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IMPACT OF COMMUNITY TREATMENT AND NEIGHBORHOOD DISADVANTAGE
ON RECIDIVISM IN MENTAL HEALTH COURTS

BY

Woojae Han

A Dissertation

Submitted to the University at Albany, State University of New York

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The Requirements of the Degree of

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School of Social Welfare

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Impact of Community Treatment and Neighborhood Disadvantage
on Recidivism in Mental Health Courts

BY

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Dedication

I dedicate this work to all members of my family, especially to my father Kookwhan Han; my mother Manseob Kim; my wife Hyejin Won; and my two sons, Jiho and Juho for their endless love, support, and prayers.

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Abstract

The purpose of the study is to investigate the impact of community treatment and neighborhood disadvantage on recidivism among offenders with mental health problems in Mental Health Courts (MHCs) and in traditional courts. Although treatment is believed to lead to reduced recidivism for offenders with mental illness, little research has been conducted for MHC participants. Further, neighborhood disadvantage are known to influence recidivism generally, but environmental factors have not been examined in the MHC context.

Data from the MacArthur MHC study were analyzed. The sample includes 741 offenders with mental illness from four counties. Participants were interviewed at baseline and six months after and objective arrest data were collected. Multilevel modelling and propensity score weighting was used to investigate individual level (level 1) and neighborhood level (level 2) variances on recidivism and to control for selection bias. Neighborhood disadvantage data were obtained from the American Community Survey at U.S. Census Bureau, and linked with residential data from participants.

Study results suggest that some of treatment variables have significant impact on arrest. For example, MHC participant with more substance abuse service were less likely to be arrest compared to those with less substance abuse service before the court enrollment. Both TAU and MHC participants has significant effect of neighborhood disadvantage on arrest before the court enrollment. After the court enrollment, only MHC participant continued to have effect of neighborhood disadvantage on arrest. In addition, MHC participant with higher treatment motivation were less likely to recidivate compared to those with lower treatment motivation after the court enrollment. The probability of recidivism remained statistically lower among the MHC than the TAU group after the court enrollment.

Understanding treatment characteristics and neighborhood disadvantage associated with recidivism for offenders with mental illness can help to more efficiently target research, practice, and policy in the future. In addition, social work professionals should recognize themselves the importance of the treatment related variables and neighborhood disadvantage to provide, develop, and implement innovative interventions for offender with mental illness. Lastly, this research will shed new light into future interventions and/or policies that aim to reduce the recidivism for this difficult-to-treat population of offenders.

CHAPTER ONE

Introduction

Mental Health Courts (MHCs) are an alternative to incarceration for people with mental illness in the criminal justice system. MHC participants are assigned to mandatory treatment under court supervision through the traditional court system. Previous studies have shown that since the 1960s there has been an increase in the number of inmates with mental illness, and that they are more likely to be re-involved with the criminal justice system, possibly due to unmet treatment needs while incarcerated (Lamb & Weinberger, 1998; Landsberg & Smiley, 2001). To overcome the limitations of the traditional court system in treating offenders with mental illness, MHCs divert them into specialty courts and link them with mental health service providers to reduce recidivism and increase treatment accessibility. Current MHC evaluation studies show successful outcomes for participants, such as reduced recidivism, improved clinical outcome, and increased access to treatment (Christy, Poythress, Boothroyd, Petrila, & Mehra, 2005; Cross, 2011; Dirks-Linhorst & Linhorst, 2012; Frailing, 2010; Herinckx, Swart, Ama, Dolezal, & King, 2005; Keator, Callahan, Steadman, & Vesselinov, 2013; Luskin, 2013; McNiel & Binder, 2007; Trupin & Richards, 2003). Nevertheless, it is not yet clear whether the treatment under the MHC system, indeed, leads to less recidivism, as has been theorized. In addition, community environment is known to be an important factor related to criminal behaviors. But, few studies have demonstrated associations between neighborhood disadvantage and recidivism in MHCs, particularly for people with mental illness in the criminal justice system. The purpose of the proposed study is to examine the impact of mental health treatment and neighborhood disadvantage on recidivism in people enrolled in MHCs. The background and rationale for the study are informed by a summary of empirical research on the associations between mental

health treatment, neighborhood influences and recidivism of offenders with mental illness. A theoretical framework that can guide future investigation of the impact of mental health treatment and neighborhood disadvantage on recidivism, and methods that will be used to address the research questions/test hypotheses will be discussed.

A. Statement of Problem

The prevalence of mental illness among people in the criminal justice system increased ten-fold between 1983 and 2006, from 6.4% to 64% (James & Glaze, 2006; Teplin, 1990). Beginning in the 1960s, de-institutionalization contributed to an increasing number of people with mental illness in the criminal justice system as more of these individuals were discharged from inpatient psychiatric hospitals but entered into the prisons (Lamb & Weinberger, 1998; Landsberg & Smiley, 2001). Thus, people with mental illness are more likely to be found in jail or prison than the psychiatric facilities. According to recently released information from a survey of all 50 states and the District of Columbia, it is estimated that there are approximately 356,268 inmates with mental illness in U.S. prison and jails while only 35,000 individuals with serious mental illness remaining in the state psychiatric hospitals (Torrey, Lamb, Eslinger, Biasotti, & Fuller, 2014). However, five decades ago, in 1964, about 500,000 individuals with severe mental illness were in state psychiatric facilities (Torrey et al., 2014). Thus, today, there are approximately ten times more people with serious mental illness in prisons and jails than in state hospitals. It has been estimated that approximately 20% of the U.S. jail population has a mental illness (Torrey et al., 2014), and the rate of severe mental illness among inmates is higher among women than men (Steadman, Osher, Robbins, Case, & Samuels, 2009). Indeed, there is a shift in the number of this population between the two systems. Without ensuring appropriate treatment,

discharging inmates with mental illness often leads to frequent re-involvement of the person with the criminal justice system (Lamb & Grant, 1982, 1983).

The increasing numbers of incarcerated people with mental illness drew the interest of the National Alliance of the Mentally Ill (NAMI). The 2015 NAMI report discussed the trend, pointing out that first, most charges for the convicted were misdemeanors or minor felonies, which are often related to untreated mental health symptoms, and second, crimes by people with mental illness often originated in addressing basic needs of life resulting from homelessness and lack of access to resources (NAMI, 2015). In addition, Stuart and Arboleda-Florez (2001) found that less than 3% of violent crime originated from the people with severe mental illness.

Untreated mental illness is a risk factor believed to influence recidivism and future incarceration (Fisher, Silver, & Wolff, 2006; Slate, 2003). For instance, people with mental illness have higher rates of re-arrest compared to arrestees without mental illness, possibly due to unmet treatment needs (Baillargeon, Binswanger, Penn, Williams, & Murray, 2009; Primm, Osher, & Gomez, 2005). Lamb, Weinberger, Marsh, and Gross (2007) found similar patterns in people with mental illness and criminal charges. Among 104 inmates with severe mental illness, most had long histories of minor offenses and unmet, or inadequate identification of, treatment needs (e.g., non-medication adherence), which contributed to inappropriate behavior when they were in stressful environments (Lamb et al., 2007).

Criminal behavior is influenced not only by individual level factors (e.g., mental illness, treatment, or previous history of crime) but also by neighborhood level factors (Sampson, Morenoff, & Gannon-Rowley, 2002). Neighborhood characteristics including rates of poverty, vacant/abandoned housing, unemployment, public benefits receipt, and single-parent homes (Anderson, 2002; Currie & Yelowitz, 2000; He Len & Steinberg, 2006; Onifade, Petersen,

Bynum, & Davidson, 2011; Webster, MacDonald, & Simpson, 2006) have been found to be associated with recidivism over and above individual factors (Kirk, 2009; Kubrin & Stewart, 2006; Wehrman, 2010). People with mental illness have been found to be particularly vulnerable to the neighborhood disadvantage as a risk factor for crimes or violence (e.g., percentage of household below the poverty level, with public assistance, underemployed or percentage of vacant housing) (Silver, 2000; Silver, Mulvey, & Monahan, 1999; Simning, VanWijngaarden, & Conwell, 2012). For example, rates of mental illness are higher in neighborhoods with higher crime levels (Simning et al., 2012). However, despite the relevance of neighborhood disadvantages for rates of offending and rates of mental illness, previous MHC studies (e.g., Hiday & Ray, 2010; Herinckx et al., 2005; McNiel & Binder, 2007; Steadman et al., 2011) have focused almost exclusively on individual-level factors when examining the correlates of recidivism.

B. Relevance to Social Work Practice and Theory

MHCs have practical and theoretical implications in the social work area. First, in terms of the practical implications, the main role of MHCs is to divert offenders with mental illness away from jails and prisons and monitor their progresses (Steadman, Davidson, & Brown, 2001). Most MHCs do not provide treatment independently but, instead, link program participants with community agencies and monitor their progress. One of the major functions of the MHCs is to monitor the receipt of mental health treatment and track participants' progress (Erickson, Campbell, & Lamberti, 2006). In addition to monitoring the overall treatment, MHC staff are part of the multidisciplinary team that assesses the needs, establishes the appropriate treatment plan, evaluates the treatment progress, and recommends discharge or not (Erickson et al., 2006;

Talesh, 2007; Wales, Hiday, & Ray, 2010). For this, MHCs often rely on social work professionals as mental health service providers. While it varies by each MHC, most MHCs include clinical social workers as their MHC team (Hiday & Ray, 2010; Trupin & Richards, 2003). Thus, social workers play a critical role as part of multi-disciplinary teams in MHCs, providing part of the services for MHC participants (e.g., screening, initial evaluation, treatment planning/monitoring, and discharge) (Roberts, 2010; Trupin & Richards, 2003).

Further, the role of the social worker in the MHC system is not limited to providing treatment, but also, community support. Community support refers to any kind of services that help clients sustain their lives in the community instead of the residential facilities (e.g., inpatient hospital, prison, or jail). Thus, the overall role of MHC caseworkers include setting up initial treatment plans, coordinating services, networking with local mental health agencies, conducting drug use evaluation, providing crisis intervention, reporting clients' progress as a court liaison, planning the community support, and developing discharge plans with clients and other MHC team members (Kelli, 2012).

While the treatment is the critical part in the MHC, previous studies provide only descriptive clinical outcomes (Cosden, Ellens, Schnell, & Yamini-Diouf, 2005; Hiday & Ray, 2010; McNiel & Binder, 2007), or compare these outcomes between those in, and not in MHCs (Boothroyd, Mercado, Poythress, Christy, & Petrila, 2005; Luskin, 2013). Thus, current MHC studies show positive clinical outcomes (e.g., more treatment, better mental health symptoms) for MHC participants compared to the traditional court participants. However, little is known about whether those positive clinical outcomes are associated with recidivism which is a final goal of the MHC. In addition, there were few of studies to investigate the effect of MHC treatment on criminal behavior. Among the few, most include limited operationalization of treatment variables

for this analysis. For example, Steadman, Redlich, Callahan, Robbins, and Vesselinov (2011) found that MHC participants without pre 6-month mental health treatment were more likely to be arrested in the 18-month follow-up. However, this study only includes the dichotomous treatment variable (yes/no) into the model and does not compare with control group. As mentioned, mental health treatment is a core component of the MHC which aims to reduce the recidivism for the program participant (Lamberti, 2007). While most studies show less recidivism among MHC participants (Cross, 2011; Dirks-Linhorst & Linhorst, 2012; McNiel & Binder, 2007; Sarteschi, 2009; Steadman et al., 2011), there are gaps in current MHC studies as to specific treatment factors that may drive positive criminal justice outcomes.

MHC system in the social work area also has theoretical implications. According to the Person-in-Environment (PIE) perspective, human behavior cannot be understood sufficiently based only on the individual, but with consideration of the various aspects of the environment (e.g., family, community, or society) around the individual (Shulman, 2011). MHCs have a particular interest in the community resources beyond community-based treatment that can prevent recidivism. For example, the caseworkers at MHC support participants in sustaining their lives in the community by teaching them about shopping, budgeting, and managing illness (Kelli, 2012). Further, to maintain stable community living, MHCs work with the community agencies to provide the various social services for participants including housing, employment, and public benefits (e.g., Medicaid, Supplemental Nutrition Assistance Program, or Social Security) (Thompson, Osher, & Tomasini, 2008). However, little is known about how the neighborhood disadvantage where the MHC participants live affects recidivism among MHC participants. Previous studies have not yet examined the trajectories from mental health treatment within the neighborhood disadvantage to recidivism, especially for MHC participants. Therefore, a clearer

understanding of these factors may improve current mental health policies, as well as the direct social work practice.

C. Introduction of the Mental Health Court

MHCs are specialized and diversionary courts in the criminal justice system that seek to link offenders with mental illness with treatment as an alternative to incarceration (Petrila, 2003). MHCs were specifically devised to decrease recidivism and to increase accessibility to community treatment among offenders with mental illness (Redlich, Steadman, et al., 2010). A basic assumption of MHCs is that untreated mental illness is the main source of criminal behaviors (Bernstein & Seltzer, 2003; Draine, Wilson, & Pogorzelski, 2007; Lamberti, 2007). MHC model changes emphasis of crime from punishing the blameworthy behaviors to changing the future criminal behaviors (Talesh, 2007). Thus, in order to reduce recidivism, a core component of MHCs is the provision of treatment (Erickson et al., 2006; Luskin, 2013; Steadman et al., 2011). In addition to the treatment, MHCs attempts to address the community engagement for the participants to live in the community without recidivism through the intensive supervision and social services (Wolff & Pogorzelski, 2005). Ultimate goal of the MHC is to decrease recidivism and to increase accessibility to community treatment among offenders with mental illness (Redlich, Steadman, et al., 2010).

Although it has been said that there are no two identical MHCs in the U.S. (Thompson et al., 2008), all aim to reduce recidivism by providing adequate mental health treatment rather than penalizing offenders (Erickson et al., 2006; Luskin, 2013; Steadman et al., 2011). MHCs share several components; (1) a specialized court devoted exclusively to defendants with mental illness; (2) court supervised community-based treatment provided by a multidisciplinary team; (3)

rewards and sanctions applied on the basis of participants' treatment adherence; (4) criteria for program graduation; and (5) court monitoring of participant progress (Thompson et al., 2008).

CHAPTER TWO

Literature Review

A. Background Information about Mental Health Courts

1. History of Mental Health Courts

The MHC model was inspired by drug courts which have demonstrated positive outcomes (Schneider, 2010). Drug court studies have provided strong evidence of reductions in drug use, arrests, and criminal justice costs among participants compared to non-participants (Gottfredson, Najaka, & Kearley, 2003; MacKenzie & Hickman, 2006; Shaffer, 2006). Drug courts divert eligible offenders from traditional courts, and instead of penalizing those arrested for drug-related charges, provide them with options to receive treatment under certain rules (Huddleston, Freeman-Wilson, & Boone, 2004). Successful outcomes from drug courts informed other court diversion programs, such as those intended for people with mental illness.

In addition to the influence of drug courts on the establishment of MHCs, the number of persons with mental illness in the criminal justice system was overwhelming the traditional court system (Ditton, 1999). Each year, about two million adults with severe mental illness (i.e., schizophrenia, bipolar disorder, and depression) are incarcerated in U.S. jails (Steadman et al., 2009). Populations in the U.S. criminal justice system have been shown to have higher rates of mental illness compared to the general population (Baillargeon et al., 2010b; Lamb & Weinberger, 1998). Nevertheless, jails do not provide adequate, or even basic services (e.g., intake and crisis intervention) due to the lack of mental health professionals working in the system (Anno, 1991). Further, offenders with mental illness have become “frequent flyers” within the criminal justice system because they lack community resources before and after being discharged from jail or prison, and, far too often, return to the system (Torrey, Kennard, Eslinger,

Lamb, & Pavle, 2010). For instance, a Los Angeles County study found that 9 out of 10 inmates with mental illness are frequent offenders, and 30 percent of them have been incarcerated more than ten times in county jails (Torrey et al., 2010).

To address the issue of inmates with mental illness, Broward County in Florida established the first MHC in 1997. A judge organized a team of criminal justice and mental health stakeholders to investigate incidents involving offenders with mental illness and offer recommendations to handle offenders with mental illness. Soon after the opening of the Broward County MHC, the model was adopted in Seattle, Washington, Anchorage, Alaska, and San Bernardino, California. In 2000, Congress passed America's Law Enforcement and Mental Health Project, providing funding to initiate mental health court programs at the county level. The goal of this federal legislation was to divert offenders with misdemeanor charges and mental illness away from the criminal system, and to place them in community treatment if necessary. In 2004, The Mentally Ill Offender Treatment and Crime Reduction Act was enacted, authorizing grants to states and localities to develop collaborative mental health and criminal justice responses for people with mental illness in the criminal justice system (Hogan, 2003; Steadman & Redlich, 2005). Since many offenders with severe mental illness also suffer from the substance abuse problems (Junginger, Claypoole, Laygo, & Crisanti, 2006; Swartz & Lurigio, 2007), many MHCs also include drug treatment in the treatment plan (Bureau of Justice Assistance, 2008). These grants may be used for jail diversion programs, treatment for offenders with mental illness, or training for multidisciplinary professionals (Abramowitz, 2005). Currently, it is estimated that there are over 300 MHCs and they have been established in nearly all states (Council of State Governments Justice Center, 2014).

2. Program Eligibility

Individuals can be referred to a MHC by law enforcement officers, jail staff, defense counsel, judges, and family members (Thompson et al., 2008). Once an individual is referred to the MHC, a multidisciplinary team (e.g., the prosecutor, defense counsel, a mental health professional) reviews the application based on current charge, history of mental illness, and criminal history. Further, the MHC team collaborates to decide program participation of referred defendants by screenings, assessments, and enrollments (Thompson et al., 2008). Most MHCs limit eligibility to persons with ‘severe mental illness’ who have long-term, and profound impairment of functioning (e.g., schizophrenia, bipolar, anxiety disorders, or severe depression) (Council of State Governments Justice Center, 2008). In terms of the criminal charge, the first-generation of MHCs accepted offenders with only misdemeanors or low-level felonies (Redlich, Steadman, Monahan, Petrila, & Griffin, 2005). However, newer generations of MHCs have expanded the scope of eligibility, accepting offenders with felony or violence charges as well (Erickson et al., 2006; Steadman & Redlich, 2005). In addition, participation in MHCs is voluntary, but some MHCs require applicants to plead guilty to participate in the program (Fisler, 2005; Redlich, 2005).

3. Program Implementation

Upon MHC acceptance of an individual to the program, the program participant is connected to the community mental health agency, and a treatment plan is established during the initial hearing at the court. Average wait-time for the first hearing is 32 days to 3 months (O’Keefe, 2006; Redlich, Steadman, Monahan, Robbins, & Petrila, 2006). Enrollment in treatment through the MHC program usually continues for 12 to 18 months (Almquist & Dodd,

2009). In MHCs, the roles of the judge and other personnel are that of facilitators focusing on community support and resources (Boothroyd, Poythress, McGaha, & Petrila, 2003). At the initial meeting, the MHC participant, the judge, the prosecutors, the defense attorney, the probation or parole officers, and the case manager work together to develop a treatment plan and to link the participant with a mental health treatment provider to ensure the success of the program (Steadman et al., 2009).

One of the MHC's major roles is to monitor the participant's progress and adherence based on various sources of information, including the criminal justice agency, the mental health agency, or a combination of both (Griffin, Steadman, & Petrila, 2002; Thompson et al., 2008). For instance, until the participant graduates from the program, the MHC monitors violations, medication adherence, and drug screenings if s/he has co-occurring disorders (Cross, 2011; Thompson et al., 2008). Most MHCs have sanctions and rewards as incentives for the participants to comply with treatment plans. Court case dismissal is a frequent reward for successful completion of the program (Griffin et al., 2002). If the program participant is not treatment compliant, MHCs may increase the number of required treatment or meetings, revise the treatment plan, or provide warnings (Bernstein & Seltzer, 2003; Erickson et al., 2006; Griffin et al., 2002). Termination of the program and being sent back to the jail is the final sanction when there is non-adherence (Erickson et al., 2006).

B. Theoretical Justification for MHCs

Different from the traditional court system, MHCs set their principles to provide adequate mental health services for offenders with mental illness. In addition to the treatment, MHCs pay attention to the resources of the community in which the program participants reside because

they may also be risk factors for criminal behaviors. People with mental illness are particularly vulnerable to the environment around them compared to those without mental illness (Silver, 2000; Simning et al., 2012). The following section will discuss the background theories that lead to MHCs' serving special populations in need including Therapeutic Jurisprudence and Risk-Need-Responsivity, Social Disorganization Theory under Ecological System Theory.

1. Ecological System Theory

Ecological Systems Theory provides a conceptual framework to identify the levels and types of institutions or groups influences on an individual (Bronfenbrenner, 1999). Although the theory was designed to explain childhood development, it can help inform this study of the impact of MHC participation on offenders with severe mental illness. Bronfenbrenner stated that an ecological system is composed of five socially organized subsystems (i.e. Microsystem, Mesosystem, Exosystem, Macrosystem, and Chronosystem) which constrain the opportunities and behaviors of the individual (Bronfenbrenner & Bronfenbrenner, 2009). The sections below describe the key features of each subsystem and its relevance for an analysis of MHC participation.

1-1. Microsystem

The individual's immediate social roles and relationships are part of the Microsystem (Bronfenbrenner, 1999). The Microsystem is where an individual interacts with people in his/her immediate social circles (family, peer, or school) (Bronfenbrenner & Bronfenbrenner, 2009). Thus, an MHC participant has the potential to interact with multiple institutions or groups (e.g., family, school, religious institution, mental health agency, and peer group etc.) that immediately

and directly interact with, and influence his/her behavioral change. Individuals within the same Microsystems may influence each other, depending on the level and quality of relationships and expectations (Bronfenbrenner & Bronfenbrenner, 2009). For example, children whose fathers have a history of incarceration are more likely to display higher levels of aggression (Wildeman, 2010). In addition, there is evidence of a strong association between exposure to violent peers and likelihood to commit crimes (Zimmerman & Messner, 2011). Therefore, if the actors in the Microsystem around the MHC participant are deviant, that system may have a negative impact on his/her criminal behaviors, resulting in recidivism.

