

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

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ABSTRACT

Aims This study investigates whether a recovery management intervention (RMI) can better link heroin users in China to drug treatment and other recovery related services in the community, improve their service utilization, and consequently generate positive recovery outcomes.

Design Secondary analysis was conducted using data of a randomized controlled trial (n=100). A latent variable modeling approach was utilized to test whether the RMI influences psychosocial factors, predicts service utilization, which in turn predicts recovery outcomes.

Setting Shanghai Zi-Qiang Social Services, China.

Participants 100 participants were recruited consecutively in two Shanghai districts (Hongkou and Yangpu) in 2009-2010.

Measurements This study measured heroin users' psychosocial functions, service utilization, and recovery outcomes.

Findings 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. The RMI exerted indirect effects on heroin users' community recovery through enhanced treatment and service utilization. Drug treatment enrollment and other social service utilization increased significantly among the RMI participants (standard path coefficient=14.51). In turn, increased service utilization led to more positive recovery outcomes in this group (standard path coefficient=0.09). The RMI was also found to have direct effects on heroin users' recovery outcomes (standard coefficient=0.93).

Conclusions Findings from this study suggest that better treatment enrollment, service utilization, and recovery outcomes can be potentially achieved with carefully designed case management interventions.

Introduction

The spread of HIV/AIDS through injection drug abuse in China

HIV/AIDS has been spreading in China extensively since the late 80s. The 2011 estimate of cumulative HIV positive cases in China was 780,000, including 154,000 AIDS cases and 28,000 AIDS-related deaths.¹ According to this most recent report of China's HIV/AIDS epidemic, HIV prevalence is still low, 0.058%, but the number of annual new HIV infections has been alarmingly high, an average of 50,000 cases per year, since 2007. Although sexual transmission has recently replaced injection drug use (IDU) and became the largest contributor to annual new HIV cases, HIV prevalence remains high among IDUs and they accounted for 18% of the annual new HIV infections in China in 2011.¹

1,545,000 drug users were registered on the police record by the end of 2010.² But the total number of drug users in China is estimated to be more than 3.5 million.³ Bordering two out of the four major illicit drug cultivation areas in the world, the 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, approximately 1 million (70%) were heroin users.² In addition, 50% to 70% of the heroin users in China inject the drug.³ Preventing the 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.

Current responses

In June 2008, "The Law against Drug Abuse and Illicit Drug Trafficking" came into effect in China, which added a component of community-based treatment and recovery to the compulsory rehabilitation facilities for drug users run by the police.^{4,5} China started to test harm

reduction programs to prevent HIV/AIDS since 2003-2004,^{6,7} because previous empirical evidence had demonstrated strong association between community treatment utilization and drug users' recovery, such as employment, criminal activity, and drug use.^{8,9,10} By September 2011, a total of 716 Methadone Maintenance Treatment (MMT) clinics had been established nationwide, serving cumulatively 332,996 heroin users and 132,879 current patients.¹ It is obvious that MMT participation rate is low. Recent evaluation studies also indicated a high dropout rate of 50% - 70% at 3-months after MMT enrollment.^{11,12} Low rates of enrollment and high rates of drop out suggest that barriers may exist in accessing and remaining in community treatment in China.³

Social work in China is still at a developmental stage.¹³ Social workers who work with drug users in community recovery were among the first several social work workforces established in China in the beginning of the 21th century.¹⁴ 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.¹⁵ However, no previous research has documented how social workers in China assist with drug users' drug treatment and wrap-around service utilization to achieve their community recovery goals.

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 MMT, other wrap-around services, and subsequently assist with their reintegration into the community.

Methods

Overall Study Design

Secondary analyses were conducted with data drawn from a larger study entitled “Reducing HIV/AIDS and Drug Abuse among Heroin Addicts Released from Compulsory Rehabilitation in China”. This randomized controlled trial study investigated the effect of the RMI in improving MMT enrollment and reducing drug use. The RMI lasted 12 weeks and was implemented by the Shanghai Zi-Qiang Social Services in two Shanghai districts. Participants were surveyed at both baseline and 3-month follow-up; service records from their social workers throughout the study period were also collected. This study received ethics approval from the Institutional Review Board at the University of California, Los Angeles.

Participants

During 2009-2010, a total of 100 Shanghai local heroin users, who were willing to enroll in MMT upon release from compulsory rehabilitation agreed to participate in the larger study and provided informed consents. 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).

Intervention Procedures

Participants in the Standard Care condition received the Zi-Qiang standard procedures. RMI participants received additional procedures, featuring:

- a. A case conference organized by social worker staff, involving participants’ family members (if any) who were provided with an “information sheet” regarding the study. Participants and their family laid out the blueprint of their community recovery goals based on their “strengths assessment”.

