Published in final edited form as:
J Subst Abuse Treat. 2010 March ; 38(2): 119. doi:10.1016/j.jsat.2009.09.002.

Structural-level factors affecting implementation of the methadone maintenance therapy program in China

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Abstract

This study identifies structural-level factors influencing methadone maintenance therapy (MMT) program implementation in China. Twenty-eight service providers and 560 randomly selected clients from 28 MMT clinics in the study area underwent face-to-face interviews. Number of clients, retention rate, coverage, and structural-level factors, were collected from a survey of service providers. Individual-level factors and self-reported illicit drug use information were obtained from clients. Urine specimens were collected from the client participants to test for heroin use. Clinics affiliated with the local CDC had more clients, higher retention rates, and broader coverage than those not affiliated with the CDC. Longer operating hours, incentive for compliant clients, and comprehensive services were positively associated with client recruitment and coverage. Comprehensive services and incentives for compliant clients were negatively associated with concurrent illicit drug use. Comprehensive services should be incorporated into the MMT program. Extended operating hours and incentives for compliant clients should be implemented.

Keywords

Methadone Maintenance Therapy; China; structural-level factors; drug users; HIV/AIDS

Introduction

China's first AIDS case was identified in 1985, heralding the HIV epidemic in Mainland China (Zhang & Ma, 2002). Now, over two decades have passed, and the epidemic continues to spread at an alarming rate. It was estimated that there were about 700,000 people living with HIV/AIDS (PLWHA) in China in 2007 (State Council AIDS Working Committee Office, UN Theme Group on AIDS in China, 2007). The drug-using population has been one of the largest

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contributors to the HIV epidemic in China. The number of drug users officially documented by the Chinese Public Security Authority was 1.16 million in 2005, but the actual number was estimated to be 3.5 million in 2007 (Chu & Levy, 2005; Kulsudjarit, 2004; Wu et al, 2007). Injecting drug users (IDU) accounted for about 40% of the cumulative reported HIV/AIDS cases in China (State Council AIDS Working Committee Office, UN Theme Group on AIDS in China, 2007). The most popular drug choice in China is heroin, with about 85% of the drug users abuse heroin (Sullivan and Wu, 2007). In addition to needle-sharing, studies also indicate that drug users are more likely to engage in extramarital sex and less likely to use condoms than non-users (Liu, Lian, Zhou, & Wang, 2001; Wu, Detels, & Zhang, 1996). Thus, drug users represent a potential bridge population for transmitting HIV/AIDS from the localized group of drug users to the general population.

Methadone maintenance therapy (MMT) was proposed as a substitution treatment for heroin addiction in 1965 (Ward, Hall, Mattick, 1999). Since then, it has become an extensively used intervention because of its effectiveness in reducing illicit drug use (Joseph, Stancliff, Langrod, 2000; Sees, Delucchi, Masson, Rosen, 2000) and criminal activity (Flynn et al., 2003a, b; Gossp, Trakada, Steward, 2005). As the HIV epidemic expanded among IDU, methadone was found to reduce the incidence of HIV infection, and it has become one of the most useful strategies for harm reduction (Kerr, Marsh, Li, 2005, Ward, Hall, Mattick, 1999). While MMT has been widely implemented worldwide for nearly 30 years as a treatment for opiate abuse, it has a relatively short history in China. In 2004, eight out-patient MMT pilot study sites were first established in Yunnan, Guizhou, Sichuan, Zhejiang and Guangxi Provinces, which had the most extensive drug use and HIV epidemics in China (Wu, 2004 and 2005). With the demonstrated efficacy of MMT as treatment for drug addiction and the subsequent reduction in HIV risk behaviors, the MMT program has been scaled up (Sullivan & Wu, 2007; Wu et al., 2007). As of November 30, 2008, 558 MMT clinics had been established nationwide in 23 provinces, autonomous regions, and municipalities, which cumulatively treated more than 170,000 clients. There clinics are assigned by local public security and public health departments to be established and operated by local Centers for Disease Control and Prevention (CDC), hospitals, or voluntary detoxification centers in drug users concentrated areas (Ministry of Health, Ministry of Public Security in of China, and State Food and Drug Administration, 2006).