One of the models that informs MHCs is known as Risk-Need-Responsivity (RNR). RNR emphasizes an individual's level of risk and several features of Microsystem to change the behaviors (Andrews, Bonta, & Wormith, 2011; Ward, Collie, & Bourke, 2009). RNR helps to understand how the treatment can lead the individual's behavioral change. RNR is known as the most effective model in assessing the needs and providing treatment for offenders' rehabilitation (Blanchette & Brown, 2006; Ward, Melsner, & Yates, 2007). This model includes three principles that guide treatment for offenders: risk, need, and responsivity.

The risk principle states that criminal behavior is preventable if the offender receives adequate treatment based on the level of risk for recidivism (Bonta & Andrews, 2007). Thus, offenders with higher risks of crime should receive more intensive treatment. For instance, an average of 25 to 50 percent of recidivism was reduced when offenders were properly assessed and received appropriate levels of treatment (Carev, 1997). Similarly, Allen (2008) found that lack of appropriate treatment for offenders with mental illness may lead to continued criminal behavior. There are two parts to the risk principle: 1) offender's risk of recidivism and 2) level of treatment needed. Screening tools with high reliability and validity help to distinguish between

offenders with different levels of recidivism probability (Campbell, French, & Gendreau, 2007). Once the level of recidivism risk is determined, courts can then ensure that the appropriate level of treatment for offenders is provided.

The needs principle focuses on the importance of criminogenic needs and treatment to reduce recidivism. Criminogenic needs are risk factors that are directly associated with criminal activities (Bonta & Andrews, 2007). There are seven major need factors which should be assessed and targeted during the treatment (Andrews, Bonta, & Wormith, 2006; Andrews & Dowden, 2006), including individual characteristics (antisocial personality pattern, criminal attitudes, substance abuse) and relationships with others in the Microsystem (peer support for crime, family/marital relationship, school/work, and recreational activities). Minor need factors include self-esteem, feelings of distress, and physical health (Bonta & Andrews, 2007). Research show significant differences in recidivism (average 19 to 23 percentage) when criminogenic needs are appropriately addressed (Andrews et al., 2006).

Last, the responsivity principle focuses on factors that may influence an individual's responsiveness to treatment that help him/her change behaviors (Andrews & Bonta, 2010). The responsivity principle states that the rehabilitation program should consider the offender's characteristics such as learning style, motivation level, personality, and interpersonal relationship. Although these factors may not be considered as risk factors, the responsivity principle plays an important role in determining the type and style of treatment that will be the most effective for a specific offender (Bonta, 2002). Treatment outcomes can be improved when the treatment pays more attention to the participant's personal strengths or personality factors (Bonta & Andrews, 2007). Thus, the treatment provider should consider individual motivation or treatment barriers as one of the key components that may affect recidivism rates (Andrews & Bonta, 2010).

Treatment under the RNR principle has demonstrated more successful outcomes than criminal sanctions, inappropriate treatment, or unspecified treatment (Ward et al., 2007). Meta-analyses have shown similar evidence from a variety of offender groups, including juvenile delinquents, female offenders, and offenders with violent charges (Dowden & Andrews, 2000, 2003). In addition, the RNR principle provides a framework for organizing programs and services that align with criminal justice organizational constraints to yield individual's positive outcomes (Andrews & Dowden, 2005; Dowden & Andrews, 2004). This research provides powerful evidence regarding how treatment under the RNR principle may be effective with offenders with mental illness. Therefore, depending on what & how the Microsystem works for the MHC participants under RNR principle, the outcomes would vary.

1-2. Mesosystem

The Mesosystem contains the interactions between the Microsystems (Bronfenbrenner & Bronfenbrenner, 2009), such as the interactions between a family and a school. The interactions within the Mesosystem have an impact on individual outcomes, health, and well-being (Denham, 2003; Steinberg, Mounts, Lamborn, & Dornbusch, 1991). In MHCs, there is intensive collaboration between individuals, groups, or institutes including the judge, community treatment providers, correctional personnel, or case managers (Thompson et al., 2008). For instance, Boothroyd et al. (2003) analyzed the MHC hearing and found that judges, mental health staff, public defenders and state attorneys work together to address participant's needs. In addition, MHC participants supported by the multidisciplinary team showed more mental health service utilization compared to the traditional court participants (Boothroyd et al., 2003).

Mesosystems work better to increase the link between the program participant and treatment providers in MHC than the Mesosystem in the traditional court system. Other studies for similar courts (i.e., drug court) demonstrate the importance of the Mesosystem. For example, Rempel et al. (2003) argue that intensive communications between agencies increased positive treatment and recidivism outcomes. In addition, a multidisciplinary approach by various government and community agencies decreased the possibility of recidivism in drug court (Searle & Spier, 2006). Finally, one meta-analysis study showed that drug court model with intensive collaboration between judges, defense counsels, treatment providers, and other staff, had the most successful outcomes (Carey, Finigan, & Pukstas, 2008).

These studies reveal the importance of the interactions among Microsystems and how they affect the outcomes. Strong and supportive relationship between the Microsystems would lead to positive changes (Shaffer, 2008). MHCs require the intensive involvement of professionals from all related disciplines (e.g., court personnel, public attorney, clinical social worker, or case manager) (Madden & Wayne, 2003; Thompson et al., 2008). Thus, MHC participant will have better treatment and criminal justice outcomes when relationships between individuals, groups, or institutions in MHC system are strong.

1-3. Exosystems

The Exosystem refers to aspects of the larger social system that indirectly influence the individual through the availability of social services (Bronfenbrenner, Husten, & Postelethwaite, 1994). For MHC participants, Exosystem has a key feature of neighborhood disadvantage, and resources for mental health services. For example, if the neighborhood has various resources for

behavioral health service and can provide intensive levels of mental health services, offenders with mental illness would have more opportunities to have the appropriate treatments.

Social disorganization theory is useful for elaborating the mechanisms through which the Exosystem influences recidivism. According to the theory, some communities are not able to effectively implement rules and regulations leading to disrupted neighborhood structure which have no social control (Bursik & Grasmick, 1999; Groves & Sampson, 1989; Travis & Waul, 2003). It posits that socially disadvantaged neighborhoods (e.g., with high rates of poverty, unemployment, population with public benefits) are more likely to experience lack of social control, resulting in higher rates of crime and delinquency (Bursik, 1988).

Kubrin and Stewart (2006) examined the impact of neighborhood socioeconomic status on recidivism of ex-offenders. They found that ex-offenders who return to disadvantaged communities are more likely to recidivate, while those returning to communities with resources have reduced chances of recidivism. Other studies have found that neighborhood factors, such as percentage of the people on public assistance, housing unit in vacant, housing units occupied by renters, and poverty significantly predict recidivism (Grunwald, Lockwood, Harris, & Mennis, 2010; Kubrin & Stewart, 2006; Mears, Wang, Hay, & Bales, 2008). In theory, MHC participants may have less recidivism when they are placed in advantaged communities (e.g., with lower poverty, vacant housing, and unemployment rates).

Silver (2000) examined social disorganization theory as applied to people with mental illness. After controlling for individual level risk factors, patients who were discharged from inpatient stays into more disadvantaged environments were more likely to commit crimes compared to those who were discharged into less disadvantaged areas. Thus, social disorganization theory was applicable to people with mental illness. It argues that people with

mental illness (e.g. MHC participants) are particularly vulnerable to committing crimes when they are in a disadvantaged community (Silver, 2000). However, this study did not target offenders with mental illness, but rather patients discharged from psychiatric facilities. An additional limitation of Silver's study was that violence was measured with self-reports, instead of objective data (e.g. Federal Bureau of Investigation or county police records) over a short period of time (10 weeks).

1-4. Macrosystem

The Macrosystem includes overarching beliefs and values and influence the interactions of Microsystem, Mesosystem, and Exosystem (Bronfenbrenner et al., 1994). Members in the same Macrosystem would share a common identity, heritage, and values (Kail & Cavanaugh, 2015). In MHC, the Macrosystem includes the county level of laws and policies for the people with mental illness and criminal charges. The county, as a Macrosystem, is the only level where an MHC will be established. Counties with MHCs display different values and beliefs towards offenders with mental illness compared to counties without MHC.

Therapeutic jurisprudence (TJ), practiced at the Macrolevel by specialty types of courts (e.g., drug court, family court, and mental health court), posits that people with mental illness are influenced by experiences in the criminal justice system, and that a punitive approach such as a legal process is not an ideal option for people who need treatment (Schneider, 2010). TJ is a relatively new approach in the criminal justice system to approach the offender's need instead of punishing their crimes (Herinckx, Swart, Ama, Dolezal, & King, 2005; Hora, Schma, & Rosenthal, 1998; Winick, 2002). TJ argues for a non-adversarial approach focusing on therapeutic outcomes for people in the legal process and the impact of the law on an individual's

emotional life and psychological well-being (Wexler & Winick, 1996; Winick & Wexler, 2003). Thus, TJ focuses on how the legal process supports the individual, and attempts to address the origins of the problem and to change behavior instead of penalizing the consequences of the behaviors (Winick, 2002).

The objective of TJ is to have positive therapeutic outcomes, both for the court participants and their families, and ultimately lead to safer communities (Palermo, 2010). Hence, courts accepting the principle of TJ collaborate with multidisciplinary team members to prevent inmates' re-involvement in the criminal justice system (Wexler & Winick, 1996). For instance, drug treatment court participation is an alternative to sentencing for a drug possession charge in a traditional court which would not be focused on reducing the offender's drug addiction (Berman & Feinblatt, 2001). Thus, drug courts require offenders to participate in a drug treatment program instead of sentencing them for drug-related charges. Based on the TJ principle, drug courts aim to break the cycle related to drug-related addictions and crime (Mitchell, Wilson, Eggers, & MacKenzie, 2012; Shaffer, 2011). This approach occurs at the Macrosystem level.

Similar to the application of TJ in the drug courts, MHCs support the basic premise of TJ by trying to ensure that the program guides participants to have positive therapeutic outcomes (Casey & Rottman, 2000). Recently, Redlich and Han (2014) examine the link between the TJ and MHC completion and found that higher levels of TJ were significantly associated with higher rates of MHC success. In contrast to the adversarial and punitive relationship between court and offender in the traditional court, staffs in MHC system attempt to establish relationship with participants by showing respect, engagement with the team, and active listening (Boothroyd et al., 2003; Cross, 2011; Wales et al., 2010).

1-5 Chronosystem

The Chronosystem encompasses the dimension of time and includes major life transitions and historical events (e.g., birth, marriage, death, and family identity/ritual) during an individual's development (Bronfenbrenner, 1986). Within the context of the MHC, Steadman et al. (2011) found that MHC participants' recidivism rate was significantly decreased. Thus, MHC enrollment as individual's historical event influences his/her criminal behaviors over time. In addition, drug usage in last 30days and having bipolar disorder predicted the likelihood to have more days in the jail incarcerated (Steadman et al., 2011). Further, McNeil and Binder (2007) found that more times in the MHC system leads to better mental health and criminal justice outcomes even after the graduate in the program. Thus, Chronosystem has implications for the MHC that life event (e.g., history of arrest, jail incarceration, and drug usage) and environmental transition (e.g., enrollment in MHC or more time in MHC) would lead to the participant's behavioral changes.

Among the five different subsystems in the ecological system theory, the proposed study will focus on four of them (Microsystem, Exosystem, Macrosystem, and Chronosystem). Microsystem is the interactions among the individuals, groups, or institutes in the MHC system. Neighborhood disadvantage belongs to the Exosystem where indirectly affect the offenders with mental illness. In Macrosystem, although MHCs share the similar structure and purposes, each MHC is controlled and operated by the county. Therefore, MHCs have different Macrosystem such as procedures, regulations, or interactions between Microsystem, Mesosystem, or Exosystem. By differentiating the MHC in each county, Macrosystem can be evaluated. Last, Chronosystem in this study is the time variation (before and after the MHC enrollment). Mesosystem, however, cannot be measured because it is hard to operationalize it. For example,

some measurements need to account for the interactions between Microsystem (e.g., number of meetings or hearing between court and community treatment providers). However, the dataset to be used in the given study does not include those measurements.

C. Prior Research on Mental Health Courts

1. Mental Health Court Findings

Since 1997, when the first Broward County mental health court was established in Florida, there have been two main emphases of MHC studies— one focuses on the mental health treatment provided and the other on whether participants have less recidivism. This trend parallels the initial goals of MHCs, to reduce recidivism and increase accessibility to the treatment. The following section will discuss the previous MHC findings and their limitations, with a focus on criminal justice outcomes and service utilization.

1-1. Recidivism

Most MHC studies follow participants for one year or less after enrollment in the study. This is important to consider because the more time is spent within the MHC (or the larger number of treatment ‘doses’ received) the better the clinical and criminal justice outcomes are likely to be (McNiel & Binder, 2007; Moore & Hiday, 2006). To my knowledge, there are only three studies with follow-up periods of more than one year. Two studies (i.e., Hiday & Ray, 2010; McNiel & Binder, 2007) examined recidivism rates over a two-year period. Hiday and Ray (2010) found that MHC graduates had lower rates of recidivism than non-graduates, and that the effect was unchanged for two years after the MHC participants graduated the program and were no longer required to receive treatment. Similarly, McNiel and Binder (2007) compared the

recidivism rate for 170 MHC participants against 8,067 defendants with mental illness in the traditional system. A hazard analysis indicated that MHC graduates had an approximately 6% probability of new violent charges, compared to 13% for the traditional group at 18 months after court enrollment. Further, this impact remained effective two years after participants' graduation from the program. However, Hiday and Ray (2010) did not include a comparison group of non-MHCs participants, and McNiel and Binder (2007) focused on one county only. And most importantly, neither study included pre-enrollment arrest record, which is known to be a robust predictor of future arrests (Andrews & Bonta, 2010; Steadman et al., 2011). In the third study, Steadman and colleagues (2011) examined arrests of MHC and comparison group participants within a pre- and post-18 month period. They found that MHC participants had a small increase incarcerated days (i.e. 12%), whereas non-MHC participants had a 105% increase in arrests, suggesting that MHCs lead participants having less number of incarceration days (Steadman et al., 2011).

Research based on shorter follow-up periods has consistently found that MHC participants have more positive criminal justice outcomes (e.g., fewer arrests, violence, or jail days) compared to similar people not in MHCs (Christy, Poythress, Boothroyd, Petrila, & Mehra, 2005; Cosden et al., 2005; Cross, 2011; Dirks-Linhorst & Linhorst, 2012; Frailing, 2010; Herinckx et al., 2005; Keator, Callahan, Steadman, & Vesselinov, 2013; McNiel & Binder, 2007; Ridgely et al., 2007; Steadman et al., 2011; Trupin & Richards, 2003) or, at least, recidivism rates among MHC participants are no higher than rates of non MHC participants (Christy et al., 2005; Cosden et al., 2005). Recently, results from a meta-analysis of 18 MHC studies indicated that MHCs are moderately effective in reducing recidivism (Sarteschi, Vaughn, & Kim, 2011). In addition, Moore and Hiday (2006) compared recidivism rates between MHC participants and

traditional court participants and concluded that MHC participants had significantly fewer arrests than participants in traditional court during a 12-month follow up.

Although most MHC studies show moderately reduced recidivism rates, there are several limitations to these studies. First, there is not enough MHC literature about recidivism outcomes from cross-sectional studies. For example, most MHC recidivism studies have focused on a single court (but see Steadman et al., 2011). Although there are no identical MHCs, most share the similar philosophies and system (Almquist & Dodd, 2009; Schneider, 2010; Thompson et al., 2008). Second, measures of recidivism are not consistent across studies. A meta-analysis of eighteen MHCs reported 62 different recidivism outcomes (e.g., jail or prison days, arrest, or warrant) (Sarteschi, 2009). Third, recidivism in MHCs has not always changed statistically significantly (Sarteschi, 2009). Redlich et al. (2006) have noted that MHC studies show positive outcomes, but the effective reduction of recidivism has not been specifically demonstrated. Christy and colleagues (2005) found 9% less recidivism among MHC than comparison group members, but the difference was not statistically significant. Similarly, O'Keefe found that Brooklyn MHC participants had a 15% increase in new offenses after court enrollment whereas there were 27% arrests 12 months prior to enrollment, but again, this difference was not statistically significant (O'Keefe, 2006).

1-2. Service Utilization and Mental Health Outcomes

Community treatment through the MHC system is one of the core elements in preventing the cycle of recidivism because of the belief that people with mental illness are likely to commit crime due to unmet treatment needs (Draine et al., 2007; Lamberti, 2007). Once people with mental illness are released from prison or jail, most of these defendants have a difficult time

connecting with existing treatment (Baca, 2012). Service utilization studies in MHC are just emerging (Martin, Dorken, Wamboldt, & Wootten, 2012; Sarteschi et al., 2011). Thus, most MHC studies only provide information on the amount or kinds of services, but not on the differences in amount of treatment before and after the MHC court enrollment or between MHC participants and offenders with mental illness in the traditional court (Cosden et al., 2005; Cosden, Ellens, Schnell, Yamini-Diouf, & Wolfe, 2003; Fisler, 2005; Hiday & Ray, 2010; McNiel & Binder, 2007; Moore & Hiday, 2006; O’Keefe, 2006; Trupin & Richards, 2003).

Only a few studies provide treatment information about MHC participants in detail. For example, MHC participants received 61.6% more services 8 months after court enrollment compared to before, while service use of traditional court defendants was lower after court enrollment than before (Boothroyd et al., 2003). The traditional court defendants were from another county in the same state, but had similar criminal charges (e.g., nonviolent misdemeanor, ordinance violation, or criminal traffic offense) and mental health problems as MHC participants. In addition, demographic factors (e.g., age, gender, and race) and current mental health status were matched between MHC and comparison group. Two years later, Boothroyd and colleagues (2005) conducted a similar study of 97 MHC participants and 77 offenders at the traditional court. They found that MHCs provided more access to MHC participants compared to regular court participants (Boothroyd et al., 2005). Similarly, one study showed that MHC participants received more services (i.e., case management, medication management, and outpatient service) in the 12 months after court enrollment compared to the 12-month pre enrollment period (Herinckx et al., 2005). Days for outpatient services were doubled, from 24 days to 48 days after MHC enrollment. Two more recent studies provide specific information about a greater availability of treatment for MHC than traditional court participants. Steadman et al. (2011)

found that 71% of MHC participants received outpatient treatment, medication management, and case management during 12 months post-enrollment, while only 38% of members in a comparison group received those services. According to the most recent study by Luskin (2013), there was a similar use of treatment between MHC participants and traditional court defendants at the time of the court enrollment. But, 6 months after court enrollment, MHC participants had received more treatment, and the difference between two groups became greater.

Although some MHC studies have examined service utilization of participants, few studies examine the impact of utilization on participants' mental health symptoms (Christy et al., 2005; Cosden et al., 2005). In addition, there is no agreement how to define the clinical outcomes in MHC (Boothroyd et al., 2005; Cosden et al., 2005; Ferguson, Hornby, & Zeller, 2008). Most recently, Sarteschi (2009) conducted meta-analysis using 23 MHC studies (Bess-Associates, 2004; Boothroyd et al., 2005; Boothroyd et al., 2003; Boulden, Johnson, & Stapleton, 2006; Boulden, Stapleton, & Liedtke, 2007; Christy et al., 2005; Cosden et al., 2005; Cosden et al., 2003; Eckberg, 2006; Ferguson et al., 2008; Herinckx et al., 2005; Linhorst & Chustack, 2008; McNiel & Binder, 2007; Moore & Hiday, 2006; Morin, 2005; Neiswender, 2005; O'Keefe, 2006; Sneed, Koch, Estes, & Quinn, 2006; Teller, Ritter, Salupo-Rodriguez, Munetz, & Gil, 2004; Trupin & Richards, 2003; Trupin, Richards, Lucenko, & Wood, 2000; Trupin, Richards, Wertheimer, & Bruschi, 2001). Through the effect-size analysis, Sarteschi (2009) found that overall main effect sizes for the mental health/clinical, quality of life, and substance abuse outcomes (e.g., depression, anxiety, and inpatient treatment days) were either not significant nor stable. Only two studies show small but positive effect size indicating positive improvement in mental health status for MHC participant compared to non-MHC participants. These limited but positive clinical outcomes from MHC are aligned with other MHC studies (Boothroyd et al.,

2005; Boothroyd et al., 2003; Herinckx et al., 2005). Due to the small sample size, limited clinical variables and studies, she concluded there was positive improvement only with limited number of clinical outcomes (Sarteschi et al., 2011).

Further, Cosden et al. (2005) investigated the efficacy of MHCs in comparison with the treatment-as-usual group. In this study, MHC participants received treatment, case management (case manager with 1:15 client ratio), section 8 housing, transportation, and job training directly from the intensive care team. The comparison group was a “treatment as usual” group, with services possibly including case management (typically with a higher ratio (1:50)), waitlist for section 8 housing, and other social services. It was found that MHC participants had fewer jail days and better psychosocial functioning than traditional court participants (Cosden et al., 2005). In particular, the MHC group had greater improvement in the global assessment functioning (GAF) score compared to those in the control group, although scores for both groups increased over a 2 year period (Cosden et al., 2005). Luskin (2013) found that MHC participants received more frequent and various services compared to traditional court defendants. However, one study found no significant changes in mental health symptoms for MHC participants (Boothroyd et al., 2005). While studies show the positive outcomes of mental health service utilization and mental health status, little is known about whether these outcomes indeed lead better criminal justice outcomes which is one of ultimate goals in MHCs.

2. Recidivism of Offenders with Mental Illness

Although previous MHC research shows moderately positive criminal justice outcomes for MHC program participants compared to traditional court participants, little is known about whether treatment, indeed, has a significant impact on these outcomes. In addition, while

neighborhood disadvantage is known to be influential in criminal behaviors, few studies have investigated neighborhood influences on recidivism within the MHC context. To investigate the potential association between treatment and neighborhood disadvantage in relation to recidivism, previous research focusing on recidivism in the MHC system and outside of the MHC system is summarized.

