chapter 4 presents the results of the data analyses described in Chapter 3. Descriptive analyses of the control, independent, and dependent variables are described. The results from the Chi-square analysis examining the distribution of consumer characteristics across the dependent variables is discussed, followed by the presentation of findings from the multivariate

logistic regression analysis to address the three research objectives. Finally, Chapter Four is briefly summarized.

Descriptive Statistics

This section provides descriptive statistics for each of the control variables, independent variables, and the dependent variables. Chi-square analyses were used to compare the distributions of all consumer characteristics included in the analyses across the dependent variables.

Independent Variables

The independent variable, race or ethnicity, was determined by the consumer's response to the following questions: "What race do you consider yourself?" and "Are you Hispanic or Latino?" The response options for the race question included Black or African American, Asian, Native Hawaiian or other Pacific Islander, Alaska Native, White, and American Indian. Consumers were allowed to select more than one category. The total number of consumers who completed a baseline assessment was 60,182. Almost half (49.2%) of the study population indicated being of non-Hispanic White race, with the next largest proportion reporting Black or African race (24.1%). The remaining consumers included 13.8% Hispanics (of any race), 2.7% Asians, 5.1% American Indians, 1.2% Native Hawaiians and .7% Alaska Natives.

Participant ages ranged from 18 to 105 with a mean age of 44.8 years and standard deviation of 12.2 years. The age of the participant on the date of the baseline assessment was used for all analyses. Age at baseline was stratified into nine groups: (1) age 18 to 25 years old; (2) age 26 to 34 years old; (3) age 35 to 44 years old; (4) age

45 to 54 years old; (5) age 55 to 64 years old; (6) age 65 to 74 years old; (7) age 75 to 84 years old; (8) age 85 to 94 years old; and (9) age 95 years or older. Table 3 indicates the percentages of the study population that were included in each age group.

The study population was split almost equally between men (46.9%) and women (52.8). Less than 1% of the study population identified as transgender (.23%) or "other" (.03%).

Dependent Variables

This study examined two dependent variables, one related to mental health functioning and one related to overall health. The following section provides descriptive data for each of the outcome variables.

Overall Health: Overall health status was assessed using a measure from the World Health Organization's (WHO) Health and Performance Questionnaire (HPQ). Consumers were asked to rate their overall heath "right now" using a 5 point scale from "excellent" to "poor". The plurality (35.4%) of participants rated their overall health as "Fair," followed by 27.5% of participants who rated their overall health as "Good," and 18.6% that rated their overall health as "Poor." Almost 12% of participants rated their overall health as "excellent" or "very good".

Mental Health Functioning: Mental Health Functioning was measured using a scale from the Mental Health Statistics Improvement Program (MHSIP) Adult Consumer Survey, a nationally used survey that measures outcomes that are important to consumers of publicly-funded mental health services. The specific item used for this study is a measure of how well consumers report managing their symptoms. Sixty percent of the

study population reported difficulty managing their symptoms at baseline. Almost 30% reported that their symptoms were not bothering them, and 7.5% of the study population were undecided.

Covariates

Education: About one third of the participants reported having a high school diploma or the equivalent (32.7%). About 25% of study participants reported having attended "some college or university," and 28.2% of the study population reported having completed less than the 12th grade. Just over 7% of the study population had at least a Bachelor's Degree, and almost 4% of the study population reported having obtained a vocational or technical diploma.

Employment: Almost 44% of the study population reported being unemployed due to disability. An additional 19% of participants reported being unemployed and "not looking for work." About 3% of participants were retired or doing volunteer work, and 18% were unemployed and seeking employment. Almost 12% of the study population reported working full- or part-time.

Comorbidity: Participants were asked about their use of alcohol and other drugs, other than those prescribed by a doctor, or used for reasons or in doses other than prescribed. Approximately 7% of the study population reported using alcohol and/or drugs on a daily or "almost daily" basis. These participants were considered to have co-occurring SUDs. In addition to SUDs, it is also not uncommon for individuals with SMI to present with post-traumatic stress (including community or school violence, domestic violence, physical psychological or sexual assault within or outside of the family, natural disaster, terrorism, neglect or traumatic grief), and the presence of trauma may impact the

effect of treatment. Almost 22% of the study population reported experiencing symptoms of post-traumatic stress. Symptoms of SUDs and post-traumatic stress were treated as binary variables in the analyses. The complete lists of demographic and clinical characteristics for the study population are summarized in Tables 3 and 4.

Table 3. Demographic Characteristics of Study Population

	White	Black	AI	Asian	NH	AN	HI	18-25	26-34	35-44	45-54	55-64	65-74	75-84	85-94	Male	Female
Total																	
	29,642	14,523	3,042	1,628	719	418	8,288	5,238	10,325	13,245	18,671	9,984	1,508	205	29	28,049	31,297
Age																	
18-25	2,361	1,319	242	121	80	55	966										
26-34	5,234	2,383	502	273	152	77	1,474										
35-44	6,640	3,167	713	348	161	100	1,867										
45-54	9,339	4,868	1008	367	193	124	2,397										
55-64	5,138	2,387	510	322	96	51	1,262										
65-74	731	293	47	120	27	9	237										
75-84	57	33	7	53	4	0	42										
85-94	8	2	0	16	1	0	2										
95+	1	0	0	0	0	0	2										
Sex																	
M	13,594	7,412	1329	746	354	236	3,745	2,527	4,974	6,264	8,888	4,522	608	70	7		
F	15,967	7,071	1,694	875	362	182	4,505	2,668	5,298	6,931	9,733	5,426	896	134	22		
Education																	
<12	6,201	5,146	798	577	187	97	3,407	1,649	2,706	3,640	5,411	2,580	526	90	8	8,534	8,101
12	10,155	4,899	937	279	230	173	2,370	2,136	3,400	4,256	6,184	2,975	342	37	6	9,941	9,422
Tech	1,320	462	130	55	34	19	245	152	403	554	765	385	43	3	0	890	1,417
College	8,533	2,920	945	345	199	99	1,503	1,113	2,947	3,452	4,428	2,498	315	29	3	5,847	8,928
BA	1,928	480	125	137	34	15	315	61	474	713	950	787	95	15	4	1,274	1,818
BA+	776	146	63	42	20	5	72	6	119	233	355	347	77	8	0	475	672
Employment																	
FT	1,511	379	137	59	30	27	297	320	688	633	602	221	11	0	0	1,088	1,386
PT	2,666	881	226	113	59	28	584	574	1,047	1,114	1,225	625	44	2	0	2,015	2,618
LFW	5,143	2,774	563	268	140	93	1,444	1,578	2,577	2,546	2,781	1,037	44	6	1	5,331	5,235
DIS	12,794	6,690	1,371	462	280	191	3,533	1,342	3,254	5,525	9,416	5,394	720	53	6	12,468	13,285
VOL	327	133	49	25	15	1	59	48	101	125	198	124	20	3	1	272	348
RTR	534	202	61	146	23	4	101	3	15	33	116	417	401	89	16	478	614
NL	5,172	2,767	489	462	136	53	1,747	1,063	2,112	2,537	3,397	1,657	175	34	3	4,780	6,202

