Title
Linking Heroin Users in China to Drug Treatment and Other Resources in the Community: Effect of a Recovery Management Intervention Model

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Linking Heroin Users in China to Drug Treatment and Other Resources in the Community: Effect of a Recovery Management Intervention Model

A Dissertation submitted in partial satisfaction of the requirements for the degree Doctor of Philosophy in Social Welfare

by

Fei Wu

2012
ABSTRACT OF THE DISSERTATION

Linking Heroin Users in China to Drug Treatment and Other Resources in the Community: Effect of a Recovery Management Intervention Model

by

Fei Wu

Doctor of Philosophy in Social Welfare

University of California, Los Angeles, 2012

Professor Robert Schilling, Chair

Illicit drug use, especially injection heroin use, is a major contributor to the spread of HIV/AIDS and other infectious diseases in China. However, the traditional punitive approach toward drug abuse issues has been ineffective, signified by a high rate of relapse. In response, China has recently adopted a community recovery approach to reduce substance abuse, prevent infectious diseases, and assist drug user’s reintegration into the society. This study investigates whether a recovery management intervention (RMI) can better link heroin users to drug treatment and other recovery related services in the community, improve their service utilization, and consequently generate positive recovery outcomes.
This study conducted multivariate analysis using data of an intervention trial study entitled “Reducing HIV/AIDS and Drug Abuse among Heroin Addicts Released from Compulsory Rehabilitation in China”. A latent variable modeling was utilized to test whether the RMI influences psychosocial factors (self-efficacy, self-esteem, social support, and barrier to treatment entry), predicts service utilization (drug treatment, social security, housing, employment, health etc.), which in turn predicts recovery outcomes (employment, drug use, and criminal activities).

Results show that the RMI had no significant effect on drug users’ psychosocial factors, and these factors were also not found to influence drug user’s service utilization and recovery outcomes. Nevertheless, drug treatment enrollment and other social service utilization increased significantly among the RMI participants. In turn, increased service utilization led to more positive recovery outcomes in this group. The RMI also exerted direct effects on heroin users’ community recovery through enhanced treatment and service utilization.

Exploring effects of interventions like the RMI can shed light on how to make drug user’s transition from the criminal justice system to the community effectively in China and other societies facing the same problem. Findings from this study suggest that better treatment enrollment, service utilization, and recovery outcomes can be potentially achieved with carefully designed case management interventions. More research effort needs to be placed in this field before introducing and implementing case management interventions on a larger scale in China.
The dissertation of Fei Wu is approved.

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To Lee Lawlor
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Chapter 1 Introduction

For more than two decades, China has been addressing the challenge of extensive illicit drug abuse and the threat of the HIV/AIDS epidemic simultaneously because the two issues are highly intertwined in the country. However, the traditional punitive approach toward drug abuse has proven to be ineffective. In response, China recently adopted a community recovery approach, such as community-based methadone maintenance treatment (MMT) and social worker assisted community reintegration, to reduce drug abuse as well as curb HIV/AIDS infections. This chapter 1) introduces the issues of HIV/AIDS and illicit drug use and how they are interconnected with each other in China; 2) describes how the country’s responses to these severe problems evolved over the years; and 3) states the purpose of the current study.

1.1 The spread of HIV/AIDS and illicit drug abuse in China

HIV/AIDS in the world

As an epidemic that has altered our world, HIV/AIDS has detrimental impacts on multiple levels of human life. HIV reduces life expectancy, slows national and regional economic development, and pushes many families into poverty (Joint United Nations Programme on HIV/AIDS, 2008). By the end of 2009, the estimated number of people living with HIV (PLHIV) worldwide was 33.3 million (31.4 million-35.3 million), which is a 27% increase compared with 26.2 million (24.6 million – 27.8 million) in 1999 (UNAIDS, 2010). While this increase is partly due to the scaling up of antiretroviral therapy and thus the reduction of AIDS-related deaths over the past few years, the contribution of annual new infections cannot be overlooked. According to the UNAIDS global report (2010), the number of new HIV

1
infections in 2009 was 2.6 million (2.3 million – 2.8 million) worldwide. The same report also pointed out that HIV/AIDS in Asia remains at low epidemic levels (under 1% in most countries), with an estimated number of PLHIV at 4.9 million (4.5 million – 5.5 million) and 360,000 (300,000 – 430,000) new infections in 2009. What is alarming in this region is the tendency of HIV/AIDS to spread more widely, especially from injection drug users and sex workers to the general population, as the epidemic matures in Asia.

The epidemic in China

A small portion of HIV infections among China’s total population of 1.3 billion (CIA, 2011) can be a significant absolute number of individuals who are living with the disease. As shown in figure 1, HIV/AIDS has been spreading in China extensively since the first case was reported in the late 80s. The annual report of new HIV cases had a ten-fold increase from the late 80s to late 90s; and another ten-fold increase happened from 1999 to 2007. The large increase in HIV positive and AIDS cases from 2004 is partly due to expanded and enhanced national surveillance. Nevertheless, the number of reported HIV and AIDS cases has been increasing continuously over the years. The 2011 estimate of cumulative HIV positive cases in China was 780,000 (620,000–940,000), including 154,000 (146,000–162,000) AIDS cases and 28,000 (25,000–31,000) AIDS-related deaths (Ministry of Health of China, Joint United Nations Programme on HIV/AIDS, & World Health Organization, 2011). According to this most recent report dedicated to understanding the changing face of China’s HIV/AIDS epidemic, the national HIV prevalence is still low, 0.058% (0.046% - 0.070%), but the number of annual new HIV infections has been alarmingly high, an average of 50,000 cases per year, since 2007. This figure is significantly higher than that of some other countries in the region. Thailand, following India
and China, has the third highest total number of PLHIV in Asia. Thailand reported 14,000 new HIV cases in 2006 (Joint United Nations Programme on HIV/AIDS, 2007).

Figure 1.

Figure 2 provides the sentinel surveillance information on HIV prevalence rates and the annual new HIV transmission rates among different risk populations over the years. As in many other countries that are affected by HIV/AIDS, the epidemic in China continues to concentrate in certain high-risk sub-populations, such as injection drug users (IDU), female sex workers (FSW), and men who have sex with men (MSM). Although sexual transmission replaced IDU and became the largest contributor to annual new HIV cases, HIV prevalence remains the highest among IDUs. More importantly, IDU still accounted for 18% of the annual new HIV infections in China in 2011 (Ministry of Health of China, Joint United Nations Programme on HIV/AIDS, & World Health Organization, 2011). Preventing further spread of HIV among IDUs, as well as from the drug using population to other populations, remains a major component of China’s effort to address the HIV/AIDS epidemic.

Figure 2

Illicit drug use worldwide

Similar to HIV/AIDS, illicit drug abuse not only affects individual drug users, but also causes social problems in the broader community. For example, children with drug using parents are at a greater risk of drug use and other risky behaviors. Second, drug abuse is often associated
with drug trafficking, violence, crimes that can finance drug use, and other harmful social problems, such as antisocial behaviors. Finally, illicit drug use also contributes to the spread of infectious diseases such as HIV and hepatitis. According to the *World Drug Report* (United Nations Office on Drugs and Crime, 2011), which describes the most recent drug consumption and production trends in the world on an annual basis, approximately 210 million people use illicit drugs every year and roughly 200,000 of them die because of drug use. The 2011 report estimated that between 3.3% to 6.1% (149 – 272 million) of the world’s population aged 15-64 used illicit substances at least once in the previous year and approximately half of them were current users. The HIV positive rate among IDUs was estimated to be 17.9%, which means 2.8 million IDUs are living with HIV worldwide. Meanwhile, approximately 50% of all the IDUs, 8 million individuals in the world, were estimated to have hepatitis C. Although Cannabis is the most widely used type of illicit drugs, opiates, especially heroin, is still the dominant drug of choice in Europe and Asia.

**Illicit drug use in China**

After the establishment of the communist government in 1949, China successfully eliminated drug abuse for over 30 years (Chen, Xie, Su, Zhang, & Jiang, 2006; Narcotics Control Bureau of the Chinese Ministry of Public Security, 2000). But shortly after China rejoined the global market in the late 1970s, the problem of drug abuse was rekindled and started to grow rapidly. In 1991, the police recorded 148,000 drug users in China; the number quickly climbed to 520,000 in 1995 and 681,000 in 1999 (Narcotics Control Bureau of the Chinese Ministry of Public Security, 2000). In 2004, 1,140,400 drug users were registered with the police (Chen et al., 2006); and the number of registered drug users was 1,545,000 by the end of 2010 (Narcotics Control Bureau of the Chinese Ministry of Public Security, 2011). The true extent of the problem
is suspected to be larger. The China Ministry of Health, Joint United Nations Programme on HIV/AIDS, and the World Health Organization (2011) estimated that among the 4.5 million IDUs in Asia, more than half of them are currently living in China. The total number of drug users in China is estimated to be more than 3.5 million (Hser et al., 2011).

Bordering two of the four major illicit drug cultivation areas in the world, the infamous golden triangle (Thailand, Laos, and Burma) and Afghanistan, opiates, especially heroin, is the dominant illicit drug consumed in China. Among the 1.5 million Chinese drug users who were registered with the police by the end of 2010, approximately 1 million were heroin users, accounting for 70% of all illicit drug users (Narcotics Control Bureau of the Chinese Ministry of Public Security, 2011). In addition, 50% to 70% of the heroin users in China inject the drug (Hser et al., 2011). HIV risky behaviors, such as needle sharing, multiple and concurrent sexual partnerships, and commercial sex, are prevalent within this population (Li, Liu, Li, Luo, Jarlais, & Koram, 2011; Sullivan & Wu, 2007).

**China under the threats of illicit drug use and HIV/AIDS**

In sum, both HIV infections and illicit drug abuse are spreading in China and the two problems are highly correlated. Drug users in China, especially injection heroin users, are at the greatest risk of becoming HIV infected. More importantly, both HIV/AIDS and drug abuse lead to hazardous health and economic consequences in the country. The mortality rate of AIDS is 0.1 per 100,000 people in China and it is the fourth leading contributor to all deaths in the country (China State Council AIDS Working Committee Office & UN Theme Group on AIDS in China, 2007). It mainly attacks working age people (20-49) and the average death age because of AIDS is 37.6 (UNAIDS, 2007). The problem of drug abuse is also the most serious among the younger Chinese population. Nearly 60% of the registered drug users in China are under 35 years of age.
(Narcotics Control Bureau of the Chinese Ministry of Public Security, 2011). In addition to premature deaths, the population affected by the dual epidemic of HIV/AIDS and drug abuse often lose their productivity, consume a significant portion of the public health as well as law enforcement resources, and are involved in criminal activities, such as burglary and prostitution. The state is responsible for paying a large proportion of costs related to HIV/AIDS and drug abuse, such as anti-retroviral treatment and compulsory rehabilitation facilities run by the public security system. At the same time, fewer members in the society can contribute to the economy due to HIV, drug use, and other concurrent medical conditions (UNAIDS, 2007). For example, families affected by the HIV or drug abuse need to deal with one or more low income-generating family members while struggling to pay for additional cost such as opportunistic infections (e.g. pneumonia) and mental health problems (e.g. depression) caused by having a family member living with a deadly disease or stigma associated with infectious diseases.

1.2 The role of social work in China’s responses to the dual epidemic of HIV/AIDS and illicit drug abuse

Latest developments of China’s responses to HIV and drug abuse

To address the rapid growth of HIV/AIDS in the country, China has intensified its responses since 2004 (Ministry of Health China, 2006). Strategies such as free HIV testing, free anti-retroviral treatment (for certain qualified patients), and improved diagnosis and treatment for the co-morbidity of HIV and tuberculosis were adopted and promoted across the country (UNAIDS, 2007). Recognizing the important role of drug abuse in HIV/AIDS transmissions, China also started to implement harm reduction programs targeting injection drug users specifically to prevent HIV/AIDS since 2003-2004 (UNAIDS, 2007). For instance, China has
quickly established more than 700 needle exchange sites (Wu et al., 2006) and more than 500 community methadone maintenance treatment (MMT) clinics (Zeng, 2008) nationwide to reduce the spread of HIV via IDU. **However, MMT as one of the nation’s major strategies to prevent HIV/AIDS, faces low enrollment and high dropout rates** (Hser et al., 2011).

The scaling up of harm reduction strategies signifies a new era of dealing with the illicit drug abuse problem in China. The new approach incorporates a public health perspective into the resolution. China has traditionally adopted a punitive approach and sentenced drug users to incarceration, such as labor camps and compulsory rehabilitation facilities (Lin et al., 2010; Sullivan & Wu, 2007). In June 2008, “The Law against Drug Abuse and Illicit Drug Trafficking” came into effect in China. Compared to its old version in the 1990s, this new legislation terminated the drug user labor camps run by the national correction bureau and added a component of community-based treatment and recovery. Community treatment and recovery, together with the compulsory rehabilitation facilities run by the Ministry of Public Security and the voluntary detoxification programs run by the medical sectors, comprise the current drug treatment system in China (Li & Huang, 2008; Yao, 2008). This major reform in China’s responses to drug abuse and related issues provided a platform for the development of social work in China. Social workers who work with drug users in community recovery were among the first few social work workforces established in China in the beginning of the 21st century (Sha, Wong, Lou, Pearson, & Gu, 2012).

**The role of social work in drug users’ community treatment and recovery in China**

Social work was first introduced into China in 1925 by American missionaries in response to the need for social workers for patients in Western style hospitals (Leung, 2001). However, it was banned during the reconstruction of higher education after the People’s
Republic of China’s inauguration in 1949. Since a communist society should be able to remove all social problems, social science research was considered unnecessary (Yuen-Tsang & Wang, 2002). All social sciences were removed from university curricula until the Cultural Revolution ended and China adopted the “Open Door” policy in the mid-80s (Leung, 1994). With no trained professionals or professional knowledge involved, social services in the pre-social work era either came from one’s employment sector or the Ministry of Civil Affairs, for those who were destitute and without family support (Sha, Wong, Lou, Pearson, & Gu, 2012).

Professional social work did not exist until the late 1980s. The first social work education program was established at Beijing University in 1988 (The Asia and Pacific Association of Social Work Education and Department of Sociology, Beijing University), and approximately 200 social work departments or programs had become members of the China Association of Social Work Education (CASWE) by the end of 2009 (Sha, Wong, Lou, Pearson, & Gu, 2012). However, social work only became an occupation with employment opportunities approximately 10 years ago. With the publishing of the Social Work Occupation Standards (Ministry of Labor and Social Security of China, 2004) and the Regulations for the Social Workers Occupational Standard System (Ministry of Civil Affairs and Ministry of Personnel, 2006), social work was officially recognized as a profession in the People’s Republic of China with a occupational qualification system established. Since then, non-government organizations (NGOs) have been expanding rapidly all over China, especially in more developed metropolitan areas such as Beijing and Shanghai, where NGOs have better chances to obtain outsourced service projects from the local governments (Wong, 2008). Shanghai has witnessed the most significant development of the social work occupation in the past few years. By 2005, there were over 1,300 social workers providing services to three populations: delinquent youth, drug abusers, and ex-
offenders; and medical social work and school social work are currently under development (Sha, Wong, Lou, Pearson, & Gu, 2012). There is a dearth of empirical research of social workers and their practice in China. For example, no previous research has documented what community resources are available in China and how social workers assist with drug users’ treatment and wrap-around service use to achieve their community recovery goals.