2-1. Mental Illness and Recidivism

Offenders with mental illness are more likely to be rearrested and re-incarcerated compared to offenders without mental illness. According to Solomon and colleagues (2002), who tracked the incarceration records of offenders with mental illness for 15 months, 18% were re-incarcerated for new criminal charges and 16% of the charges were for technical violations (Solomon, Draine, & Marcus, 2002). Another study conducted by Case and colleagues (2009) investigated the recidivism rates of 546 offenders with mental illness from 14 jail diversion programs. They found that over half of the offenders were re-incarcerated within 1 year of program enrollment (Case, Steadman, Dupuis, & Morris, 2009). A recent study of 9245 ex-offenders who had been incarcerated in Utah State prisons from 1998 to 2002 found that the average length of time to return to prison was 385 days for offenders with serious mental illness and 742 days for offenders without serious mental illness (Cloyes, Wong, Latimer, & Abarca, 2010). The difference between the two groups was statistically significant ($p < .05$). These higher rates among offenders with mental illness in the criminal justice system support the plausible hypothesis that people with mental illness are in becoming involved or re-involved in the criminal justice system due to untreated mental illness compared to offenders without mental illness.

MHCs support the idea that if the specialty court program considers offenders' psychological, social, and emotional functioning related to the crime, it should help break the cycle of recidivism (Andrews & Bonta, 2010; Palermo, 2010)., Currently jails and prisons are not ideal places to provide timely, appropriate, and effective treatments for incarcerated inmates with mental illness (Anno, 1991; Solomon, Osborne, Loguglio, Mellow, & Mukamal, 2008). Every year, 100,000 inmates with mental illness return to the community (Draine, Wolff, Jacoby, Hartwell, & Duclos, 2005). Once released into the community, ex-offenders with mental illness are still in need of services given the chronic nature of their illness. One study investigated 337 released offenders with mental illness and found that few participants received clinically meaningful treatment (Lovell, Gagliardi, & Peterson, 2002). In addition, they usually have difficulties in finding social/familial support, housing, and connections with mental health agencies (Lovell et al., 2002). Thus, MHCs focus on coordinating various services to address the multiple needs of offenders with mental illness by providing treatment, counseling, case management, vocational support, and/or housing (Thompson et al., 2008).

Treatment motivation and perceptions have also been examined in relation to re-arrest rates. One meta-analysis of 129 studies concluded that voluntary treatment significantly reduced recidivism, whereas mandated treatment did not (Parhar, Wormith, Derkzen, & Beauregard, 2008). However, within mandated treatment programs, specifically, in a sample of drug court participants, lower perceptions of voluntariness have been found to be associated with higher rates of recidivism (Sung & Belenko, 2005). Further, Levenson and Macgowan (2004) found that program participants with higher levels of engagement (e.g., attendance, contribution) were more likely to progress in group therapy, and that prisoners with higher treatment motivation were more likely to receive aftercare treatment, which, in turn, significantly reduced recidivism

(Melnick, De Leon, Thomas, Kressel, & Wexler, 2001). In addition, one study that analyzed approximately 800 drug court participants concluded that self-reported motivation positively predicted future program completion which was negatively associated with future recidivism (Cosden et al., 2006). Last, only one MHC study was conducted to MHC participants with higher levels of initial perceived voluntariness and procedural justice and knowledge about the MHC were likely to have decreased number of arrest, prison, MHC bench warrants, and higher court compliance, which result in higher likelihood of MHC graduation (Redlich & Han, 2014). While there are studies examining the impact of treatment adherence on recidivism in traditional or drug court, little is known about the role of treatment motivation or perception in recidivism in MHC.

Despite the fundamental assumptions about treatment and recidivism in MHCs as supported by the theories of TJ and RNR, little is known about whether treatment utilization does, indeed, lead to better criminal justice outcomes. To my knowledge, three MHC studies have attempted to examine the association between community treatment and recidivism (Herinckx et al., 2005; Keator et al., 2013; Steadman et al., 2011). First, Herinckx et al. (2005) found that MHC participants who recidivated were twice as likely to have been in an inpatient psychiatric facility in the 12 months prior to arrest compared to participants who did not recidivate. However, this result is from only one county (one MHC). Second, Steadman et al. (2011) found that the absence of treatment in the six months prior to entering the MHCs was significantly associated with more arrests and jail days. Third and most recently, Keator et al. (2013) found no impact of community treatment on the number of arrests or jail days for MHC participants. But both the Steadman et al. and the Keator et al. studies only included a dichotomous treatment variable (yes/no). However, there are a number of other treatment variables such as types of treatment

(mental health, substance abuse), adherence (treatment, medication) that may impact future crime. Recently, Luskin (2013) investigated how MHC enrollment affected treatment usage by comparing service utilization between MHC participants and control group participants in one county. But, this study did not address whether the treatment in MHCs affects the likelihood of future arrest.

Outside of the MHC context, there are studies on the links between mental illness and recidivism with offender samples. Henggeler and colleagues (2006) examined the impact of drug courts, which share a similar diversion to treatment approach with MHCs, on substance use and criminal behavior. They found that drug court with the multisystemic treatment provider in the community was more effective in decreasing the substance use and criminal behavior than family court services with usual community services (Henggeler et al., 2006). A meta-analysis of 114 studies found that offender treatment attrition led to more recidivism (Olver, 2011). The authors concluded that offenders with poor treatment adherence had a higher risk of future offenses, which significantly predicted recidivism regardless of program type or treatment setting. Recently Martin et al. (2012) examined the effect of the intervention for offenders with mental illness. Due to inconsistent results and small effect sizes, they tentatively concluded that drug abuse treatment only moderately reduces re-involvement with the criminal justice system. In summary, previous studies demonstrate that treatment can have a meaningful impact on reducing criminal behavior for people with mental illness in the traditional court system or non-MHC specialty courts. But, even with treatment as a core component of the MHC system, its role has not been tested sufficiently.

2-2. Neighborhood Disadvantage and Recidivism

Research on the effects of neighborhood characteristics on recidivism, particularly among people with mental illness, is scarce (Grunwald et al., 2010; Stahler et al., 2013). Previous studies have not yet investigated the association between environmental factors and crime due to the existing and strong belief that criminal activity is individually motivated (Silver, 1999). Recidivism studies typically focus on individual factors because they have been assumed to be the only or primary predictors of risky behaviors (Kubrin & Stewart, 2006). This approach, however, overlooks the evidence linking neighborhood disadvantage to various behavioral risk factors and outcomes, especially the associations between neighborhood influences and mental illness (Boardman, Finch, Ellison, Williams, & Jackson, 2001; Mair, Diez Roux, & Galea, 2008; Sampson et al., 2002; Stahler et al., 2007; Stahler, Mennis, Cotlar, & Baron, 2009) and crime (Bursik & Grasmick, 1999; Hynes & Lopez, 2009; Sampson & Raudenbush, 1997).

Few studies have examined the impact of neighborhood disadvantage on recidivism (Stahler et al., 2013). An early study in the late 1980s examined the effect of neighborhood on recidivism for parolees (Gottfredson & Taylor, 1988) and found some interactions between individual characteristics and neighborhood disadvantages, but there was no direct impact of neighborhood found on recidivism. Silver and colleagues (1999) surveyed 293 patients who were discharged from psychiatric hospitals. After controlling for individual level factors (i.e., gender, age, mental health, previous history of arrest), they found that people living in neighborhoods with higher poverty rates were more likely to be involved in violent behavior compared to people from less poor neighborhoods. This study indicates that neighborhood disadvantage can significantly impact the individual factors predicting criminal activity. In addition, criminal

violence has consistently been associated with a poor socioeconomic environment (Sampson & Raudenbush, 1997).

Similarly, Kubrin and Stewart (2006) analyzed approximately 5000 offenders under community supervision and found a meaningful impact of neighborhood on recidivism. After controlling for individual factors, they found that offenders from highly disadvantaged communities (i.e., proportion of persons on public assistance, below the poverty level, unemployed, and median family income) were much more likely to be rearrested within 1 year than those returning to less disadvantaged communities. Further, Stahler and colleagues (2009) found that people living in poor neighborhoods (e.g., with a high vacant housing rate) were more likely to be re-hospitalized within one year in comparison to people living in wealthier neighborhoods. This study indicates that neighborhood disadvantage can have a significant impact not only on criminal behavior, but also on mental health.

An interesting study conducted by Kirk (2009) examined the impact on recidivism of relocation due to Hurricane Katrina. He found that parolees who had relocated from the distressed areas of New Orleans had a lower rate of recidivism compared to people returning to their communities. This provides some ideas about how devastated environments affect criminal behaviors. Recently, Grunwald et al. (2010) investigated in further detail about the neighborhood effects on juvenile offenders' recidivism. This study found that concentrated disadvantaged neighborhoods affected recidivism for drug offenses, but not for violent or property related offenses. Indeed, the neighborhood disadvantage has been found to be influential for criminal behavior above and beyond individual factors and may serve as a critical indicator for examining the likelihood of recidivism for offenders.

MHC could provide hidden but potentially positive influence on the neighborhood disadvantage which has impact on the recidivism. As mentioned, MHCs have special attention to link the participants with the community resources (Kelli, 2012; Thompson et al., 2008). By providing the community supports such as housing, employment, and public benefits (Thompson et al., 2008), MHCs help the participants live in safer and more resourceful environments. For example, Morin (2005) examined how the MHC affects the housing status for the participants to live in the community. She found that 100% of MHC graduates had a stable housing while those who did not graduate from the program were less likely to have it (Morin, 2005). In this case, MHC supports the participant to have stable housing which is one of the key factors preventing the criminal justice involvement, particularly for people with mental illness (Lamb & Weinberger, 2001). Disadvantaged communities which have little social and economic resources (e.g., high rate of poverty, unemployment, and vacant housing) is significantly associated with the crime (Clear, 2007; Hay, Fortson, Hollist, Altheimer, & Schaible, 2006; Swahn & Bossarte, 2009). Thus, community support from the MHC could lead to the participant living in the safe and resource-affluent communities, then, this environment will enable program participants not to commit the crime again. To my knowledge, no study has examined the link between neighborhood disadvantage and recidivism among MHC participants compared to traditional court participants.

D. Significance of Research

Given the preceding review of theories related to recidivism, and the empirical evidence regarding the consequences of MHC participation, additional research that attends to the influences of mental health treatment and neighborhood characteristics is warranted. The meta-

analysis shows that MHCs are successful in reducing recidivism (Sarteschi, 2009). However, despite the important theorized link between community treatment and recidivism, research on the components of treatment received by MHC participants and their connection to mental health symptom reduction and recidivism is rare (Martin et al., 2012; Sarteschi et al., 2011). Of the few studies that have been done, most examine criminal justice outcomes, but do not take changes in clinical status into account (Cosden et al., 2005; Hiday & Ray, 2010; McNiel & Binder, 2007) or compare recidivism rates of MHC participants with those of control groups (Boothroyd et al., 2005; Herinckx et al., 2005) without investigating the mechanisms accounting for the between-group differences.

Research about the impact of community treatment and neighborhood disadvantage on recidivism in MHC will have theoretical significance because it can identify the mechanisms that account for the positive criminal justice outcomes of MHCs. To the extent that specific components of community treatment are identified, results will have practical significance for mental health system providers regarding program design, as well as for court personnel about the kinds of treatment programs to which offenders should be diverted. Many studies have demonstrated that MHCs lead to positive outcomes (Sarteschi et al., 2011), but these outcomes may not originate from community treatment as currently theorized. Previous studies (not involving MHCs) support the idea that the neighborhood disadvantage significantly impacts criminal behavior, particularly for people with mental illness (Silver, 2000; Simning et al., 2012). Indeed, neighborhood disadvantage may be one of the key factors associated with recidivism among offenders with mental illness. Presently, to my knowledge, MHC studies have yet to examine the impact of neighborhood factors, which may be equally as important for MHC success as diversion to community treatment. In summary, both community treatment and

neighborhood disadvantages may be critical predictors of recidivism among offenders with mental illness. Overall, although most studies show positive criminal justice and clinical outcomes for MHC participants, little is known about the impact of community treatment and neighborhood disadvantage on recidivism in MHCs compared to traditional courts. To maximize the positive effects that MHCs are designed to achieve, it is critical to improve knowledge of the effects of community treatment and neighborhood factors on recidivism among offenders with mental health problems who are, and who are not involved in MHCs.

Adapting from the ecological system theory and existing literature, Figure 1 presents a model that guides this proposed study. In this model, both community treatment and neighborhood disadvantage affect recidivism. However, receipt of community treatment is an individual factor (level 1) nested within the neighborhood disadvantage (level 2).

E. Research Objectives and Hypotheses

The goal of the proposed research is to investigate the impact of community treatment and neighborhood disadvantage on recidivism (presence and severity of new arrest) for offenders with mental health problems who are and who are not enrolled in MHCs. There are three specific research objectives:

1. **Objective 1.** To examine whether participants in MHCs have more positive treatment outcomes and live in more favorable neighborhoods compared to participants in traditional courts (TAU) and whether those differences increase over time.
 - 1-1. Hypothesis one: MHC participants will have ‘better’ treatment utilization and live in ‘better’ neighborhood, whereas the TAU group will have worse treatment outcomes, and live in relatively disadvantaged communities.

- 1-2. Hypothesis two: Differences in treatment (treatment adherence, perceptions of treatment voluntariness and motivation, and treatment usage) and neighborhood disadvantage between the MHC and TAU group will become larger over time.

2. **Objective 2.** To examine the impact of treatment and neighborhood factors on recidivism among offenders with mental health problems.
 - 2-1. Hypothesis three: Greater treatment utilization and living in relatively more advantaged neighborhoods will be associated with fewer arrests for both groups.
 - 2-2. Hypothesis four: The positive effects of treatment and relative neighborhood advantage are expected to be larger for the MHC group compared to the TAU group.

3. **Objective 3.** To examine whether the effects of treatment and neighborhood factors on recidivism change over time in each group (MHC and comparison group), and whether MHC involvement (as compared to traditional court) reduces recidivism after the time variation in treatment and neighborhood factors are considered.
 - 3-1. Hypothesis five: MHC participants will have significantly more positive changes in treatment and neighborhood effects as compared to the TAU group.
 - 3-2. Hypothesis six: The probability of recidivism will be statistically significantly lower among the MHC group compared to the TAU group after court enrollment, controlling for treatment and neighborhood disadvantage effects.

CHAPTER THREE

Methodology

A. Data Sources

The theoretical model underlying the proposed study is represented in Figure 1 (Appendix B). In this two-level model, individuals (level 1) are nested within the neighborhoods (level 2).

The data source for level 1 (individual factors) is the MacArthur MHC study. This study was undertaken by Policy Research Associates Inc., led by Drs. Henry Steadman and Allison Redlich, and funded by the John D. and Catherine T. MacArthur Foundation. It is a prospective, 18-month longitudinal study that is the only MHC study to include 1) multiple sites (N= 4), and 2) experimental (MHC) and comparison (TAU) samples. It has extensive, but highly restricted data from various organizations such as the participating MHCs, the same-jurisdiction traditional courts, and objective arrest records.

The MHC sample includes participants who enrolled in the MHC program between October 2005 and July 2007. The TAU sample was drawn from recently arrested individuals with mental health problems who were not referred to, nor had been rejected from, the MHC, over the same time period in the same locations. The four MHCs were chosen because they 1) accepted both felony and misdemeanor charges, 2) were in jurisdictions with large enough jails to draw the TAU sample, 3) were expected to (and have) sustain(ed) the MHC program over the next three to five years, and 4) had judges and MHC/criminal justice personnel willing to be part of the research. Participants were interviewed in person at enrollment into the MHC or entry into the criminal justice system (baseline) and then 6 months later (follow-up) on variety of topics, including housing history, treatment utilization, and substance use and mental health problems.

Addresses for each study participant were extracted from the MacArthur MHC study. Respondents provided all the addresses for order of residence, number of moves, type of residence, and length of stay during last 6-month at baseline and follow-up interview. This enables me to track the changes of the neighborhood disadvantage in each given address. Individual address was geocoded using the ArcGIS software in order to get the unique 11 digit census tract number. Using the census tract number, I earned the rate of poverty, unemployment, vacant/abandoned housing, public benefits recipients, and single-parent families in each census tract from 2005-2009 data at American Community Survey (ACS) at U.S. Census of Bureau. These numbers will be used as neighborhood disadvantage which will be discussed later section in detail. Level 2 is census-tract level data for the neighborhood disadvantage factors which is a small, statistical subdivision of a county or equivalent entity where population size is between 1200 and 8000 people (Bureau of the Census, 2014).

Although site variable may control for the different jurisdiction by each county, due to the limited sample size, it is not included in the final study model. Preliminary data analyses indicate that there is not much variation between those jurisdictions which prevent the inclusion of site as level three variables.

B. Analytic Sample

In the proposed research, only study participants who completed both interviews was included: MHC ($n=357$) and TAU sample ($n=384$), representing 71% of the original total sample. There are no significant differences between the original and study samples on age, gender, race, and most serious diagnosis. Nevertheless, San Francisco site had significantly more non-follow-up interviewees than other three sites. MHC study participants remained in the project regardless

of their MHC completion status (i.e., graduated, still-in, or terminated from the court). Among the 741 study participants, the mean age is 36.83 years, and over half (59.9%) are men. Approximately half of the sample is White (47.5%). Three fourths of participants had a severe mental illness (i.e. schizophrenia, bipolar, or depression). Data in the proposed study come from combined self-reports at baseline and 6-month follow-up, and from objective arrest data.

C. Measures

1. Dependent Variable: Arrest

Objective arrest record is from the Federal Bureau of Investigation and county police records. Although the MacArthur MHC study provides the full arrest records for 36 months window (pre- and post- 18 months), this research limits the use to those records 12 months (pre and post 6 months) due to the limited timeframe for other study variables (only 12 months). The dependent variable is dichotomous, '0' as no arrest and '1' as arrest during the one year period (i.e., 6 months before and after court enrollment/arrest). Since the arrest records provide the date of the arrest and residential information gives duration of each address, I can identify whether the arrest happened in specific neighborhood disadvantage during the study period.

2. Independent Variables: Community Treatment Utilization (Individual as Level 1)

Treatment adherence includes two self-report measures of adherence. *Appointment adherence* was measured on a 5-point scale (0 = avoided keeping appointment altogether to 4 = never missed an appointment). Medication adherence used a 6-point scale (0 = never took medication to 5 = never missed taking medication). Both were measured 6 months before and after court enrollment/arrest. *Treatment perceptions* include two scales: perceived voluntariness

and treatment motivation. Eight statements were used to measure participants' perception of the extent to which treatment was voluntary (e.g., I had more influence than anyone else on whether I went to treatment) from 0 = strongly disagree to 4 = strongly agree. Perceived voluntariness was measured by the MacArthur Perceived Coercion Scale (MPCS) which was adapted for MHCs (Poythress, Pettila, McGaha, & Boothroyd, 2002). The MPCS has been used with patients in various settings and in many countries with robust reliability and validity (Gardner et al., 1993; Lidz et al., 1997). As an entire sample, the Cronbach's Alpha for MPCS is .75 at baseline and .77 at follow-up. TAU's Cronbach's Alpha for MPCS is .74 at baseline and .78 at follow-up. MHC's Cronbach's Alpha for MPCS is .75 at baseline and .75 at follow-up. Higher scores indicated more perceived choice about receiving treatment. Treatment motivation questionnaire (TMQ) asks seven statements about the reasons for entering treatment and feelings about current treatment and has been used numerous times, particularly for mandatory service recipients (Ryan, Plant, & O'Malley, 1995). Participants were asked to rate a series of statements from 1 = not at all to 7 = very true. As an entire sample, the Cronbach's Alpha for TMQ is .67 at baseline and .71 at follow-up. TAU's Cronbach's Alpha for TMQ is .67 at baseline and .70 at follow-up. MHC's Cronbach's Alpha for TMQ is .68 at baseline and .73 at follow-up. *Treatment usage* included mental health and substance abuse services. Participants were asked to indicate the amount of treatment received in the pre- and post- 6-month period, by indicating how many nights/times, if any, they received services.

3. Independent Variables: Neighborhood Disadvantage (Community as Level 2)

For level 2, the purpose is to capture the information about the neighborhood disadvantage the study participants lived when they were not hospitalized or incarcerated. In the

baseline and follow-up interviews, participants were asked to provide the actual address, type of residence (e.g., house, group home, inpatient hospital, jail/prison), and number of days at the each address during the prior 6 months. In the baseline and follow-up interviews, a total of 2,999 and 2,847 addresses were provided, respectively. Each address has its own tract-level Geocode which enables me to operationalize the neighborhood disadvantage for each address (see below for detail). All non-residential addresses (i.e., inpatient hospital, prison, or jail) was excluded (949 addresses at baseline and 1187 addresses at 6 months) in order to come up with a parsimonious yet meaningful measure of neighborhood disadvantage. On average, the TAU group moved 3.94 and 4.20 times during pre-and post-6-month period, respectively. However, the MHC group moved 4.16 and 3.46 times during pre-and post-6-month period, respectively. For TAU, average days in each address are 58.52 days and 50.28 days during pre-and post-6-month period, respectively. For MHC, average days in each address are 77.22 days and 64.79 days during pre-and post-6-month period, respectively.

Five factors shown to affect the risk of recidivism are rates of poverty, unemployment, vacant/abandoned housing, public benefits recipients, and single-parent families. While there are other potential predictors of recidivism (e.g. hot spots: high crime intensity), these five neighborhood factors are most relevant to recidivism (Grunwald et al., 2010; Kubrin, Squires, & Stewart, 2007; Kubrin & Stewart, 2006). More importantly, to better reflect participants' exposure to these neighborhood factors, the time an individual spent in a given neighborhood was included in the analysis, measuring the total number of days staying at each location. Thus, with the given five neighborhood indexes and days in each location, I can calculate the proportional neighborhood score and sum all of each location. For example, if an individual lived in two different locations in 6 months, such as 120 days where the poverty rate is 5% and

60 days where the poverty rate is 8%, then, total exposure to that neighborhood factor (poverty rate) is $.05 \times \frac{120 \text{ days}}{180 \text{ days}} + .08 \times \frac{60 \text{ days}}{180 \text{ days}}$. By calculating the scored neighborhood disadvantage, I can identify whether the individual moved better or worse neighborhood disadvantage.