LFW: Looking for Work; DIS: Disabled; Vol: Volunteering for unpaid work; RTR: Retired; NL: Not currently looking for work

Table 4. Clinical Characteristics of Study Population

	White	Black	AI	Asian	NH	AN	HI	18-25	26-34	35-44	45-54	55-64	65-74	75-84	85-94	Male	Female
Total																	
	29,642	14,523	3,042	1,628	719	418	8,288	5,238	10,325	13,245	18,671	9,984	1,508	205	29	28,049	31,297
O-Health (1 = Best, 5 = Worst)																	
1	854	851	119	52	28	18	321	333	499	464	612	299	68	10	1	1,448	838
2	2,435	1,383	263	112	70	48	562	667	1,006	1,040	1,274	798	143	22	1	2,760	2,191
3	8,541	3,976	835	467	217	131	1,962	1,752	3,169	3,639	4,649	2,662	448	45	10	8,297	8,110
4	10,453	5,195	1,063	560	237	135	3,001	1,628	3,570	4,802	6,735	3,603	496	79	13	9,221	11,727
5	5,515	2,308	628	330	104	72	1,791	543	1,452	2,472	4,202	1,953	240	37	4	4,433	6,462
MH Functioning Symptoms Managed																	
1(SD)	5,787	2,063	730	280	114	69	1,476	770	1,874	2,674	3,663	1,541	133	19	4	4,262	6,403
2	12,500	5,696	1,259	646	302	138	3,509	2,021	4,067	5,540	7,931	4,163	554	88	14	10,757	13,644
3	2,265	954	239	138	57	68	606	519	884	963	1,241	668	113	10	1	2,153	2,247
4	7,246	4,617	657	431	206	121	2,000	1,517	2,740	3,186	4,599	2,866	550	77	9	8,484	7,095
5(SA)	1,157	805	113	69	29	17	343	288	513	558	727	399	78	2	0	1,425	1,140
Comorbidity																	
Trauma	12,303	5,215	1,624	365	230	181	3,288	2,048	4,376	5,584	7,443	3,627	396	39	4	9,408	14,091
SUD	2,623	1,073	271	85	51	46	622	544	1,049	1,125	1,473	603	55	3	1	2,419	2,435

O-Health: Overall Health; SD: Strongly Disagree; SA: Strongly Agree

Distribution of Consumer Characteristics across Dependent Variables

Chi-square analysis was conducted to compare the distribution of the consumer characteristics for dependent variable 1: mental health functioning. The results are presented in Table 5. The results indicated that for age group of the consumer (χ^2 = 655.9552, $p < 0.0001$); gender (χ^2 = 117.1415, $p < 0.0001$); race (χ^2 = 339.2726, $p < 0.0001$); level of education (χ^2 = 20.7150, $p < 0.001$); employment status (χ^2 = 26.1190, $p < 0.0001$); post-traumatic stress (χ^2 = 1.2e+04, $p < 0.0001$); and SUDs (χ^2 = 49.1453, $p < 0.0001$), that any differences in the observed and expected frequencies between groups can be attributed to chance.

Chi-square analysis was also conducted to compare the distribution of the consumer characteristics for dependent variable 2, overall health. The results are presented in Table 5. The results indicated that for age group of the consumer (χ^2 = 73.7525, $p < 0.0001$); gender (χ^2 = 258.3535, $p < 0.0001$); race (χ^2 = 110.6762, $p < 0.0001$); level of education (χ^2 = 124.9780, $p < 0.0001$); employment status (χ^2 = 737.2720, $p < 0.0001$); post-traumatic stress (χ^2 = 7.2e+03, $p < 0.0001$); and SUDs (χ^2 = 680.9913, $p < 0.0001$) that differences in the observed and expected frequencies between groups can be attributed to chance.