In sum, social workers who work with drug users in the community constitute one of the first few social work workforces in China. It plays a key role in China’s recent attempt to curb the epidemic of HIV/AIDS through the promotion of drug users’ community treatment and recovery. Yet it is still a recent establishment with less than 10 years history. This new development of social work in China, along with drug abusers’ community treatment and recovery, provide a window of opportunity for research.

1.3 Purpose of the study

The purpose of this study is to investigate whether a Recovery Management Intervention (RMI) model (adapted from the Strengths Based Case Management model, which is well-tested in the United States with drug offenders) will improve linkages of heroin users released from compulsory rehabilitation facilities in China to community-based Methadone Maintenance Treatment (MMT) and assist with their reintegration into the community upon release. China is facing the pressing epidemic of drug abuse and in urgent need to control the rapid spread of HIV/AIDS due to injection drug use. In response, the Chinese government has recently started to promote community-based MMT programs because research has shown that MMT is effective in reducing drug use and HIV risks among injection heroin users. Despite the government’s effort to push this agenda, the enrollment rates of drug users released from compulsory rehabilitation
facilities to MMT programs are low and the dropout rates are high. Meanwhile, no previous research has provided empirical evidence on social worker assisted-community service utilization and recovery outcomes. Studies conducted in the United States have shown that a case management program can facilitate drug user’s transition from prison to community and improve treatment participation and retention. Based on data from a study that randomly assigned eligible and consenting heroin users into either an enhanced usual care group or a RMI group, I compare the outcomes in terms of linkages to MMT and other community services, as well as their recovery success by group assignments. Results generated by this trial study will be able to inform future development of social work interventions like the RMI programs in China and other parts of the world to improve community treatment and services for drug users and thus reduce heroin use and HIV/AIDS risks.

The following chapter will fulfill three major tasks: 1) To lay out the tenets of the Behavioral Model for Vulnerable Populations, which directs how this study conceptualizes the issues of underutilization of community treatment and services for drug users; 2) To provide a literature review of past empirical evidence on MMT and other wrap-around services in China and the world, the effectiveness of various case management models in promoting community-based care for drug offenders in the United States and therefore a potential resolution for China’s MMT implementation issues; and 3) To state the specific research question of the study and specify hypotheses derived from the research question.
Chapter 2: Theoretical Framework and Literature Review

To better study and address the issue of community treatment underutilization and improve recovery outcomes among heroin users in China, this study applies the Behavioral Model for Vulnerable Populations (Gelberg, Anderson, & Leake, 2000). It is a recent expansion of the Andersen’s Behavioral Model of Health Services Use (Anderson, 1968; Anderson & Aday, 1978; Phillips, Morrison, Anderson, & Aday, 1998). This chapter will 1) illustrate the theoretical framework; 2) review the literature on access to MMT and other community resources among drug users in general and in China specifically; 3) review literature on how case management, the strengths based case management in particular, improve drug users’ service utilization and outcomes; and 4) demonstrate how this study operationalizes the concepts and mechanisms defined by the Behavioral Model for Vulnerable Populations. Finally, research questions and hypotheses derived from the theory specifications are presented.

2.1 The Behavioral Model for Vulnerable Populations

*The Behavioral Model of Health Services Use*

*Basic Concepts:* Initially developed in the late 1960s, revisited, revised, and empirically tested frequently over the past 5 decades, Andersen’s Behavioral Model of Health Services use is one of the leading theoretical frameworks in the field of health care utilization research. It allows for an examination of a wide variety of factors that may influence health care access and utilization at both societal and individual levels. The most recent development of the model encompasses four domains: 1) Environment; 2) Population characteristics; 3) Health behavior; and 4) Health outcomes (Andersen, 1995).
The environment domain contains factors that describe health care system and external environment characteristics in relation to the utilization of a certain health service. Health care system characteristics refer to “policies, resources, organization, and financial arrangements influencing the accessibility, availability, and acceptability of medical services”; and external environmental factors are defined as “economic climate, relative wealth, politics, level of stress and violence, and prevailing norms of the society that may affect the way society views health” (Phillips et al. 1998, pp. 574).

The population characteristics domain is comprised of predisposing, enabling, as well as need factors. Predisposing characteristics include biological imperatives and demographic statistics (e.g., age, gender, marital status, education, ethnicity, social networks, health beliefs, and health service related knowledge and attitudes) that will influence people’s use of health services. Enabling factors are personal and community resources (e.g., income, health insurance, social support, regular source of care, as well as organizational characteristics such as provider-to-client ratio and types of services available) that facilitate or impede health service use. Need factors represent an individual’s evaluated and perceived health status (e.g., diagnoses, stage, severity, and symptoms of diseases).

The third domain, health behavior, and the fourth domain, health outcomes, are considered outcome measures of health care utilization. Health behavior entails personal health choices, practice, and types and volume of service utilization. Health outcomes measure the effectiveness of utilization with individual client’s perceived and evaluated health status as well as satisfaction (e.g., improved health outcomes, reduced symptoms or problem severity, and perceived quality of care).
Mechanism: As posited by Andersen and colleagues (1996), the environment and population characteristics domains may influence individual health outcomes directly, or work through health behaviors such as service utilization, to impact on health outcomes. However, the relationships between domains are not in one direction only. Recent updates of the model added reciprocal feedback loops, such that the outcome domains, in turn, also affect certain individual and environmental factors simultaneously (Andersen, 1995; Phillips et al., 1998). For example, having a physical or mental health condition as a need factor often determines access to care and utilization. Utilization, if effective, will improve the condition and therefore reduce the need for care.

Another important tenet of the Behavioral Model of Health Services Use is the concept of mutability (Andersen, 1995), which is critical in promoting health care access and utilization. Factors that affect health care use and health outcomes do not share the same mutability. Environmental factors such as cultural norms, social rules, policies, and health care delivery system features should be under constant monitoring and improvement to facilitate equal access to health care. However, societal and institutional changes often take a long time and are beyond the scope of one research study or a single sociobehavioral intervention. Gender, age, ethnicity, and other predisposing characteristics are almost impossible to change to promote utilization. The one exception among predisposing factors is health beliefs and knowledge, which can be improved within a fairly short time period through adequate education programs. Need variables also have low mutability even though people’s perceived needs can be altered through factors such as real medical evaluations, health education programs, or financial support. On the contrary, enabling resources are considered highly mutable among the factors that are strongly associated with health care utilization. Therefore, they are the focus of this present study.
The Development: The Behavioral Model of Health Services Use is an ambitious conceptual framework for its inclusiveness of a large variety of potential individual, community, provider-related, and environmental contributors to the utilization of health services. One criticism, however, is that the model has become so large that it reduces its predictive power. It simply posits too many factors that might have an impact on health care utilization, with no specifications of which variables or what mechanisms between variables to test. Nevertheless, some other scholars regard this inclusiveness as what makes the Andersen model flexible and dynamic for studying service utilization. Factors and relationships can be incorporated, defined, and specified in regard to a particular health condition, need, or even a certain population. For example, Gelberg, Andersen, & Leake (2000) have extended the model to better understand health seeking behaviors of vulnerable populations.

Several groups are viewed as vulnerable in health access research: ethnic minorities, undocumented immigrants, children and adolescents, mentally ill, chronically ill, disabled persons, the elderly, the impoverished, and people who are homeless (Aday, 1993; Gelberg et al., 2000). Each group may face particular challenges in accessing health services, and identifying these obstacles may help promote population-specific health service utilization and thus improve health outcomes. A major contribution of the Behavioral Model for Vulnerable Populations is the incorporation of factors tailored to a certain vulnerable population to improve health care use and health outcomes. In addition to traditional predisposing, enabling, need, and health behavior factors, the model for vulnerable populations posits “vulnerable predisposing factors” such as country of birth, sexual orientation, mobility, mental illness, history of criminal involvement etc.; “vulnerable enabling factors”, including competing needs, social service resources, case manager
involvement and so on; “vulnerable need factors” that indicate the pressing health needs of a target vulnerable population (e.g., skin/leg/foot problem for people who are homeless); and vulnerable health behavior measures like unsafe sexual behaviors.

**Implication for this study:** Drug dependence has traditionally been viewed as a personal choice and therefore a moral deficit, a social problem, and a criminal behavior, rather than a medical condition. Even when the medical aspect of drug dependence is acknowledged, it is treated as a “curable, acute condition” (MecLellan, Lewis, O’Brien, & Kleber, 2000, pp. 1689) instead of a chronic illness. However, more and more scholars and practitioners are starting to accept the recent view of substance abuse as a chronic health condition. For example, most general health practitioners believe that no effective treatment exists for curing alcoholism or other substance abuse because 40% to 60% of those who use alcohol or other drugs return to active substance use within a year after treatment (Finney &Moos, 1992; Hubbard, Graddock, Flynn, Anderson, & Etheridge, 1997; McLellan, & McKay, 1998). Substance abuse, like type 2 diabetes, hypertension, and asthma, should be treated as a condition having effective treatments and regimens for maintenance and management, but not yet curable (McLellan et al., 2000).

The target population of this study, heroin users released from compulsory rehabilitation in China, can be viewed as a vulnerable population with a chronic illness condition. The Behavioral Model for Vulnerable Populations, then, is a good fit because it provides a framework to incorporate factors and mechanisms that are specifically relevant to study long term drug recovery strategies like MMT and other community service utilization among heroin users in China.
2.2 Existing Literature on MMT and Other Community Services for Drug Users

**MMT as a drug treatment in general**

Long periods of forced abstinence do not guarantee lessened opiate dependence. When recently released from prison to an environment where contributors to drug use (e.g. adverse life events and drug using friends) may still exist, drug users are at particularly high risk for relapse, and consequently overdose and disease transmission if they relapse (McCoy, McCoy, Lai, Yu, Wang, & Meng, 2001; Yang, Wang, & He, 1998; Wu, Detels, Zhang, Li, & Li, 2002; Wang, Gerald, Chen, & Chen, 1998). Methadone is the most widely used pharmacological treatment for opiate dependence globally (NIDA, 2006). According to a recent meta analysis of the effects of MMT for IDUs in general (Gowing, Farrell, Bornemann, Sullivan, and Ali, 2004; Marsch, 1998), a large body of the United States and international research (UK, Australia, Italy, and Germany) has shown the efficacy of Methadone Maintenance Treatment (MMT) for the treatment of opiate addiction when measured by reduction in the use of illicit drugs, (Lott, Strain, Brooner, Bigelow, & Johnson, 2006; Dolan, Shearer, MacDonald, Mattick, Hall, & Wodak, 2003; Kwiatkowski & Booth, 2001), reduction in needle sharing (Marsch, Bickel, Badger, & Jacobs, 2005), reduction in commercial sex work, as well as reduction in the number of reports of multiple sex partners (Schroeder, Epstein, Umbricht, & Preston, 2006). These behavioral changes will then lead to positive secondary effects such as reduction in criminal activity, reduction in HIV transmission and infection, improvement in social functioning and productivity, improvement in health conditions, retention in addiction treatment, reduction in suicide, and reduction in lethal overdose (Prendergast, Greenwell, Farabee, & Hser, 2009; Prendergast & Cartier, 2008). In general, MMT can help to break the cycle of substance abuse, health risks, criminal behavior, and re-incarceration among heroin dependents, although it has not been extensively tested among Asian
populations.

**MMT in China**

In order to address the dual epidemic of drug abuse and HIV/AIDS, the Chinese government has recently authorized the establishment of MMT clinics in the community throughout the country. The first eight MMT trial sites were set up in 2004 and soon expanded to 320 clinics in 2006. By the end of 2007, China had a total of 503 community MMT clinics in 23 out of 31 provinces (Zeng, 2008). By the end of September 2011, a total of 716 MMT clinics had been established nationwide, serving cumulatively 332,996 heroin users and 132,879 current patients (Ministry of Health of China, Joint United Nations Programme on HIV/AIDS, & World Health Organization, 2011). MMT participants show significantly improved results than their non-MMT counterparts, such as higher rates of abstinence, lower rates of injection drug use and needle sharing, and less engagement in unprotected sex (Zhang, Xu, Li, Hu, & Jiang, 2008; Feng, Wei, Wei, Bai, & Shan, 2007). Despite the government’s effort in promoting MMT and the high rates of relapse after incarceration, few drug users released from compulsory rehabilitation in China participate in MMT (He et al., 2008). According to Zeng (2008), only around 95,000 individual drug users nationwide had enrolled in MMT clinics at the end of 2007, accounting for only 8% of the drug users who are registered with the police. Considering drug users who are not registered officially, the proportion of MMT utilization among drug users will be even lower. Meanwhile, dropout rates among those who enrolled in MMT are reported to be high. A few recent studies (He et al., 2008; Wang et al., 2007; Feng et al., 2007) indicated a dropout rate of 50% - 70% at 3-months after MMT enrollment. Low rates of enrollment and high rates of drop out suggest that barriers may exist in accessing and remaining in MMT in China.

**Wraparound services for recovery**
Etheridge and Hubbard (2000) define wraparound services as psychosocial services that facilitate treatment access, improve retention, and address clients’ co-occurring problems. Wraparound services, in addition to core services that directly handle diagnosis and treatment of addiction, are also an important component of comprehensive drug treatment. As pointed out by *The Principles of Drug Addiction Treatment* (NIDA, 2009), substance-dependent individuals often encounter many addiction related problems (e.g., health, mental health, occupational, legal, housing, and financial). Therefore, successful substance abuse treatment programs not only address clients’ drug treatment needs, but also help with these other challenges. Figure 3 below is a model of comprehensive drug abuse treatment proposed by NIDA (2009, p.12). Services focus on addressing clients’ drug abuse include: intake processing/assessment, treatment plan, pharmacotherapy, continuing care, behavioral therapy and counseling, clinical and case management, substance use monitoring, and self-help/peer support groups. Wraparound services usually involve medical, mental health, vocational, child care, family, housing, transportation, financial, legal, HIV/AIDS, as well as educational programs.

While evidence shows that MMT is effective in reducing HIV risk behaviors such as injection drug use among opiate-dependent individuals, especially IDUs, past research has indicated that adequate wraparound services can also contribute to improved MMT participation and retention and therefore treatment outcomes (Ducharme, Mello, Roman, Knudsen, & Johnson, 2007; Ducharme, Knudsen, & Roman, 2006). In particular, the provision of mental
health, employment, medical, childcare, as well as transportation services has been associated with enhanced drug treatment utilization and treatment outcomes (Smith & Marsh, 2002; Friedmann, Lemon, & Stein, 2001; Friedmann, D’Aunno, Jin, & Alexander, 2000; Marsh, D’Aunno, & Smith, 2000) in past research.