Neighborhood disadvantage was measured by index of census tract-level measures. Final neighborhood disadvantage is summed 5 index including rate of poverty, unemployment, vacant/abandoned housing, public benefits recipients, and single-parent families. Previous research suggested that neighborhood disadvantage is theoretically better to be used as one factor instead of each variable (Elliott et al., 1996; Flagg, Needham, & Locher, 2014; Lord & Mahoney, 2007; Ross & Mirowsky, 2001; Sampson, Sharkey, & Raudenbush, 2008). In addition, principal components analysis (PCA) indicated that a one-factor solution accounting for 76% of variance had an eigenvalue of 3.81 and loading close or greater than .45 for all variables. Based on the outcomes from PCA, one factor model (combination of 5 indexes including rate of poverty, unemployment, vacant/abandoned housing, public benefits recipients, and single-parent families) was suggested. Each of 5 indexes for neighborhood disadvantage was analyzed in descriptive analysis. Then, neighborhood disadvantage as one factor was used in all further analyses.

One challenge in operationalizing neighborhood factors is the difference between the two study groups in the number of days in the community and the number of times participants moved. By definition, as diversion programs, MHCs are meant to reduce the number of incarceration days. On average, the TAU group spent 154.21 days and 95.22 days in the community during pre-and post-6-month period, respectively. However, the MHC group spent 146.74 days and 142.81 days in the community during pre-and post-6-month period, respectively. Thus, the risk period of exposure to neighborhood factors is expected to be smaller for the TAU participants than MHC participants.

Each address has different neighborhood factors. To account for these issues, I use a weighting method (see below).

4. Control Variables

Previous literature shows that age, gender, history of drug use, history of hospitalization, and most serious charge relate to crime (Cloyes et al., 2010; Kling, Ludwig, & Katz, 2005; Sampson & Laub, 2003; White & Gorman, 2000). The present study considers the effects of these variables by adding them as control variables. All the control variables were collected by the self-reported questionnaire.

4-1. Age

Age is known to be associated with arrest. For example, Sampson and Laub (2003) examines trajectories of crimes over the life time among delinquent boys from their ages 7 to 70. They conclude that the crime declines regardless of their first age of arrest. It is coded as a continuous variable. The age ranged from 18 to 75.

4-2. Gender

In terms of the gender, it is often reported that males are more likely to commit crime (King, Massoglia, & MacMillan, 2007). Minton and Zeng (2015) analyzed the gender in U.S. criminal justice system from 2005 to 2014. They found that there were approximately 7 times more male inmate than female in local jails. This variable was coded as a dichotomous variable (0=male; 1=female).

4-3. Drug use

History of drug use is one of the strongest indicators of crime. After reviewing the trends in drug use and crime rates by city over 10 years, White and Gorman (2000) concluded that drug use is significantly associated with the crime. In addition, a time series analysis of New York City demonstrates the positive relationship between drug use and minor crimes (e.g., robbery, burglary) but not severe crimes (e.g., felony, murder) (Corman & Mocan, 2000). In this study drug use is measured by a single question: “During the past 30 days, how many days have you used illegal or non-prescribed drugs to get high?” Then, the interviewer showed a list of drugs and read those for the interviewee. The list of drug operationalized in this study includes Quaalude, Seconal, Valium, Xanax, Librium, barbiturates, Marijuana, pot, grass, hashish, Amphetamine, speed, uppers, crystal meth, dexadrine, Heroin, morphine, opium, Methadone, Darvon, Codeine, Percodan, Demerol, Coke, crack, freebase, LSD, mescaline, peyote, psilocybin, STP, PCP, angel dust, mushrooms, Glue, paint thinner, aerosol spray, gasoline, liquid paper, Steroids, and Ecstasy. Drug use is coded as a continuous variable, range from 0 to 30.

4-4. Hospitalization

Hospitalization may not be directly related to the crime. However, hospitalization is an indicator of severe mental illness which is known to be associated with crime (Cloyes et al., 2010). In this study, hospitalization is measured by a single-item question: “During past 30 days, have you even been hospitalized in a psychiatric hospital or psychiatric ward?” Hospitalization is coded as a dichotomous variable (0=no; 1=yes).

4-5. Most serious charge

Crime severity was originally coded on a 10-point severity scale (1 = murder to 10 = minor) using the objective crime severity categories developed by the U.S. Department of Justice (Wolfgang, Figlio, Tracy, & Singer, 1985). Previous recidivism studies indicated that severity of the crime was significantly associated with the future crime (Grann & Wedin, 2002; Sjöstedt & Långström, 2002; Wierson & Forehand, 1995). In this study, the most serious charge is measured by a single-item question: “Tell me the most serious offenses you have ever been arrested for”. Thus, question measures the most serious charge among any historical crimes. Original responses include 10 different choices (i.e., 1 as Murder/Manslaughter, 2 as Rape/Sodomy, 3 as Assault, 4 as Robbery, 5 as Kidnapping/Arson, 6 as other crimes against a person, 7 as Sex crimes, 8 as Property crimes, 9 as Drug crimes, 10 as Minor crimes). In addition, most serious charge is recoded into three groups (7-10=minor crime, 4-6=moderate crime, 1-3=severe crime) due to insufficient numbers in certain categories (e.g., murder has only one case). Lastly, they were reversed and a larger score means a severe crime.

4-6. Race

Previous studies consistently found that certain racial/ethnic group (e.g., Black or Hispanic) showed higher level of crime rate compared to their counter parts (e.g., White) (Piquero & Brame, 2008; Walker, Spohn, & DeLone, 2011). In this study, there were four different racial/ethnic groups including White, Black, Hispanic, and others. Three dummy variables were included in the analyses (reference group=White).

4-7. Site

As mentioned, the data was collected from four different sites in this study (i.e., San Francisco, Santa Clara, Minneapolis, and Indianapolis). In order to control the possible variation between the sites, three dummy site variables were included in this analyses (reference group = San Francisco).

D. Analysis Strategy

1. Hypotheses testing strategy

Participants in the MHC and TAU samples are not randomly assigned. Thus, to control for this non-randomized selection process, I use propensity score weighting, a well-known statistical method to account for unequal probabilities of inclusion in treated and non-treated samples (Lunceford & Davidian, 2004; Rosenbaum & Rubin, 1984). I first conducted a logistic regression with the dependent variable of 0=TAU and 1=MHC and include demographic variables (e.g. age, race, and sex). Second, I added all available potential explanatory variables except study variables for selection into TAU and MHC which are personal characteristics including ever married, years of education, lived with biological father until 15 years of age, father ever arrested, and father used illegal drugs; mental health history including age the individual first saw a mental health professional, age at first psychiatric hospitalization, current mental health status including Insight and Treatment Attitudes Questionnaire (ITAQ), Colorado Symptom Index scores (CSI); history of child and sexual abuse; criminal justice variables including age at first arrest, number of arrests since 15 years of age, number of pre-18-month incarceration days and arrests, charge level for most serious offense. The ITAQ was designed to measure awareness of mental illness and awareness of treatment for their mental illness

(McEvoy et al., 1989). The ITAQ consists of 11 items and each item rated from 0 to 2 (0= no insight, 1=partial insight, 2=full insight). Higher ITAQ indicates that the respondents have more insight about their mental illness. The CSI was developed to measure the symptomatology by asking frequency of psychological or emotional difficulties (1: at least every day – 5: not at all) (Conrad et al., 2001). Then, I build the most parsimonious model by the stepwise procedure, examining the pseudo R2. Variables selected for the final model by the stepwise procedure were age, race, sex, site, marital status, Colorado Symptom Index, days using illegal drugs in last 30 days, diagnosis of depression, ever been hospitalized, received treatment for medical problem, violence at baseline interview, age at first arrest, and target arrest charge level (warrant, violation, misdemeanor, felony). The final model includes variables that improve R2 significantly and the corresponding probability of being in MHC is the propensity score, which I use in all analyses as weights to adjust for selection bias.

Multilevel modeling is ideal for estimating higher level effects (e.g., neighborhood) when individuals are clustered within neighborhoods (Raudenbush & Bryk, 2002) in that it explicitly recognizes that individuals within a particular neighborhood may be more similar to one another than those living in distinct neighborhoods. Multilevel modeling allows for investigations of individual and neighborhood variance components on the outcome variable of interest (i.e., recidivism), while maintaining the appropriate level of analysis for the independent variables (i.e., treatment, neighborhood) (Kubrin & Stewart, 2006). For this analysis, I use Stata 14 and present the model estimate with robust standard errors.

For **Hypothesis one**, a Mann-Whitney U Test or ANOVA depending on the number of groups is conducted to examine the differences of treatment and neighborhood factors between

the two groups (MHC and TAU) as well as over time (entry into the court/arrest and 6 months later). The unit of analyses is individual ($N=741$).

For **Hypothesis two**, I run the paired sample t-test between the group mean difference at baseline and group mean difference at 6 months later for each variable. The unit of analyses is individual ($N=741$).

For **Hypothesis three**, I run the multilevel logistic regression to analyze whether the neighborhood factors (level 2: community) associate with recidivism considering treatment factors (level 1: individual). The unit of analyses is census track (TAU: $N=762$ at baseline, $N=587$ at follow-up; MHC: $N=727$ at baseline, $N=655$ at follow-up). The two-level equation is as follows:

Level 1 model: $\text{Log}\left(\frac{p}{1-p}\right) = \beta_{0jk} + \beta_{1j}age_{1jk} + \beta_{2j}gender_{2jk} + \beta_{3j}drug\ use_{3jk} + \beta_{4j}hospitalization_{4jk} + \beta_{5j}most\ serious\ charge_{5jk} + \beta_{6j}Black_{6jk} + \beta_{7j}Hispanic_{7jk} + \beta_{8j}Others_{8jk} + \beta_{9j}Santa\ Clara_{9jk} + \beta_{10j}Minneapolis_{10jk} + \beta_{11j}Indianapolis_{11jk} + \beta_{12j}appointment\ adherence_{12jk} + \beta_{13j}medication\ adherence_{13jk} + \beta_{14j}treatment\ motivation_{14jk} + \beta_{15j}perceived\ voluntariness_{15jk} + \beta_{16j}mental\ health\ service_{16jk} + \beta_{17j}substance\ abuse\ service_{17jk} + e_{ijk}$, where the $\text{Log}\left(\frac{p}{1-p}\right)$ is the log-odds of arrest which is probability of being arrest indicating 0 as no arrest and 1 as arrest, β_{0jk} is the intercept, β_{1j} to β_{17j} are the coefficients for each study variable including age, gender, drug use, hospitalization, most serious charge, Black, Hispanic, Others, Santa Clara, Minneapolis, Indianapolis, appointment adherence, medication adherence, treatment motivation, perceived voluntariness, mental health service, and substance abuse service, respectively and e_{ijk} is error term.

Level 2 model: $\beta_{0jk} = \gamma_{00k} + \gamma_{01k}neighborhood\ environment + u_{0jk}$, for $n > 0$, where β_{0jk} is a function of the level-2 predictors, u_{0jk} is the random effect at level two, other level-1 coefficients, $\beta_{nj}, p > 0$, as fixed.

The aim of the multilevel logistic regression is to predict the probability that an arrest occurs for the individual i as a function of treatment and neighborhood variables. Thus, potential differences across the neighborhood disadvantage are captured with the random component in the multilevel modeling.

For **Hypothesis four**, I compare the effect of study variables between group (TAU and MHC) at baseline (Time A) and 6 months later (Time B). The unit of analyses is combined census track ($N=1489$ at baseline; $N=1242$ at follow-up).

- Time A:

$$y^A = \beta_0^A + \dots + \beta_{12}^A medication\ adherence_{12} + \dots + \beta_{18}^A neighborhood\ disadvantage_{18}$$

- Time B:

$$y^B = \beta_0^B + \dots + \beta_{12}^B medication\ adherence_{12} + \dots + \beta_{18}^B neighborhood\ disadvantage_{18}$$

For instance, in terms of medication adherence, I can identify the significant difference between β_{12}^{AT} (effect of medication adherence at Time A in TAU) and β_{12}^{AM} (effect of medication adherence at Time A in MHC) by calculating $Z = \frac{\beta_{12}^{AT} - \beta_{12}^{AM}}{\sqrt{SEb_{12}^{2AT} + SEb_{12}^{2AM}}}$ where SEb_{12}^{2AT} is square of standard error at Time A for TAU and SEb_{12}^{2AM} is the square of standard error at Time A for MHC (Paternoster, Brame, Mazerolle, & Piquero, 1998). This analysis examines whether there are significant differences in the effect of each treatment and neighborhood factors between TAU and MHC at each Time A and Time B.

For **Hypothesis five**, I use the same equations from hypothesis four to compare the coefficient at baseline and 6 months later. However, I add an interaction term in order to compare the between group changes over time for each study variable. The unit of analyses is combined census track ($N=1489$ at baseline; $N=1242$ at follow-up). The equations are as follows:

- Time A: $y^A = \beta_0^A + \dots + \beta_{12}^A medication\ adherence_1 + \dots + \beta_{19}^A medication\ agherence \times study\ group_{13}$

- Time B: $y^B = \beta_0^B + \dots + \beta_{12}^B medication\ adherence_1 + \dots + \beta_{19}^B medication\ agherence \times study\ group_{13}$

For instance, in terms of medication adherence, I can identify the significant difference between β_{19}^A (effect of medication adherence \times study group at Time A) and β_{19}^B (effect of medication adherence \times study group at Time B) by calculating $Z = \frac{\beta_{19}^A - \beta_{19}^B}{\sqrt{SEb_{19}^{A^2} + SEb_{19}^{B^2}}}$. This analysis examines whether MHC participants have significant positive changes in the effect of each treatment and neighborhood factors between Time A and B.

For **Hypothesis six**, I run multilevel logistic regression with two-level equation as described at hypothesis three along with group dummy variable (TAU=0; MHC=1). The unit of analyses is combined census track ($N=1489$ at baseline; $N=1242$ at follow-up).

To account for the different amounts of time spent in a given neighborhood, I recalculate the data by multiplying each neighborhood factor by the percentage of days in a neighborhood during 6 months. By using multilevel regression and propensity score weighting methods, I can investigate individual and neighborhood-level variance on recidivism controlling for selection bias.

2. Strategies for handling missing data

The pattern of missing data for each study variables was examined. Table 1 shows the number of missing cases in each study variables by group (TAU and MHC) and time (baseline and follow-up). Overall, the amount of missing data is minimal and randomly distributed. For both TAU and MHC group, missingness for all study variables are far below than 2%. In addition, as suggested by λ^2 tests for missingness (Allison, 2001), the missing pattern did not significantly differ between TAU and MHC group for all study variables. Thus, the patter of missing data is deemed as missing at random (MAR) which is an appropriate assumption to use the imputation procedure in order to handle missing data. Among the several options for imputation, mean imputation is used because there is relatively small sample size for the multilevel analysis and only small numbers of missingness (most less than 1%) exist for all study variables. Mean imputation is a method where the missing value on a certain variable is replaced by the mean of the available cases.

Table 1

Number of Missing Study Variables by Group and Time (N=741)

	Baseline			Follow-up		
	TAU	MHC	<i>p(t)</i>	TAU	MHC	<i>p(t)</i>
Treatment Adherence						
- <i>Appointment adherence</i>	0	0	<i>N.S.</i>	0	1	<i>N.S.</i>
- <i>Medication adherence</i>	5	3	<i>N.S.</i>	0	0	<i>N.S.</i>
Treatment Perception						
- <i>Treatment motivation</i>	0	7	<i>N.S.</i>	6	6	<i>N.S.</i>
- <i>Perceived voluntariness</i>	0	0	<i>N.S.</i>	1	1	<i>N.S.</i>
Treatment Usage						
- <i>Mental health service</i>	0	1	<i>N.S.</i>	1	2	<i>N.S.</i>
- <i>Substance abuse service</i>	0	2	<i>N.S.</i>	0	2	<i>N.S.</i>
Neighborhood disadvantage	0	0	<i>N.S.</i>	0	0	<i>N.S.</i>
Arrest	0	0	<i>N.S.</i>	0	0	<i>N.S.</i>

CHAPTER FOUR

Results

The current study aimed to (1) explore the within group difference of treatment utilization and neighborhood disadvantage over time (pre-and post-6-month), (2) investigate associations between treatment utilization and neighborhood disadvantage and recidivism among MHC participants and traditional court participants, (3) examine the effects of treatment utilization and neighborhood disadvantage on recidivism over time (pre-and post-6-month) in each group (MHC and traditional court group), and (4) test the impact of MHC involvement (as compared to traditional court on recidivism. This chapter includes three sections. The first section, as a univariate analysis, presents a detailed description of the study sample including demographic characteristics, treatment utilization, and neighborhood variables. The second section, as a bivariate analysis, includes the correlation between independent study variables to examine the potential for multicollinearity. The third section, as a multivariate, includes results from paired t-tests and z tests to compare the different effect of study variables by group and time. In addition, multilevel logistic regression was conducted to estimate the effect of treatment utilization and neighborhood disadvantage on recidivism.

A. Descriptive Analysis

1. Sociodemographic description of study samples

All of the descriptive data in this section were self-reported by study participants. Table 2 presents the demographic characteristics of the study sample by groups. Overall, average age of the study participants was 36.83 ($SD=9.85$) years old with a range between 18 and 75 years. MHC group participants were older than TAU group participants ($t(739)=-1.93, p<.05$). Over half of the

study participants were male (59.92%). Nearly half of study participants were White (46.29%). The number of Hispanic participants in the TAU group was more than double the number of Hispanic participants in the MHC group ($t(739)=3.32, p<.001$). In terms of the site, Santa Clara had the most study participants (32.52%) following by Minneapolis (25.10%), Indianapolis (23.08%), and San Francisco (19.30%). There was no significant difference between the MHC and TAU group other than age and number of Hispanic participants.

Table 2

Sociodemographic Description of Study Participants

	Treatment as usual (N=384)		MHC (N=357)		Overall (N=741)		t	Significance
	N	%	N	%	N	%		
Age (M±SD)	36.2±9.0		37.6±10.7		36.83±9.85		-1.93	.05
Gender							-1.04	.30
Male	237	62	207	58	444	59.92		
Female	147	28	150	42	297	40.08		
Race-ethnicity								
White	173	45	170	48	343	46.29	-.70	.48
Black	117	31	131	36	248	33.47	-1.80	.07
Hispanic	66	17	31	9	98	13.23	3.32	.001
Other	28	7	24	7	52	7.02	.30	.76
Site								
San Francisco	67	17.45	76	21.29	143	19.30	-1.32	.19
Santa Clara	133	34.64	108	30.25	241	32.52	1.27	.20
Minneapolis	102	26.56	84	23.53	186	25.10	.95	.34
Indianapolis	82	21.35	89	24.93	171	23.08	-1.15	.25

2. Clinical characteristics and treatment utilization of study samples

Table 3 shows the clinical characteristics and treatment utilization of the study participants. Depression (29.15%) was the most common diagnosis among study participants followed by Schizophrenia (25.37%), Bipolar (24.02%), and other (21.46%). Nearly eighty percent of the study participants reported a primary diagnosis that is considered to be a serious mental illness (i.e., schizophrenia, bipolar, and depression). Average hospitalization was .70 times at the baseline but decreased to .17 times at the follow-up. In terms of the substance use, study participants reported use of illegal or non-prescribed drugs 9.32 times during the past 30 days from the baseline. However, substance usage decreased to 5.61 times during the past 30 days from the follow-up interview. On average, study participants showed 3.97 on appointment adherence indicating that *they missed 1 or 2 times, but basically kept their appointments*. At the follow-up interview, study participants show similar but slightly improved level of appointment adherence as of 4.02. In terms of the medication adherence, study participants showed 3.69 representing that they were between *missed several times, but took at least half of the time and missed only 1 or 2 times, but basically took it all*. After 6 months, however, study participant shows higher medication adherence scores of 3.89. Treatment motivation scores for study participants was 38.94 at the baseline and 38.58 after 6 months. Thus, study participants had no meaningful changes of treatment motivation 6 months after the court enrollment. Perceived voluntariness, however, increased from 25.52 at the baseline to 28.14 at follow-up interview indicating that they had more voluntariness toward the treatment. Lastly, study participants received 35.65 times mental health services 6 months before court enrollment but increased to 60.82 times 6 months after the court enrollment. In terms of the substance abuse treatment, study participants used 27.61 times at baseline and increased to 39.85 times at the follow-up point.

Table 3

Clinical Characteristics and Treatment Utilization of Study Participants

	Treatment as usual (N=384)		MHC (N=357)		Overall (N=741)	
	N	%	N	%	N	%
Primary diagnosis						
Schizophrenia	59	15	129	36	188	25.37
Bipolar	91	24	87	24	178	24.02
Depression	159	41	57	16	216	29.15
Others	75	20	84	24	159	21.46
	T1	T2	T1	T2	T1	T2
	Mean	SD	Mean	SD	Mean	SD
Hospitalization	.67	.70	.14	.35	.76	.42
Substance use	11.52	12.40	6.78	10.77	6.94	10.72
	4.53	9.40	4.53	9.40	9.32	11.84
	5.61	10.14	5.61	10.14	5.61	10.14
	.46	.17	.46	.17	.46	.17
	.37		.37		.37	
Treatment Utilization						
Treatment adherence	3.83	1.19	4.25	.97	4.14	1.03
- <i>Appointment adherence</i>	3.83	1.19	4.25	.97	4.14	1.03
- <i>Medication adherence</i>	3.67	1.28	3.63	1.34	3.75	1.27
Treatment Perception	23.87	8.66	22.99	9.03	24.80	8.75
- <i>Treatment motivation</i>	23.87	8.66	22.99	9.03	24.80	8.75
- <i>Perceived voluntariness</i>	28.43	5.89	28.89	6.34	28.65	5.90
Treatment Usage	26.20	45.22	61.26	84.03	45.81	76.27
- <i>Mental health service</i>	26.20	45.22	61.26	84.03	45.81	76.27
- <i>Substance abuse service</i>	26.72	49.97	37.41	57.84	28.56	87.70
	27.61	70.66	42.48	90.72	27.61	70.66
	39.85	75.48	39.85	75.48	39.85	75.48

Note: T1: baseline, T2: follow-up

3. Neighborhood characteristics of study participants

Table 4 represents neighborhood disadvantage of study participants. Neighborhood disadvantage includes five index of rate of poverty, unemployment, public benefit recipient, single-parent house, vacant/abandoned housing at tract level. In terms of the poverty, the scores decreased from 2.61 to 2.57 indicating that study participants moved in the neighborhood where the poverty rate is low 6 months after court enrollment. In addition, both rate of unemployment and public benefit recipients were decreased implying that study participants move into the neighborhood with lower rate of unemployment and public benefit recipients (from 4.93 to 4.77 and from .70 to .66, respectively). However, there was no change of rate of single-parent house (i.e. 1.19) before and after the court enrollment. Lastly, rate of vacant/abandoned housing was increased from 1.58 to 1.60 6 months after court enrollment.