Table 5: Chi-Square Analysis of Consumer Characteristics

Variables	MH Function Improved (%)	χ^2	OH Improved (%)	χ^2
Race		p<0.0001		p<0.0001
White	10,926(66.3)		9,830(59.7)	
Black	4,765(58.7)		5,092(62.7)	
AI	1,206(67.9)		1,011(56.9)	
Asian	780(66.4)		662(56.3)	
NH	276(62.3)		291(65.7)	
AN	130(50.0)		175(67.3)	
HI	3,183(67.3)		2,642(55.8)	
Age		p<0.0001		p<0.0001
18-25	1,509(60.4)		1,823(73.0)	
26-34	3,305(62.6)		3,498(66.3)	
35-44	4,783(66.3)		4,381(60.7)	
45-54	7,368(66.5)		6,041(54.5)	
55-64	4,037(63.6)		3,642(57.4)	
65-74	536(57.3)		558(59.6)	
75-84	74(54.0)		72(52.6)	
85-94	16(69.6)		7(30.4)	
95+	0(0.0)		0(0.0)	
Gender		p<0.0001		p<0.0001
Male	9,532(59.9)		10,151(63.8)	
Female	12,105(67.3)		9,903(56.1)	
Trauma	15,547(73.8)	p<0.0001	1,834(45.9)	p<0.0001
SUD	403(68.6)	p<0.0001	709(42.2)	p<0.0001
Education		p<0.0001		p<0.0001
<12	4,613(57.7)		3,765(47.1)	
12	5,359(55.2)		5,277(54.4)	
Tech	670(60.9)		565(51.4)	
College	4,354(60.8)		3,891(54.4)	
BA	925(58.6)		941(59.6)	
BA+	354(59.1)		357(59.6)	
Employed		p<0.0001		p<0.0001
Fulltime	670(49.9)		922(68.7)	
Parttime	1,348(51.9)		1,663(64.0)	
Looking	2,113(55.1)		2,231(58.2)	
Disabled	8,537(59.3)		6,971(48.4)	
Volunteer	237(53.7)		258(58.5)	
Retired	348(55.4)		342(54.5)	
NL	335(68.8)		2,262(48.8)	

Regression Analyses

The dependent variables, overall health and mental health functioning were examined with a series of three multivariate logistic regression models. Model 1 examined the effects of the demographic variables, race or ethnicity, age, and gender on the dependent variables, mental health functioning and overall health, while holding other variables constant. In Model 2, comorbid SUD and/or post-traumatic stress are included as additional potential mediators. Model 3 also includes the type of services received.

The following variables were included in all models: age at entry to treatment; gender; race or ethnicity; employment, education and psychological distress. Comorbid SUD and post-traumatic stress were added to Model 2, and Model 3 included the addition of four types of services received: psychopharmacological, trauma-specific, case management, and co-occurring therapy. Statistical significance was defined as $P < 0.05$ in a two-sided test. Statistical analyses were conducted using STATA software, version 12.

Model 1: Effects of Race or Ethnicity, Age, and Gender

Multivariate logistic regression analysis was conducted to investigate the association between each of the demographic variables; age, race or ethnicity, and gender and the odds of improved mental health functioning, while controlling for other covariates (level of education, employment, psychological distress). The results indicate that consumers of Black race *(*Odds Ratio (OR) = 0.72, p = 0.023), Asian Race (OR = 0.95, p<0.0001), and Alaska Natives (OR = 0.68, p = 0.15), were statistically significantly less likely to report improved mental health functioning when

compared with consumers of non-Hispanic White race (the reference population).

All age groups between 26 and 64 (26-34: OR = 1.16, p = 0.013; 35-44: OR = 1.27, p<0.0001; 45-54: OR = 1.35, p<0.0001; 55-64: OR = 1.19, p = 0.003) were more likely than the reference group (18 to 25 year olds) to report improved mental health functioning. There were no statistically significant associations between age group and mental health functioning for consumers aged 65 or older.

Women were almost 50% more likely than men to report improved mental health functioning (OR = 1.46, p<0.0001). But, for overall health, women were 28% (OR = 0.72, p<0.0001) less likely than men to report improvement. Older age was also associated with decreased odds of reporting overall health. All age groups between 26 and 74 were less likely to report improved overall health compared to 18 to 25 year olds. The association was not significant for 75-84 year olds (OR = 0.70, p = 0.098), but 85 to 94 year olds were also statistically significantly less likely (OR = 0.17) than 18 to 25 years olds to report improved mental health functioning.

For race and overall health, Blacks (OR = 1.08, p = 0.023), Native Hawaiians (OR = 1.31, p = 0.019), and Alaska Natives (OR = 1.47, p = 0.007) were statistically significantly more likely to report improved overall health, when compared with non-Hispanic Whites. Hispanics (OR = 0.86, p<0.0001) were the only ethnicity that were less likely than non-Hispanic Whites to report improved overall health. All results from the multivariate logistic regression analysis for research objective 1 can be found in Model 1 of Tables 5 and 6.

Model 2: Influence of Comorbid Substance Use Disorders and Post-traumatic Stress

A second multivariate logistic regression model was run that included the

additional variables of comorbid post-traumatic stress and SUD, while controlling for other covariates (level of education, employment, and psychological distress). The results indicate that for Blacks and Alaska Natives, the odds of reporting improved mental health functioning remained significant with little to no change in the OR (Blacks: OR = 0.73, $p<0.0001$; Alaska Natives: OR = 0.68 $p = 0.006$). For consumers of Asian race, after controlling for comorbid trauma, and SUD, Asian race was no longer statistically significantly (OR = 0.98, $p = 0.786$).

Controlling for comorbidity did not seem to influence the effect of age on mental health functioning. All of the age groups between 26 to 34 continued to be statistically significantly more likely than 18 to 25 year olds to report improved mental health functioning (26-34: OR = 1.15, $p = 0.017$; 35-44: OR = 1.27, $p<0.0001$; 45-54: OR = 1.36, $p<0.0001$; 55-64: OR = 1.21, $p = 0.001$). This was also true for gender. Women were still almost 50% more likely than men to report improved mental health functioning after controlling for comorbid SUD and trauma (OR = 1.45, $p<0.0001$).

For the dependent variable overall health, Model 2 indicates that the inclusion of comorbid SUD and trauma did not impact the effect of race on improved overall health. Blacks (OR = 1.07, $p = 0.039$), Native Hawaiians (OR = 1.30, $p = 0.023$), Alaska Natives (OR = 1.47, $p = 0.008$), were still more likely compared to non-Hispanic Whites to report improved overall health, and Hispanics were still less likely (OR = 0.86, $p<0.0001$) than non-Hispanic Whites to report improved overall health. Similar results were observed for age and gender, regarding the influence of comorbid SUD and trauma. Women were still 28% less likely than men to report improved overall health (OR = 0.72, $p<0.0001$), and all age groups between 26 and 74 (26-34:

OR = 0.79, p<0.0001; 35-44: OR = 0.64, p<0.0001; 45-54: OR = 0.55, p<0.0001; 55-64: OR = 0.63, p<0.0001), and 85 to 94 year olds were less likely than 18 to 25 year olds to report improved overall health. For gender and age, the inclusion of comorbidity in the model did not mediate the effects on overall health. All results from the multivariate logistic regression analysis for research objective 2 can be found in Model 2 of Tables 5 and 6.