Under current regulations, all applicants for MMT should provide certificates for having been treated in mandatory detoxification center or reeducation-through-labor center before, or any approval materials of having attended any voluntary treatment before based on four criteria: (1) be at least 20 years of age, (2) be a registered local resident of the area which the clinic is located for at least 6 months or holding a temporary resident certificate, (3) have several failed attempts to quit heroin use, and (4) be of good civil character. Those who are HIV positive do not need to fulfill criterion number two. The Criterion number four has been understood to mean that the applicant must have the ability to give informed consent, and be free of any criminal or civil charges. Those who fail to attend the maintenance treatment for seven consecutive days without proper reason are dispelled from the treatment program (Ministry of Health, Ministry of Public Security of China, and State Food and Drug Administration, 2006).

Typically, each MMT clinic is required to have no fewer than eight staff members, including at least two doctors, two nurses, one pharmacist, and one security person. The doctor who is responsible for the maintenance treatment is required to hold a physician qualification certificate, have received training on analgesic drugs, and have prescription writing privileges on analgesic and psychotropic drugs (Ministry of Health, Ministry of Public Security of China, and State Food and Drug Administration, 2006). A National MMT Training Center, based in the Yunnan Institute for Drug Abuse (YIDA), was established to take responsibility for

providing training for clinical staff working in MMT clinics. Service providers from newly established MMT clinics from different parts of the country gather in a large lecture hall to attend a 5-day training which focuses on related policies, MMT working procedures, narcotics drug management, methadone dosage and side-effect management. In additional to the pharmacological approach, supportive services including referrals for testing of sexually transmitted infection, social support, and skills training for employment are in the early stages of being incorporated into MMT clinics in China (Wu et al., 2007).

In the past five years, China has made great progress in establishing MMT programs. However, program planners, researchers, and policy-makers of MMT programs are facing three special challenges. First, despite a high number of registered opiate addicts in the country, the number of clients in the MMT program is very limited, with low coverage of the total drug-using population (Li et al, 2007). There is great variation in the numbers of users in each MMT clinic, some with more than 200, while others have fewer than 20 (Wang, 2006). Clearly the program does not reach the majority of opiate addicts, although there is adequate capacity to handle more clients. Second, the client drop-out rate is high in most sites (Qian, et al., 2006). Third, a considerable proportion of clients continue illicit drug use while participating in MMT.

Previous studies have documented particular individual-level characteristics that are associated with treatment entry and retention. A study of 1,163 drug users in Canada identified factors negatively associated with MMT use, including being male, aboriginal ethnicity, and recent incarceration. Sex-trade involvement with HIV-positive status and older age were positively associated with treatment entry (Callon et al, 2006). Other studies have suggested that age and treatment motivation were positively related to retention (D'Aunno and Pollack, 2002; Joe et al, 1998; Simpson et al, 1997). Treatment characteristics are also crucial predictors of retention. For example, methadone dosage is strongly positively associated with retention and other favourable treatment outcomes (Liu et al, 2008; Maxwell & Shindemian, 2002; Rhoades et al, 1998).

Few researchers have investigated the measures necessary for recruitment and retention in the MMT program in China. Structural-level factors, including operating hours, staff training, and the availability of comprehensive services, which may influence client recruitment and retention, have not been adequately examined. This study adds to the existing literature with its examination of the impact of structural-level factors on MMT clinic client recruitment, retention, and abstinence.

Material and methods

Study sites and participants

The study was conducted in Zhejiang and Jiangxi Provinces between March and September, 2008. At the time of the study, there were a total of 28 MMT clinics located in different counties or cities in these two provinces, and all were included in the study. The study participants included service providers and clients in these MMT clinics.

The director of each MMT clinic was contacted and asked to recommend one service provider who was experienced and knowledgeable about that MMT clinic (at least three months of service there) who would be willing to participate in our survey. A total of 28 service providers participated in the study. In addition to service providers, 20 clients were randomly selected from each of the 28 MMT clinics, using a random number table rendering a total sample size of 560 clients. The sample size justification was based on power calculations. The other reason to choose 20 clients from each of the clinics was that for some of the clinics there were only about 30 clients so it would be too difficult for the clinics with few clients to achieve sample size larger than 20. The selected clients were approached by MMT service providers when they

came into the clinic for treatment and informed about the study. The refusal rate was less than 5%. The clients had to be at least 18 years old to participate in the study.