Wraparound services in China

Although social work as a discipline was advancing for more than two decades in China, the growth of social work as a profession did not happen until the beginning of the 21st century (Sha, Wong, Lou, Pearson and Gu, 2012; Leung, 2001). With rapid economic growth and social development, the Chinese society is becoming more and more diversified and people’s needs for social services continue to increase. The traditional government-operated welfare system, which only included orphanages, senior homes, organizations advocating women’s rights, and unions, can no longer meet the diverse needs of the society. In addition, the cost of providing social services by a centralized system is high and the services are often of poor quality and low efficiency (Zhang, 2007). In order to build a “harmonious society” (a concept deeply rooted in the Chinese belief system and being promoted by the current administration), the government declared a move from a centralized welfare system to purchasing services from non-government organizations and social work professionals in 2000 (Chen, 2008; Wang, 2007). In response to this policy provision, social work services and workforces have been developed to work with specific populations, such as mental health patients in community rehabilitation, patients and their families in hospitals, people in the correctional system, youth, and drug users in community recovery (Fan & Xu, 2007; Xu, 2007). The planned social services for drug users include: counseling, behavioral intervention, social support, family therapy, social networking, and community resources such as MMT clinics, social security funds, employment services, and
general health services (Zhang, 2008). Since the recent establishment of social work for community drug treatment, no research has documented how many planned wraparound services are currently available for heroin users in the community and how they are being utilized.

**Case management as the main linking mechanism to community resources**

In the United States, research has identified continued participation in community treatment after prison-based rehabilitation as critical for drug offenders’ successful recovery (Simpson, Joe, & Brown, 1997). One strategy to ensure successful transition from drug treatment in a confined environment to community care is to provide case management. Empirical evidence has confirmed the effectiveness of case management in facilitating drug offenders’ admission to community drug treatment and other services after release and subsequently in addressing problems of substance abuse (Siegal et al., 1996), employment (Martin & Inciardi, 1993; Siegal et al., 1996), and criminality (Siegal, Li, & Rapp, 2002). The brokerage/generalist model, the assertive community treatment/intensive case management model, the clinical/rehabilitation model, and the strengths-based case management model are the four most often utilized case management models for working with the substance abuse population in the United States (Hesse, Vanderplasschen, Rapp, Broskaert, & Fridell, 2009).

**Case management in China**

As a newly established discipline and profession, social work in China is still at a developmental stage. Professionals and scholars tend to adopt and adapt theoretical concepts, practice models, and research methods from Western literature (Fan & Xu, 2007). For example, case management was only recently introduced to social workers working with drug users in Shanghai (Guan & Li, 2008). The current practice in Shanghai resembles a low-intensity case management model that focuses heavily on monitoring instead of connecting clients with
community resources. The referral services to other community resources are not systematic or
standardized although there seems to be a handful of community resources available. More
importantly, there has been no scientific documentation or empirical examination available on
case management in China (Fan & Xu, 2007).

**Effectiveness of the strengths-based case management**

The effectiveness of case management models has been tested extensively with persons
with substance use disorders in the United States. According to a recent meta-analysis (Hesse,
Vanderplasschen, Rapp, Broekaert, & Fridell, 2007), two types of outcomes are often measured
when evaluating the effectiveness of different case management models, including individual
level treatment outcomes in the seven substance use and related problem areas (alcohol use, drug
use, employment status, family/social relations, physical health, legal status, and mental health)
defined by the Addiction Severity Index (ASI) plus housing status and secondary structural
outcomes such as treatment participation and retention, service utilization, hospitalization, client
perception and satisfaction with the intervention(s). In reviewing 15 randomized controlled trials
of brokerage, generalist, assertive, clinical, and strengths-based case management models, this
meta analysis concluded that the strengths-based model was found to have the highest overall
effect (SMD=.70), followed by brokerage (SMD=.33), and intensive case management
(SMD=.19).

However, a systemic review of 48 peer-reviewed articles on effectiveness of case
management (Vanderplasschen, Wolf, Rapp, & Broekaert, 2007) reveals that results on the
individual level treatment outcomes generated by the strengths-based intervention have been
inconclusive. For example, a NIDA-funded randomized controlled trial of strengths-based case
management with drug users in general only demonstrated limited differences, including better
legal results at 6-month follow-up, improved employment situations at 12-month, and reduced
drug use at 3-month (Vaughan-Sarrazin, Hall, & Rick, 2000). Even these few differences that
were detected tended to fade quickly over time, especially on drug abuse (Saleh, Vaughn, Hall,
Levey, Fuortes, UdenoHolmen, 2002). Although these cited studies in the United States were not
tested specifically with criminal justice populations, a large percentage of the substance-using
clients studied had been, or were, involved in the criminal justice system. Therefore, it is a
relevant model for the target population of this proposed study. Another large NIDA-funded test
of strengths-based case management detected effects on employment functioning at 6-months
(Siegel et al., 1996), reduced drug use and reduced criminality post-treatment (Siegal, Li, &
Rapp, 2002). Overall, strengths case management interventions apparently have shown a certain
degree of effectiveness improving individual client treatment outcomes. But more studies need to
be conducted to sufficiently support strengths-based case management’s effect in different
treatment areas and for different length of follow-up periods.

Nevertheless, effects of strengths-based case management on structural outcomes,
especially treatment participation, program retention, service utilization, and successful linkages
to treatment and other resources have been consistent. The two large NIDA trials referred above
both concluded that strengths-based case management facilitated drug abuse treatment
participation, retention, and utilization of other services among general drug-using population
(Rapp et al., 1998; Vaughan-Sarrazin, Hall, & Rick, 2000). Other studies demonstrated the
effectiveness of strengths-based case management on successfully linking drug users to
treatment and other relevant services. For instance, Rapp et al. (2008) compared strengths-based
case management with two other case management models and found that strengths-based
intervention resulted in significantly higher percentages of successful linkages to drug treatment and other related services (55% vs. 44.7% vs. 38.7%).

Strengths-based case management specifications

Among the frequently utilized case management models in the United States, strengths-based case management may be particularly suitable for adaptation to serve the target population because 1) the strengths-based case management practice guidelines developed by previous research have demonstrated the most positive results in linking drug offenders to community treatment and services in the United States; 2) the focus on strengths instead of problems can help drug using participants combat the sense of being vulnerable and powerless associated with their former drug offenders’ status, and establish the confidence needed to reintegrate into the community after a long time in a constrained environment; and 3) the intervention procedures do not require advanced professional training or a team approach and therefore are easy to follow.

Strengths-based case management was originally developed for persons with mental illness and then adapted for working with other populations such as drug users (Rapp & Chamberlain, 1985). Its major goal is to provide clients with the support needed to regain a meaningful life while combating their illness in the community (Rapp & Wintersteen, 1989). Elements of strengths-based case management models usually involve an assessment of clients’ strengths instead of a pathology of deficits to encourage beliefs in their capabilities, and active outreach and advocacy on behalf of the clients to help reach their goals (Hall, Vaughan-Sarrazin, Vaughn, Block, & Schut, 1999; Siegal & Rapp, 1996; Saleebey, 2002; Siegal et al., 1996). Under this approach, clients are viewed as active partners in planning their own aftercare in the community and are expected to utilize and commit to treatment and other services.
Assessment, linking, monitoring, and advocacy comprise the four core functions across almost all case management models (Rapp et al., 2008; SAMHSA, 2000). However, principles, quality of work, case contact intensity, as well as staff qualification requirements vary from model to model (Vanderplasschen, Wolf, Rapp, and Broskert, 2007). Case management models based on strengths distinguish themselves from other models in the following six major aspects (Prendergast & Cartier, 2008; Ridgely, Morrissey, Paulson, Goldman, & Calloway, 1996):

1) **Strengths Assessment** – evaluates clients’ abilities in nine life domains using scales developed by previous studies with mental health and substance-using clients (Martin, Eisenberg, & Inciardi, 1993; Rapp & Chamberlain, 1985): life skills, finance, leisure, relationships, living arrangements, occupation/education, health, internal resources, and recovery.

2) **Planning** – helps clients identify realistic and meaningful goals and objectives; analyze foreseeable obstacles in achieving goals and objectives; and make specific plans to fulfill these goals.

3) **Linking** - facilitates clients’ access to needed treatment, services, and resources (both formal and informal) through referrals or other effective ways of transfers.

4) **Outreach** – establishes good relationships and maintains regular contacts with clients before and during their reentry to the community.

5) **Advocacy** – negotiates with different agencies in the community on behalf of the clients to ensure equitable access to treatment and services.

6) **Monitoring** – evaluates progress with clients on a regular basis; provides feedback about clients’ recovery; and keeps good relationships with personnel from other agencies.
Despite different adaptations of the strengths case management model, 3 phases remain core to its implementation:

1) A strengths assessment session completed by case managers and clients as a preliminary step before community reentry;

2) A case conference between case managers, clients, and individuals identified by clients as important to their community reintegration to discuss recovery plans;

3) Strengths case management in the community and/or follow-up contacts for a certain amount of time.

In the specific context of working with previously incarcerated drug users in community recovery, a successful strengths case management model should assist drug users coming out of prison to see and believe in their strengths, design realistic goals and action plans, retain a certain level of contacts, review progress as well as obstacles, and identify and coordinate community resources.

2.3 Operationalization

In sum, community drug treatment MMT can not only reduce illicit drug use and HIV risky behaviors, but also generate positive social adjustment outcomes such as increased employment and reduced criminal involvement among opiate dependent individuals. Wraparound services at the same time help this population to remain in drug treatment and provide assistance in other recovery areas such as health, mental health, employment, family, legal, and financial. However, underutilization of these community services has been identified as a major problem for drug users’ community recovery in China, where the community infrastructure for drug recovery has only recently been established. Case management, especially
the strengths-based case management model, has been tested to be an effective means to link drug users to community resources, improve service utilization, and consequently improve drug users’ recovery success in the United States.

The main focus of this study is to investigate whether an enhanced enabling factor, social work service in the community (via the adoption of the Recovery Management case management intervention (RMI)), will 1) change heroin users’ attitudes toward treatment and service utilization, as well as recovery; 2) improve their actual treatment and other service use in the community; and finally, 3) generate positive recovery outcomes. The diagram below summarizes the Behavioral Model for Vulnerable Populations and how the current study operationalizes its major constructs to conceptualize and address the issue of community recovery for heroin users in China.

2.4 Research question and hypotheses

The Behavioral Model for Vulnerable Populations and past empirical research have identified a number of environmental, predisposing, enabling, and need factors that may impact health care utilization and individual health outcomes. The current study focuses on improving a high mutability enabling factor, case management, in order to assist with drug users’ community recovery. The overarching research question is whether the implementation of an RMI program will improve MMT and wraparound service use, and subsequently enhance
recovery success among heroin users released from the police administered rehabilitation facilities in China.

To answer the research question, this study posits the following hypotheses:

1. The RMI will improve participants’ attitudes toward drug treatment and other wraparound services, as well as recovery outcomes such as drug abstinence.

2. The RMI will generate more actual drug treatment (i.e., MMT) and other wraparound service use in the community.

3. The enhanced service utilization will then lead to more recovery success, in terms of drug abstinence, employment status, and legal status, among heroin users released from the compulsory rehabilitation facilities.

After describing the study design and procedures, the next chapter further discusses in detail how the constructs of the Behavioral Model for Vulnerable Populations were measured and the relationships between the measured variables. Finally, the analytical steps are reported at the end.
Chapter 3 Methods

Specific aims of this study include: 1) to answer the research question of whether an RMI will impact on Chinese drug users’ service utilization and thus their community recovery outcomes, and 2) test the specific hypotheses derived from the research question. To fulfill these aims, I built my research project upon a larger scale intervention study entitled “Reducing HIV/AIDS and Drug Abuse among Heroin Addicts Released from Compulsory Rehabilitation in China”. In this chapter, I will discusses the overall design of the study, settings and procedures, study measures and variables included in the final analyses, and finally, the planned analyses.

3.1 Overall Study Design

This study consists of two components. Data were first obtained from the intervention study, which randomly assigned 100 eligible and consenting heroin users in Shanghai to either a Standard Care group or a Recovery Management Intervention (RMI) group to investigate the effect of the RMI in improving methadone treatment enrollment and reducing drug use. Participants in both study conditions were surveyed at both baseline and 3-month follow-up. I then conducted multivariate analysis with the data to examine the hypothesized relationships. The RMI lasted 12 weeks and was implemented by social workers from the Shanghai Zi-Qiang Social Services. The second component included a questionnaire of professional identity with all current social workers of Zi-Qiang Social Services. Zi-Qiang is not only the agency that carried out the intervention study, but also the first social work workforce in the country to work with drug users in community recovery. This study received ethics approvals from the Institutional
3.2 Procedures

Part I: The Intervention Study

Setting

The intervention study was conducted in Shanghai, the largest and one of the most developed metropolitan areas in China, with approximately 17 million residents and 28,000 registered drug users. It is an ideal locale for testing the RMI because Shanghai has a strong social worker presence supported by the municipal government to assist drug users in community recovery after they are released from the compulsory rehabilitation institutions. Established in 2003 as the first social work consortium in China dedicated to drug user’s community recovery, Shanghai Zi-Qiang Social Services (Zi-Qiang means “getting strong by self-improvement”) is a community-based social service network with 585 social workers hired by the Shanghai municipal government. It is considered a model social work program in China. The main responsibilities of the social workers are to 1) keep regular contact with clients when they are still in compulsory rehabilitation to establish treatment relationship and prepare them for life after release, 2) keep regular contact with drug users after they return to the community and provide services based on their needs, 3) conduct regular drug testing to monitor drug users’ community recovery progress. Currently there are three compulsory rehabilitation facilities (two for men and one for women) in Shanghai and all local illicit drug users released from these centers are contacted and monitored by Zi-Qiang social workers regularly for three years of community recovery (three year is a fixed terms according to the 2008 legislation on illicit drug
trafficking and drug abuse). The RMI was designed to be incorporated into this existing community recovery support mechanism.

According to Zi-Qiang Social Services (2009), current routine social work practice with drug users in Shanghai consists of the following major procedures: 1) The Zi-Qiang Social Services receives a monthly listing of drug users scheduled to be released from compulsory rehabilitation. Social workers usually go in rehabilitation facilities for pre-release preparation visits during which they introduce themselves and establish therapeutic relationships with clients; 2) Upon discharge, social workers meet with individual drug users together with community police officers and family members (if any) to lay out post-release reporting requirements, which include monthly contact with the social worker and random urine testing in a local hospital (at least six times in the first year, at least four times in the second year, and at least twice during the third year according to Shanghai local drug policy); 3) The police will require random urine tests if social work services are declined by the clients. The police can request that drug users go to designated hospitals where they can access clients’ urine test results. Upon police detection, urine violations by the clients may result in their reincarceration into the compulsory rehabilitation facilities. Upon the detection of positive urine, social workers can suggest that drug users who tested positive but would like to stop using heroin to join Methadone Maintenance Treatment (MMT) in the community; and 4) Social workers are also responsible for linking returning drug users to community-based drug treatment such as MMT and community resources such as low-income social security offices, employment training and job-searching agencies, primary health clinics, subsidized housing organizations and so on. The intervention study trained 20 social workers from two Zi-Qiang district branches, Hongkou and Yangpu, in 19 street offices to implement the intervention and administer the baseline and follow-up surveys.
Participants

A total of 100 participants were recruited from all three Shanghai compulsory rehabilitation facilities consecutively during 2009-2010. Recruitment criteria include:

1) Meeting Diagnostic and Statistical Manual of Mental Disorder (DSM-IV; American Psychiatric Association, 1994) criteria for heroin dependence at the time of incarceration;
2) Willingness to enroll in an MMT program upon release; and
3) Permanent Shanghai resident in the two districts where the study was conducted.