- b. Social workers contacted participants every week for 12 weeks post-release.
- c. At each contact, a urine sample was collected from RMI participants on-site to test for opiates.
- 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 wrap-around services based on their continuous weekly review of RMI clients' strengths, goals, and objectives.

Study Measures

Group is a dummy coded variable representing participants' study condition assignment.

Three likert (1-5) subscales were extracted from the Client evaluation of self and treatment to reflect participants' self-perceived treatment readiness and motivation:

- 1) *Desire for help*
- 2) *Treatment readiness*
- 3) *Pressure for treatment*

Service utilization was captured by three count variables:

- 1) *Number of assessment*
- 2) *Number of referrals*
- 3) *Number of service/treatment utilized*

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

- 1) *Arrest (not arrested=successful)*
- 2) *Urine result (negative=successful)*
- 3) *Employment status (employed=successful)*

Demographic characteristics include the following:

- 1) *Residential district*
- 2) *Gender*
- 3) *Age*
- 4) *Education*
- 5) *Marital status*
- 6) *Living arrangement*
- 7) *Employment history*

Drug and other related problems were measured with:

- 1) *Arrest history*
- 2) *Medical problem*
- 3) *Mental health problem*
- 4) *Age of first use*
- 5) *Years of use*
- 6) *Injection drug use*
- 7) *Type of drug used*

Hypotheses

Empirical evidence has proven that case management can facilitate drug offenders' admission to community drug treatment and other services after release and subsequently in addressing problems of substance abuse,¹⁰ employment,¹⁶ and criminality.⁸ Previous research

also concluded that drug users' treatment readiness and motivations are closely associated with their treatment/service engagement.¹⁷ This study, therefore, hypothesized the following: 1) RMI will make a significant difference in participants' motivation and readiness to participate in treatment and services. 2) Increased motivation and readiness for treatment will then lead to increased MMT and other wrap-around service use. 3) RMI will influence participants' utilization of MMT and other wrap-around services in the community, and thus lead to a significant difference in participants' recovery outcomes. 4) RMI will also have direct effect on improving participants' recovery outcomes.

Analyses

Preliminary analysis

Descriptive statistics and missing data examination were conducted. Data were also examined for non-normality. To check the randomization, categorical methods (e.g. chi-square) were used to compare groups for discrete data. T-tests were used to test for homogeneity of the groups for continuous data.

Intervention effects

This study utilized a Structural Equation Modeling (SEM) approach to examine the hypothesized relationships. A standard path coefficient was estimated for each path in the hypothesized model to indicate relationships between observed variables and latent factors. Maximum likelihood methods were used to estimate every relationship using $P < .05$ as the criterion. SPSS 19.0 was utilized to perform data management tasks, preliminary analyses, and data preparation for the subsequent SEM steps. All SEM modeling were conducted with EQS6.2.

Results

Data examination

The Bonett-Woodward-Randall test in EQS detected significant excess multivariate kurtosis (Mardia's Coefficient=7.89; Normalized Estimate=2.72), 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.¹⁸ 6 participants dropped out from the study, missing the follow-up survey completely and parts of their treatment and service utilization data. Among the 94 participants who stayed in the study, average missing data rate was at 1% for each variable.

Baseline characteristics

No statistical significant differences were detected between the two study conditions on their demographic characteristics (Table 1). 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 our participants were single, 25% were married, and 25% were divorced or separated. A large proportion of participants (83.9%) were living dependently with family member(s) or friends at baseline. Approximately 1/3 of the participants were employed (full-time or part-time) in the past 3 years. Although there were roughly equal numbers of participants in the experimental and the control group within each residential district, Yangpu had almost twice as many participants as Hongkou.

Table 1

As shown in Table 2, study participants did not show any significant difference in their drug use severity and other related problems at baseline. Age of first drug use was 27.9(SD=7.5), average year of drug use was 10.6 (SD=9.1), and about 7% injected drug within 30 days before

their last arrest. Opiates are the primary drug of choice for the participants (73.7%). 9% of them indicated usage of methamphetamine within one month before their last arrest and methadone usage was 6%. Almost all of them (93.7%) had past substance abuse treatment experiences. In terms of drug related problems, 34% of the participants had been arrested before for reasons other than drug offenses, 13.1% reported medical problems 30 days before baseline survey, and 33% experienced mental health problems in the same period.

Table 2

Treatment readiness and motivation at baseline and 3-month follow-up

Motivation to participate in treatment and treatment readiness differed slightly over the 3-month period and by study conditions. The RMI group showed positive changes in all three aspects of the treatment motivation and readiness domain, 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 pressure for treatment (31.5 to 30.7). None of the changes was statistically significant.