Model 3: Influence of Type of Services Received

A third multivariate logistic regression model examined the influence of the type of services received on the effects of age, race, and gender, while controlling for other covariates (level of education, employment, and psychological distress).

When the type of services received were included in the model, Blacks (OR = 0.73, p<0.0001), and Alaska Natives (OR = 0.70, p = 0.011) were still statistically significantly less likely, compared to non-Hispanic Whites, to report improved mental health functioning, while American Indians were 17% (OR = 1.17, p = 0.011) more likely than non-Hispanic Whites to report improved mental health functioning.

The type of services received also did not seem to influence the effects of age or gender on mental health functioning. Women were 45% more likely than men to report improved mental health functioning (OR = 1.45, p<0.0001), and older age increased the odds of reporting improved mental health functioning for all age groups between 26 and 64 (26-34: OR = 1.16, p = 0.016; 35-44: OR = 1.27, p<0.0001; 45-54: OR = 1.37, p<0.0001; 55-64: OR = 1.21, p = 0.002).

For overall health, the effects of race remained relatively constant after

controlling for the type of services received. Blacks (OR 1.07, p = 0.036), Native Hawaiians (OR = 1.30, p = 0.025), and Alaska Natives (OR = 1.45, p = 0.010) were still more likely compared to non-Hispanic Whites to report improved overall health. Hispanics (OR = 0.85, p<0.0001) were still less likely than non-Hispanic Whites to report improved overall health. Women remained 28% less likely than men to report improved overall health, and older age continued to be associated with decreased odds of reporting improved overall health. All age groups between 26 and 74, and 85 to 94 were less likely than 18 to 25 year olds to report improved overall health (26-34: OR = 0.78, p<0.0001; 35-44: OR = 0.64, p<0.0001; 45-54: OR = 0.55, p<0.0001; 55-64: OR = 0.63, p<0.0001; 65-74: OR = 0.71, p<0.0001; 85-94: OR 0.17, p = 0.008). All results from the multivariate logistic regression analysis for research objective 3 can be found in Model 3 of Tables 5 and 6.

Table 6 Odds Ratios for Improved Mental Health Functioning among Individuals with SMI treated in CMHCs

	Model 1			Model 2			Model 3		
Variable	OR	95% CI	P-Value	OR	95% CI	P-Value	OR	95% CI	PValue
Race									
Black	**0.72**	**0.68, 0.78**	**0.023**	**0.73**	**0.69, 0.78**	**<.0001**	**0.73**	**0.68, 0.78**	**<.0001**
AI	1.18	1.05, 1.32	0.963	**1.16**	**1.03, 1.31**	**0.013**	**1.17**	**1.04, 1.31**	**0.011**
Asian	**0.95**	**0.81, 1.10**	**<.0001**	0.98	0.84, 1.14	0.786	0.99	0.85, 1.15	0.893
Native HI	0.88	0.70, 1.10	0.079	0.89	0.71, 1.12	0.315	0.89	0.71, 1.12	0.324
Alaska Native	**0.68**	**0.51, 0.89**	**0.015**	**0.68**	**0.51, 0.90**	**0.006**	**0.70**	**0.53, 0.92**	**0.011**
Hispanic	1.02	0.94, 1.10	0.695	1.02	0.94, 1.11	0.561	1.03	0.95, 1.12	0.497
White (reference)									
Age									
26-34	**1.16**	**1.03, 1.31**	**0.013**	**1.15**	**1.02, 1.30**	**0.017**	**1.16**	**1.03, 1.30**	**0.016**
35-44	**1.27**	**1.13, 1.42**	**<.0001**	**1.27**	**1.13, 1.42**	**<.0001**	**1.27**	**1.13, 1.42**	**<.0001**
45-54	**1.35**	**1.21, 1.51**	**<.0001**	**1.36**	**1.22, 1.52**	**<.0001**	**1.37**	**1.22, 1.52**	**<.0001**
55-64	**1.19**	**1.06, 1.34**	**0.003**	**1.21**	**1.08, 1.36**	**0.001**	**1.21**	**1.07, 1.36**	**0.002**
65-74	0.86	0.71, 1.04	0.126	0.88	0.73, 1.07	0.200	0.88	0.73, 1.07	0.196
75-84	0.75	0.49, 1.15	0.190	0.78	0.51, 1.20	0.256	0.79	0.51, 1.21	0.271
85-94	0.73	0.24, 2.17	0.568	0.73	0.24, 2.23	0.579	0.74	0.24, 2.24	0.589
18-25 (reference)									
Sex									
Women	**1.46**	**1.38, 1.54**	**<.0001**	**1.45**	**1.37, 1.53**	**<.0001**	**1.44**	**1.37, 1.52**	**<.0001**
Comorbidity									
Trauma				**1.46**	**1.35, 1.58**	**<.0001**	**1.47**	**1.36, 1.60**	**<.0001**
SUD				**1.70**	**1.50, 1.92**	**<.0001**	**1.70**	**1.51, 1.92**	**<.0001**
Services Received									
Psycho-pharmacological							**1.07**	**1.03, 1.12**	**0.002**
Trauma-specific							0.97	0.93, 1.01	0.163
Co-occurring							0.96	0.92, 1.00	0.065
Case Management							0.96	0.92, 1.01	0.096

Table 7: Odds Ratios for Improved Overall Health among Individuals with SMI treated in CMHCs