Among all 435 drug users released during the one year recruitment period, 300 were not eligible (mainly because their residence was outside the two study districts, but 15 were ineligible because they were unwilling to enroll in MMT), 35 refused to participate, resulting in a total of 100 heroin users who agreed to participate and provided informed consent. A computer-generated randomization sheet was used to randomly assign participants to either the Standard Care condition (n=50) or the RMI condition (n=50). A social worker coordinator at the Zi-Qiang central office conducted the randomization based on the assignment sheet once she was notified of a confirmed study participant. The coordinator then informed relevant social worker staff about the assignment result.

Baseline survey

Upon release from the compulsory rehabilitation facility, participants who met the study’s eligibility criteria were invited by social worker staff to participate in the study. Those who signed the “consent to participate in research” form completed a baseline interview in a private room at the social work branch office located in their residential district. The baseline interview was administered by social worker staff and it took an average of 90 minutes to complete.
**Intervention**

Participants were randomly assigned to one of the following two conditions:

1) **"Standard Care" condition** (n=50): participants in this condition received the Zi-Qiang standard procedures that are used with clients released from compulsory rehabilitation to the community plus a strengths assessment. Standard care includes:

   a. receiving a “strengths assessment” from social workers upon return to their residential district
   b. making a post-release plan with social workers, local police officers, and family members (if any)
   c. regular contact (at least monthly) with social worker staff post-release and standard referral service as specified by current routine practice of community recovery in Shanghai
   d. urine collection post-release at intervals determined by social worker staff (at least every two months) as required by current routine practice in Shanghai, and
   e. off-site urine testing at local-area hospitals as requested by the police

2) **"Recovery Management Intervention” condition** (n=50): participants in this condition received the standard procedures and strengths assessment that were used with the Standard Care group. At the same time, the following additional procedures were applied with this group:

   a. Upon release, participants in this condition were required to participate in a case conference organized by social worker staff. The case conference will
involve participants’ family members (if any) who will be provided with an information sheet regarding the study procedures. During the case conference, participants will be asked to sign a behavioral contract (which lays out the blueprint of their community recovery) before the strengths assessment was conducted.

b. Social workers will contact participants every week for 12 weeks post-release.

c. At each contact, a urine sample was collected from RMI participants on-site. The social worker staff immediately tested the urine sample on-site for opiates, recorded test results, and destroyed the sample.

d. If the urine sample tested positive for opiates, the social worker immediately provided a referral to the participant for MMT.

e. The social worker was provided with a list of available community resources to promptly refer clients to relevant resources based on their continuous weekly review of RMI clients’ strengths, goals, and objectives.

3-Month follow-up

Finally, regardless of study condition assignment, all participants were re-contacted by social worker staff to complete an in-person follow-up interview and provide a urine specimen at 3-months after the date of the post-release meeting. The follow-up interview required approximately 60 minutes to complete and was conducted in-person either on-site or at another location the participant preferred.

Social worker service records
Regardless of condition assignment, all study participants who were released from compulsory rehabilitation had their individual administrative data files that were routinely recorded by their social workers. These records included frequency and result of contact efforts, post-release planning, treatment attendance and retention records, service utilizations types and volume, and urine test results. During the informed consent process, participants were informed that as a part of participation in the research their records would be collected and shared as part of the study data.

**Part II: The second component**

**Participants**

All 585 Zi-Qiang social workers from 19 branch offices were invited and participated. To be eligible, participants had to be social workers currently registered with the Shanghai Zi-Qiang Social Services. There were no other inclusion/exclusion criteria. All social workers registered with the Shanghai Zi-Qiang Social Services were invited to participate in the study via the assistance of their chief administrator’s office. An invitation email from the researcher was sent to all 19 branches of social work offices of Zi-Qiang through their internal listserv explaining the purpose of the study, introducing basic information about the questionnaire, inviting all social workers to fill out the professional identity questionnaire, and illustrating the procedures how the survey will be administered. Two weeks after the initial invitation, a follow-up email was sent out through the Zi-Qiang chief administrator’s office to all their social workers to remind them of the survey.

**Surveys**

A copy of the questionnaire of social worker professional identity was sent to all Zi-Qiang social workers shortly after the intervention study ended and the recruitment invitation email was sent out. No personal identifiers such as names, addresses, or their worker ID were
collected. Therefore, participation was voluntary and anonymous. A follow-up email was sent out to all the workers two weeks after the initial invitation to remind those who had not filled out the survey.

3.3 Study Measures

All instruments and data collection procedures have been used in previous studies in the United States, and some have been used in China. Those not used in China before were translated into Chinese and examined during the Developmental Phase activities (focus groups and Community Advisory Board meetings discussing study feasibility and protocols) of the intervention study to ensure their cultural appropriateness. Translation was first performed by the Chinese-speaking researchers at UCLA and then back-translated by Shanghai local collaborators. Discrepancies were resolved through an iterative process of team discussions, focus group discussion, and pilot testing. Table 1 summarizes the measures of interest and the time of measurement.

Table 1

Service utilization

To capture services received by clients in the study in various recovery domains during the three months study period, numbers of services received in the following areas, including medical (e.g., physical exams), mental health (e.g., psychological counseling or referral to mental health clinics), legal (e.g., meeting with community public security officials), employment (e.g., social security applications, job training, meeting with community
employment workers), family and social support (e.g., subsidized housing applications and relationship counseling), and alcohol and drugs (e.g., MMT referral and enrollment and relapse prevention counseling), were extracted from the social worker service records.

**Urine test**

Immediately after completion of the baseline and 3-month follow-up surveys, participants were asked to provide urine samples in the private room in which they were filling out the surveys. Urine samples collected by the social worker staff were then sent to the Shanghai Mental Health Center for testing.

**Arrest**

At the final data collection point, social worker service records were examined for entries concerning police arrests.

**Employment**

At the end of the 3-month period, participants’ employment status was recorded by the social workers.

**Main effects**

RMI intervention adapted from the strengths-based case management model was administered by 20 local social workers. The main instrument is the *Strengths Inventory - Progress Evaluation Scale (PES)*. The PES provides an assessment of the client’s present strengths, achievements, and resources in the nine domains that are the focus of strengths case management (life skills, finance, leisure, relationships, living arrangements, occupation and education, health, internal resources, and recovery). Each domain is ranked by the client using anchored scales from “1” (less healthy functioning) to “9” (most healthy functioning). The PES used in the RMI intervention study is the version that has been modified for use in previous
NIDA-funded studies of strengths case management for substance abusers (Hall, Vaughan-Sarrazin, Vaughn, Block, & Schut, 1999; Martin, Butzin, Saum, & Inciardi, 1999) and originally developed by Ihilevich & Gleser (1982) for use with mental health clients. This assessment tool was used at post-release to provide a basis for clients’ action plan and updated regularly during the 3-month course of the intervention.

**Client Evaluation of Self and Treatment at Intake (CEST)**

CEST includes short scales for treatment motivation (problem recognition, desire for help, treatment readiness, external pressure), psychological functioning (self-esteem, depression, anxiety, and decision-making), social functioning (childhood problems, hostility, risk-taking, and social conformity), and criminal thinking. The three treatment motivation scales represent the Stages of Change model as delineated by Prochaska & DiClemente (1986). Each scale uses a 5-point Likert response set. The Cronbach alpha reliability coefficient for the different scales ranges from .63 to .91.

**Social Support**

This construct was measured with the social support section of the TCU CEST and consists of nine items that gauge the degree of personal support received by clients from outside sources (family and friends) for their treatment and recovery efforts. This scale is well established in the literature (Garner et al., 2007).

**Self-esteem**

Self-esteem was reported on a 10-item self-esteem scale developed by Rosenberg (1989). It has been widely used in America.
The 15-item self-efficacy scale developed by Hill et al. (2000) was utilized to evaluate participants’ willingness and confidence to stay abstinent from illicit drugs.

**Barriers to MMT treatment entry**

The perceived barriers to drug treatment were measured with a 36-item questionnaire (Schwartz et al., 2008) that measures patient attitudes towards methadone treatment.

**Demographic characteristics, drug use severity, and other related problems**

These are single questions inquiring about participants’ general background information at the baseline survey.

### 3.4 Variables included in analyses and hypothesized relationships

**Group:** is a dummy coded variable representing participants’ study condition assignment, 0=standard care group, and 1=RMI group.

**Attitudes toward treatment utilization and drug use** were captured with the following variables:

1) **Barrier to treatment entry:** is the change score of the barrier to treatment entry scale from baseline to 3-month follow-up.

2) **Social support:** is the change score of the social support scale from baseline to 3-month follow-up.

3) **Self-esteem:** is the change score on the self-esteem scale from baseline to 3-month follow-up.

4) **Self-efficacy:** indicates participants’ score on the self-efficacy to stay abstinent from heroin at 3-month follow-up.

**Service utilization** was reorganized into three variables:

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1) **Assessment received:** represents the number of assessment received by the participants from their social worker.

2) **Referrals received:** refers to the number of referral services received by the participants from their social worker.

3) **Service completed/utilized:** shows the number of services, drug treatment or other wraparound services, participants received from different community service resources as recorded by their social worker.

**Recovery success** of the participants was represented by combining the following three variables into one ordinal level variable (0=not successful, 1=somewhat successful, 2=successful, 3=very successful):

1) **Arrest:** indicates that at 3-month follow-up, whether a participant was arrested or not, 1=not arrested, 0=arrested.

2) **Urine results:** informs us at 3-month follow-up, whether a participant was tested positive for either opiate, methamphetamine, ecstasy, or ketamine, 1=negative, 0=positive.

3) **Employment status:** measures whether a participant was employed at 3-month follow-up, 1=employed, 0=not employed.

Four subscales were extracted from the *Client evaluation of self and treatment* to reflect participants’ self-perceived treatment readiness and motivation.

1) **Problem recognition:** whether a client admits or denies his/her problem is important at treatment entry;

2) **Desire for help:** reflects participants’ motivation for participating in treatment;

3) **Treatment readiness:** refers to client’s readiness for change; and
4) **Pressure for treatment:** is the external pressure or force (e.g., family, legal problems) that motivate clients to participate in treatment services.

**Demographic characteristics** include the following:

1) **District:** is a dummy variable indicating participants’ residential district in Shanghai, 0=HongKou, 1=Yangpu.

2) **Gender:** is a dummy coded variable, 0= male, 1= female.

3) **Age:** is a continuous measure and the mean age and its standard deviation was calculated for each participant.

4) **Education:** average years of education were used to demonstrate participants’ educational background.

5) **Marital Status:** is a categorical variable that captures whether the participants were married or not at the time of study, 0=single, 1=married, 2=widowed, 3=divorced or separated.

6) **Living arrangement:** is a categorical variable that indicates whether the participants lived with family or friends or independently, 1=independent living, 2=dependent living, 3=other such as homeless.

7) **Employment history:** inquired about participants’ main employment status in the past three years before study enrollment, 1=full time employed, 2=part time employed, 3=not employed.

**Drug and other related problems** were measured with:

1) **Arrest history:** asked the participants to indicate whether or not they had been previously arrested for reasons other than drug offense, 1=yes, 0=no.
2) **Medical problem:** is a dummy variable showing if participants had experienced any medical problems 30 days before the time of baseline survey, 1=yes, 0=no.

3) **Mental health problem:** is also a dummy variable that measures participants’ experienced mental health problem 30 days before the time of baseline survey, 1=yes, 0=no.

4) **Age of first use:** mean age of first use of illicit drugs and the standard deviation were calculated for each participant.

5) **Years of use:** describes how long the participants had been using illicit drug at the time of survey.

6) **Injection drug use:** requested the participants to report any injection drug use 30 days before they were arrested and put into compulsory rehabilitation (because all participants were just released from compulsory rehabilitation, they could not access any illicit drugs in any way 30 days prior to the time of the survey).

7) **Type of drug used:** provided information on the primary drug of choice by the participants 30 days before they were last arrested and sentenced to compulsory rehabilitation.

**Hypothesized relationships**

Based on the Behavioral Model for Vulnerable Populations, this study predicts that study conditions, whether participants received the RMI or not, will make a significant difference in participants’ attitudes toward treatment/services and recovery (self-efficacy, self-esteem, social support, barriers to MMT entry, and treatment readiness), actual utilization of MMT and other wraparound services in the community, and then lead to a significant difference in participants’
recovery outcomes. According to previous empirical research on relationships between drug users’ attributes, psychosocial functioning, treatment readiness and motivations, and their treatment/service engagement (Joe, Broome, Rowan-Szal, & Simpson, 2002), psychosocial variables are closely associated with clients’ treatment and service utilization (e.g., self-efficacy, self-esteem, and social support were proven to be positively associated with clients’ treatment process). This study also added the barriers to MMT treatment entry as a psychosocial indicator for service use because MMT utilization is one of the main target behavior outcomes of the study. Any differences in demographic characteristics and drug use problems will be included in the analysis as covariates. Figure 5 below presents the relationships between the variables predicted by the present study.

Figure 5

3.5 Analyses

Preliminary analysis

Descriptive statistics and missing data examination were conducted. Frequencies were run and examined for non-normality (using plots, examination of skewness, kurtosis tests, etc.) for the variables. Since multivariate kurtosis was detected indicating non-normality of the data, this study needed to utilize a robust correction to the maximum likelihood estimation because it has been proven to perform very well with a wide variety of non-normal conditions (Chou and Bentler, 1995). Missing data analysis was also conducted and the EM imputation was utilized.

Baseline equivalence across experimental conditions
Although randomization of participants ideally should take care of potential confounders, it is important to evaluate the comparability of study groups to check for potential confounders. Categorical methods of analysis (e.g. cross tabulations, chi-square) were used to compare groups for discrete data (e.g., employment history and marital status). T-tests were used to test for homogeneity of the groups for continuous data (e.g., age and years of education). If statistically significant difference was found, the covariates would be included in any subsequent analysis.