Table 3

Service utilization and recovery success

Table 4 reports the outcomes of the RMI. On average, participants in the RMI group received a significantly higher 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 resolve participants' needs in the listed areas are rare, less than an average of 1 time in most areas. The only statistical difference was found in referrals made to employment opportunities (.4 vs. .2). 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. One positive result in service utilization worth noticing is that no standard care group participants enrolled in the community MMT programs, while 4 RMI group participants (8%) enrolled in MMT. But this difference was also not statistically significant ($p=0.06$).

The RMI group had a lower arrest rate (4% vs. 9%) and lower positive urine rate (8.5% vs. 8.7%) than the control group at 3-month follow-up. The only significant difference across study conditions was employment at 3-month follow-up ($p<.001$). 33% of the RMI group participants secured a job at the end of the study, while only 2.2% of the standard care group participants were employed. Consequently the RMI participants showed better recovery success than participants in standard care (2.2 vs. 1.8), $p<.01$.

Table 4

Latent variable modeling

Confirmatory factor analyses (CFA) were conducted to assess the adequacy of the measurement model and the covariance matrix between the constructs. This present study examined two latent factors: 1) motivation and readiness to treatment participation, and 2) actual treatment and service utilization. Three sub-domains of the CEST questionnaire measure clients' motivation and readiness for treatment participation according to past empirical evidence¹⁶ and

they loaded on to one factor: 0.82 for desire for help, 0.87 for treatment readiness, and 0.89 for pressure 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. CFA of the three variables generated significant factor loadings, 0.89 for assessment, 0.70 for referral, and 0.91 for completed services, indicating a high potential to be analyzed as a latent factor. Fit indexes indicated adequate fit: $ML_x^2=189.50$, 15df; CFI=0.97, RMSEA=0.07, and the Bentler-Bonnett non-normed fit index=0.95.

Figure 1 summarizes the structural equation model. A square represents a single observed variable and a circle represents a latent factor that is indicated by multiple observed variables. An arrow indicates the direction of the hypothesized relationship. RMI did not show any impact on participants' changes over time in motivation and readiness to participate in treatment (0.57). This attitudinal factor was not related to clients' actual treatment and service utilization (0.21). This study found that participants from Hongkou district showed significantly more positive results in service utilization (3.41). But controlling for the effect of the residential district as a covariate, the RMI still showed a strong impact on participants' service utilization (14.51). 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 then led to significantly better recovery success in the RMI group (0.09). In addition to this mediated process, group assignment also showed direct effect on participants' recovery success (0.93). The goodness of fit indexes of the Model are satisfactory. In addition to the commonly used comparative fit index (CFI) (CFI=0.96) and the root mean-square error of approximation

(RMSEA) (RMSEA=0.08), this study also looked at the Bentler-Bonett non-normed fit index (0.94) as our preliminary analyses detected data non-normality.¹⁹

Figure 1

Conclusions

Main findings

The RMI was found to have a significant effect in participants' utilization of MMT and other wrap-around services, controlling for the effect that living in Hongkou district of Shanghai contributed to more service use. Consequently, more treatment and service utilization led to significantly greater recovery success among the RMI participants. Besides this mediated effect, RMI also exerted positive influence directly over participants' recovery success.

Discussions

Study participants

The participants represent typical heroin users in community recovery in China.³ The majority of heroin users in China are middle-aged males, who have less than high school education, are not in a marriage, and are unemployed. Most of them did not use illicit drugs until mid or late 20s, have previous drug treatment experiences, and have a criminal history for reasons other than drug offences. Two distinctive characteristics of this study sample are 1) lower injection rates and 2) a high rate of dependent living. High dependent living may be because the participants were recruited immediately after they were released from compulsory rehabilitation. The low rate of injection drug use was unusual as 50-70% of all heroin users in China inject the drug.³ The speculated reason was that participants were just released from a confined environment after a long time (average length of stay in compulsory rehabilitation was

two years²⁰), questions related to illicit drug use could be a topic too sensitive for them to answer truthfully. Yangpu and Hongkou are two out of the 19 administrative districts of Shanghai. Differences between the two districts may lie in their population sizes, economies, income levels, community resources, infrastructures, and social workers such as the participants vs. social worker ratio.

Attitudes and perceptions toward drug treatment and recovery

Contrary to our findings, past empirical research indicates that clients' self-rated attitudes and perception toward service use are strongly related with their actual engagement in treatment and services, changes during the process, and recovery outcomes.¹⁷ Three factors may help explain why RMI did not influence participants' attitudes toward treatment and services: 1) it takes a long time to change people's beliefs and attitudes. Three months may not have provided enough time for us to observe attitudinal changes, 2) the RMI does not have a component intervening drug users' attitudes, although it is expected that intense social worker contacts and support could bring positive changes in their attitudes, and 3) CEST scales were first utilized with the Chinese drug using population. Measurement errors, such as translation inaccuracy, language misuse, and cultural insensitivity, may exist.