	Model 1			Model 2			Model 3		
Variable	OR	95%	P-Value	OR	95%	P-Value	OR	95%	P-Value
Race									
Black	**1.08**	**1.01, 1.15**	**0.023**	**1.07**	**1.00, 1.14**	**0.039**	**1.07**	**1.00, 1.14**	**0.036**
AI	1.00	0.90, 1.12	0.963	1.01	0.91, 1.13	0.828	1.01	0.90, 1.13	0.877
Asian	1.01	0.87, 1.17	0.896	0.99	0.85, 1.15	0.904	0.99	0.86, 1.15	0.920
Native HI	**1.31**	**1.05, 1.64**	**0.019**	**1.30**	**1.04, 1.63**	**0.023**	**1.30**	**1.03, 1.62**	**0.025**
Alaska Native	**1.47**	**1.11, 1.95**	**0.007**	**1.47**	**1.10, 1.95**	**0.008**	**1.45**	**1.10, 1.93**	**0.010**
Hispanic	**0.86**	**0.79, 0.93**	**<.0001**	**0.85**	**0.79, 0.92**	**<.0001**	**0.85**	**0.79, 0.92**	**<.0001**
White (reference)									
Age									
26-34	**0.78**	**0.69, 0.88**	**<.0001**	**0.79**	**0.70, 0.89**	**<.0001**	**0.78**	**0.69, 0.88**	**<.0001**
35-34	**0.64**	**0.57, 0.72**	**<.0001**	**0.64**	**0.57, 0.72**	**<.0001**	**0.64**	**0.57, 0.71**	**<.0001**
45-54	**0.55**	**0.49, 0.61**	**<.0001**	**0.55**	**0.49, 0.61**	**<.0001**	**0.55**	**0.49, 0.61**	**<.0001**
55-64	**0.64**	**0.57, 0.72**	**<.0001**	**0.63**	**0.56, 0.71**	**<.0001**	**0.63**	**0.56, 0.71**	**<.0001**
65-74	**0.72**	**0.60, 0.87**	**0.001**	**0.71**	**0.59, 0.86**	**<.0001**	**0.71**	**0.59, 0.86**	**<.0001**
75-84	0.70	0.46, 1.07	0.098	0.69	0.45, 1.04	0.080	0.69	0.45, 1.04	0.078
85-94	**0.17**	**0.05, 0.63**	**0.015**	**0.17**	**0.05, 0.62**	**0.008**	**0.17**	**0.05, 0.63**	**0.008**
18-25 (reference)									
Sex									
Female	**0.72**	**0.68, 0.76**	**<.0001**	**0.72**	**0.68, 0.76**	**<.0001**	**0.72**	**0.69, 0.76**	**<.0001**
Comorbidity									
Trauma				**0.83**	**0.77, 090**	**<.0001**	**0.83**	**0.77, 0.89**	**<.0001**
SUD				**0.67**	**0.60, 0.75**	**<.0001**	**0.67**	**0.60, 0.75**	**<.0001**
Services Received									
Psycho-pharmacological							1.02	0.98, 1.07	0.345
Trauma-specific							1.02	0.98, 1.06	0.405
Co-occurring							1.01	0.97, 1.05	0.628
Case Management							1.02	0.97, 1.07	0.372

Summary

This study examined heterogeneity in treatment effects across subgroups, among individuals with serious mental illness receiving integrated primary and behavioral healthcare in Community Mental Health Centers. The primary objectives were to (1) assess the effects of race or ethnicity, age, and gender on mental health and overall health outcomes; (2) assess the influence of comorbid Substance Use Disorders or post-traumatic stress on the effects of race or ethnicity, age, and gender on mental health and overall health outcomes; and (3) assess the influence of type of services received on the effects of race or ethnicity, age, and gender on mental health and overall health outcomes.

Statistically significant differences in the odds of improved mental health functioning were observed for Blacks, Asians, Alaska Natives and American Indians. Blacks, Alaska Natives and Asians were less likely than Whites to report improved mental health functioning. However, this association was no longer significant for Asians when comorbid trauma and SUD were added to the model. American Indians were more likely than non-Hispanic Whites to report improved mental health functioning but only after controlling for comorbidity and the type of services received.

Statistically significant differences in the odds of improved mental health functioning were also found by age group. All age groups were more likely to report improved mental health functioning compared to consumers 18 to 25 years old. The inclusion of comorbidity and the type of services received in the model did not impact the direction or significance of these associations. Women were less likely to report

improved mental health functioning than men, and comorbidity and type of services received did not effect this association.

Statistically significant differences were also found for race, age, and gender in the odds of improved overall health. Blacks, Native Hawaiians and Alaska Natives were more likely than non-Hispanic Whites to report improved overall health, while Hispanics were less likely than non-Hispanic Whites to report improved overall health. This association was not mediated by comorbid SUD, trauma or the type of service received. While older age, compared to 18 to 25 year olds, was associated with greater odds of improved mental health functioning, older age was associated with lower odds of improved overall health for all age groups 26 to 74 and 85 to 94. This reverse pattern was also observed for women. Women were less likely than men to report improved overall health, while they were more likely than men to report improved mental health functioning. In Chapter Five the implications of this study's findings are discussed and interpreted.

CHAPTER 5: CONCLUSIONS, IMPLICATIONS & RECOMMENDATIONS

Introduction

This chapter provides a summary of the study including a review of the significant findings, discussion of how the findings relate to the existing literature, and exploration of potential explanations for the unexpected findings. Implications for policy and practice are also discussed, as well as recommendations for future research. Chapter Five concludes with a discussion of the significance of the study and concluding remarks.

Overview of the Study

This study explored age, gender, and race or ethnicity differences in treatment outcomes after controlling for potential confounders, including clinical characteristics, such as comorbid SUD, and post-traumatic stress, and the type of treatment received. The primary objective was to examine heterogeneity in treatment effects across subgroups among individuals with serious mental illness (SMI) receiving integrated primary and behavioral healthcare in Community Mental Health Centers. Three specific research objectives were addressed:

1) Assess the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes among individuals with SMI receiving integrated primary and behavioral healthcare in CMHCs;
2) Assess the influence of comorbid SUDs and post-traumatic stress on the effects of race or ethnicity, age, and gender on mental health functioning and overall health outcomes, among individuals with SMI receiving integrated primary and behavioral healthcare in CMHCs; and
3) Assess the influence of the type of services received on the effects of race, age, and gender on mental health functioning and overall health outcomes, among individuals with SMI receiving integrated primary and behavioral healthcare in CMHCs.