**Intervention effects**

To test the effect of the RMI on heroin users’ attitudes toward recovery and treatment service use, their actual service utilization, and then their community recovery outcomes, this study utilized a structural equation modeling (SEM) approach to examine the hypothesized relationships between study variables. There are four reasons for using this specific technique. 1) SEM is applicable to both continuous and discontinuous variables (i.e., dichotomous, ordinal, counts, censored, and multinomial); and has been applied to various research questions, especially questions involve causal assumptions; 2) For experiments that randomized participants to treatment or control, SEM is also valuable because it can examine complex relationships between variables. The hypothesized relationships of this study involve mediating variables (e.g., clients’ attitudes and their service/treatment utilization) as a mechanism between the intervention and recovery outcomes. SEM is the only approach that can test all the relationships of the variables simultaneously; 3) The capacity of SEM to handle complex relationships simultaneously also helps to determine whether other possible confounding mechanisms exist; 4) Some variables, such as the “latent variables”, are not directly observable, but rather inferred from observed variables. Among the numerous strengths of SEM, lies the distinctive ability to construct latent variables from measured variables, which accounts for the measurement errors.
and therefore allows accurate estimates of the causal relationships among latent variables (Bollen & Pearl, 2012; Jo, 2008).

As shown in Figure 5., the total effect of group assignment include five key parameters: 1) the effect of study condition assignment on the participants’ attitudes and service utilization; 2) the effect of participants’ attitudes (toward drug use/recovery) and service utilization on the recovery outcomes conditional on assignment status; 3) the effect of participants’ attitudes (toward treatment) on service utilization; 4) the effect of group assignment on recovery success directly; and 5) the effect of demographic characteristics on patients’ attitudes and service utilization.

The final modeling contained three major steps:

1) Confirmatory factor analyses were conducted to see whether assessment received, referrals received, and service completed/utilized can load onto a service utilization factor; whether problem recognition, desire for help, treatment readiness, and pressure for treatment can be combined into a motivation for treatment factor.

2) Some exploratory bivariate analyses were conducted between the variables of interest as listed above.

3) To estimate the effects of interest, a standard path coefficient was then estimated for each path in the hypothesized SEM model to indicate relationship between variables and factors. Robust maximum likelihood methods were used to estimate every relationship using P<.05 as the criterion.

Post-hoc power analysis

A post-hoc power analysis was conducted to calculate the statistical power based on 100 participants in the intervention study. This study uses EQS to conduct latent variable path
analyses of the above specified relationships. The model fit indexes of root-mean-Square error of approximation (RMSEA) generated by the EQS models were then be utilized to calculate power (MacCallum, Browne, & Sugawara, 1996).

SPSS 19.0 was utilized to perform data management tasks, preliminary analyses, and data preparation for the subsequent SEM steps. All SEM analyses were conducted with EQS6.2. Post hoc power analysis was implemented in R.

In the following chapter, results will be reported according to each step of the analyses planned in section 3.5 of this chapter.
Chapter 4 Results

In this chapter, I will report results from each step of the planned analyses described in the methods chapter. First, this chapter discusses what preliminary data analyses were conducted to examine data and how non-normality and missing data (if any) were handled in the context of SEM. Second, I describe the study sample’s demographic characteristics, drug use severity and other related problems, their treatment motivation and readiness, attitudes and perception toward service utilization and recovery, and their actual service utilization and recovery success in regard to group assignments. Third, I present the SEM procedures applied with the data described in the last chapter and the final latent variable models. Finally, results from a post-hoc power analysis of the RMI effect based on the 100 study participants are reported.

4.1 Preliminary Analysis

*Multivariate kurtosis*

The Bonett-Woodward-Randall test in EQS detected significant excess multivariate kurtosis (Mardia’s Coefficient=21.21; Normalized Estimate=5.37), indicating non-normality of the data included in the analysis at a one-tail 0.05 level. It is recommended to utilize a Robust Correction (Method=ML, ROBUST) to the Maximum Likelihood (Method=ML) estimation if data are non-normal. The robust method has been proven to perform better with a wide variety of non-normal conditions (Chou and Bentler, 1995).

*Treating missing data*

Missing data analysis was conducted with the key variables included in the final modeling. Six participants dropped out of the study at various times during the three-month
period, missing the follow-up survey completely and parts of their treatment and service utilization data. All six participants (two from the RMI group and four from the standard care group) were missing because they relapsed to illicit drug use and were arrested by the police. Among the 94 participants who stayed in the study, the average missing data rate was 1% for each variable. In order to include as many subjects as possible in the SEM modeling, an EM imputation was performed. The EM algorithm generates a sequence of parameter estimates by cycling iteratively between an expectation (E) step and a maximization (M) step. The E-step estimates the expected complete data log-likelihood based on the observed data, while the M-step maximizes the log-likelihood obtained in the E-step to obtain updated parameter estimates under a given model. This iterative process has been proven to generate more accurate estimates of imputed scores than other commonly used methods, such as mean imputation and regression imputation (Bentler, 2006).

4.2 Descriptive information

Demographic characteristics at baseline

Table 2 provides participants’ demographic characteristics recorded at baseline. No statistically significant differences were detected between the two study conditions on their demographics. 23% of the 100 participants were female, mean age was 38.7 (sd=11.2), and average education was 9.7 (sd=1.8) years. 50% of the participants were single, 25% were married, and 25% were divorced or separated at time of measurement. A large proportion of participants (83.9%) were living with family member(s) or friends at baseline survey. Around 1/3 of the participants were employed (including full-time or part-time employment) in the past three years. Although there were roughly equal numbers of participants in the experimental and
the control group within each residential district, Yangpu district had almost twice as many study participants as Hongkou.

Table 2

**Drug use and other related issues at baseline**

Participants’ drug use severity and other problems related to drug use were captured in Table 3. Study participants did not show any significant differences in their drug use severity and other related problems. Age of first illicit drug use was 27.9 (SD=7.5), average year of drug use was 10.6 (SD=9.1), and about 7% injected drugs within 30 days before the baseline survey. Drug use pattern 30 days before baseline between participants in the two study conditions are quite similar. Opiates are the primary drug of choice for the participants (73.7%). 9% of them indicated usage of methamphetamine within one month before baseline and methadone usage was 6%. Almost all of them (93.7%) had past alcohol or substance abuse treatment experiences. In terms of drug related problems, 34% of the participants had been arrested for reasons other than drug offenses, 13.1% reported medical problems 30 days before baseline survey, and 33% experienced mental health problems 30 days before. Although more RMI group participants reported experiencing mental health problems (40%) than their control group counterparts (26%), the difference was not statistically significant.

Table 3
Table 4 presents study participants’ attitudinal and perceptual change over the 3 months study period toward treatment and service utilization, motivation and readiness for treatment, and drug abstinence and recovery. According to Table 4 below, participants’ motivation to participate in treatment and treatment readiness changed slightly over time and differed a little by group. However, none of the changes was statistically significant. Participants in the RMI group showed positive changes in all four aspects of the treatment motivation and readiness domain, problem recognition (24.8 to 25.4), desire for help (25.7 to 26.2), treatment readiness (30.5 to 30.9), and pressure for treatment (30.9 to 31.5). At the same time, scores of participants in the standard care group declined over the 3 month time period in terms of their desire for help (25.4 to 25.2) and external pressure for treatment (31.5 to 30.7). In regard to service utilization and drug abstinence and recovery, participants in both groups showed slight positive changes in their attitudes from baseline to follow-up. At 3 months, attitudes of participants in the RMI group were slightly more positive than their standard care group counterparts in perceived social support (40.2 vs. 39.5) and self-esteem (15.9 vs. 15.6). However, the differences were not statistically significant. Their perception of barriers to methadone treatment entry was the same across the two study conditions (106.5 vs. 106.5). The only exception was the participants’ self-efficacy toward staying abstinent from drugs. It showed a significant group difference at 3-month follow-up (50 vs. 49.5). Unlike other attitudinal scales, self-efficacy was only measured once at the 3-month follow-up.
Service utilization and recovery success

In table 5, I report two kinds of outcomes of the RMI: 1) direct outcomes such as participants’ utilization of social worker assessment and referrals, MMT, and other related services in the community during the 3 month study period; and 2) secondary outcomes including participants’ recovery success in drug abstinence, employment status, and criminal activity involvement. As shown in the table, participants in the RMI group received a significantly higher average number of assessment services from their social workers in the fields of employment needs (3.6 vs. 0.1), employment skills (2.1 vs. 0), financial needs (2.8 vs. 1.2), housing needs (0.5 vs. 0.1), health needs (2.0 vs. 0.5), MMT needs (1.6 vs. 0.1), family and friends relationship needs (4.3 vs. 0.5). However, actual referrals made to the community resources that can help meeting participants’ needs in the areas stated above are rare, less than an average of 1 time in most areas. The only statistical difference was found in referrals made to employment opportunities (0.4 vs. 0.2). Participants in the RMI group did not differ significantly from their control group counterparts in having their needs met successfully in the areas of financial, medical, housing, and settlement. Slightly more participants in the RMI group obtained social security (81.3% vs. 80.4%). More RMI participants received subsidized housing (10.4% vs. 6.5%). But the control group participants received more medical services (50% vs. 43.8%), and settlement services (45.8% vs. 52.2%). One positive result worth noting in service utilization is that no standard care group participants enrolled in the community MMT programs, while four RMI group participants (about 8%) enrolled in MMT. But this difference was also not statistically significant (p=0.06).
In terms of recovery success and its components, the RMI group showed more positive outcomes. Although not statistically significant, the RMI group had a lower arrest rate (4% vs. 8%) than the control group at 3-month follow-up. Also at 3 months, positive urine testing rate did not show any meaningful difference across the two study conditions (12% vs. 16%). However, the RMI group had significantly more participants employed at 3-month follow-up (p<.001). 32% of the RMI group participants secured a job at the end of the study, while only 2% of the standard care group participants were employed. Consequently the RMI participants showed more recovery success (e.g., did not get arrested, did not use illicit drugs, and were employed) than participants in standard care (2.2 vs. 1.8, p<.01).

Table 5

<table>
<thead>
<tr>
<th>Background information of Zi-Qiang social workers and their perceived professional identity</th>
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<tr>
<td>Table 6 below captures the demographic characteristics of the social workers at Shanghai Zi-Qiang Social Services. Not all information presented in the table about the Zi-Qiang social workers is included in the SEM, but it is important because Zi-Qiang is the first social work workforce in China dedicated to working with drug users and there had never been any empirical research study about them. The purpose of this survey is to provide background information for the multivariate analysis and it may help explain multivariate analysis results. 60% of the surveyed social workers were female. It is not a very racially diverse group because the Han Chinese accounted for 99% of the workforce and a large majority of them were native Shanghainese. Their mean age is 33 and the average years in practice were three. However, their</td>
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demographic characteristics showed some interesting facts. Although more than 80% of the social workers reported college and above degrees, less than 15% of them were trained in social work and only half of the workforce were licensed social workers. Close to 80% of them were satisfied with their job.

Table 6

Table 7 presents the Shanghai Zi-Qiang social workers’ perception of their own profession, especially their opinions on the importance of acquiring knowledge and skills. Since the instrument was first applied with a Chinese social worker population, I conducted factor analyses and reliability checks. The adaptation of this instrument with a group of Chinese social workers generated Cronbach’s α ranging from .71 to .85 for the five domains, indicating decent reliability of the survey. The >.50 factor loadings ensured domain integrity for this population. The surveyed Shanghai social workers reported relatively high perceptions of their profession (30.4 out of 35), their knowledge and skill adequacy (35.6 out of 45), their practice capacity (28.2 out of 35), self-awareness (20.4 out of 25), and propensity to act (24 out of 30). Interestingly, they scored higher than the group of American social work practitioners that this instrument was developed for in several domains (Frans, 1993), including collective identity (30.4 vs. 28.3), knowledge and skills (35.6 vs. 34.2), critical awareness (20.4 vs. 19.0), and propensity to act (24.0 vs. 23.2). Compared to American social workers, Zi-Qiang social workers only showed a lower score in self-concept (28.2 vs. 29.0).
4.3 SEM procedures and models

*Factor analysis as a precursor of SEM*

Confirmatory factor analyses (CFA) were conducted as a precursor for SEM model building. It assessed the adequacy of the measurement model and the covariance matrix between the constructs/factors. This study examined two latent factors before including them in further latent variable modeling: 1) clients’ motivation and readiness for treatment participation, and 2) their actual treatment and service utilization.

According to Joe et al. (2002), four sub-domains of the Client Evaluation of Self and Treatment (CEST) questionnaire measure clients’ motivation and readiness for treatment participation and engagement: problem recognition, desire for help, treatment readiness, and pressure for treatment. Problem recognition, which signifies clients’ perceived needs to treat their problems, did not return a significant factor loading (-0.39) with the other three sub-domains in the CFA. The factor loadings for the other three sub-domains were all significant: 0.82 for desire for help, 0.87 for treatment readiness, and 0.89 for pressure for treatment. Since this is consistent with past empirical evidence (Joe et al., 2002) demonstrating the significance of desire for help, readiness for treatment, and pressure for treatment in indicating substance use clients’ motivation and readiness for treatment, only these three sub-domains were included in further analyses as a latent factor, clients’ motivation and readiness for treatment.
The treatment and service utilization factor is indicated by three measured variables: assessment, referral, and completed services, which are aggregated numbers of total assessment, referrals, and completed services received by each study participant. The rationale to explore these three variables together as a factor is that the more assessments conducted by social workers, the more understanding social workers will have about their clients’ needs, which then lead to more referrals to relevant services and actual utilization of those services. CFA of these three variables generated significant factor loadings, 0.89 for assessment, 0.70 for referral, and 0.91 for completed services, indicating a high potential for them to be analyzed as a latent factor in further SEM modeling.

Fit indexes for the CFA model indicate adequate fit: ML $\chi^2 = 189.50$, 15df; CFI=0.97, RMSEA=0.07, and the Bentler-Bonnett non-normed fit index=0.95. Therefore, no supplementary correlations or model modifications were added to the CFA or subsequent path models.

Participants’ other attitudes toward service utilization and recovery, namely their self-esteem, self-efficacy toward staying drug abstinent, perceived social support, and perceived barriers to MMT treatment entry, are well-established attitudinal instruments measuring a unique construct. Therefore, this study did not attempt to combine any of these measures together to form a latent variable.

**Bivariate analyses**

Figure 6 presents bivariate relationships between demographic characteristics, motivation and readiness for treatment participation, and clients’ other attitudes toward service and recovery with participants’ actual service utilization as well as recovery success. The only demographic characteristic included is residential district because there was a difference in number of
participants between the two participating districts of the intervention study. Although the mean 
scores of the variables in the motivation and readiness for treatment factor did not show much of 
a difference by study conditions, we still included them in the analyses to explore their effect as a 
factor. Similarly, clients’ other attitudes toward service and recovery were also analyzed because 
they are key constructs of the Behavioral Model for Vulnerable Populations that informs this 
study. The relationship between the latent factor of service utilization and recovery success was 
also examined. When latent variable of treatment and service utilization or motivation for 
treatment participation was involved in the examination, this study treated each target 
relationship as a simple SEM model. Multiple sample analysis was conducted to investigate a 
relationship within each study condition and standardized path coefficient was estimated for the 
target relationship using \( p = .05 \) as the criterion. The relationship between recovery success and 
three single observed variables (i.e., self-esteem, social support, and self-efficacy) were explored 
in one path analysis. Figure 6 below illustrates the correlations between variables. A square 
represents an observed variable while a latent factor indicated by multiple observed variables is 
represented by a circle.