Service utilization and recovery success

The RMI group received significantly more needs assessments from their social workers in common drug recovery areas of employment, occupational skills, financial, relationship, housing, health, and MMT.²² According to current practice routine with drug users, settlement needs are standardized for all drug offenders returning from compulsory rehabilitation, which only entails standard filing procedures in the community to obtain regular residents' IDs, employment IDs, and other basic welfare.²¹ This may explain why there was no group difference

in assessing clients' settlement needs. However, group difference in needs assessment was not reflected in referrals social workers made for the participants to services in the community, nor was it present in services successfully completed by the participants. The only difference was the referrals made to actual job opportunities in the community.

This imbalance between needs assessment, referrals, and service use could be due to the lack of relevant resources and services 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 social work and drug users' community recovery are both new in China, there may not be many community-based resources social workers can access. They may also lack coordination with other community sectors. Future endeavors need to find out current available community resources, referral mechanisms, and follow-up procedures to improve social work with drug users in recovery in China.

In both study conditions more than 80% of the participants received social security assistance. It is possible that because Shanghai is the most developed metropolitan area in China, it is easy for drug users in need to obtain financial support. MMT is currently the major community drug treatment program promoted by the Chinese government, but the usage rate of MMT has been reported low, despite the high relapse rate among drug users.^{3,20} The MMT enrollment rates at the end of the 3 months was 8.3 vs 0 ($p=.06$), indicating a marginal effect of the RMI. The most important criterion for MMT referral and enrollment is the detection of relapse to drugs. Approximately 8% of the participants from both study conditions relapsed at 3-months, but only the RMI participants were enrolled in MMT. Therefore, more social work contacts and frequent urine testing seem to facilitate the detection of relapse and participants' transfer to treatment. A possible explanation 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. Studies entailing more participants for a longer time would generate more accurate findings about the effects of RMI. In conclusion, this finding confirms with previous research on the effect of strengths-based case management in improving clients' treatment and wraparound service utilization.²³

As shown in Western literature,^{8,10,16} employment status, drug use, and arrest status are recovery outcomes often found to be positively associated with intense case management and enhanced service utilization. The RMI group participants showed better results in recovery success. In addition to the mediated effect through service utilization, RMI has also showed direct effect on participants' recovery outcomes. Future studies are needed to find out the mechanism of this direct effect.

Limitations

Limitations of this study include: 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. 3) A 3 month follow up period was relatively short for detecting recovery outcomes. 4) Regional variation in China is large. But this study focused only on Shanghai. Results may lack generalizability and transferability to other localities in China.

Implications

This study provides evidence that case managements like the RMI have the potential to improve the utilization of community drug treatment and other wrap-around services, and

improve drug recovery success among opiate dependent individuals in China or other countries that are facing the same challenge of moving from the outdated punitive approach to a community recovery orientation.

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Tables and Figures

Table 1. Demographic characteristics at intake, by group

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

^a: significant main effect of group (p<.05).

Table 2. Drug use severity and other related issues at intake, by group

	Experiment (n=50)	Control (n=50)	Total (n=100)
Arrest History (other than drug offense), %	32	36	34
Medical problems-past 30 days, %	10	16.3	13.1
Mental health problems-past 30 days, %	40	26	33
Drug use history			
Age of first use (SD)	28 (8.1)	27.8 (7.0)	27.9 (7.5)
Years of use (SD)	10.5 (8.6)	10.7 (9.7)	10.6 (9.1)
Injection in past 30 days, %	8.3	6	7.1
Drug use-past 30 days, %			
Heroin/opiates	72	75.5	73.7
Methadone	6	6	6
Methamphetamine	10	8	9
Sedatives	0	4	2
Other	4	4	4
Ever had alcohol/drug treatment, %	93.6	93.8	93.7

^a: significant main effect of group (p<.05).

Table 3. Client attitudes toward treatment and services at intake and 3 month follow-up, by group

	Baseline (n=100)		3 month FU (n=94)	
	Experiment (n=50)	Control (n=50)	Experiment (n=48)	Control (n=46)
Treatment motivation and readiness (10-50)				
Desire for help, Mean (SD)	25.7 (5.5)	25.4 (4.3)	26.2 (5.4)	25.2 (5.2)
Treatment readiness, Mean (SD)	30.5 (4.2)	29.4 (4.5)	30.9 (4.5)	30.0 (5.2)
Pressure for treatment, Mean (SD)	30.9 (5.2)	31.5 (4.5)	31.5 (6.9)	30.7 (6.3)

^a : significant main effect of group (p<.05).

Table 4. Service utilization and recovery success at 3-month, by group

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

^a: significant main effect of group (p<.05).

^b: significant main effect of group (p<.01).

^c: significant main effect of group (p<.001).

Figure 1 Structural Equation Model of Drug User Community Recovery