A series of three logistic regression models were used to examine the effects of age, race or ethnicity, and gender on mental health functioning and overall health. Model 1 controlled for psychological distress, education level, and employment status. In

Model 2, comorbid SUD and post-traumatic stress were added to the model, and in Model 3, the type of services received were added to the model.

The final multivariate logistic regression model (Model 3) examined the effects of race or ethnicity, age, and gender on mental health functioning and overall health, controlling for psychological distress, education level, employment status, comorbid SUD and post-traumatic stress, and the type of services received. Analyses were conducted using STATA 12. The p-values are from two-sided tests with a 5% significance level.

Significant Findings

For mental health functioning, there were statistically significant differences in treatment effects for race or ethnicity, gender, and age. Black consumers, Asian consumers, and Alaska Native consumers were 28% to 32% less likely than non-Hispanic Whites to report improved mental health functioning. For Asians and American Indians, this association was mediated by comorbid SUDs, and post-traumatic stress. For Asians, the association was no longer significant after controlling for comorbid SUDs and post-traumatic stress. For American Indians, the effect of race became significant only after controlling for comorbidity, but interestingly, American Indians were 16% more likely than non-Hispanic Whites to report improved mental health functioning. These finding suggest that for Blacks and Alaskan Natives, in particular—the difference for Asians was just 5%, which according to the AHRQ definition of disparity, requiring differences of at least 10% in magnitude, does not reflect disparity—that there may be deficits in the quality of the integrated care provided for these populations. This view is consistent with

the conceptual framework for this study, Kilbourne et al's Health Disparities Research framework, which suggests that health disparities reflect gaps in the quality of care delivered which may be due to underperformance or non-adherence to processes or protocols that are considered to be best practices. It may be helpful to further examine the association between race and mental health functioning treatment outcomes for American Indians (who were more likely than non-Hispanic Whites) to report improved mental health functioning, and for Native Hawaiians and Hispanics, for whom there were no statistically significant differences in improved mental health functioning, when compared to non-Hispanic Whites. This may elucidate processes or protocols that may be impacting their better treatment outcomes that can be used to inform treatment for the subgroups with disparities.

Consumers ages 26- to 64-years old were more likely to report improved mental health functioning compared to consumers 18- to 25-years old, and this association was not mediated by comorbidity or the type of services received. There were no statistically significant associations between age and improved mental health functioning for consumers ages 65- to 94-years old. Given that much of the prior research on the effectiveness of integrated care has focused on elderly populations, there is already strong evidence that integrated care benefits the elderly. The results from this study indicate that for mental health functioning, there is evidence to suggest that younger to middle-aged consumers may also benefit from integrated care.

Women were 44% to 46% more likely than men to report improved mental health functioning. This association was not mediated by comorbidity or the type of service received. In contrast, for overall health, women were 28% less likely than men

to report improvement. These findings indicate differential effects between men and women for mental health functioning and overall health, but they also indicate that the direction of the difference in the effect varies for mental health outcomes and overall health. This finding was also observed for age and race.

Older age (compared to the reference population of 18 to 25 year olds) was associated with decreased odds of reporting improved overall health. This is in contrast to older age being associated with increased odds of reporting improved mental health functioning. For overall health, all age groups between 26 and 74 were 22% to 45% less likely to report improved overall health compared to consumers 18 to 25 year olds. While this association was not significant for 75-84 year olds (OR = 0.70, p = 0.098), 85 to 94 year olds were 83% less likely than consumers 18 to 25 years old to report improved overall, a finding that is not surprising, as overall health tends to decline with age.

While there is considerable evidence from prior research supporting the exacerbation of symptoms and the potential altering of the course of treatment for consumers with comorbid SUD and post-traumatic stress, the findings from this study suggest that neither comorbid post-traumatic stress or SUD significantly impacted the effects of the demographic variables and overall health treatment outcomes. For race or ethnicity, age and gender, neither the direction nor strength of the association changed substantially after controlling for comorbidity.

For mental health functioning, a similar finding is observed, with no significant impact found after controlling for comorbidity for age and gender. The exception is for race, where for American Indians, controlling for comorbidity results in a

statistically significant odds of reporting improved mental health functioning. This may reflect the greater proportion of American Indians reporting comorbid SUD and post-traumatic stress.

The type of services received did not seem to influence the effects of race or ethnicity, age, or gender on mental health functioning or overall health. For both treatment outcomes, the effects of race, age, and gender remained relatively constant after controlling for the type of services received. However, the results from Model 3, which included the following types of services received: psychopharmacological; trauma-specific; co-occurring therapy, and case management; indicate that of the four treatment types considered, only psychopharmacological treatment was associated with improved odd of reporting mental health functioning, after controlling for all other variables. Consumers that received psychopharmacological treatment were 7% (OR = 1.07, p = 0.002) more likely than consumers not receiving psycho-pharmacological treatment to report improved mental health functioning.

Findings related to the literature

Few studies have examined racial differences in health outcomes in equal- access healthcare settings (Jha, Shlipak, Hosmer, & Frances, 2001). This study adds to the body of literature exploring racial disparities in settings where access is presumably not an issue (Haider, Scott, Rehman, & Velopulos, (2013). This is an important area to explore as health disparities are often attributed to socioeconomic issues, including lack of healthcare coverage, which can impede access to healthcare services delivery. Some prior studies have demonstrated that equal access healthcare systems eliminate disparities

for Black individuals (Chaudhary et al., 2017), although much of the prior research in this area has focused on disparities related to mortality, hospital readmission, or healthcare utilization. The results from this study with respect to the elimination of disparities for Black individuals are mixed. Disparities for Blacks were absent for overall health, but Blacks were still significantly less likely than non-Hispanic Whites to report improved mental health functioning, even after controlling for comorbidity, psychological distress and the type of services received, suggesting that there may be deficits in the quality of care for this population.