Table 4

Neighborhood Disadvantage of Study Participants

%	Treatment as usual (N=384)				MHC (N=357)				Overall (N=741)			
	T1		T2		T1		T2		T1		T2	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Poverty	2.53	3.80	2.38	3.51	2.71	3.73	2.75	3.64	2.61	3.77	2.57	3.58
Unemployment	4.61	6.25	4.49	2.79	5.27	7.01	5.02	6.31	4.93	6.64	4.77	6.07
Public benefit recipient	.68	1.20	.61	1.01	.72	1.32	.71	1.17	.70	1.26	.66	1.10
Single-parent house	1.13	1.75	1.10	1.81	1.26	2.14	1.27	2.03	1.19	1.95	1.19	1.93
Vacant/abandoned housing	1.47	2.30	1.46	2.41	1.69	2.51	1.72	2.66	1.58	2.41	1.60	2.55

Note: T1: baseline, T2: follow-up

4. Crime characteristics of study participants

In terms of the most serious charge, 75% of the study participants had only mild charges. The rest of charges were moderate (10.26%) or serious (13.90%). In terms of the recidivism, study participants were arrested 1.59 times during the 6 months before the court enrollment. However, the arrest rate was only .55 times 6 months after the court enrollment.

Table 5

Crime Characteristics of Study Participants

	Treatment as usual (N=384)		MHC (N=357)		Overall (N=741)							
	N	%	N	%	N	%						
Level of Most serious charge												
Mild	297	77.34	265	74.23	562	75.84						
Moderate	44	11.46	32	8.96	76	10.26						
Serious	43	11.20	60	16.81	103	13.90						
	T1	T2	T1	T2	T1	T2						
	Mean	SD	Mean	SD	Mean	SD						
Recidivism	1.85	1.88	.65	1.64	1.31	1.12	.45	.85	1.59	1.58	.55	1.32

Note: T1: baseline, T2: follow-up

B. Multicollinearity

The problem of multicollinearity may arise because this study uses the similar group of variables (e.g. medication adherence vs. appointment adherence). To identify potential multicollinearity issues, correlations between study variables were tested. Bivariate correlations are between minimal to modest as shown in Table 6. Cutoff correlations score indicating multicollinearity are known to be .80 (Grewal, Cote, & Baumgartner, 2004). From this criterion, study variables do not suggest issues of multicollinearity. Another criterion use to assess for multicollinearity is variance inflation factors (VIF). VIF higher than 10 is known to have the problem of multicollinearity (Aiken, West, & Reno, 1991). Post-regression analyses for both timelines (baseline and follow-up) showed that mean for the VIF scores were 1.11 and 1.10, respectively. In addition, no variables have VIF score higher than 1.5. Thus, there was no indication for multicollinearity among study variables.

Table 6

Correlations between Independent Study Variables by Time

Baseline	1	2	3	4	5	6
1. Appointment adherence	1					
2. Medication adherence	.19 _c					
3. Treatment motivation	.01	-.04				
4. Perceived voluntariness	.12 _c	.13 _c	-.01 _c			
5. Mental health service	.10 _c	.06	.06 _a	-.09 _c		
6. Substance abuse service	.06 _a	-.02	.17 _c	-.07 _b	.38 _c	
7. Neighborhood disadvantage	.07 _b	.05	-.07 _a	.05	-.07 _a	-.10 _c
<hr/>						
Follow-up						
1. Appointment adherence	1					
2. Medication adherence	.18 _c					
3. Treatment motivation	-.05	-.02				
4. Perceived voluntariness	.08 _b	.10 _c	-.07 _a			
5. Mental health service	.18 _c	.07 _a	.06 _a	-.08 _b		
6. Substance abuse service	.05	.01	.21 _c	-.08 _b	.39 _c	
7. Neighborhood disadvantage	-.01	.09 _b	-.01	-.01	.03	-.04

Note: p_a<.05, p_b<.01, p_c<.001

C. Hypothesis testing

The six hypotheses that guided the analysis are listed below. The results of the hypothesis tests are outlined in this section. Propensity score weighting was used for all hypotheses testing analyses.

Hypothesis one: MHC participants will have ‘better’ treatment utilization and live in ‘better’ neighborhood, whereas the TAU group will have worse treatment outcomes, and live in relatively disadvantaged communities.

1. Within group comparison (baseline vs. follow-up)

This section will discuss differences of each study variable between baseline and follow-up measure in each group. There are three categories of difference; clinical characteristics, neighborhood characteristics, and crime characteristics. As discussed in the previous section, propensity score weighting was applied for all group comparison analysis.

Clinical characteristics. Within group difference included eight clinical variables; hospitalization, substance use, appointment & medication adherence, treatment motivation, perceived voluntariness, and number of mental health & substance abuse services. Primary diagnosis was dropped in this analysis because there was no change over the study period. Table 7 demonstrates that there were significant differences in hospitalization and substance use between baseline and follow-up ($t(384) = 18.04, p = .001$; $t(384) = 3.67, p = .001$, respectively) for the TAU group. This indicates that TAU group participants had decreased numbers of hospitalization and substance use 6 months after court enrollment (baseline vs. follow-up). In terms of treatment utilization, the TAU group had increased scores of appointment adherence and number of mental health service and substance abuse service ($t(384) = -6.64, p = .001$; $t(384) = -8.67, p = .001$; $t(384) = -3.08, p = .002$, respectively) over the 6-month study period. However, there were no significant

changes on medication adherence, treatment motivation, and perceived voluntariness. Last were within group comparison was about neighborhood disadvantage and recidivism over time. The TAU group had no significant difference in neighborhood disadvantage but meaningful changes on recidivism ($t(384) = .71, p = .48$; $t(384) = 15.73, p = .001$, respectively). Thus, TAU group participants significantly reduced the number of arrests over time.

Similar to the TAU group, MHC participants had decreased numbers of hospitalization ($t(357) = 20.76, p = .001$) and substance use ($t(357) = 3.59, p = .001$) from baseline to follow-up. Contrary to the TAU group, the MHC group had significant changes of clinical characteristics except treatment motivation. These findings indicate that MHC participants had increased scores of appointment and medication adherence and numbers of mental health and substance abuse services, but decreased scores of perceived voluntariness ($t(357) = -1.95, p = .05$; $t(357) = -4.73, p = .001$; $t(357) = -3.12, p = .001$; $t(357) = -4.39, p = .001$; $t(357) = 3.27, p = .001$, respectively).

Neighborhood and crime characteristics. Same as the results from TAU group, there was no significant changes on neighborhood disadvantage but significant difference in recidivism ($t(384) = .57, p = .57$; $t(384) = 14.12, p = .001$, respectively). Therefore, MHC group participants significantly decreased the number of arrests over time but not their neighborhood disadvantage.

In summary, the hypothesis was partially supported in that MHC group participants were found to have more positive treatment outcomes compared to the TAU group participants depending on the clinical characteristics. For example, MHC group participants had increased medication adherence over time while TAU group participants had no significant changes. However, MHC group participants showed worse treatment outcomes (such as decreased perceived voluntariness) while the TAU group has no changes on this treatment outcome.

Table 7

Change of Study Variables Over Time

	TAU (N=384)			MHC (N=357)		
	Mean diff	<i>t</i>	<i>p</i>	Mean diff	<i>t</i>	<i>p</i>
Hospitalization	-.49	-18.04	.001	-.57	-20.76	.001
Substance use	-3.67	-4.56	.001	-2.40	-3.59	.001
Treatment Adherence						
- <i>Appointment adherence</i>	.40	6.64	.001	.12	1.95	.05
- <i>Medication adherence</i>	.07	.98	.32	.34	4.73	.001
Treatment Perception						
- <i>Treatment motivation</i>	-.77	-1.14	.25	.29	.45	.66
- <i>Perceived voluntariness</i>	.46	1.04	.30	-1.22	-3.27	.001
Treatment Usage						
- <i>Mental health service</i>	32.55	8.67	.001	12.31	3.12	.001
- <i>Substance abuse service</i>	10.69	3.08	.002	13.90	4.39	.001
Neighborhood disadvantage	-.53	-.71	.48	-.46	-.57	.57
Recidivism	-1.20	-15.73	.001	-.87	-14.12	.001

Note: Mean diff: follow-up-baseline

2. Between group comparison (TAU vs. MHC)

Clinical characteristics. For the between group differences at baseline and follow-up, eight clinical characteristics were included hospitalization, substance use, appointment and medication adherence, treatment motivation, perceived voluntariness, mental health service and substance abuse service usage. First, the ANOVA test outlined in Table 8 demonstrated that there was significant difference at baseline ($F(1,737) = 16.21, p = .001$); the MHC group had more hospitalizations compared to the TAU group (.76 and .67, respectively, see Table 3). However, after 6-month, there was no significant difference between TAU and MHC ($F(1,739) = 2.07, p = .15$). In regard to substance use, TAU group participants reported higher numbers of substance use compared to MHC group participants ($F(1,721) = 28.35, p = .001$) (11.52 and 6.94 times, respectively, see Table 3). Those difference continued to be significant at the follow-up ($F(1,724) = 6.27, p = .01$). In addition, MHC group showed higher appointment adherence compared to the TAU group at baseline ($F(1,739) = 9.05, p = .001$) (3.83 and 4.14, respectively, see Table 3 and Table 8). However, it became non-significant after 6 months ($F(1,739) = .50, p = .48$). Table 8 demonstrates the group difference of medication adherence. There was no significant group difference at baseline ($F(1,739) = .35, p = .56$); however, the difference becomes significant after 6 months ($F(1,739) = 18.57, p = .001$). MHC group reported higher level of medication adherence compared to the TAU group at follow-up (see Table 3). In terms of the treatment motivation, there was no significant group difference at baseline ($F(1,615) = .22, p = .64$) but it became significant after 6 months ($F(1,638) = 3.92, p = .05$). The change indicates that MHC group had higher treatment motivation compared to the TAU group (25.13 and 22.99, respectively, see Table 3). For the perceived voluntariness, there was no significant group difference at baseline ($F(1,624) = .47, p = .49$) but significant at follow-up ($F(1,665) = 11.71, p = .001$). However, opposite to the treatment

motivation, the TAU group had higher perceived voluntariness compared to the MHC group (see Table 3). In addition, there was significant group difference of mental health service usage between TAU and MHC at baseline ($F(1,738) = 17.47, p = .001$) indicating that MHC participants used more mental health services compared to the TAU participants (26.20 and 45.81 times/nights, respectively). However, the difference became non-significant at follow-up ($F(1,736) = .71, p = .40$). Lastly, there was no significant group differences of substance abuse service usage both at baseline and follow-up ($F(1,737) = 1.27, p = .26; F(1,737) = .05, p = .83$).

Neighborhood characteristics. Neighborhood disadvantage are summed rates of poverty, unemployment, vacant/ abandoned housing, public benefits recipients, and single-parent families in the census tract level. In terms of the neighborhood disadvantage, there was no significant group difference both at baseline and follow-up ($F(1,1491) = 2.40, p = .12; F(1,1249) = .168, p = .20$; see Table 8 and Table 4).

Crime characteristics. There are level of most serious charge (mild, moderate, and serious) and rate of recidivism. For the level of most serious charge, there was no significant group difference both at baseline and follow-up for mild and moderate crime charge ($t(739) = 1.00, p = .32; t(739) = 1.12, p = .26$). However, there were more people with a serious charge in the MHC compared to the TAU group ($t(739) = -2.21, p = .03$). For the recidivism rate, the MHC group showed a lower rate of recidivism compared to the TAU group both at baseline and follow-up ($F(739) = 20.20, p = .001; F(739) = .546, p = .02$; see Table 8 and Table 5).

In summary, the hypothesis was partially supported. For the clinical characteristics, the MHC group had better treatment outcomes in terms of substance use, appointment adherence, and mental health service usage at baseline. In addition, the MHC group had better treatment outcomes of substance use, medication adherence, and treatment motivation than TAU group at follow-up. In

terms of the neighborhood characteristics, there was no significant group difference in neighborhood disadvantage both at baseline and follow-up. Lastly, MHC group participants had more severe crime charges and lower recidivism rates compared to the TAU group participants.

Table 8
Comparison of Study Variables between Groups (N=741)

	Baseline			Follow-up		
	% diff		<i>t</i>		<i>p</i>	
Most serious charge						
Mild	3.11%		1.00		.32	
Moderate	2.50%		1.12		.26	
Serious	-5.61%		-2.21		.03	
	Mean diff	<i>F</i> (<i>t</i>)	<i>p</i>	Mean diff	<i>F</i> (<i>t</i>)	<i>p</i>
Hospitalization	-.09	16.21	.001	-.05	2.07	.15
Substance use	4.58	28.35	.001	2.25	6.27	.01
Treatment Adherence						
- <i>Appointment adherence</i>	-.31	9.05	.001	2.02	.50	.48
- <i>Medication adherence</i>	-.08	.35	.56	-.49	18.57	.001
Treatment Perception						
- <i>Treatment motivation</i>	-.93	.22	.64	-2.14	3.92	.05
- <i>Perceived voluntariness</i>	-.22	.47	.49	1.46	11.71	.001
Treatment Usage						
- <i>Mental health service</i>	-19.61	17.47	.001	.91	.71	.40
- <i>Substance abuse service</i>	-1.84	1.27	.26	-5.07	.05	.83
Neighborhood disadvantage	-1.26	2.40	.12	-1.25	1.68	.20
Recidivism	.54	20.20	.001	.20	5.46	.02

Note: Mean diff: TAU-MHC

Hypothesis two: Differences in treatment variables (treatment adherence, perceptions of treatment voluntariness and motivation, and treatment usage) and neighborhood disadvantage between the MHC and TAU group will become larger over time.

This section will examine whether group difference at baseline become larger at the follow-up. Positive differences represent that MHC group had higher score of the study variable. Similar to the previous section, current analyses focused on the three different categories of study variables; clinical, neighborhood, and crime characteristics. At baseline, MHC group had higher scores of all study variables except recidivism. These outcomes indicated that MHC group had more appointment adherence, medication adherence, treatment motivation, perceived voluntariness, mental health services, substance abuse services and lived in more disadvantaged neighborhood compared to the TAU group. However, MHC group had fewer number of recidivism than TAU group at baseline. At follow-up, MHC group had higher score of medication adherence, treatment motivation, substance abuse service, and neighborhood disadvantage but lower score of appointment adherence, perceived voluntariness, mental health service, and recidivism. These outcomes meant that MHC group had better medication adherence, treatment motivation, and substance abuse services and lived in more disadvantaged environment than TAU group. On the other hands, MHC group had worse appointment adherence, perceived voluntariness compared to the TAU group. Lastly, MHC group continued to have fewer number of recidivism than TAU group.

Comparison of the group differences between baseline and follow-up illustrated by Table 9 indicated that all differences were significant. However, not all differences became larger as hypothesized. First, there were larger differences over time for medication adherence, treatment motivation, perceived voluntariness, substance abuse services, and recidivism ($t(1480) = 73.58, p$

= .001; $t(1480) = 1.10, p = .001$; $t(1480) = -55.46, p = .001$; $t(1480) = 17.34, p = .001$; $t(1480) = 8.20, p = .001$, respectively). However, some of the differences between groups became smaller over time including appointment adherence, mental health services, and neighborhood disadvantage ($t(1480) = -49.10, p = .001$, $t(1480) = 28.69, p = .001$; $t(1480) = 138.05, p = .001$, respectively). In summary, the second hypothesis was partially supported by findings that suggested that some of study variables (i.e., medication adherence, treatment motivation, perceived voluntariness, substance abuse service, recidivism) become larger in their differences over time.

Table 9

Comparison of Study Variables between Groups over Time

	T1 diff	T2 diff	Total diff	<i>t</i>	<i>p</i>
Treatment Adherence					
- <i>Appointment adherence</i>	.31	-.02	smaller	-49.10	.001
- <i>Medication adherence</i>	.08	.49	larger	73.58	.001
Treatment Perception					
- <i>Treatment motivation</i>	.93	2.14	larger	1.10	.001
- <i>Perceived voluntariness</i>	.22	-1.46	larger	-55.46	.001
Treatment Usage					
- <i>Mental health service</i>	19.61	-.91	smaller	28.69	.001
- <i>Substance abuse service</i>	1.84	5.07	larger	17.34	.001
Neighborhood disadvantage	1.26	1.25	smaller	138.05	.001
Recidivism	-.54	-.79	larger	8.20	.001

Note: T1 diff: MHC-TAU at baseline

T2 diff: MHC-TAU at follow-up

Hypothesis three: Greater treatment utilization and living in relatively more advantaged neighborhoods will be associated with fewer arrests for both groups.

Table 10 outlines the effects of treatment utilization and neighborhood disadvantage on arrest. There were four different models depending on time (baseline and follow-up) and group (TAU and MHC). The first model examines the study model for the TAU group at baseline. In terms of the treatment utilization as a level 1, no treatment utilization variables had a significant impact on arrest. However, neighborhood disadvantage was found to be associated with arrest in TAU group such that participants living in the worse neighborhood environment were more likely to be arrested compared to those living in better neighborhood environments ($p < .001$). None of control variables were significantly associated with arrest ($p > .05$).

The second model examines the study model among the MHC group at baseline. There was significant effect of site variable on arrest, suggesting that the odds of being arrested among Santa Clara study participants was 1.72 times higher than odds of being arrested among study participant in San Francisco (OR=1.72, 95% CI=1.03,2.88, $p < .05$). However, people living in Indianapolis were .46 percent less likely to be arrested compared to those in San Francisco (OR=.54, 95% CI=.30,.95, $p < .05$). Contrary to the first model, MHC participants who received substance abuse treatment were 1 percent less likely to be arrest compared to those who received less substance abuse treatment (OR=.99, 95% CI=.99,1.00, $p < .001$). In addition, similar to previous model, neighborhood disadvantage as a level 2 has significant impact on arrest ($p < .001$). Thus, people living in more troublesome neighborhood environment were more likely to be arrested than those in the good neighborhood environments.

The third model tested the same study model but among the TAU group at follow-up. Analysis suggested that none of study variables including control, level 1 and level 2 variables were significantly associated with arrest ($p > .05$).

The last model investigates the same study model for the MHC group at follow-up. No control variables were significantly associated with arrest. Among the treatment utilization as a level 1 variables, treatment motivation (OR=.97, 95% CI=.95,1.00, $p < .05$) had significant effect on arrest. This finding suggested that MHC participants with higher treatment motivation and perceived voluntariness were 3 percent less likely to be arrested compared to those with lower treatment motivation. Lastly, neighborhood disadvantage as a level 2 variable had significant impact on arrest ($p < .01$), indicating that MHC participants within the worse neighborhood environments were more likely to be arrested than those within the good neighborhood environments. The unit of analysis is residential information not the number of study participants. Thus, the total case of analyses increased to 1,489 and 1,242 for baseline and follow-up, respectively from 741 total study participants.

In summary, the proposed hypothesis was partially supported with greater treatment utilization among MHC at baseline (i.e., substance abuse services) and MHC (i.e., treatment motivation) at follow-up and good neighborhood environment across all group and time (except TAU at follow-up) were significantly associated with fewer arrests.

Table 10

Effect of Treatment Utilization and Neighborhood Disadvantage on Recidivism

	Baseline		Follow-up	
	TAU (N=762)	MHC(N=727)	TAU (N=587)	MHC (N=655)
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Control Variables				
Age	1.00 (.98,1.01)	1.00 (.98,1.01)	.98 (.94,1.02)	1.00 (.97,1.04)
Gender (female=1)	.90 (.69,1.19)	1.03 (.72,1.37)	1.04 (.59,1.81)	.59 (.31,1.14)
Drug use (yes=1)	1.00 (.94,1.01)	1.01 (.99,1.03)	1.01 (.99,1.03)	1.04 (.99,1.08)
Hospitalization (yes=1)	.94 (.70,1.27)	1.10 (.74,1.64)	.73 (.35,1.52)	.74 (.32,1.71)
Most serious charge (higher, severe)	1.03 (.84,1.26)	.92 (.71,1.20)	.94 (.56,1.58)	.59 (.34,1.05)
Race (ref=White)				
Black	.94 (.67,1.32)	.84 (.51,1.39)	1.36 (.60,3.07)	1.00 (.54,1.85)
Hispanic	1.23 (.81,1.87)	1.08 (.57,2.05)	1.97 (.81,3.78)	2.31 (.81,6.53)
Others	.82 (.46,1.47)	1.28 (.54,3.05)	2.68 (.92,7.80)	1.53 (.32,7.27)
Site (ref=San Francisco)				
Santa Clara	1.54 (.86,2.75)	1.72 (1.03,2.88)*	1.07 (.41,2.80)	1.74 (.41,7.44)
Minneapolis	.71 (.45,1.11)	.60 (.35,1.02)	.80 (.32,1.98)	.72 (.16,3.20)
Indianapolis	1.11 (.70,1.76)	.54 (.30,.95)*	1.17 (.46,2.99)	3.35 (.96,11.68)
Treatment Utilization (Level 1)				
Treatment Adherence (higher, better)				
- <i>Appointment adherence</i>	1.00 (.86,1.16)	1.24 (.97,1.57)	1.12 (.83,1.51)	.99 (.60,1.64)
- <i>Medication adherence</i>	1.04 (.84,1.28)	.90 (.76,1.07)	.83 (.66,1.04)	1.04 (.71,1.01)
Treatment Perception (higher, more)				
- <i>Treatment motivation</i>	1.01 (1.00,1.03)	.99 (.97,1.01)	1.02 (.99,1.04)	.97 (.95,1.00)*
- <i>Perceived voluntariness</i>	1.00 (.96,1.03)	1.02 (.99,1.06)	1.00 (.96,1.05)	.97 (.92,1.02)
Treatment Usage (higher, more)				
- <i>Mental health service</i>	1.00 (1.00,1.01)	1.00 (1.00,1.01)	1.00 (1.00,1.01)	1.00 (.99,1.01)
- <i>Substance abuse service</i>	1.00 (.99,1.00)	.99 (.99,1.00)***	1.00 (.99,1.01)	1.00 (.99,1.00)

(Continued)

	Variance of Random Effects			
Neighborhood Disadvantage (Level 2)	1.08***	1.73***	.47	1.10**
Log Likelihood	-912.65	-871.78	-402.40	-365.26

Note: * $p < .05$, ** $p < .01$, *** $p < .001$; OR: odds ratio, CI: confidence interval

Hypothesis four: The positive effects of treatment and relative neighborhood advantage are expected to be larger for the MHC group compared to the TAU group.