Participants’ residential district had an impact on their service utilization for the RMI 
group (standard path coefficient=\(-7.69\)) and Yangpu residency is associated with less treatment 
enrollment and service utilization. But the significant district effect on service utilization was not 
found within the standard care group (standard path coefficient=\(-.51\)). The motivation and 
readiness for treatment factor showed a similar pattern. The factor only exerted positive 
influence on participants’ service utilization within the RMI group (standard path coefficient=\(.48\) 
vs. \(-0.04\) for the control group). Perceived social support and barriers to treatment entry had no 
effect on participants’ service utilization. Neither self-esteem, self-efficacy, nor social support
affected the recovery outcomes. However, the service utilization factor was found to have a significant effect on participants’ recovery success for both groups (standard path coefficient=4.14).

**Latent variable models**

To investigate all the hypothesized relationships simultaneously, I fitted two predictive SEM models, one with self-efficacy and one without, to position the previously described measured variables and latent factors. Two models were fitted because the self-efficacy variable was only measured at the 3-month follow-up. As previously described in chapter 3, all other treatment motivation and readiness variables, and attitudinal and perceptual variables toward service utilization and recovery were measured at both baseline and 3-month follow-up. Adding in a score of self-efficacy in the same model with change scores for all other variables that were measured at baseline and follow-up will inevitably reduce the power of the analyses (McArdle & Prindle, 2008). The two models were fitted first with 100 participants with imputed data and then 94 participants, excluding those who had dropped out of the study. Artificially imputed data does not guarantee an adequate resolution of missing data and may even bias research data (Bentler, 2006), especially since data for this study were not missing at random. Compared to the models using imputed data (Bentler-Bonnet non-normed fit index=0.93, CFI=0.95, RMSEA=0.06), models with available data for the 94 participants that remained in the study generated better model fit (Bentler-Bonnet non-normed fit index=0.96, CFI=0.97, RMSEA=0.05). Therefore, this
study presents two final models with available data without imputation (n=94), model 1 with no self-efficacy and model 2 with self-efficacy added.

Figure 7 summarizes the results of the two models. Again, a square represents a single observed variable, such as self-esteem and social support. A circle represents a latent factor that is indicated by multiple observed variables (e.g. service utilization and motivation and readiness for treatment participation). An arrow indicates the direction of the hypothesized relationship, often from an independent variable/factor to a dependent variable/factor (for example, from motivation and readiness for treatment participation to participants’ service utilization).

According to model 1, RMI did not make a difference on the changes over time of participants’ self-esteem (standard path coefficient=0.02), perceived social support (standard path coefficient=0.13), or the barriers to treatment entry (standard path coefficient=0.02); and RMI did not show any impact on participants’ changes over time in motivation and readiness to participate in treatment (standard path coefficient=-0.57). Most attitudinal variables and the treatment readiness and motivation factor had no effect on participants’ actual service utilization (self-esteem=-0.06, social support=0.06, barrier to MMT entry=-0.05) and recovery success (self-esteem=0.01, social support=0.16, barrier to MMT entry=0.01). However, the motivation and readiness for treatment participation factor was found to be positively related to clients’ actual treatment and service utilization (standard coefficient=0.36).

Ideally, group assignment would be the only factor that caused the study participants to differ in their service utilization. Unfortunately, this study found that participants’ residential districts also had an impact. Participants from Hongkou district showed significantly more positive results in service utilization (standard path coefficient=4.44). But controlling for the effect of the residential district as a covariate, the RMI still showed a strong impact on
participants’ service utilization (standard path coefficient=14.15). Participants in the RMI group had utilized a lot more treatment and other services than their counterparts in the standard care group.

More service and treatment utilization by the RMI group led to better recovery success in that group (standard path coefficient=0.15). In addition to this mediated process, group assignment also showed a direct effect on participants’ recovery success. Being in the RMI was associated with better recovery results (standard coefficient=1.67).

The goodness of fit indexes of Model 1 are all satisfactory. In addition to the commonly used comparative fit index (CFI) (CFI=0.97) and the root mean-square error of approximation (RMSEA) (RMSEA=0.05), this study also referred to the Bentler-Bonett non-normed fit index (0.96) as our preliminary analyses detected data non-normality (Hu & Bentler, 1999).

Model 2 generated exactly the same findings as Model 1, with very minor changes in the estimated standard path coefficients. Group assignment had an impact on participants’ recovery success both directly and through their enhanced treatment and service utilization. As in Model 1, participants in the experimental group used significantly more community-based treatment and other related services, which was associated with more positive recovery success found in this group. RMI is also directly related to positive recovery success. Participants’ motivation and readiness to participate in treatment were also found to be positively related to their actual service use. Adding the variable self-efficacy in Model 2 did not result in any change in these relationships. Model 2 also did not detect any significant role for self-efficacy. The RMI did not show any significant effect on self-efficacy (standard path coefficient=-0.57), and self-efficacy toward staying drug abstinence had no meaningful impact on participants’ service utilization (standard coefficient=0.01) or recovery outcomes (standard path coefficient=0.01). By adding
self-efficacy into the model, all three goodness of fit indexes declined, indicating less model fit. The Bentler-Bonett non-normed fit index was 0.91, CFI was at 0.94, and the RMSEA was raised to 0.07.

Figure 7

4.4 Post-hoc power analysis

In the framework of structural equation modeling, which has considerably more parameters than simple procedures (e.g. t-test and ANOVA), power analysis is more complicated. There is no consensus on a single power analysis method for SEM. One popular approach was developed by MacCallum and colleagues, which directly estimate power based on a null and alternative value of the RMSEA fit index (MacCallum, Browne, & Cai, 2006; MacCallum, Browne, & Sugawara, 1996). Since the 90% confidence interval of the RMSEA of model 1 starts at 0 and straddles 0.05 (CI=0~0.09), three sets of null and alternative RMSEAs were needed to test for power generated under close fit ($\varepsilon_0=0.05$, $\varepsilon_a=0.08$), not-close fit ($\varepsilon_0=0.05$, $\varepsilon_a=0.01$), and exact fit ($\varepsilon_0=0.00$, $\varepsilon_a=0.05$). Therefore, the power based on 94 subjects and 66 degrees of freedom for close fit is 0.51, 0.31 for not-close fit, and 0.38 for exact fit. Power generated by Model 2 with 94 subjects and 78 degrees of freedom for the three different tests of fit is 0.56 for close fit and 0.38 for not-close fit. Since the CI does not start from 0 and straddles 0.05 (0.038~0.102), test for exact fit is not needed. Both models indicated mediocre power.

Li and Bentler (2011), along the same line, developed a method to analyze power and compare models based on the degrees of freedom of any chosen pair of RMSEAs. Since the
focus of this study is to examine the effect of RMI on drug users’ treatment and service utilization and their recovery success, I therefore compared model 1 (df=66) with a model without the RMI parameter (df=55). The null hypothesis is that the two models are practically equal. With 94 subjects and the difference in degrees of freedom (11) of the two models, the power to reject the null hypothesis is 0.79, indicating a strong effect of the RMI.

The following chapter, the discussion and conclusion section, will summarize main research findings, provide interpretations and explanations of these findings, as well as point out implications, limitations, and future directions for the current study.
Chapter 5 Conclusions and discussion

This final chapter of the dissertation 1) summarizes and interprets major findings of the study, 2) discusses and explains the findings in relation to the Behavioral Model for Vulnerable Populations and within the specific Chinese context, 3) lays out study implications, limitations, and future research directions.

5.1 Main findings

Demographic characteristics

A little less than one quarter of the 100 intervention study participants were female, most of them were middle aged, and only one quarter of them were married at the time. The average years of education received by this sample was nine years. Many of them did not finish high school, which is typically equivalent to 12 years of education in China. Only around 1/3 of the participants had any kind of employment during the three years prior to the baseline survey. A high percentage (almost 85%) of the participants were living dependently with family members or friends at the time of the study. Comparing the two Shanghai districts that participated in the study, the Yangpu social worker branch administered twice as many participants as the Hongkou branch.

Drug use and other related issues

The majority of the study participants did not start using illicit drugs until their mid or late 20s and most of them had a 10 or more year history of using drugs. Long drug use history often led to repeated treatment episodes, so almost all of the participants had indicated previous drug treatment experiences. Less than one out of ten indicated that they had injected heroin.
during the 30-day period before they were arrested and sentenced to compulsory rehabilitation.

Although they all met the DSM-IV criteria for heroin dependence because they qualified for the study, a small portion of them indicated using other drugs 30 days before they were arrested.

Concurrent health and mental health problems were prevalent among study participants. A little more than 1/3 of the participants indicated experiencing mental health problems and more than 10% reported health related concerns. Involvement in criminal activities was also common among the participants. More than 1/3 of the participants also had an arrest history for reasons other than illicit drug use.

**Attitudes and perceptions: overtime changes and by group differences**

Several attitudinal and perceptional measures that are proxies for drug users’ actual service utilization and drug recovery were included in the study: participants’ motivation and readiness for treatment participation, perceived barrier to MMT treatment entry, social support, self-esteem, and self-efficacy. Both groups showed positive changes over the 3-month intervention period in the four subdomains of treatment motivation and readiness (i.e., problem recognition, desire for help, treatment readiness, and pressure for treatment). However, these changes were very small. The RMI group showed more positive treatment readiness and motivation, but the differences in the four subdomains by study conditions were not statistically meaningful. Participants’ perceived social support and self-esteem were similar over time and by group. They showed small over time increases and differences across study conditions. But none of the changes were statistically significant. This study also found that participants’ perceived barriers to MMT treatment also increased slightly over time and the two study groups scored exactly the same on the barriers to MMT entry scale at the 3-month follow-up. The only
significant attitudinal difference this study observed was that the RMI participants showed higher self-efficacy to stay abstinent from illicit drugs at 3-month follow-up.

**Actual treatment and service utilization and recovery success**

Differences were found between the two study conditions in their actual service utilization and recovery success. The RMI group received significantly more times of assessment from their social workers in seven out of the eight need areas: employment, occupational skills, financial, relationship, housing, health, and MMT. The two groups did not show any difference in the settlement needs area. However, the number of referrals social workers made to treatment and services and the number of successfully completed services by the participants did not show much difference by group. There was no difference in the percentages of services successfully completed between the RMI and the standard care group. The only difference across study conditions was the higher number of referrals made to employment opportunities for the RMI group. In regard to the three recovery success components, the only significant difference by study conditions was the percentage of participants employed at the time of 3-month follow-up. Approximately 1/3 of the RMI participants secured a job, while only 2% of their standard care group counterparts were employed at the end of the study. The difference in arrest rate was not significant between the two study conditions, but the arrest rate of the RMI group was noticeably lower (4% vs. 8%). However, urine positive rates at 3-month follow-up were the same between the two study conditions.

**Final modeling and results**

Descriptive analysis revealed that the randomization process of the intervention study was successful. The RMI group and the standard care group did not differ significantly in any of
the demographic, drug use severity, and drug related problem variables. But since Yangpu had almost twice as many participants as Hongkou and district-wide differences may exist in Shanghai, the latent variable modeling included a district variable as a covariate to control for its possible effect on participants’ service utilization and recovery success. Three subdomains of the Client Evaluation of Self and Treatment (desire for help, treatment readiness, and pressure for treatment) were combined into one factor as participants’ motivation and readiness for treatment. This factor was included in the final analysis together with other attitudinal and perceptual variables (self-esteem, self-efficacy, social support, and barrier to MMT treatment entry).

Directly as a result of the RMI, the factor of participants’ actual treatment and service utilization was manifested by three variables: total number of assessments, total number of referrals, and total number of services successfully completed. Secondary results of the study, whether clients were employed, arrested, or provided positive urine, were all binary indicators. They were combined into one variable, recovery success, since previous empirical evidence had demonstrated strong association between treatment participation and service utilization and employment, criminal activity, and drug use (Siegal, Li, & Rapp, 2002; Vaughan-Sarrazin, Hall, & Rick, 2000; Siegal et al., 1996).

Before conducting multivariate modeling, I explored a series of bivariate analyses on key hypothesized relationships. Participants’ residential district in Shanghai is associated with participants’ actual service and treatment utilization. The factor of clients’ motivation and readiness for treatment also showed an effect on service utilization. As predicted, participants’ service utilization was related to their recovery success. Self-esteem, self-efficacy, social support, and barriers to treatment entry demonstrated no impact on service utilization or participants’ recovery success in the bivariate analyses.
In the latent variable models, the RMI did not show any impact on the attitudinal and perceptional factor and variables, such as motivation and readiness for treatment, self-esteem, self-efficacy, social support, and barrier to treatment entry. Most of these attitudes and perceptions did not exert any influence on participants’ outcomes. Nevertheless, the latent variable of participants’ motivation and readiness for treatment had a positive influence on their treatment enrollment and service utilization. The RMI was found to have a significant effect on participants’ treatment and service utilization. The RMI group participants utilized significantly more community treatment (i.e., MMT) and other wraparound services than their standard care group counterparts, controlling for the effect that living in Hongkou district of Shanghai contributed to more service use. Consequently, more treatment and service utilization led to more positive recovery success among the RMI participants. Besides this mediated effect, RMI also exerted direct influence on participants’ recovery success. Compared to participants in standard care, the RMI group were more likely to be employed and provide clean urine samples, but less likely to be arrested.

5.2 Discussions and explanations of research findings

The three hypotheses

This study tested three hypotheses derived from the Behavioral Model for Vulnerable Populations (Chapter 2), but the SEM models only confirmed two out of the three hypothesized relationships. The RMI improved MMT enrollment and the usage of other wraparound services in the community among heroin users released from compulsory rehabilitation centers. Enhanced treatment and service utilization, in turn, led to more positive outcomes in drug use, criminal
activity involvement, and employment status among the RMI participants. However, the hypothesis of RMI exerting a positive influence on drug users’ attitudes toward treatment and service utilization, as well as recovery, was not supported. Detailed explanations of the relationships between RMI, participants’ demographic and drug problem severity, their attitudes toward treatment/service use and recovery, their actual use of community-based drug treatment and wraparound services, and their recovery success are discussed below.