This study adds to the body of the literature on the effectiveness of integrated care, by focusing on differences in treatment outcomes for a study population with diagnoses of SMI in a community mental health setting. Prior research on the effectiveness of integrated care has typically focused on integration of behavioral health in primary care facilities for consumers with depression or other less serious mental health issues, (Druss et al., 2001; Pomerantz et al., 2010; Solberg et al., 2013; Thiejke et al., 2007), and not examined the extent to which the impact of integrated care varies for different populations. Prior studies on the effectiveness of integrated care on mental health functioning and mental health symptoms found reductions in positive symptoms, and improvement in some, but not all, measures; which is consistent with the findings from this study.

Implications for Policy and Practice

Since late 2003, the Centers for Medicare and Medicaid Services has provided data regarding beneficiaries' race and ethnic background to participating health plans and

has required that they conduct at least one project to reduce disparities. Many health plans have implemented integrated approaches to healthcare delivery as a means to address disparities. However, prior research offers limited evidence about whether integrated care decreases disparities. The findings from this study, while mixed, are consistent with the proposition that integrated care may be associated with reductions in disparities for some populations and outcomes. In this study, disparities in overall health were absent for Blacks, Native Hawaiians, and Alaska Natives; and disparities in mental health functioning were absent for women, and American Indians. This finding lends support to the potential of integrated care as a policy solution to addressing variations in outcome on the basis of nonclinical factors such as race. It is important to identify delivery system reforms that may address disparities because persistent racial and ethnic disparities in the quality of care may not be eliminated by policy instruments such as the extension of Medicaid coverage. Addressing these disparities may require a more multifaceted approach that includes changes in healthcare delivery systems and organizational culture, which are central tenets of integrated care.

Important priorities for future investment of resources for integrated care include examining the sustainability of successful integration models, identifying methods of expanding integrated care into various settings, examining the business case for integration, assessing the cost-effectiveness of integration, and identifying key components of successful integrated care approaches.

There are several practical issues that must be considered regarding implementation of integrated care, particularly for CMHCs. Implementation of co-location models of integrated care for CMHCs is often supported by grant funding, and

grant funding is not a practical long-term payment option. Also, as payment models for healthcare services become increasingly performance and quality-based, there are concerns that Pay-for-Performance initiatives may actually worsen disparities, if providers concerned about achieving improved health outcomes choose to restrict their clientele to consumers with less severe illnesses. Risk adjustment may be needed to avoid equity concerns where there might be an unintended consequence of neglecting medically complex patients. Studies that examine variation in outcomes for sub-populations, such as this dissertation, could help inform the design of risk adjustment models for value-based payment.

This study benefitted from the use of standardized measures across CMHCs. The use of standardized quality measures in mental health services may be particularly helpful in identifying deficits in the quality of care and developing appropriate quality improvement initiatives. The use of patient-reported outcome measures continues to receive support from providers and policy-makers as a tool for assessment and comparison of outcomes. Healthcare providers are also increasingly accepting that patient-reported outcomes can be used to promote change in the delivery and organization of healthcare. However, it is critical that patient-reported outcomes are used to guide treatment, as well as for reporting on provider performance. The use of patient-reported outcomes has significant potential for improving clinical care by identifying areas of concern that may be unrecognized by the provider, allowing clinicians to monitor consumer status longitudinally, and providing an important, and perhaps authoritative source of information about treatment response.

Deciding which patient-reported outcome measures to use can be a barrier to

adoption, but selecting appropriate tools and measures is critical for patient-reported outcome measures to be both actionable, and clinically relevant. Even after review of the validity and reliability of patient-reported outcome measures, it may not always be clear which measure is most appropriate. The International Consortium for Health Outcomes Measurement suggests that it is sometimes best to move forward with the best currently available option. An example of this can be observed with the NOMs tool measure for overall health. Patient-reported outcome measures are typically divided into three categories: (1) symptom burden; (2) functional impact; and (3) health-related quality of life. The NOMs tool uses the Kessler Psychological Distress Scale (K6) to assess symptoms of psychological distress, the National Association of State Mental Health Program Directors, Mental Health Statistics Improvement Program Scale to assess mental health functioning, and the World Health Organization Health and Performance Questionnaire (HPQ) measure for overall health, presumably as an indicator of health-related quality of life. However, health-related quality of life is a multi-dimensional concept and it may be difficult for a single-item measure to capture all of the domains—physical, mental, emotional, and social—that may impact quality of life. Testing and development of health-related quality of life measures is ongoing and more comprehensive measures may be on the horizon. The Patient-Reported Outcomes Measurement Information System Global Health Measure assesses global health-related quality of life through questions on physical health, mental health, fatigue, pain, emotional distress, social activities, and roles.

Kilbourne et al.'s (2006) Heath Disparities Research Framework, the conceptual framework for this study, depicts the progressive nature of health disparities research and

the issues and challenges associated with each phase. The framework emphasizes understanding the multilevel determinants of health disparities and the development and testing of interventions to address disparities that engage communities, providers, and policymakers. The framework provides an important foundation upon which the research objectives addressed in this study, and the future of health disparities research, are based. However, the framework could be improved by including a phase that is focused on defining health disparities. Defining health disparities is mentioned as an issue in Phase 1: Detection, but it is not the focus of Phase 1, and having a conceptual definition of disparity is essential to measuring progress towards eliminating disparities. Determining when a difference becomes a disparity is subjective and has important implications for the measurement of disparities, and for health policy.