As described in the analysis strategy, z tests were used to compare difference group effects. These results can be found in Table 11. At baseline, there was significant difference of effect between TAU and MHC in terms of the appointment adherence ($z=2.79$, $p<.001$) and mental health service ($z=4.80$, $p<.001$). These findings indicated that effect of appointment adherence and mental health services among MHC group lead to reduce the number of arrest while the effect of them among the TAU group adversely increased the possibility of being arrested. At follow-up, only medication adherence among MHC group had a significantly more positive effect compared to TAU group ($z=1.98$, $p<.05$). This demonstrated that the effect of the medication adherence among MHC group had a role in reducing possible arrests while the effect of it among the TAU group actually increased the possibility of arrest. As a result, the outcomes of analysis partially support the fourth hypothesis. The unit of analysis was increased based on the residential information from 741 total study participants.

Table 11

Coefficient Comparison of Study Variables between Groups

	Baseline (N=1489)				Follow-up (N=1242)			
	$\beta 1$	$\beta 2$	z	p	$\beta 1$	$\beta 2$	z	p
Treatment Adherence								
- <i>Appointment adherence</i>	.02	-.20	2.79	.001	.12	-.05	-1.56	.95
- <i>Medication adherence</i>	.04	-.07	.11	.45	.19	-.02	1.98	.02
Treatment Perception								
- <i>Treatment motivation</i>	.01	-.01	-5.46	.99	.01	-.02	-4.75	.99
- <i>Perceived voluntariness</i>	.001	.01	-4.21	.99	-.001	-.01	-.59	.54
Treatment Usage								
- <i>Mental health service</i>	.003	-.001	4.80	.001	.001	.001	.64	.25
- <i>Substance abuse service</i>	-.003	-.01	-7.22	.99	-.002	-.001	-.98	.85
Neighborhood Disadvantage	.05	.04	-2.64	.99	.02	.01	-1.85	.98

Note: $\beta 1$: coefficient for TAU, $\beta 2$: coefficient for MHC

Model for TAU at baseline: $y^{AT} = \beta_0^{AT} + \beta_1^{AT} age_1 + \beta_2^{AT} gender_2 + \beta_3^{AT} drug\ use_3 + \beta_4^{AT} hospitalization_4 + \beta_5^{AT} most\ serious\ charge_5 + \beta_6^{AT} Black_6 + \beta_7^{AT} Hispanic_7 + \beta_8^{AT} Others_8 + \beta_9^{AT} Santa\ Clara_9 + \beta_{10}^{AT} Minneapolis_{10} + \beta_{11}^{AT} Indianapolis_{11} + \beta_{12}^{AT} appointment\ adherence_{12} + \beta_{13}^{AT} medication\ adherence_{13} + \beta_{14}^{AT} treatment\ motivation_{14} + \beta_{15}^{AT} perceived\ voluntariness_{15} + \beta_{16}^{AT} mental\ health\ service_{16} + \beta_{17}^{AT} substance\ abuse\ service_{17} + \beta_{18}^{AT} neighborhood\ disadvantage_{18}$

Model for MHC at baseline: $y^{AM} = \beta_0^{AM} + \beta_1^{AM} age_1 + \beta_2^{AM} gender_2 + \beta_3^{AM} drug\ use_3 + \beta_4^{AM} hospitalization_4 + \beta_5^{AM} most\ serious\ charge_5 + \beta_6^{AM} Black_6 + \beta_7^{AM} Hispanic_7 + \beta_8^{AM} Others_8 + \beta_9^{AM} Santa\ Clara_9 + \beta_{10}^{AM} Minneapolis_{10} + \beta_{11}^{AM} Indianapolis_{11} + \beta_{12}^{AM} appointment\ adherence_{12} + \beta_{13}^{AM} medication\ adherence_{13} + \beta_{14}^{AM} treatment\ motivation_{14} + \beta_{15}^{AM} perceived\ voluntariness_{15} + \beta_{16}^{AM} mental\ health\ service_{16} + \beta_{17}^{AM} substance\ abuse\ service_{17} + \beta_{18}^{AM} neighborhood\ disadvantage_{18}$

In order to compare the coefficient for groups ($\beta 1$ and $\beta 2$) at baseline, z test was conducted (Paternoster et al., 1998).

For example, in terms of the appointment adherence, the equation to calculate z score is

$$z = \frac{\beta_6^{AT} appointment\ adherence_6 - \beta_6^{AM} appointment\ adherence_6}{\sqrt{SE_6^{AT} appointment\ adherence_6^2 - SE_6^{AM} appointment\ adherence_6^2}}, \text{ while } SE \text{ represents the standard error}$$

error

Hypothesis five: MHC participants will have significantly more positive changes in treatment and neighborhood effects as compared to the TAU group.

Outcomes from the z-tests to compare the different effect (using study variable \times study group interaction) at baseline and follow-up can be found in Table 12. The full model including all study variables and interactions was conducted to calculate the coefficient of interaction terms. However, only the coefficient of each interaction term was reported in this table. MHC participants had positive changes for appointment adherence (from -.093 to -.132), medication adherence (from -.097 to -.102), treatment motivation (from -.011 to -.016), and perceived voluntariness (from -.014 to -.020) as compared to the TAU group, but those changes were not statistically significant ($p > .05$). Counter to what was hypothesized, the effect of mental health service (from -.007 to -.005), substance abuse service (from -.01 to -.004), and neighborhood disadvantage (from -.024 to -.020) on arrest decreased over time but not statistically significant ($p > .05$). Similar to hypothesis four and five, the unit of analysis was increased to 1,489 and 1,242 based on the residential information. In summary, the results of the analyses provided partial support for the fifth hypothesis.

Table 12

Effect Changes over Time on Recidivism between Groups

Interaction terms	Baseline (N=1489)		Follow-up (N=1242)		z	p
	β	S.E.	β	S.E.		
Treatment Adherence						
- <i>Appointment adherence</i> × <i>study group</i>	-.09	.03	-.13	.04	-1.06	.87
- <i>Medication adherence</i> × <i>study group</i>	-.10	.03	-.10	.04	.15	.43
Treatment Perception						
- <i>Treatment motivation</i> × <i>study group</i>	-.01	.003	-.02	.005	-1.02	.85
- <i>Perceived voluntariness</i> × <i>study group</i>	-.01	.004	-.02	.007	-1.06	.87
Treatment Usage						
- <i>Mental health service</i> × <i>study group</i>	-.01	.002	-.01	.003	.86	.19
- <i>Substance abuse service</i> × <i>study group</i>	-.01	.002	-.004	.003	.66	.24
<i>Neighborhood disadvantage</i> × <i>study group</i>	-.02	.01	-.02	.01	1.03	.14

Note: *Study group* (TAU=0, MHC=1)

In order to the interaction effect, analyses were conducted based on the equation below.

For example, in terms of the appointment adherence × study group between baseline and follow-up, below equations were used.

Model at baseline for :

$y^A =$

$$\beta_0^A + \beta_1^A \text{age}_1 + \beta_2^A \text{gender}_2 + \beta_3^A \text{drug use}_3 + \beta_4^A \text{hospitalization}_4 + \beta_5^A \text{most serious charge}_5 + \beta_6^A \text{Black}_6 + \beta_7^A \text{Hispanic}_7 + \beta_8^A \text{Others}_8 + \beta_9^A \text{Santa Clara}_9 + \beta_{10}^A \text{Minneapolis}_{10} + \beta_{11}^A \text{Indianapolis}_{11} + \beta_{12}^A \text{appointment adherence}_{12} + \beta_{13}^A \text{medication adherence}_{13} + \beta_{14}^A \text{treatment motivation}_{14} + \beta_{15}^A \text{perceived voluntariness}_{15} + \beta_{16}^A \text{mental health service}_{16} + \beta_{17}^A \text{substance abuse service}_{17} + \beta_{18}^A \text{neighborhood disadvantage}_{18} + \beta_{19}^A \text{appointment adherence} \times \text{study group}_{19}$$

Model for follow-up:

$y^B =$

$$\beta_0^B + \beta_1^B \text{age}_1 + \beta_2^B \text{gender}_2 + \beta_3^B \text{drug use}_3 + \beta_4^B \text{hospitalization}_4 + \beta_5^B \text{most serious charge}_5 + \beta_6^B \text{Black}_6 + \beta_7^B \text{Hispanic}_7 + \beta_8^B \text{Others}_8 + \beta_9^B \text{Santa Clara}_9 + \beta_{10}^B \text{Minneapolis}_{10} + \beta_{11}^B \text{Indianapolis}_{11} + \beta_{12}^B \text{appointment adherence}_{12} + \beta_{13}^B \text{medication adherence}_{13} + \beta_{14}^B \text{treatment motivation}_{14} + \beta_{15}^B \text{perceived voluntariness}_{15} + \beta_{16}^B \text{mental health service}_{16} + \beta_{17}^B \text{substance abuse service}_{17} + \beta_{18}^B \text{neighborhood disadvantage}_{18} + \beta_{19}^B \text{appointment adherence} \times \text{study group}_{19}$$

Then, to compare the coefficients between baseline and follow-up for appointment adherence × study group, z test was conducted as below (Paternoster et al., 1998).

$$z = \frac{\beta_{13}^A \text{appointment adherence} \times \text{study group}_{13} - \beta_{13}^B \text{appointment adherence} \times \text{study group}_{13}}{\sqrt{SE_{13}^A \text{appointment adherence} \times \text{study group}_{13}^2 - SE_{13}^B \text{appointment adherence} \times \text{study group}_{13}^2}}, \text{ while } SE$$

represents the standard error

Hypothesis six: The probability of recidivism will be significantly lower among the MHC group compared to the TAU group after court enrollment, controlling for treatment and neighborhood disadvantage effects.

Table 13 outlines the model used to estimate the effect of MHC enrollment on recidivism, when controlling for other variables. Six months before the court enrollment (baseline), MHC group participants were 34 percent less likely to be arrested (OR=.66, 95% CI=.552,.85, $p<.01$) as compared to TAU group participants. In addition, study participants with more substance abuse service were 1 percent less likely to be arrested (OR=.99, 95% CI=.99,1.00, $p<.01$) compared to those with less substance abuse services. Last, study participant in Minneapolis were 32 percent less likely to be arrest compared to those in the San Francisco (OR=.68, 95% CI=.48,.97, $p<.05$).

Six months after the court enrollment (follow-up), MHC group participants were still 44 percent less likely to recidivate (OR=.56, 95% CI=.39,.83, $p<.01$) compared to the TAU group participants. This implies that not only did MHC group participants have fewer arrests at both times (before and after the court enrollment) but the probability of recidivism was lower after the court enrollment. At follow-up, the odds for the recidivism among Hispanic was 2.17 time higher than odds of recidivism among White (OR=2.17, 95% CI=2.08,4.38, $p<.05$) . In addition, odds for recidivism among study participant in Indianapolis were 1.94 times higher than odds for recidivism among those in San Francisco (OR=1.94, 95% CI=1.05,3.91, $p<.05$). Study participants living in the disadvantaged neighborhood were more likely to be arrested compared to those in the better neighborhood environment for both T1 and T2 ($p<.001$ and $p<.05$, respectively). Again, the unit of analysis is based on the residential information not from the total study participants ($n=741$).

Table 13

Effect of MHC Involvement on Recidivism

	T1 (N=1489) OR (95% CI)	T2 (N=1242) OR (95% CI)
Control Variables		
Age	1.00 (.99,1.01)	1.00 (.98,1.01)
Gender (female=1)	1.04 (.86,1.26)	.74 (.51,1.07)
Drug use (yes=1)	1.00 (.99,1.01)	1.02 (1.00,1.04)
Hospitalization (yes=1)	1.01 (.81,1.26)	.84 (.49,1.42)
Most serious charge (higher, severe)	.98 (.85,1.14)	.81 (.56,1.10)
Race (ref=White)		
Black	.90 (.72,1.13)	1.31 (.74,2.32)
Hispanic	1.18 (.89,1.56)	2.17 (2.08,4.38)*
Others	1.02 (.66,1.58)	2.20 (.83,5.84)
Site (ref=San Francisco)		
Santa Clara	1.42 (.93,2.18)	1.40 (.63,3.12)
Minneapolis	.68 (.48,.97)*	.81 (.42,1.54)
Indianapolis	.71 (.47,1.05)	1.94 (1.05,3.61)*
Treatment Utilization (Level 1)		
Treatment Adherence (higher, better)		
- <i>Appointment adherence</i>	1.09 (.96,1.24)	1.07 (.82,1.40)
- <i>Medication adherence</i>	.96 (.83,1.10)	.90 (.75,1.07)
Treatment Perception (higher, more)		
- <i>Treatment motivation</i>	1.00 (.99,1.02)	1.00 (.98,1.02)
- <i>Perceived voluntariness</i>	1.01 (.99,1.03)	1.00 (.96,1.03)
Treatment Usage (higher, more)		
- <i>Mental health service</i>	1.00 (1.00,1.01)	1.01 (1.00,1.01)
- <i>Substance abuse service</i>	.99 (.99,1.00)***	1.00 (.99,1.00)
Study Group (MHC=1)	.66 (.52,.85)**	.56 (.39,.83)**
	Variance of Random Effects	Variance of Random Effects
Neighborhood Disadvantage (Level 2)	.89***	11.23*
Log Likelihood	-1819.89	-634.04

Note: T1: before court enrollment (baseline), T2: after court enrollment (follow-up)

* $p < .05$, ** $p < .01$, *** $p < .001$

OR: odds ratio, CI: confidence interval

CHAPTER FIVE

Discussion and Conclusions

The current study aimed to (a) determine whether MHC participants had more positive outcomes in individual treatment and lived in more favorable neighborhood environments compared to participants in TAU group over time; (b) identify the impact of treatment and neighborhood factors on recidivism among offenders with mental health problems; and (c) examine whether the effects of treatment and neighborhood factors on recidivism change over time in each group (MHC and comparison group) and MHC involvement (as compared to traditional court) reduced recidivism controlling for treatment and neighborhood factors after court enrollment. Ecological system theory (Bronfenbrenner, 1986, 1999), Risk-Need-Responsivity principles (Andrews et al., 2011), social disorganization theory (Bursik, 1988), and therapeutic jurisprudence theory (Wexler & Winick, 1996; Winick & Wexler, 2003) were used for this investigation. Under the three research objectives, there were six research questions; “Do MHC participants have better treatment utilization and live in better neighborhood environment while the TAU group has worse outcomes or live in a relatively disadvantaged community?,” “Do differences in treatment utilization and neighborhood disadvantage variables between groups become larger over time?,” “Are greater level of treatment utilization and ‘better’ neighborhood disadvantage (i.e., lower levels of neighborhood disadvantage) associated with fewer arrest for both groups?,” “Are the positive effects of treatment and lesser neighborhood disadvantage expected to be larger for the MHC group compared to the TAU group?,” “Do MHC participants have significantly greater levels of positive changes in treatment and neighborhood effect as compared to the TAU group?,” and “Does the probability of recidivism remain statistically lower among the MHC group compared to the TAU group after MHC enrollment?” This chapter

presents a discussion of the study findings, and their relationship with existing literature.

Implications for policy, research, and practice as well as suggestions for future research are also discussed. Lastly, the chapter outlines the study’s limitations and strengths.

Table 14

Results for Hypothesis Testing

Hypothesis	Outcomes
H1: MHC participants will have ‘better’ treatment utilization and live in environments with ‘better’ neighborhood disadvantages, whereas the TAU group will have worse outcomes, or live in relatively disadvantaged communities.	P
H2: Differences in treatment and neighborhood disadvantage variables between the MHC and TAU group will become larger over time.	P
H3: Greater treatment utilization and lowered neighborhood disadvantage will be associated with fewer arrests for both groups	P
H4: The positive effects of treatment and lowered neighborhood disadvantage factors are expected to be larger for the MHC group compared to the TAU group.	P
H5: MHC participants will have significantly positive higher levels of changes in treatment and neighborhood effects, as compared to the TAU group	N
H6: The probability of recidivism will remain statistically lower among the MHC group compared to the TAU group after MHC enrollment, controlling for treatment and neighborhood disadvantage effect.	Y

Notes: Y=Supported; N=Not supported; P=Partially supported

A. Major Findings

1. Treatment utilization and study group

In the TAU group, there were significant increases in appointment adherence, use of mental health services, and use of substance abuse services after court enrollment. It is notable that study participants in the traditional court system had positive outcomes. These findings are aligned with other MHC studies, which find that traditional court participants also had higher levels of treatment utilization (e.g., case management, individual therapy, group therapy) and better mental health symptoms (e.g., life stress, psychosocial functioning) (Cosden et al., 2005).

It is not clear what exactly drove these positive treatment outcomes among traditional court participants despite not being enrolled in the MHC. However, McAlpine and Mechanic (2000) found that those with a history of criminal justice involvement were four times more likely to receive specialty mental health services compared to those without history in the criminal justice system. In addition, inmates with severe mental illness (e.g., schizophrenia, major depression, and bipolar) were three times more likely to use a psychiatric hospital in their lifetime compared to those who were never involved in the justice system (Fisher et al., 2006). Similarly, Cosden et al. (2003) found that offenders at the traditional court still had opportunities to treat their mental illness (e.g., regular court supervision, higher ratio but case manager, housing support), but not in a manner that was as intensive as that provided to MHC participants. Thus, it is suggested that offenders with severe mental illness have greater opportunities to receive mental health services once they are involved in the justice system.

In the MHC group, some treatment variables showed improved outcomes after court enrollment, including included increased appointment adherence, medication adherence, mental health services use, and substance abuse service use. In the present study, it was hypothesized that MHC participants will have ‘better’ treatment outcomes after court enrollment. MHC participants, however, did display one adverse result contrary to the hypothesis, in that they had decreased perceived voluntariness after court enrollment. This finding is not surprising because treatment at MHC is mandatory (Sarteschi et al., 2011). In fact, it is not always problematic that perceived voluntariness decreased over time. Instead, higher level of perceived coercion may lead to better treatment retention over time (Young & Belenko, 2002). Similarly, mandatory treatment may leads to significant reduction in future arrests, compared to non-mandatory treatment (Junginger et al., 2006; Young, Fluellen, & Belenko, 2004). Thus, it is plausible that

decreased perceived voluntariness toward treatment in MHC may have positively influenced the final outcome (i.e., reduction in recidivism).

When comparing treatment outcomes between groups, MHC participants had higher rates of appointment adherence and mental health services usage compared to those by TAU participants before court enrollment. While there were slight group differences in appointment adherence, MHC participants received far higher levels of mental health services (i.e. 19.61 times/nights) compared to TAU participants. This implies that MHC participants had more needs for treatment than TAU participants even before they had enrolled in court. Indeed, preliminary analysis found that MHC participants had a higher number of hospitalizations during past 6-month for both before and after court enrollment, compared to TAU participants (see Table 3). Thus, people who had a greater needs for mental health services were more likely to be accepted to the MHC, compared to those with lesser less need.

This line of reasoning is consistent with findings in previous research that prior mental health status was the one of the most important criteria relevant to the MHC screening process (Steadman, Redlich, Griffin, Petril, & Monahan, 2005). In addition, the severity of mental illness as demonstrated by having an Axis I diagnosis (e.g., schizophrenia, major depression, bipolar) was a critical component when determining MHC participation (Kelli, 2012). Lastly, clinical staff among the MHC team reported that “Treatability” was a major criterion used by them when determining eligibility (Wolff, Fabrikant, & Belenko, 2011). Treatability could be considered by examining the individual’s treatment history and treatment compliance. Thus, having a longer history of mental health services usage *before* court enrollment played a critical role in confirming the severity of mental illness, as well as level of adherence to treatment in the individual, in turn; leading to higher acceptance rates into MHC.

After court enrollment, there were significant group differences between MHC and TAU, including in medication adherence, treatment motivation, and perceived voluntariness. It is notable that MHC participants showed higher treatment motivation than TAU participants. Kelli (2012) found that MHC rewarded and encouraged offenders through reinforcement. For example, the MHC judge took time off of probation or dropped charges in order to motivate participants to comply with treatment (Kelli, 2012). In addition, MHC judges minimized discussions about participants' pending criminal charges and focused on their prior symptoms, diagnosis, and treatment issues (Boothroyd et al., 2003). This approach supported the principle of therapeutic jurisprudence (TJ) by addressing the origins of the problem to change behaviors, and not just the crimes committed as a consequence of the behaviors (Winick & Wexler, 2003).

Another finding is that MHC participants had lower levels of perceived voluntariness than TAU participants after court enrollment. As mentioned, lower perceived voluntariness is not always negatively associated with higher treatment retention rates and lower rates of future arrests (Junginger et al., 2006; Young et al., 2004). One potential explanation for lower levels of perceived voluntariness could be that MHC participants were not aware of their freedom of choice in the MHC program which, in turn, decreased perceived voluntariness. Such an interpretation is consistent with previous research. Poythress et al. (2002) divided MHC participants into two groups based on responses to the question, "Either during your court hearing or before the hearing, did anyone explain to you that you could choose to go back to a regular misdemeanor court?". The group that was aware of the option had significantly lower levels of perceived coercion. In addition, previous studies found that most MHC participants chose to enroll in MHC program but, at the same time, also had lack of information about the voluntary nature of court options and requirements prior to entering (Redlich, Hoover, Summers,

& Steadman, 2010). Thus, MHC participants may not have had a clear understanding or received enough explanation about their autonomy in the program which, in turn, may have led to lower levels of perceived voluntariness.

2. Neighborhood disadvantage and study group

In terms of the factors of neighborhood disadvantage, both study groups (TAU and MHC) had decreased levels of neighborhood disadvantage (.53 and .46, respectively), indicating that participants had moved into better neighborhood environments 6 months after court enrollment. However, there were no significant changes over time (baseline and follow-up), and between groups (TAU and MHC). The result may be due to the use of 6 months as a follow-up because it is a relatively short period of time and participants may not have had enough time or resources to move into better neighborhood environments.