Study participants

The sample represents typical heroin users in community recovery in China. Compared to a recent study conducted with new MMT patients just released from compulsory rehabilitation in Shanghai and Yunnan, China (Hser et al., 2011), the sample of this study had similar gender ratio, mean age, education background, marital status, employment, age of first illicit drug use, and drug treatment and arrest history. The majority of heroin users in China are middle-aged males, who have less than high school education, are not married, and are unemployed. Most of them did not start using illicit drugs until their mid or late 20s, have at least one previous drug treatment experience, and have a criminal history for reasons other than drug use offences. Two distinctive characteristics of this group of study participants are 1) lower injection rates and 2) a high rate of dependent living. A high percentage of dependent living may be explained by the fact that the participants were recruited immediately after they were released from compulsory rehabilitation, and it is a common practice in China that unmarried adults live with their parents. The low rate of injection drug use was unusual because, as Hser et al. (2011) pointed out, at least 50-70% of all heroin users in China inject the drug. The speculated reason for such a low injection drug use rate was that the question asked whether the participants had injected drugs within the past 30 days. No participants could possibly have used drugs during rehabilitation.
The question was then revised to ask the participants about injection drug use 30 days before their incarceration. Since all the participants were just released from a confined environment after a long time (average length of stay in compulsory rehabilitation was two years, according to Lin et al. (2010)), any question related to illicit drug use could be a topic too sensitive for them to answer truthfully.

The only significant demographic characteristic in the final SEM models was the participants’ residential districts. Yangpu and Hongkou are two of the 19 administrative districts in Shanghai. Variations between the two districts may lie in their different population size, economies, income levels, community resources, capacities, and infrastructures. More relevant to the purpose of this study, differences exist amongst the social workers. In Hongkou, 13 social workers served 35 study participants (1:2.7) while 29 social workers from Yangpu helped 65 participants (1:2.2) during the three-month intervention period. The participant vs. social worker ratio was similar between the two districts.

The Hongkou district of Shanghai had 35 social workers; 57% of their social workers were female, all of them had college or higher education, but only 14.3% were trained in social work. 42.9% of the Hongkou social workers were licensed social workers. Among the 61 Yangpu social workers, 41% were female. Around 95% had college or higher education and 14.8% were trained in social work. 55.7% of the Yangpu social workers were licensed. Yangpu had significantly more male social workers than Hongkou and more social workers in Yangpu were licensed. Mean age (36 years) and average year in practice (3.5 years) were similar across the two districts. Their professional identity scores for the five domains measured did not show any difference. Therefore gender ratio and percentage of licensed workers were the only possible
explanations for the observed effect of district on participants’ treatment participation, service utilization, and recovery success.

Participants’ attitudes and perceptions toward treatment and recovery

Past empirical research on drug users’ engagement in treatment and recovery indicates that clients’ self-rated attitudes and perception toward service use and recovery are strongly related to their actual engagement in treatment and services, changes during the treatment process, as well as their recovery outcomes (Joe et al., 2002). According to Joe et al.’s review of drug treatment research, clients’ psychofunctioning attributes such as self-esteem and self-efficacy are highly indicative of drug users’ final treatment and recovery success. In addition, social network support provides a good gauge of how well family and friends’ support impacts on drug users’ treatment participation and recovery. As reported in the results chapter, participants in the RMI group showed slightly more positive changes over time than the standard care group members in their attitudes and perceptions, but none of these changes was significant, except the self-efficacy difference by study conditions. However, this difference cannot be attributed to the RMI according to our final SEM model. Subsequently, these psychofunctioning and social network indicators also were not related to either participants’ service utilization or their final recovery outcomes. Consistent with previous Western literature (Joe et al., 2002), participants’ motivation and readiness for treatment participation is positively associated with their treatment enrollment and community service utilization.

Three factors may help explain why RMI did not have influence over participants’ self reported psychosocial functions: 1) It always takes longer to change people’s beliefs, attitudes, and perceptions than their behaviors. Three months may not have provided enough time for us to
observe participants’ change at this level; 2) The RMI does not have a component directly influencing drug users’ psychosocial function, such as self-esteem and self-efficacy, although this study expected that more frequent social worker contacts, as an intense form of support, could bring positive changes in drug users’ psychological and social functions; and 3) Many of these scales were first utilized with the Chinese drug using population, which means the instruments had never been translated or validated in the specific Chinese context. Measurement errors, such as translation inaccuracy, language misuse, and cultural insensitivity, may exist.

**Treatment and services utilization and recovery success**

Participants’ actual treatment and service utilization revealed an interesting phenomenon. The RMI group received significantly more needs assessments from their social workers in seven areas including employment, occupational skills, financial, relationship, housing, health, and MMT (except settlement needs). According to current Zi-Qiang routine practice with drug users, settlement needs are quite similar for all drug users returning from compulsory rehabilitation to community recovery, which only entails standard filing procedures in the community to obtain regular residents’ IDs, employment IDs, and other basic welfare (personal correspondence). This may explain why there were no group differences in assessments made about clients’ settlement needs. However, this group difference in assessment was not reflected in referrals that the same social workers made for the participants to utilize various services and resources in the community, nor was it present in services successfully completed by the participants. The only difference observed was in the referrals made to available job opportunities in the community. Regardless of the very low referral frequency for both groups, around 80% of the participants in both groups received social security. Around 10% of the RMI group participants received subsidized housing, which is almost 4% more than the standard care group participants. On the
contrary, around 7% more of the standard care group participants used medical services and had their settlement needs met. However, these differences are not statistically significant.

As previously described in chapter 2, these need areas are common recovery related problems encountered by drug users (Morgenstern, Hogue, Dauber, Dasaro, & McKay, 2009). Although the RMI group was assessed significantly more, the actual number of referrals was not significantly higher for this group. Rather, it was consistently low for all need areas across the two study conditions. The reason could be that more assessment did not detect more needs in the RMI group. Or it could be due to the lack of relevant resources and services available in the community. For example, there were no referrals made to any services that could help with participants’ relationship needs simply because there was no such services available. As mentioned in Chapter 2, social work and community recovery are both new in China. There may not be many community-based resources that social workers can access and utilize. It could also be hard for the social workers to integrate and coordinate with other community sectors because the social work consortium was only recently established. Future research endeavors are needed to identify and organize the current available resources in the community, referral mechanism at Shanghai Zi-Qiang social services, and how to improve referral services for drug users in recovery in China.

More than 80% of the participants received social security assistance. It is consistent with drug users financial situation that most of them had no source of income soon after their release from the compulsory rehabilitation facilities. It is also possible that because Shanghai is the most developed metropolitan area in China, it is easy for drug users in need to obtain financial support if they make the requests (average number of referrals made to the social security bureau was 1). The area of MMT needs, linkage, and utilization is of particular interest to this study. MMT is
currently the major community drug treatment program promoted by the Chinese Ministry of Health since 2004, but the usage rate of MMT has been reported low, despite the high relapse rate among drug users (Hser et al., 2011; Lin et al., 2010). The MMT enrollment rate at the end of intervention was 8% vs 0 (p=.06) for the RMI and the standard care group, indicating a marginal effect of the RMI. The most important criterion for MMT enrollment is the detection of relapse to drug use. Under this circumstance, the social work research staff would make an MMT referral as requested by the intervention study if they detected relapse. According to Table 4, around 8% of the participants from both study conditions were tested positive at 3 months, but only the RMI group participants were enrolled in MMT. The conclusion is that intense social work contacts and more frequent urine testing helped with the detection of participants’ drug treatment needs and thus facilitated their transfers to community treatment. One possible reason for the non-significant difference in MMT enrollment is that the urine positive rate was still low at 3 months for most drug users in recovery and our limited sample size did not have enough power to detect the real difference between the two groups. Larger scale studies entailing more participants for a longer time period may be able to generate more accurate findings about the effects of RMI. In conclusion, this finding confirms previous research on case management (Hesse, Vanderplasschen, Rapp, Broskaert, & Fridell, 2009) that case management, strength-based case management models in particular, can improve clients’ treatment and service utilization.

As pointed out in previous western literature (Siegal et al., 1996, Martin & Inciardi, 1993; Siegal, Li, & Rapp, 2002), employment status, drug use, and arrest status are secondary recovery outcomes often found to be positively associated with intense case management intervention. In terms of these recovery success indicators, the RMI group participants did better than the
standard care group in employment and non-arrest rates, although only the difference in employment rate showed a statistically significant difference (33% vs. 2%). Overall, frequent assessment may lead to a better understanding of clients’ employment needs and a faster reaction to such needs. Therefore, more referrals were made following frequent assessment and the RMI group received significantly more employment opportunities in the community.

In addition to the mediated effect of the RMI on participants’ recovery success through enhanced service utilization, the RMI also showed direct effect on participants’ recovery outcomes. Besides intensified contacts, monitoring, as well as services, the RMI also contains other factors that may influence drug users’ recovery outcomes. For example, the strengths assessment and recovery objectives that were conducted every week with RMI participants can remind clients of their strengths in accomplishing their long term and short term recovery objectives, analyze potential obstacles in achieving those goals, and make long term and short term plans to reach their goals for their own recovery.

5.3 Study implications, limitations, and future directions

Implications

First, this study provides evidence that case management interventions like the RMI have the potential to improve the utilization of community drug treatment and other wraparound services, and therefore improve drug recovery success among opiate dependent individuals in China or other countries and societies that are facing the same challenge of moving from the outdated punitive approach to a community recovery oriented approach. Second, many of the constructs, such as the RMI and clients’ attitudes (e.g., self-esteem, self-efficacy, social support etc.) were measured for the first time among the drug using population in China. The findings have generated an empirical evidence basis for future studies, especially cross-cultural studies, to
study similar populations, compare findings, and validate instruments. Finally, the social work profession and the workforce dedicated to drug users’ community recovery are a recent phenomenon in China. This study has provided useful information to understand social work and the role of social workers in drug user’s community recovery in China.

**Limitations**

This study has the following limitations: 1) The sample size was 100, rendering only small to medium power in the context of multivariate modeling. 2) Some of the scales were first introduced/translated to China and had never been validated with the Chinese drug using population. Some measurement errors may exist in the analyses. 3) It was not possible to link the exact social worker professional identity scores of the research staff to participants’ outcomes because the social worker survey was completely anonymous. The social worker survey could only provide a background context for understanding the participants’ results. 4) Regional variation in China is large. But all participants, social workers, and data collected by this study were from Shanghai. Results may lack generalizability and transferability to other localities in China.

**Future directions**

First, more effort needs to be placed on refining the study instruments as well as intervention protocols to make the translation more accurate and language more relevant for the Chinese cultural environment. Second, similar studies of case management or other social work interventions on a larger scale, with more participants and in more Chinese localities, are a logical next step to replicate the intervention study because analyses of the small scale trial of RMI showed positive results. Finally, more research on community resources available to drug users in community recovery and the social worker workforce in China is needed to explore
feasible ways to conduct better empirical research, strengthen the local workforce, and improve community-based drug treatment and services for the substance using populations. For example, qualitative inquiries may be conducted with social workers to determine available community resources for drug users, what challenges they face in connecting clients to these community resources, and what other resources would be useful in the future to improve drug users’ success in community recovery. Researchers need to replicate the RMI intervention or conduct similar intervention studies that include more participants and multiple localities to further investigate the direct and indirect effects of case management on drug users’ service use and recovery in China.
Figure 1. Annual Reported HIV Positives and AIDS Cases in China 1985-2007 (as of October 2007) (Source: State Council Aids Working Committee Office of China & UN Theme Group on AIDS in China, 2007)
Figure 2. Sentinel surveillance data for HIV/AIDS risk groups in China (Source: Ministry of Health of China, Joint United Nations Programme on HIV/AIDS, & World Health Organization, 2011).
Figure 3. Comprehensive Drug Abuse Treatment in the United States (Source: NIDA, 2009).
Figure 4. Model of Community Drug Treatment Utilization

Population Characteristics
- Predisposing factors
- Enabling factors
- Need factors

Health Behavior
- Personal health practices
- Health service utilization

Health Outcomes
- Personal health status
- Evaluated health status
- Consumer satisfaction

Population characteristics
- Predisposing: Demographics
- Enabling: RMI
- Predisposing: Attitudes (self-efficacy, self-esteem, social support, barrier to MMT, and treatment motivation)

Health behavior
- Need assessment
- Referrals
- Services successfully completed

Health outcomes
- Obtained employment
- Not arrested
- No illicit drug use
Figure 5. Relationships between variables

**Hypothesized relationships**

- **RMI**
- **Self-efficacy, self-esteem, social support, and Barrier to MMT, and Treatment readiness**
- **Demographics (covariate)**
- **Recovery success**
- **MMT treatment and Wrap-Around Service Use**
Figure 6. Results of bivariate analysis

District

G1: -7.69@
G2: -.51

action

Motivation

(CEST)

G1: .48@
G2: -.036

Social Support

G1: 0.02
G2: 0.001

Barrier

G1: 0.19
G2: 0.02

Service utilization

G1: 0.48@
G2: -.036

Social Support

G1: 0.02
G2: 0.001

Barrier

G1: 0.19
G2: 0.02

Service utilization

4.14@

Recovery Success

Social Support 0.14
Self-esteem 0.04
Self-efficacy 0.01
Figure 7. Latent variable models
<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
<th>Time of measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MMT service use and</td>
<td>Cient and service records (Shanghai Zi-qiang social services)</td>
<td></td>
</tr>
<tr>
<td>Wraparound service use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urine results</td>
<td>Tested at time of survey (+/−)</td>
<td>X</td>
</tr>
<tr>
<td>Arrest</td>
<td>Arrested (Y/N)</td>
<td>X</td>
</tr>
<tr>
<td>Employment</td>
<td>Employed (Y/N)</td>
<td>X</td>
</tr>
<tr>
<td><strong>Independent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMI</td>
<td>Case management intervention</td>
<td></td>
</tr>
<tr>
<td>Social support (Garner et al., 2007)</td>
<td>Drug user’s perceived social support</td>
<td>X</td>
</tr>
<tr>
<td>Self-efficacy (Hiller et al., 2000)</td>
<td>Confidence and willingness to stay abstinence</td>
<td>X</td>
</tr>
<tr>
<td>Self-esteem (Rosenberg, 1989)</td>
<td>Reported self-esteem</td>
<td></td>
</tr>
<tr>
<td>Client evaluation of self and</td>
<td>Treatment readiness</td>
<td>X</td>
</tr>
<tr>
<td>treatment (Prochaska &amp; DiClemente, 1986)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Barriers to treatment entry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Schwartz et al., 2008)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Demographic information</td>
<td></td>
</tr>
<tr>
<td>District</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Living arrangement</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Employment history</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Arrest history</td>
<td>Drug use severity and other related problems</td>
<td>X</td>
</tr>
<tr>
<td>Medical problems</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Mental health problems</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Age of first drug use</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Years of drug use</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Injection drug use</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Type of drugs used</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Table 2. Demographic characteristics at intake, by group