Having a consistent definition of disparity could help to focus research and policy on the areas of greatest need, but definitions vary significantly. AHRQ defines disparity as any difference among populations that differs from the reference population by at least 10 percent and is statistically significant. The IOM defines disparity as differences in the quality of healthcare that are not due to clinical needs, access-related factors, or appropriateness of intervention The World Health Organization (WHO) defines disparities as differences in health that are unnecessary, avoidable, and considered unfair and unjust. While the distinctions in these definitions may be small, they are important. Having a consistent conceptual definition of disparities can help to facilitate reporting of disparities as well as measuring progress towards eliminating them.

Recommendations for Further Research

Research that focuses on differences in the influence of individual characteristics on outcomes and quality of care can be used to identify subpopulations that require particular attention, and to inform health policy. This study considered both socio-demographic (age, race/ethnicity, and gender) and clinical characteristics (psychiatric symptoms, comorbidities, and functional status) as individual characteristics. Additional research is needed that examines the role and interaction of these factors, as well as other factors that may affect disparities in outcomes. Social network characteristics, including constructs such as the size of an individual's social network, intensity, or frequency of contact, as well as functional characteristics such as the level of emotional support provided by the network, have been shown to be associated with mental health outcomes in some prior research (Rost et. al., 2002). While this variable was not included in the present study, there is a growing body of research suggesting that the role of social connectedness on mental health outcomes may be significant. Additional research exploring the role of social networks on mental health outcomes could help elucidate the cultural factors related to community building and family engagement that may impact disparities.

Also, while integrating primary and behavioral healthcare may help improve outcomes for consumers with SMI (Druss et al., 2001; Frank & Epstein, 2014), the degree of coordination or integration may be a significant factor. Fully integrated models of integration, rather than co-location or collaboration models, may provide the highest quality of care for consumers with SMI (Gerrity, 2015). This dissertation did not address whether specific models of integration may be more or less likely to eliminate

disparities, because due to the requirements of the grant, the PBHCI grantees were relatively similar in their implementation of integrated care. Further research is needed to better understand the role of aspects of the healthcare delivery system and integration models, including financing, organizational culture; and other mutable organizational factors, such as the comprehensive nature of the services delivered, level of coordination and continuity.

Future research in the area of integrating primary care into specialty mental health settings should examine the relevant attributes of the service system, the service range, provider mix, treatment locations, cost-effectiveness, linkages with other systems, and organizational mechanisms for outcomes monitoring and quality improvement. Future research on integration should also examine outcomes related to SUDs. Given the prevalence of co-occurring SUD and SMI, and the growing opioid addiction epidemic, it is important that integrated healthcare is comprehensive and broad enough in scope to address, not only physical and mental health outcomes but also outcomes related to SUDs. This is also consistent with the health home model of care which promotes a whole person philosophy that offers coordinated care to individuals with multiple chronic health conditions, including mental health and substance use disorders.

Significance of the Study

This study benefited from data from a large study population of more than 60,000 consumers (at baseline) collected over a 6-year period. The broad socio-demographic, educational, and vocational characteristics of this population may enable generalization to the greater population of SMI consumers treated in CMHCs across the United States.

As emphasis on public health and the expansion of healthcare coverage has helped to increase access to mental health services for the underserved, health policy is becoming increasingly focused on improving the quality of these services. This study contributes to the existing research by considering whether the origin of the disparity is attributable to differences in the quality of care provided to vulnerable and less vulnerable populations, or other factors, such as the severity of illness (i.e., comorbid SUD and post-traumatic stress) and type of services received.

The findings from this research may help healthcare providers and administrators interested in implementing integrated physical and behavioral health programs by providing evidence that identifies populations for whom there may be deficits in the quality of the integrated care provided. The findings from this study may also be used to assist payers in developing criteria for quality-based payments or risk-adjustment models.

There is a growing emphasis on studying patient-reported outcomes. The outcomes of treatment or clinical interventions that are reported by the patient are being increasingly prioritized, and little information is available regarding the effectiveness of integrated services on patient-reported outcomes. This study assessed patient-reported outcomes for persons with SMI in CMHCs, which addresses several of the gaps identified in the existing literature on the effects of integrated care (Carey et al. 2013).

Findings from this study may also benefit consumers of integrated services, healthcare providers, case managers, and policymakers, by providing outcomes research regarding treatment effectiveness for populations that have not been previously studied, which could be used to inform implementation and protocol development for integrated

care. Providers may also use the findings to explain the effectiveness of integrated services to consumers to assist them in making informed decisions about their healthcare, and to train future providers on the benefits of integrated care models.

This study provides support for the clinical potential for integrated care beyond depression and provides support for the potential of integrated healthcare to improve the quality of mental healthcare by reducing health disparities.

Concluding Remarks

Expansion of funding for integrated care programs was a key provision of the ACA, and proponents of healthcare reform touted a decrease in health disparities as one of the anticipated benefits of integrated care. A key takeaway from this study is that integrated care does seem to be associated with an absence of disparities for some races and outcomes. Disparities in overall health were absent for Blacks, Native Hawaiians, and Alaska Natives; and disparities in mental health functioning were absent for women, and American Indians.

This study also highlights the importance of studying health disparities in outcomes because they may reflect gaps in the quality of care, including underperformance of treatments or processes of care. As healthcare administrators and policy-makers increasingly embrace and promote delivery system reform, it is important to conduct disparities research that is designed to identify and address gaps in the quality of care.

This dissertation contributes to the gaps in the existing literature in several areas: it examines factors that may confound observed differences in healthcare outcomes for

different groups; it assesses the effects of integrated care interventions on patient-reported outcomes in real-world clinical settings; and it describes the role of demographic and clinical characteristics on variation of treatment outcomes. The findings can be used to inform coordination and management of mental healthcare services. This information can also be used to help improve the quality of care for individuals with SMI, and others who utilize mental health services.

While it is important to continue to conduct research that examines the impact that social determinants have on health outcomes of specific populations, and to use the findings to consider broader issues; researchers, policymakers and administrators should also recognize that disparities stem from many different causes including persistent societal inequities in jobs, education, and other factors. Fundamental changes in social policy, not just health policy, are necessary to eliminate disparities in healthcare outcomes.

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