Another explanation for this outcome is that there was site variation for changes in neighborhood disadvantage. It is possible that residents in one site had more plausible options for moving out from the disadvantaged neighborhood than those in the other sites. This is in line with the finding that there were significant levels of site variations in neighborhood disadvantage for both pre and post 6 month ($F(1489) = 31.40, p = .001$); $F(1247) = 56.43, p = .001$). In addition, study participants only at Santa Clara had significant reduction in their neighborhood disadvantage ($t(756) = 2.98, p = .01$) over time. According to U.S. Census Bureau (2015), Santa Clara covers a much larger geographical area (1304 square miles) than San Francisco, Minneapolis, or Indianapolis (47, 606, and 362 square miles, respectively). Furthermore, the court system limits the area where the ex-offender can live (Logan, 2007). According to preliminary analysis, most of the study participants (over 99%) lived in the same county as their assigned courts. Thus, although

MHCs provided various services (e.g., lower ratios of case manager, housing support, and intensive monitoring) for the participants to live in good neighborhood environments (Cosden et al., 2005), the resources in each county may vary, or may be insufficient in making possible improvements in neighborhood disadvantage levels within the short period of time (6 months).

An additional explanation for non-significant changes in neighborhood environment is that MHC participants do not have enough time to move out from the disadvantaged neighborhood because they are released into the community immediately upon enrolling in the MHC program (Thompson et al., 2008). Thus, they don't have enough time to seek out alternative housing in good neighborhoods and, instead, may return to the disadvantaged neighborhood where they used to reside. Unfortunately, current data does not provide any related information that might be considered for further investigation of this point.

In terms of the between-group differences over time, MHC participants reported higher levels of neighborhood disadvantage both before and after the court enrollment (1.26 and 1.25 lower, respectively) compared to their TAU counterparts. This suggests that the MHC participants lived in more disadvantaged neighborhoods than did TAU participants. This is well aligned with previous research that people with severe mental illness (e.g., schizophrenia) were more likely to live in worse neighborhood circumstance than the overall population (Newman, 1994). In addition, Silver, Mulvey, and Swanson (2002) found that neighborhood disadvantage was significantly associated with higher rates of major depression and substance abuse disorder. The research concluded that severe mental illness leads people to have lower socioeconomic status (e.g., education, household income) which, in turn, compel them to live in disadvantaged neighborhoods (Silver et al., 2002). Thus, while severe mental illness itself might not have direct impact on neighborhood choice, socioeconomic status mediates the impact. Given that MHC

participants may have higher degree of mental illness (e.g., in symptom, severity, and treatment history), it makes sense for them to live in more disadvantaged neighborhoods compared to the more traditional court participants. Indeed, preliminary analysis revealed that MHC participants have received more treatments compared to TAU participants, only excepting mental health services after court enrollment (see Table 3). In this, there was only a slight difference between the groups (61.26 vs. 60.35).

3. Impact of treatment utilization and neighborhood disadvantage on recidivism

Four separate analyses were conducted in order to estimate the effect of treatment utilization and neighborhood disadvantage on recidivism by time (baseline and follow-up) and group (TAU and MHC). The first analysis examined the baseline among the TAU group participants. It is interesting that no control or treatment variables were associated with arrests in this model, except for neighborhood disadvantage, which will be discussed in the later section.

The second model examined MHC participants at baseline. In this analysis, substance abuse services were found to be related to arrests before court enrollment. Findings indicated that substance abuse services had a significant impact on arrests. This suggests that the more substance abuse services MHC group participants received, the fewer times they were arrested before court enrollment. Drug treatment is critical in serving offenders with severe mental illness, particularly because offenders with mental illness are more likely to have substance use disorder than the general population (Cloud, 2014; Karberg & James, 2005). Further, offenders with severe mental illness (e.g., schizophrenia, depression, bipolar) are more likely to have substance use disorder than offenders without severe mental illness (Baillargeon et al., 2010a; Mumola & Karberg, 2006).

This finding was well aligned with previous studies showing that substance abuse treatment had significant effects on reduction in arrests. Drug court aims to provide offenders with substance abuse treatment to prevent further drug use or crime, instead of incarceration (Nolan, 2009). Wilson, Mitchell, and Mac Kenzie (2006) conducted a systematic review of fifty five drug court studies and concluded that offenders at the drug court program were less likely to re-offend compared to similar offenders in traditional courts. In addition, randomized control study for offenders with substance abuse diagnosis found that drug treatment not only decreased the use of substance abuse, but also criminal behaviors (Henggeler et al., 2006). Thus, treatment for offenders with substance abuse is effective in reducing future crime.

The third model examined TAU participants after court enrollment. Similar to the first model, analysis does not provide any significant treatment factors associated with recidivism. In addition, neighborhood disadvantage did not have any significant effects on recidivism.

The last model examines MHC participants 6 months after court enrollment. Among the treatment variables, MHC participants with higher levels of treatment motivation were less likely to recidivate, compared to those with lower levels of treatment motivation. Findings are consistent with previous studies showing that treatment motivation was positively associated with the treatment process and outcomes for offenders under mandatory substance abuse programs (Hiller, Knight, Leukefeld, & Simpson, 2002). Treatment motivation had a positive effect on not only treatment outcomes (e.g., treatment adherence and symptom) but also on criminal justice outcomes (e.g., recidivism). De Leon, Melnick, Thomas, Kressel, and Wexler (2000) examined the association between treatment motivation, aftercare, drug use, and days to re-incarceration during a 1-year post release period. There was no direct impact of treatment motivation found on drug use or days to re-incarceration. However, treatment motivation was

found to have direct impact on aftercare which, in turn, significantly influenced drug use and days to re-incarceration (De Leon et al., 2000). Thus, treatment motivation helped ex-offenders continue to receive community treatment, in turn leading to positive treatment outcomes (e.g., fewer future arrests or drug use). Going back to the Risk-Need- Responsivity (RNR) model, the study findings supported the hypothesis that treatment and treatment-related variables (i.e., substance abuse service and treatment motivation) significantly affect the individual's behavioral changes. However, it is notable that the TAU group participants had no significant impact in relation to RNR-related variables on arrest. Thus, as with previous research (Blanchette & Brown, 2006; Ward et al., 2007), current findings confirmed the effectiveness of the RNR model in addressing the needs for rehabilitation of offenders.

In terms of the association between the court ordered treatment and outcomes, there is ongoing debate about whether coercive treatment can be effective for offenders or not. Some argue that treatment will be effective only if service recipients are willing to participate and have strong motivation to change their lives (Platt, Buhninger, Kaplan, Brown, & Taube, 1988; Rosenthal, 1988). However, other studies did not support this idea. For example, Anglin, Prendergast, and Farabee (1998) examined the effectiveness of coercive treatment for drug abusers and concluded that coercion using the justice system was not related to program effectiveness. In addition, Wilson et al. (2006) evaluated fifty-five studies from drug courts requiring mandatory treatment, as MHC does and concluded that offenders participating in the drug court program were less likely to recidivate than similar offenders at the traditional court. While treatment is mandatory in the MHC program, most participants reported that it was their choice to enroll (Poythress et al., 2002; Redlich, Hoover, et al., 2010; Wales et al., 2010). It is interesting that MHC participants have higher motivation even with mandatory treatment (see

Table 3). This may be because MHC has a different approach from traditional court, i.e. therapeutic jurisprudence (TJ). As mentioned, TJ focuses on how the court system supports the individual in changing the origins of the problem, rather than punishing the consequences of his/her criminal behaviors (Winick, 2002). Thus, MHC staffs, such as the judge, the clinician, and the prosecutor are all supportive of program participants to be successful (e.g., have less recidivism and successful graduation) (Cosden et al., 2003; Fislser, 2005; Wales et al., 2010). It is also notable that at follow-up only the MHC group had significant impact regarding the treatment variable (i.e., treatment motivation) on recidivism but not the TAU group, at baseline or at follow-up.

Across the three study models, and except for TAU at follow-up, neighborhood disadvantage was found to have significant impact on arrest. In particular, there is significant association between neighborhood disadvantage and arrest among MHC group participants for both times (baseline and follow-up). These findings suggest that offenders with mental illness living in more disadvantaged neighborhoods were more likely to commit crimes than those living in less disadvantaged neighborhoods. Current recidivism studies are often exclusively focused on the individual risk factors such as history of crime, socio-economic status, treatment, mental illness, or family factors. (Douglas, Vincent, & Edens, 2006; Gendreau, Little, & Goggin, 1996; Mulder, Brand, Bullens, & Van Marle, 2010). In contrast, little is known about the role of neighborhood disadvantage on criminal behavior among people with severe mental illness (Stahler et al., 2013).

To my knowledge, this is the first study to confirm the effects of neighborhood disadvantage on arrest among MHC participants when controlling for several treatment variables at the individual level. The study findings support the social disorganization theory, which posits

that people who live in disadvantaged neighborhoods are more likely to be involved in criminal activities compared to those who live in better neighborhoods (Bursik & Grasmick, 1999). In addition, these findings also support the idea that social disorganization theory, understood as a part of the ecological system theory is applicable to people with severe mental illness in the criminal justice system. Specifically, study findings showed that the Exosystem is valid among MHC participants, with neighborhood environments having a direct influence on individual criminal behavior. For example, people living in a more disadvantaged environment were more likely to be arrested, compared to those living in better neighborhood environments. This finding explicitly supports social disorganization theory. It is notable that MHC participants were significantly impacted by neighborhood disadvantage on arrest, while traditional court participants were not affected by neighborhood disadvantage after the court enrollment. It may be posited that the MHC participant continued to be vulnerable to the disadvantaged neighborhood, and also that their continued residency in more disadvantaged environments led to more criminal activities. Preliminary analysis indicated that MHC participants lived in a more disadvantaged environment compared to the traditional court participants both before, and after court enrollment (see Table 8). Since there was significant impact of the neighborhood environment on arrest among MHC participants, more consideration should be granted to the factor to prevent future crime.

There have been only a handful of studies investigating the effect of neighborhood factors on crime, particularly for people with mental illness (Silver, 2006). For example, on the basis of a study of 270 discharged psychiatric inpatients in the early 1990s, Silver (2000) found that patients discharged into disadvantaged neighborhoods were more likely to commit crime than those discharged into less disadvantaged neighborhoods. However, findings of the current

study were from a research design more robust than Silver's study in terms of study sample (i.e. offenders with severe mental illness vs. patients from a psychiatric hospital), measurement for criminal activity (i.e., objective vs. self-report), and timeline (i.e. 6 months vs. 10 weeks). This result is particularly critical, given the fact that people with mental illness are more likely to live in disadvantaged neighborhoods than the general population (Ross & Mirowsky, 2001; Silver et al., 2002). More importantly, disadvantaged neighborhoods directly increased depressive symptom among residents (Kim, 2010). Thus, disadvantage neighborhoods and mental illness are mutually reinforced in a negative way.

Study findings highlight the importance of neighborhood factors when predicting criminal activities among people with mental illness. Knowing the neighborhood context where the people with mental illness reside may help in assessing the risk of involvement with the criminal justice system. Silver (2006) argued that the application of social disorganization theory for determining the potential criminal behavior of people with mental illness is more relevant today than before. This is in part due to deinstitutionalization policies, which reduced the number of patients in psychiatric facilities (Manderscheid et al., 2000; Wachholz & Mullaly, 1993). Thus, an increasing number of individuals with mental illness currently reside in communities where psychiatric services are provided by community mental health agencies.

It is also notable that neighborhood disadvantage continued to have a significant effect on arrest across the four study models while individual-level variables (e.g., treatment utilization) did not have consistent impact on arrest. The current study emphasized the importance of neighborhood environment as a risk factor for recidivism above and beyond individual factors, particularly for people with severe mental illness. Findings from this study play an important role in accurately assessing the risks for recidivism. Research to date has focused almost exclusively

on individual-level factors. For example, a meta-analysis of 126 recidivism studies for offenders with mental disorder found that most studies examined the effect of individual-level factors on crime (e.g., criminal history, family/marital status, drug use, psychosis, or treatment), instead of considering of neighborhood factors (Bonta, Blais, & Wilson, 2014). In addition, risk assessment tools for recidivism highly rely on the individual-level factors (Wong & Gordon, 2006; Yang, Wong, & Coid, 2010). As study findings have shown, neighborhood disadvantage is an influential factor, and a predictor of criminal behaviors above and beyond individual factors. In addition, neighborhood disadvantage may serve as a critical indicator for examining the likelihood of recidivism for offenders. Thus, further consideration should be granted to neighborhood factors when predicting recidivism, particularly among offenders with mental illness.

While not a part of the research question in this study, it is possible to gather a range of meaningful results depending on how neighborhood disadvantage is operationalized. First, what would we find if we chose only the most disadvantaged neighborhood for individual cases, or determined the neighborhood where study participants had lived the longest? To this, descriptive analysis revealed that there are a lot of variations in specifics of neighborhood disadvantage among the study participants (Min=.78, Max=45.88, SD=7.95). In addition, multivariate analysis showed a negative association between the disadvantaged neighborhood and days at an address ($\beta=-.002$, SE=.001, $P<.05$). This implies that study participants in more disadvantaged neighborhoods were likely to move out within short periods of time. Thus, depending on how to operationalize the neighborhood disadvantage variable, the implications regarding recidivism could be different, and further research is needed.

Second, housing stability could have significant impact on recidivism. As mentioned earlier, study participants moved approximately 4, and 3.8 times before, and after court enrollment, respectively. Previous studies found that people lacking residential stability were more likely to commit crimes (Bellair, 2000; McNulty & Holloway, 2000; Turney & Harknett, 2009; Wilcox, Quisenberry, & Jones, 2003). Thus, study outcomes may vary if residential stability is considered as being one of factors representing neighborhood disadvantage.

Last, the current study excludes non-residential addresses, such as psychiatric hospital, jail, or prison because there was no connection to be drawn in these contexts between neighborhood disadvantage and study participants. However, depending on the days spent in these facilities, arrest rates could be higher or lower. For example, if the study participants spent more days in psychiatric hospital, the possibility of being arrested may be reduced due to the appropriate and intensive mental health services provided. The current study aims to examine the relationship between neighborhood disadvantage and arrest. However, it would be interesting to investigate how differences in the number of days in each non-neighborhood facility (e.g., psychiatric hospital, jail) affected individual criminal activities, and to track changes in relation to neighborhood disadvantage for each individual during the study period. As Matthews and Yang (2013) argued, definition of neighborhood is not consistent, and findings may vary depending on the criteria and area of studies.

4. Effect of treatment utilization and neighborhood disadvantage over time and group

Two separate analyses were conducted in order to examine the effects of study variables by time (baseline and follow-up) and group (TAU and MHC). First, in terms of effect comparison between groups, appointment adherence and mental health services had significant

impact on recidivism at baseline. With appointment adherence, it is notable that the effects of appointment adherence on arrest were negative (i.e., -.20 at baseline) only among MHC participants, while TAU participants showed positive effect for the same. This finding indicates that the higher the level of appointment adherence, the lower the number of arrests, but only among MHC participants at baseline. It is plausible that mandatory treatment at MHC had a significant effect on increased treatment adherence which may, in turn, have led to a reduced number of arrests. This finding is in line with previous studies on other court diversion programs (e.g. drug court). For example, Winick and Wexler (2001) argued that the therapeutic jurisprudence approach focuses on participants' psychological needs, which led to increased levels of treatment compliance and successful outcomes at drug court (e.g., fewer drug related crimes). As mentioned, court ordered treatment does not undermine program success (Anglin et al., 1998). Thus, increased treatment adherence by the justice system may play an important role in positively influencing future crime among MHC participants. Similarly, the impact of mental health services on arrest was negative only among MHC participants (i.e. -.001). This implies that MHC participants with more mental health services were less likely to be arrested.

Lastly, at follow-up, the effects of medication adherence only among the MHC participants were negative. This implies that MHC participants with higher levels of medication adherence were less likely to be arrested compared to those with lower levels of medication adherence. The literature has shown mixed outcomes regarding the relationship between medication adherence and crime. For example, Fazel, Zetterqvist, Larsson, Langstrom, and Lichtenstein (2014) found that offenders who took antipsychotics and mood stabilizers showed 45% and 24% reduced violent crime respectively over 4 years. Similarly, medication compliance was a critical indicator in actual crime commitment, particularly for people with severe mental

illness (Swartz et al., 1998). However, it has also been suggested that the prescription of psychotropic drugs has a limited relationship with crime (Marcotte & Markowitz, 2011). Data from thirteen countries showed that psychotropic drug use was associated with decreased violent crimes, but not with property- or homicide-related crimes (Marcotte & Markowitz, 2011). Thus, it was concluded that the effect size for medication treatment on crime is small. These contrasting findings may be due to different study populations or difference in the types of drugs or crime in prior research. Although there were mixed outcomes, at least it is notable that MHC participants had a negative relationship, while TAU participants had an adverse (i.e., positive) relationship to medication adherence on arrest at follow-up.

The second analysis examined whether MHC participants had positive effect changes in study variables compared to TAU group participants. Findings indicated that there were no significant positive effect changes in the MHC group which led to fewer arrests than in the TAU group. While not statistically significant, some study variables also showed positive effect changes after MHC court enrollment (e.g., decreased effect of appointment adherence, medication adherence, treatment motivation, and perceived voluntariness on recidivism). While most MHC studies investigate the factors associated with recidivism, little is known about how the effect of those factors changes after MHC court enrollment as compared to traditional court. This shortcoming is often due to methodological limitations (e.g., no longitudinal observation or comparison group) (Steadman et al., 2011). Previous MHC studies consistently showed positive outcomes (e.g., fewer numbers of recidivism) compared to the traditional court group (Sarteschi, 2009). These findings add to the value of previous studies by showing how the effect of various treatment and neighborhood disadvantage factors have changed over time, and how those

changes now affect recidivism rates for MHC participants compared to traditional court participants.

One of the core elements of MHC is to increase accessibility of community treatment (Thompson et al., 2008). It is notable that treatment usage for both mental health and substance abuse did not have any meaningful effect changes over time. Thus, treatment usage did not have a significant impact on recidivism (see Table 10) and there were no changes, in effect, among MHC participants. These outcomes may raise the question as to whether treatment through the MHC system is effective at reducing recidivism.

Herinckx et al. (2005) examine the linkage between mental health services (e.g., case management, medication monitoring, individual therapy) and arrests among 368 MHC participants. They found that the most significant factor in predicting the success of MHC (i.e., fewer arrests) was participants' graduation status (graduated, still-in, and terminated), and not availability of mental health services (Herinckx et al., 2005). In addition, Bonta, Law, and Hanson (1998) conducted a meta-analysis including 74 different predictors (e.g., demographic, criminal history, deviant lifestyle, and clinical factors) to examine the predictors of recidivism. They found that clinical variables (e.g., treatment history) did not significantly predict a general or violent crime (Bonta et al., 1998).

However, treatment may have the hidden impact on criminal behaviors, particularly among offenders with mental illness. For example, offenders with mental illness are more likely to be exposed to risk factors of recidivism, such as disadvantaged neighborhood (Dickinger, Eno Louden, Robinson, Troshynski, & Skeem, 2008), unemployment (Draine, Salzer, Culhane, & Hadley, 2002), history of victimization (Goodman et al., 2001), and substance abuse (Baillargeon et al., 2010a; Wilson, Draine, Hadley, Metraux, & Evans, 2011). In addition,

qualitative research from 55 MHC participants revealed that community treatment led to close relationships and positive cooperation between MHC participants, the judge, and service providers, which was critical to clients' success (Herinckx et al., 2005). As such, Skeem, Manchak, and Peterson (2011) argued that the effect of mental illness on crime is mostly mediated by other criminogenic factors (e.g., history of crime, socio-economic status, some type of severe mental illness), all of which can have a direct impact on criminal justice outcomes. Ultimately, current findings and previous research suggest that although community treatment through the MHC system (e.g., mental health treatment and substance abuse treatment) may not have a direct impact on reducing criminal behaviors, MHC has been found to mediate the significant factors predicting the crime.

5. Impact of MHC enrollment on recidivism

MHC studies consistently support various positive outcomes from the program (e.g., reduced recidivism). For example, one meta-analysis of MHC studies found that MHC has a small to medium effect on the decrease in future crimes (Sarteschi et al., 2011). Different from previous MHC studies, however, the current study found a significant impact of court enrollment on recidivism after including different variables, such as treatment (level 1) and neighborhood disadvantage (level 2). Even after controlling for a non-randomly assigned sample using propensity score weighting, MHC participants were found to be 34 percent less likely to commit a crime compared to the TAU group before court enrollment. Six months after court enrollment, MHC participants were 44 percent less likely to recidivate compared to the TAU group. Thus, the probability of committing crime was decreased after the MHC court enrollment, which showed the effectiveness of the MHC program. Most previous MHC studies did not include

multiple data collections and courts and comparison group due to methodological limitations (Steadman et al., 2011). To my knowledge, this is the first study to show changes in the probability of recidivism among MHC participants after controlling for multilevel variables.

While there is no disagreement about the efficacy of the MHC, it is not yet clear what specific factors in MHC contribute to lower recidivism rates compared to the traditional court. MHCs were established to prevent future crimes by providing community treatment instead of incarceration for offenders with mental illness (Thompson et al., 2008). However, there have been mixed findings on whether community treatment through the MHC system indeed has significantly impacted recidivism (Erickson et al., 2006; Keator et al., 2013; Steadman et al., 2011). In addition, the current study did not find a direct impact of treatment usage (i.e., mental health and substance abuse service) after court enrollment, as it aimed to. Instead, treatment-related variables, such as increased treatment motivation were found to lead to a reduced number of arrests.

There are a few plausible explanations as to how we can interpret these outcomes. First, as briefly mentioned, it is possible that treatment itself may not lead to significant criminal justice outcomes (e.g., reduced arrest), but treatment along with the MHC system (e.g., court monitoring, supportive relationship between participants and staffs) decreases future criminal activities for offenders with severe mental illness. Skeem et al. (2011) has argued that there is no direct evidence that recidivism reduction is mediated by mental health services. In addition, randomly assigned samples of offenders with co-occurring disorder to Integrated Dual Diagnosis Treatment (IDDT) or treatment as usual show no treatment-related differences in arrests and incarcerations (Chandler & Spicer, 2006). Similarly, evidence-based mental health services (e.g., assertive community treatment and IDDT) had no significant impact on criminal justice

outcomes (reduced arrest) compared to treatment as usual (Calsyn, Yonker, Lemming, Morse, & Klinkenberg, 2005).