<table>
<thead>
<tr>
<th></th>
<th>Experiment (n=50)</th>
<th>Control (n=50)</th>
<th>Total (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female, %</td>
<td>22</td>
<td>24</td>
<td>23</td>
</tr>
<tr>
<td>Residential District, %</td>
<td></td>
<td></td>
<td>35</td>
</tr>
<tr>
<td>Hongkou</td>
<td>34</td>
<td>36</td>
<td>65</td>
</tr>
<tr>
<td>Yangpu</td>
<td>66</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>Mean age (SD)</td>
<td>38.6 (12.3)</td>
<td>38.7 (10)</td>
<td>38.7 (11.2)</td>
</tr>
<tr>
<td>Mean yr of education (SD)</td>
<td>9.8 (1.7)</td>
<td>9.6 (1.9)</td>
<td>9.7 (1.8)</td>
</tr>
<tr>
<td>Marital status, %</td>
<td></td>
<td></td>
<td>25</td>
</tr>
<tr>
<td>Married</td>
<td>18</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Previously married</td>
<td>20</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Never married</td>
<td>62</td>
<td>38</td>
<td>50</td>
</tr>
<tr>
<td>Dependent living situation, %</td>
<td>87.8</td>
<td>84</td>
<td>83.9</td>
</tr>
<tr>
<td>Employed (past 3 yrs), %</td>
<td>34</td>
<td>28</td>
<td>31</td>
</tr>
</tbody>
</table>

*a*: significant main effect of group (p<.05).
Table 3. Drug use severity and other related issues at intake, by group

<table>
<thead>
<tr>
<th></th>
<th>Experiment (n=50)</th>
<th>Control (n=50)</th>
<th>Total (n=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrest History (other than drug offense), %</td>
<td>32</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>Medical problems-past 30 days, %</td>
<td>10</td>
<td>16.3</td>
<td>13.1</td>
</tr>
<tr>
<td>Mental health problems-past 30 days, %</td>
<td>40</td>
<td>26</td>
<td>33</td>
</tr>
<tr>
<td>Drug use history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age of first use (SD)</td>
<td>28 (8.1)</td>
<td>27.8 (7.0)</td>
<td>27.9 (7.5)</td>
</tr>
<tr>
<td>Years of use (SD)</td>
<td>10.5 (8.6)</td>
<td>10.7 (9.7)</td>
<td>10.6 (9.1)</td>
</tr>
<tr>
<td>Injection in past 30 days, %</td>
<td>8.3</td>
<td>6</td>
<td>7.1</td>
</tr>
<tr>
<td>Drug use-past 30 days, %</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heroin/opiates</td>
<td>72</td>
<td>75.5</td>
<td>73.7</td>
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<tr>
<td>Methadone</td>
<td>6</td>
<td>6</td>
<td>6</td>
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<tr>
<td>Methamphetamine</td>
<td>10</td>
<td>8</td>
<td>9</td>
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<tr>
<td>Sedatives</td>
<td>0</td>
<td>4</td>
<td>2</td>
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<tr>
<td>Other</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Ever had alcohol/drug treatment, %</td>
<td>93.6</td>
<td>93.8</td>
<td>93.7</td>
</tr>
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*a: significant main effect of group (p<.05).
Table 4. Client attitudes and perception toward treatment utilization and drug abstinence at intake and 3 month follow-up, by experimental condition

<table>
<thead>
<tr>
<th></th>
<th>Baseline (n=100)</th>
<th>3 month FU (n=94)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Experiment (n=50)</td>
<td>Control (n=50)</td>
</tr>
<tr>
<td><strong>Treatment motivation and readiness (10-50)</strong></td>
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<tr>
<td>Problem recognition, Mean (SD)</td>
<td>24.8 (5.2)</td>
<td>24.7 (5.3)</td>
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<tr>
<td>Desire for help, Mean (SD)</td>
<td>25.7 (5.5)</td>
<td>25.4 (4.3)</td>
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<tr>
<td>Treatment readiness, Mean (SD)</td>
<td>30.5 (4.2)</td>
<td>29.4 (4.5)</td>
</tr>
<tr>
<td>Pressure for treatment, Mean (SD)</td>
<td>30.9 (5.2)</td>
<td>31.5 (4.5)</td>
</tr>
<tr>
<td><strong>Attitudes toward treatment utilization, drug abstinence and recovery</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Barrier to treatment entry (4-140)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social support (0-50), Mean (SD)</td>
<td>106.2 (4.4)</td>
<td>106.4 (8.5)</td>
</tr>
<tr>
<td>Self-esteem (0-30), Mean (SD)</td>
<td>40.1 (6.1)</td>
<td>39.2 (4.2)</td>
</tr>
<tr>
<td>Self-efficacy (0-75), Mean (SD)^a</td>
<td>28.0 (5.4)</td>
<td>27.4 (3.7)</td>
</tr>
<tr>
<td></td>
<td>50.0 (14.0)</td>
<td></td>
</tr>
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</table>

^a: significant main effect of group (p<.05).
Table 5. Service utilization and recovery success at 3-month, by group

<table>
<thead>
<tr>
<th></th>
<th>Experiment (n=48)</th>
<th>Control (n=46)</th>
<th>Total (n=94)</th>
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<tr>
<td><strong>Needs assessment, average # (SD)</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Employment needs&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.6 (3.2)</td>
<td>0.1 (0.2)</td>
<td>1.9 (2.9)</td>
</tr>
<tr>
<td>Employment skills&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.1 (2.4)</td>
<td>0 (0.2)</td>
<td>1.1 (2.0)</td>
</tr>
<tr>
<td>Financial needs&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.8 (1.9)</td>
<td>1.2 (0.4)</td>
<td>2.0 (1.6)</td>
</tr>
<tr>
<td>Relationship needs&lt;sup&gt;a&lt;/sup&gt;</td>
<td>4.3 (2.4)</td>
<td>0.5 (1.0)</td>
<td>2.4 (2.7)</td>
</tr>
<tr>
<td>Housing needs&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.5 (0.8)</td>
<td>0.1 (0.2)</td>
<td>0.3 (0.6)</td>
</tr>
<tr>
<td>Health needs&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2.0 (1.9)</td>
<td>0.5 (0.5)</td>
<td>1.3 (1.6)</td>
</tr>
<tr>
<td>Settlement needs</td>
<td>0.7 (0.7)</td>
<td>0.5 (0.5)</td>
<td>0.6 (0.6)</td>
</tr>
<tr>
<td>MMT needs&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1.6 (1.9)</td>
<td>0.1 (0.3)</td>
<td>0.9 (1.5)</td>
</tr>
<tr>
<td><strong>Referrals made to, average # (SD)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employment opportunities&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.4 (0.7)</td>
<td>0.2 (0.4)</td>
<td>0.3 (0.6)</td>
</tr>
<tr>
<td>Employment skills training</td>
<td>0.1 (0.3)</td>
<td>0 (0)</td>
<td>0 (0.3)</td>
</tr>
<tr>
<td>Social security services</td>
<td>1.1 (0.8)</td>
<td>0.8 (0.8)</td>
<td>1.0 (0.8)</td>
</tr>
<tr>
<td>Housing services</td>
<td>0.1 (0.3)</td>
<td>0.1 (0.3)</td>
<td>0.1 (0.3)</td>
</tr>
<tr>
<td>Health services</td>
<td>0.6 (0.5)</td>
<td>0.5 (0.5)</td>
<td>0.6 (0.5)</td>
</tr>
<tr>
<td>Settlement services</td>
<td>0.5 (0.5)</td>
<td>0.5 (0.5)</td>
<td>0.6 (0.5)</td>
</tr>
<tr>
<td>MMT services</td>
<td>0.2 (0.6)</td>
<td>0 (0)</td>
<td>0.1 (0.4)</td>
</tr>
<tr>
<td><strong>Services successfully completed, %</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social security</td>
<td>81.3</td>
<td>80.4</td>
<td>80.9</td>
</tr>
<tr>
<td>Housing</td>
<td>10.4</td>
<td>6.5</td>
<td>8.5</td>
</tr>
<tr>
<td>Medical</td>
<td>43.8</td>
<td>50</td>
<td>46.8</td>
</tr>
<tr>
<td>Settlement</td>
<td>45.8</td>
<td>52.2</td>
<td>48.9</td>
</tr>
<tr>
<td>MMT</td>
<td>8.3</td>
<td>0</td>
<td>4.3</td>
</tr>
<tr>
<td><strong>Recovery success, #(SD)&lt;sup&gt;b&lt;/sup&gt;</strong></td>
<td>2.2 (0.7)</td>
<td>1.8 (0.6)</td>
<td>2.0 (0.7)</td>
</tr>
<tr>
<td>Employment&lt;sup&gt;c&lt;/sup&gt;, %</td>
<td>33.3</td>
<td>2.2</td>
<td>18.1</td>
</tr>
<tr>
<td>Positive urine testing,%</td>
<td>8.5</td>
<td>8.7</td>
<td>8.6</td>
</tr>
<tr>
<td>Arrest%</td>
<td>4.2</td>
<td>8.7</td>
<td>6.4</td>
</tr>
</tbody>
</table>

<sup>a</sup>: significant main effect of group (p<.05).
<sup>b</sup>: significant main effect of group (p<.01).
<sup>c</sup>: significant main effect of group (p<.001).
<table>
<thead>
<tr>
<th>Table 6. Demographics (N=585), Shanghai Zi-Qiang Social Services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yrs in Practice, mean(SD)</td>
</tr>
<tr>
<td>Female, %</td>
</tr>
<tr>
<td>Ethnicity, %</td>
</tr>
<tr>
<td>Han</td>
</tr>
<tr>
<td>Muslin</td>
</tr>
<tr>
<td>Yi</td>
</tr>
<tr>
<td>Mongolian</td>
</tr>
<tr>
<td>Native Shanghainess speaker, %</td>
</tr>
<tr>
<td>Highest degree, %</td>
</tr>
<tr>
<td>University</td>
</tr>
<tr>
<td>College</td>
</tr>
<tr>
<td>Other</td>
</tr>
<tr>
<td>SW major, %((Y))</td>
</tr>
<tr>
<td>Licensed, %((Y))</td>
</tr>
<tr>
<td>Age, mean(SD)</td>
</tr>
<tr>
<td>Satisfied with job, %</td>
</tr>
</tbody>
</table>
### Table 7: Social Worker’s Perceptions of Personal and Professional Power

<table>
<thead>
<tr>
<th>Subscale</th>
<th>Mean(SD)</th>
<th>Factor loadings</th>
<th>Reliability</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Professional Identity (1-5)</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Collective Identity Subscale (7-35)</strong></td>
<td>30.4(3.1)</td>
<td></td>
<td>0.82</td>
</tr>
<tr>
<td>I enjoy spending time with other people in my profession.</td>
<td>4.6(5)</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>It is helpful to join with others to solve problems.</td>
<td>4.6(5)</td>
<td>0.80</td>
<td></td>
</tr>
<tr>
<td>The workers in my agency all have a common purpose.</td>
<td>4.1(7)</td>
<td>0.69</td>
<td></td>
</tr>
<tr>
<td>I identify strongly with my profession.</td>
<td>4.2(6)</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>I consider myself a joiner.</td>
<td>4.5(6)</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>I enjoy using a team approach.</td>
<td>4.3(6)</td>
<td>0.59</td>
<td></td>
</tr>
<tr>
<td>I have frequent contact with other specialists in my field.</td>
<td>4.2(6)</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td><strong>Knowledge and Skills subscale (9-45)</strong></td>
<td>35.6(4.0)</td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>I usually know what response to take to situations that arise at work.</td>
<td>3.9(7)</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>My education prepared me for my job.</td>
<td>4.1(7)</td>
<td>0.64</td>
<td></td>
</tr>
<tr>
<td>I have adequate information resources to solve most professional problems.</td>
<td>3.8(7)</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>I am aware of all the pertinent issues related to my field of practice.</td>
<td>4.0(6)</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>I rarely run into unfamiliar problems at work anymore.</td>
<td>3.7(6)</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>I often read professional journals.</td>
<td>4.1(6)</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>I attend frequent conferences and training sessions to improve my skills.</td>
<td>4.1(6)</td>
<td>0.50</td>
<td></td>
</tr>
<tr>
<td>If I don’t have the answer to a question, I always know where to get it.</td>
<td>4.1(6)</td>
<td>0.62</td>
<td></td>
</tr>
<tr>
<td>I am frequently told that I am a very knowledgeable worker.</td>
<td>3.8(7)</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td><strong>Self-Concept Subscale (7-35)</strong></td>
<td>28.2(3.2)</td>
<td></td>
<td>0.83</td>
</tr>
<tr>
<td>I feel that I am important to the people I work with.</td>
<td>4.0(7)</td>
<td>0.69</td>
<td></td>
</tr>
<tr>
<td>I feel as competent as anyone else I work with.</td>
<td>3.9(7)</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>I feel pretty sure of myself even when people disagree with me.</td>
<td>3.8(6)</td>
<td>0.69</td>
<td></td>
</tr>
<tr>
<td>I think I serve a valuable role in my professional capacity.</td>
<td>4.1(6)</td>
<td>0.73</td>
<td></td>
</tr>
<tr>
<td>I generally make a good impression with others.</td>
<td>4.3(6)</td>
<td>0.66</td>
<td></td>
</tr>
<tr>
<td>I feel self-assured around my superiors.</td>
<td>4.0(6)</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>I don’t doubt my self-worth even when I think others do.</td>
<td>4.2(6)</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td><strong>Critical Awareness Subscale (5-25)</strong></td>
<td>20.4(2.5)</td>
<td></td>
<td>0.71</td>
</tr>
<tr>
<td>I am usually able to think through all the relevant issues.</td>
<td>4.2(6)</td>
<td>0.77</td>
<td></td>
</tr>
<tr>
<td>I always know who has the power in different situations.</td>
<td>3.9(7)</td>
<td>0.67</td>
<td></td>
</tr>
<tr>
<td>My place in the world is always very clear to me.</td>
<td>4.2(6)</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>I usually know exactly where I stand.</td>
<td>4.3(5)</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>My intuitions and hunches prove to be right most of the time.</td>
<td>3.9(7)</td>
<td>0.51</td>
<td></td>
</tr>
<tr>
<td><strong>Propensity to Act Subscale (6-30)</strong></td>
<td>24(2.8)</td>
<td></td>
<td>0.83</td>
</tr>
<tr>
<td>I volunteer to take on extra work in areas of concern or interest to me.</td>
<td>4.3(6)</td>
<td>0.68</td>
<td></td>
</tr>
<tr>
<td>When I become aware of activities to address a problem of interest, I try to find out how to get involved.</td>
<td>4.1(6)</td>
<td>0.78</td>
<td></td>
</tr>
<tr>
<td>I am often the one to initiate responses to problems.</td>
<td>3.7(7)</td>
<td>0.75</td>
<td></td>
</tr>
<tr>
<td>I have organized co-workers or others to offer new programs or interventions.</td>
<td>3.7(7)</td>
<td>0.70</td>
<td></td>
</tr>
<tr>
<td>One of the things I like in a job is to have multiple involvements in different areas of interest.</td>
<td>4.0(7)</td>
<td>0.76</td>
<td></td>
</tr>
<tr>
<td>I would rather take action than to trust that things will work out.</td>
<td>4.2(6)</td>
<td>0.77</td>
<td></td>
</tr>
</tbody>
</table>

Eigenvalue/Percentage of variance

|                          | 3.53/50.4   | 4.15/46.1      | 3.59/51.3   | 2.65/53.1   | 3.30/55.0   |
References