Community treatment through the MHC system may have an indirect impact on criminal activity by introducing other variables, such as criminogenic factors. For example, the “black robe effect” of judges providing treatment for offenders with severe mental illness may play a significant role in reduced criminal behaviors (Han & Redlich, 2015). Thus, the lack of meaningful relationship between treatment and arrest may be explained by the fact that MHC participants are required to receive treatment, but traditional court participants are not. Indeed, mandatory treatment was found to be influential in improving criminal justice outcomes (e.g., reduction in arrests) (Swanson et al., 2001; Young et al., 2004). In addition, therapeutic jurisprudence (TJ) may have significant impact on changing an MHC participant’s criminal behaviors. MHC staff (e.g., judge, clinical staff, and probation officer) tries to have supportive relationships with offenders by focusing on potentials and possibilities, while traditional courts aim to penalize based on the consequences of an offender’s behaviors (Boothroyd et al., 2003; Christy et al., 2005; Thompson et al., 2008). The TJ approach in MHC may affect participants’ motivation to change their lives, which is known to be significant predictor of recidivism (Cosden et al., 2006; De Leon et al., 2000; Tierney & McCabe, 2002).

The last hypothesis for fewer numbers of recidivism in MHC participants may be connected to the authority’s power and scope to use sanctions against people who do not follow the court order. MHCs use various approaches to handle the disposition of criminal charges to mandate adherence to community treatment (e.g., pre-adjudication suspension of prosecution of charges, post-plea strategies that suspend sentencing, probation, and back to traditional court docket) (Griffin et al., 2002). Depending on their compliance, an MHC has a high level of power

to change a participant's legal status as a key stakeholder. Forensic Assertive Community Treatment (FACT) is designed to handle offenders with mental illness in a similar way. However, compared to the MHC, a FACT program has more limited control over a participant's legal status. Morrissey, Meyer, and Cuddeback (2007) found that effectiveness of FACT is weak in terms of lowering recidivism. Thus, Griffin et al. (2002); Monahan et al. (2005) have suggested that extra leverage via court sanctions should be given to FACT to have more positive criminal justice outcomes (e.g., fewer numbers of arrest). Perceived penalties in cases of non-compliance, and stakeholders' power to influence offenders' legal status may have a more significant impact on criminal behaviors when combined with community treatment.

B. Implications

Findings from the research have numerous implications for practice, policy, and research, pertaining not only to MHCs, but also to interventions for offenders with mental illness in general. Specific recommendations for further research are also reported in this section.

1. Practice implications

As noted in the introduction, the main role of an MHC is to divert offenders with mental illness away from incarceration and provide opportunities to access community treatment (Steadman et al., 2001). Instead of providing direct services, MHCs link participants with local mental health agencies (Thompson et al., 2008). This dissertation provides precise identification and confirmation of multilevel factors predicting criminal activities. First, according to the person-in-environment (PIE) perspective, social work professionals need to consider both individual (e.g., age, gender, education, mental health) and environmental (e.g., neighborhood disadvantage)

factors when accessing a client's needs (Shulman, 2011). Current court diversion programs (e.g., drug court, MHC) for offenders with mental illness mostly address needs on an individual level (e.g., mental illness, housing, income, employment) (Luskin, 2013; Mitchell et al., 2012; Sarteschi et al., 2011; Shaffer, 2006). Findings from the current study provide further support for social disorganization theory, and information about how neighborhood disadvantage might affect criminal behavior, particularly among offenders with mental illness. Not only are the individual-level variables (e.g., treatment adherences, treatment perceptions, treatment motivation) significant, but, neighborhood disadvantage also has a significant impact on criminal activities for this population. In addition, this study found that MHC participants often live in more disadvantaged environments compared to traditional court participants possibly due to their severe mental illness. Thus, further consideration about the neighborhood environment should be granted to precisely assess needs for offenders with mental illness. Social work professionals need to assess clients' neighborhood environment when setting up a treatment plan for them. In addition, MHCs need to expand their boundaries of services in terms of the neighborhood environment. As mentioned, current services through the MHC system focus primarily on individual factors. MHC and local agencies can work together for participants to live in the good neighborhood environment by providing supportive housing as part of the MHC services.

Another practice implication centers around the levels of community treatment provided through the MHC system. As with other offenders studies (Bonta et al., 1998), the current study did not find evidence for a direct impact of mental health or substance abuse services on arrest after MHC enrollment. Instead, the current study found a significant effect of treatment-related variables (e.g., treatment motivation, substance abuse service) on arrest. Social work professionals may need to work with MHC participants to increase their understanding of the legal system, and the

necessity of treatment. This will, in turn, contribute to positive criminal justice outcomes (e.g., a reduction in recidivism). This is aligned with previous research that MHC participants with higher understanding of the procedural justice and system, and higher levels of motivation are more likely to be successful in MHC programs (e.g., graduate) compared to their counterparts (e.g., not graduate, still in the program) (Redlich & Han, 2014). In addition, MHC participants were more likely to have higher level of positive belief about the program compared to people with mental illness involuntarily admitted to hospital, or traditional court participants (Hiday, Swartz, Swanson, & Wagner, 1997; Poythress et al., 2002; Wales et al., 2010). Wales et al. (2010) argued that high levels of procedural justice influenced treatment motivation and reduction in recidivism among MHC participants. This suggests that social work professionals may need to address perceptions or feelings toward the treatment for offenders with mental illness to make better outcomes. Treatment alone may not lead to better criminal justice outcomes for the offenders with mental illness. As Skeem et al. (2011) argued, treatment mediate the link between treatment perceptions and criminal activities. Thus, future research should investigate the association between treatment related variables (e.g., adherences, perceptions), community treatment, and justice outcomes in MHC.

2. Policy implications

The overarching goal of the proposed study was to document and understand the factors underlying recidivism for people with mental illness involved in the justice system who are, and who are not diverted. Understanding the treatment and neighborhood factors associated with recidivism for this population can help to more efficiently target policy interventions in the future. MHC was established to handle the increasing number of offenders with mental illness in the justice system and aims to provide them with more treatment opportunities than traditional court

might. Perhaps the most important potential implication concerns the efficacy of existing MHC policies. Study findings providing policymakers with firm evidence that treatment alone as a core component of MHC policies does not work as intended will encourage evidence-based decision-making. Current research suggests that MHC should focus on the various treatment-related factors (e.g., treatment adherences and perceptions). Evidence-based policy decisions working to enlarge the scope of MHC services should be encouraged to include a focus on participants' perceptions and adherence to mandatory treatment. Current MHC participants experience a lack of understanding and information during the enrollment process (Redlich, Hoover, et al., 2010). MHC may need to set up regulations or standardize procedures to ensure participant's better understanding about the legal process, and of the voluntary nature of the program.

Another implication for policy is that understanding the relevance of the neighborhood context is critical for recidivism. The leading policy goal is to reduce recidivism or making way for offenders with mental illness to exit from the justice system (Skeem et al., 2011). While there are an efforts to set up theoretical perspectives on recidivism, U.S. policies treating offenders with mental illness focus solely on individual factors (Skeem et al., 2011). Contemporary programs for offenders with mental illness have only recently been linked with community treatment, and there has been a "proliferation of case management services as the policy response" (Draine et al., 2007 p. 161). However, case management likely does not address the broader aspects of the problems among offenders with mental illness (e.g., disadvantaged neighborhood). Similarly, the Mentally Ill Offender Treatment and Crime Reduction Act focuses on identifying the individual's symptom, and providing mental health and substance abuse treatment services to respond to the increasing number of offenders with mental illness in the justice system (Clamurro, 2015). Future policies need to broaden the area of interest to include a focus on neighborhood disadvantage

where offenders with mental illness reside. In addition, targeted policy reforms need to be designed to reduce recidivism by addressing the issue of neighborhood disadvantage among people with mental illness in the criminal justice system.

Current analyses only provide evidence for the significant effect of neighborhood disadvantage on recidivism. However, some specific interventions in regard to the neighborhood environment could be implemented. Current community rehabilitation policies for ex-offenders are based on the risk-need-reponsivity (RNR) (Polaschek, 2012). Thus, the RNR model tries to improve an individual's capacity to live in the community, instead of facing re-incarceration. However, the current study found the role and impact of neighborhood disadvantage on arrest to be above and beyond individual factors. Thus, policies for ex-offenders could have more consideration regarding how to improve the neighborhood environment where the ex-offender resides. For example, the jail will work with community agencies to look for housings in a good neighborhood environment before releasing the offender.

In addition, policies for ex-offenders could work on issues in the disadvantage neighborhood, including poverty, unemployment, vacant/abandoned housing, public benefits recipients, and single-parent families in the community in order to decrease crime. Thus, policy could focus on not only placing offenders in good neighborhood environments, but also change disadvantage environments in order to decrease recidivism by offenders with mental illness. As mentioned, offenders with severe mental illness are more likely to live in disadvantaged neighborhoods and this neighborhood environment also worsens their mental illness. Thus, policies should focus on how to change this cycle of recidivism by addressing the disadvantaged environmental factors for offenders with mental illness.

Finally, there need to be formalized MHC policies and procedures to improve court operations and ensure participants' freedom of choice. While there are approximately 350 MHCs across the states (Goodale, Callahan, & Steadman, 2013) and each MHC is operated at the county level. Thus, MHCs may not have the same policy goals, eligibility criteria, information-sharing protocols, referral and screening procedures, treatment resources, sanctions and incentives, and other program components (Thompson et al., 2008). For example, Redlich et al. (2005) compared 15 MHCs and could not find consensus in policy in terms of eligibility, adjudication models, or ways of sanction and supervision. In addition, different MHCs may only accept defendants with specific criminal charges (Goodale et al., 2013). For example, only defendants with misdemeanor charges were accepted in six among eight MHCs with more than 15 years of history (Redlich et al., 2005). Indeed, Separate preliminary analyses revealed that there are significant variations in recidivism and treatment utilization outcome among four MHCs. These variation may be originated from the MHC policy in each site. The discrepancy of the MHC policy also makes it challenging to evaluate program effectiveness which may affect the sustainability of the program (Thompson et al., 2008). Thus, formalization of MHC policy may not only enhance the stability of MHC implementation but also ensure a defendant's choice of participation in an MHC.

3. Research implications

The findings of the current study have specific implications for MHC research and for broader research on offenders with mental illness in the justice system. This study aimed to estimate the impact of community treatment and neighborhood disadvantage on recidivism. The current study was one of the first to explore the multilevel factors associated with justice

outcomes in the MHC system and found significant impact of disadvantaged neighborhood on crime. The next step in the area of MHC research is to explore the associations between justice outcomes (e.g., arrest) and other neighborhood disadvantage factors in detail, such as distance from and to the mental health agency, distance from the hot-spot (intensive crime area), or housing stability.

In addition, future research may split the combined neighborhood disadvantage factors into separate indices (e.g., rate of poverty, unemployment, vacant/abandoned housing, public benefits recipients, and single-parent families) to more fully investigate what factors are involved in criminal activities and recidivism. In addition to thinking about ways to operationalize these factors around neighborhood disadvantage, other factors may be considered for future research. For example, it may be meaningful to account for time spent in/number of stays in non-residential setting (e.g., prison, inpatient hospital). Depending on the period or number of times spent in these facilities, the individual's criminal activity may vary. Also, future research could take advantage of details in terms of types of housing and types of treatment. Lastly, it is recommended to include other measures that are theoretically relevant factors to crime (e.g., family dysfunction, adverse childhood experience, and social support). The current study also found that MHC participants were more likely to reside in disadvantaged neighborhoods compared to the traditional court participant before and after court enrollment. In future research, these unique outcomes should be further explored through tracking mental health symptoms and neighborhood environment factors over time in order to investigate the potential link between mental health, neighborhood environment, and criminal behaviors. This work will shed light on unrevealed factors possibly associated with the justice involvement for the people with mental illness.

The current analyses demonstrated that community treatment alone (mental health and substance abuse services) may not lead to positive justice outcomes (e.g., fewer arrests) in the MHC program. Instead, treatment-related outcomes (e.g., treatment adherence and perception) were found to be influential for future arrests. Future MHC research may benefit from the inclusion of qualitative research to more fully understand the mechanisms of adherences and perceptions among offenders with mental illness.

Another finding suggested that there was no significant association between the number of services (i.e., mental health and substance abuse) and recidivism in the MHC program. Wolff (2002) argued that treatment only focused on MHC participants' mental health needs does not reduce the individual's criminal behavior. However, the association between the quality of service and crimes among MHC participants is not yet clear. The current study does not measure community treatment in detail, such as size of the agency, quality of services, or accessibility of services in each MHC. Program outcomes should be examined based on these and other treatment-related factors. Further research is recommended to examine the links between capacity of the agencies (e.g., credentials of clinical staff, community resources, and programs) and justice outcomes in the MHC system. This area of research is especially important in escalating the quality of services and not just the quantity of individuals in the MHC system. Further research can help local agencies identify the services and capacities that will best address the needs of the population going through MHCs. Such research will be critical in identifying resources necessary for successful rehabilitation, and to guide effective collaboration between local agencies and MHCs to rehabilitate offenders with mental illness in the justice system.

C. Study Limitations and Strengths

One of the limitations of this study was the inability to represent the whole MHC population. As previously mentioned, no single MHC model exists (Almquist & Dodd, 2009). Although MHCs share similar features, such as structure, multidisciplinary system, and ultimate goals (Thompson et al., 2008), they vary by jurisdiction (Steadman & Redlich, 2005). Accordingly, although this study uses data from the first national MHC study, including four MHCs and comparison courts, results of this study may not be generalized to all MHCs. This is one of the common limitations of most MHC studies (Steadman et al., 2011).

The data source for the research is another limitation. Although objective data (i.e., arrest record) is part of the research, most of the study variables come from a self-reported survey. Therefore, it might be possible for the participant to wrongly report data. Colditz, Miller, and Mosteller (1989) provided a similar argument that individuals are not always truthful, or their answers tend to be socially desirable when using self-report measures. For example, in this study, when asked for information on medication or appointment adherence, the respondents could possibly report false data due to fear of penalty for non-adherence. MHCs are voluntary, but become mandatory treatment programs once the participant has enrolled. Thus, if the MHC participants show non-adherence to court ordered treatment, they violate the contract, and could go back to jail. For this reason, it was stressed to participants that their answers were confidential and would not be shared with court personnel. However, it is still possible for study respondents to not be honest.

Next, existing data cannot measure all the subsystems under the ecological system theory. The current study evaluated the Microsystem, Exosystem, Macrosystem, and Chronosystem. However, it was hard to operationalize the Mesosystem within the capacity of the current data. In

order to measure the Mesosystem, surveys would need to explore the interactions between MHC personnel, including judges, community treatment providers, correctional personnel, and case managers. This would require a mixed-method approach using both qualitative and quantitative research. The current study did not include such measurements to explore the factors related to the Mesosystem in MHCs.

In addition, the study did not measure the availability or quality of treatment at each site or mental health agency, although there was extensive treatment data in terms of the type, location, and days. Quality of services and community resources may have a significant impact on criminal activities. Thus, future research may include the organizational-level data in the community mental health agency (e.g., number of programs, credentials of clinical staff). This level of data will enable a greater level of understanding of community treatment for offenders with mental illness. In addition, easier navigation of community resources for offenders with mental illness is recommended, because the success of offender rehabilitation may vary depending on availability of treatment in each community.

Another limitation is that there is no single correct way to operationalize the neighborhood (Matthews & Yang, 2013). While the current study used a census tract to define the neighborhood, there are other levels available to measure the neighborhood (e.g., census blocks, census block groups). Given that the census block is the smallest level of geography, changing the definition of neighborhood may change study findings.

Lastly, criminal records in the current study only include pre- and post- six months. Although, previous history of arrest is one of the strongest predictors of the risk of future crime (Kurlychek, Brame, & Bushway, 2006; Meloy, 2000), there was no standardized time for crime. For example, MHC participants may not commit a crime within the post-six-month period, but

might commit an offense afterward. Similarly, the follow-up period of the survey was six-months, which is relatively short. It might be too early to find meaningful changes in terms of treatment utilization and neighborhood disadvantage. Thus, a longer follow-up period (e.g., two years) after MHC enrollment would be optimal in more accurately investigating the longer-term effects of the MHC program.

This study has multiple strengths leading to implications for MHC policy, practice, and research. One key strength is the use of a rich dataset and propensity score weighting. Although data come from four different MHCs, MHCs share similar structures, content, and goals (Thompson et al., 2008). In addition, the MacArthur MHC study has a large sample with in-depth data (e.g., individual, neighborhood) from four MHCs and traditional courts, and with national arrest data. Further, although the original sample was not randomly assigned, possible selection bias will be adequately handled by using the propensity score, and thus, study outcomes can be generalized to other MHCs.

D. Conclusion

The current study explores the impact of treatment and neighborhood factors on recidivism in MHCs, compared to that in traditional courts. The mechanism behind the more successful outcomes through MHCs (e.g., less recidivism) is not clear yet, particularly in relation to the effects of community treatment. In addition, assessment of neighborhood influence on crime remains underdeveloped in MHCs. The findings from this study partially supported the study hypotheses. Analyses found significant difference in study variables between groups (TAU vs. MHC) and time (before and after court enrollment). For example, MHC participants had significantly increased medication adherence, but decreased perceived voluntariness as compared

to the traditional court participant after court enrollment. In addition, multilevel analyses identified that the factors of treatment motivation and neighborhood disadvantage significantly predict future arrest after MHC enrolment. Last, MHC participants showed a lower probability of recidivism compared to the TAU participants 6 months after court enrollment. These study findings indicate that offenders with mental illness under court diversion programs (i.e., MHCs) show better treatment outcomes, as is proposed by the risk-need-responsivity model and the idea of therapeutic jurisprudence. In addition, the factor of disadvantaged neighborhoods has a significant influence on recidivism among MHC participants, which supports the ecological system theory and social disorganization theory. The current study supports the significance of neighborhood environment among offenders with mental illness in leading to successful community rehabilitation. Understanding treatment characteristics and neighborhood disadvantages associated with recidivism for offenders with mental illness can help to more efficiently target research, practice, and policy in the future. In addition, social work professionals must themselves recognize the importance of treatment-related variables issues around neighborhood disadvantages to develop and implement innovative interventions for offenders with mental illness. This research and its findings will shed light on new and future interventions as well as policies that aim to reduce recidivism in this difficult-to-treat population of offenders.

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Figure 1. Theoretical Framework: Proposed Multilevel Model & Ecological System Theory

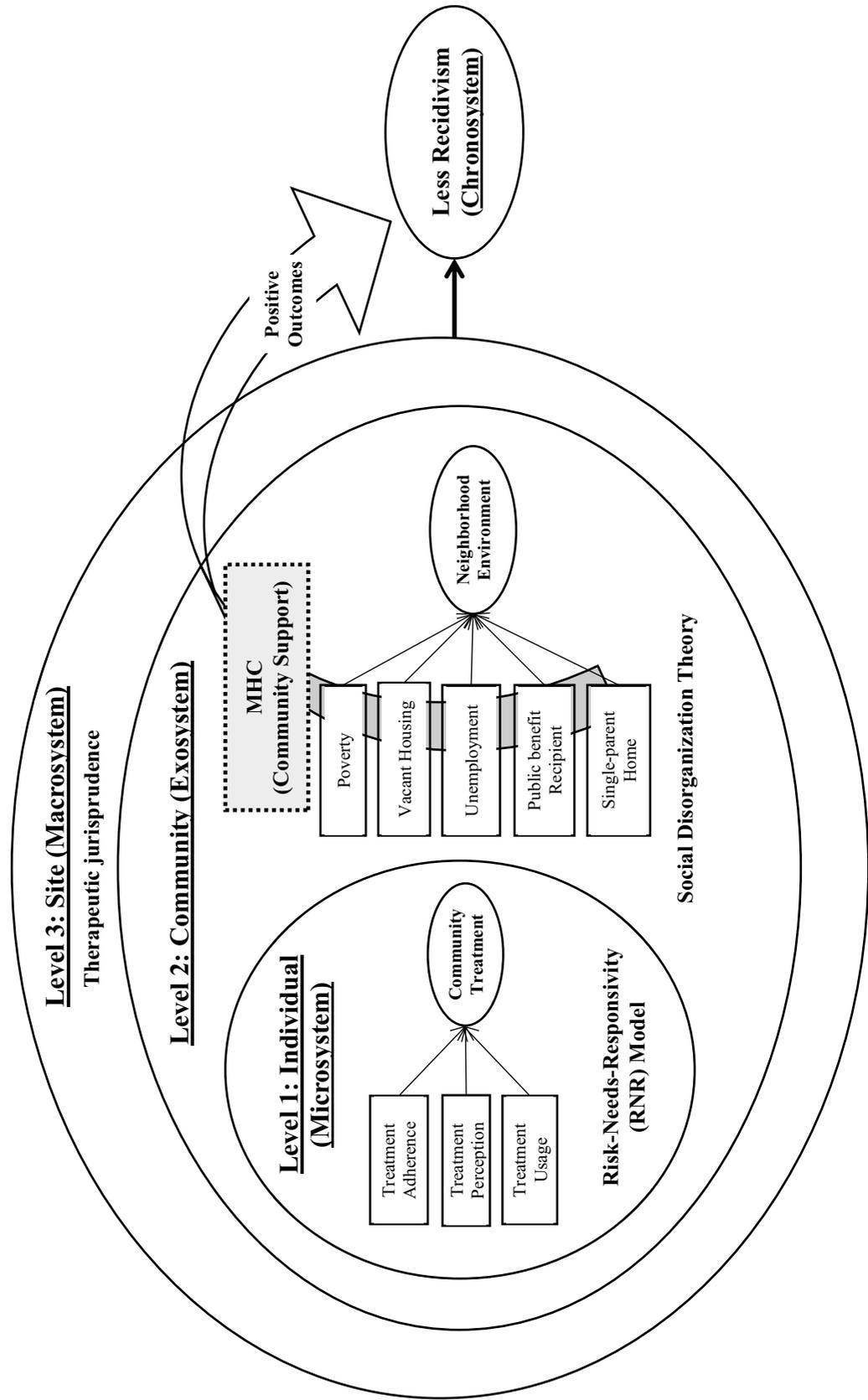


Figure 2. Ecological System Theory in MHC