Of the 28 service providers interviewed, 12 (42.9%) were female, and their ages ranged from 26 to 65 years. All had been working in MMT clinics for more than a year. Five (17.9%) were nurses, 11 (39.3%) were clinic directors, and the remainder were doctors. At the time of the survey, 14 (50.0%) of the sample had a five-year medical education or higher. Among the 560 client participants, 471 (84.1%) were male, 310 (55.4%) were 30–39 years of age, 350 (53.6%) had graduated from junior high, and 168 (30.0%) were unemployed at the time of the study. A large proportion (398; 71.1%) were injecting drug users, 309 (55.2%) had a drug use history of more than 10 years, and 474 (84.6%) had been registered as drug users with the local police department. The clients had been using MMT in the current clinic for an average of 13.5 months, ranging from 4 days to 3.9 years. The average dosage received daily was 42.5 mg (SD=21.7 mg), and the mean travel time to the MMT clinic everyday was 45 minutes roundtrip, ranging from two minutes to five hours. The participants spent 568 Yuan (83.5 USD) on drugs per day on average before they started MMT.

Data collection

Before collecting the data, respondents were informed of the study purpose, procedures, and potential benefits and risks. Informed consent was obtained, assuring voluntary participation. No personal identifiers were linked to the survey responses or urine test results. Upon completion of the survey, each participant was given 40 Yuan (5.88 USD) as compensation for their time. The study procedure and materials were approved by the Institutional Review Boards (IRB) of both the University of California, Los Angeles (UCLA) and the National Center for AIDS/STD Control and Prevention, Chinese Center for Disease Control and Prevention (CCDC).

The anonymous face-to-face interviews administrated by trained interviewers were conducted with both MMT service providers and clients. Interviews were conducted in private rooms in the MMT clinics. After the client interview, the participants were asked to provide a urine specimen. The interviewers assured clients that the purpose of the urine test was for scientific research only, that testing was voluntary and confidential, and that the result would not affect their methadone provision, health care, or employment.

Measures

The service providers' survey contained questions assessing (1) clinic structural-level characteristics, including location and history of the MMT clinic, affiliated institute (i.e., CDC, hospital, or voluntary detoxification center), number of staff members and their training (how many staff members received national-level training), daily operating hours, whether the clinic provided comprehensive services (individual psychological counseling, HIV/AIDS education, group counseling, skills training, counseling to their family members and etc.), whether it provided incentive for compliance and recruitment of new clients; and (2) outcomes of the study, including number of clients under treatment, number of clients ever treated in the clinic, and local number of opiate addicts registered with the local police department. The information collected from the service providers was compared and confirmed with investigators' observations and medical records.

The client survey elicited information about socio-demographic characteristics, years since the first time of opiate use, experience with detoxification, length of using MMT in the current clinic, illicit opiate use throughout MMT participation, and accessibility to comprehensive services and the utilization of those services.

Data analysis

We first conducted descriptive analyses of the clinic structural-level characteristics, such as affiliation, operating hours, comprehensive services, and incentives provided for clients. The retention rate was defined as the proportion of current clients among the cumulative clients, and the coverage was calculated using the current client numbers divided by the number of local registered opiate addicts. Two-sample t-tests (for independent variable with two levels) and analysis of variance (ANOVA) (for independent variable with more than two levels) were performed to determine whether the current client numbers, retention rates, or coverage were different among clinics with different structural-level factors. Pearson correlation coefficients were calculated to investigate relationships among clinic characteristics.

We defined concurrent drug use as having a positive urine drug test or self-reported illicit drug use since initiating methadone treatment. Multilevel regression models were fitted to examine the relationship between concurrent illicit drug use and characteristics of the client and his/her clinic. The data in this study are hierarchically structured, with client nested within MMT clinic. Individuals within a clinic often shared facility-level characteristics, and may thus be more similar in their concurrent drug use behavior than individuals from different healthcare facilities. Multilevel modeling allowed separation of the nested sources of variation, which increased the efficiency in identifying important sources of variation (Snijders & Bosker, 1999). We fitted two models to examine how the factors were associated with an individual's concurrent drug use. Model 1 included individual-level covariates, and model 2 added clinic-level factors to model 1. The respective odds ratios (ORs) and 95% confidence intervals (CI) are reported. The analyses were conducted using SAS version 9.1.3 (SAS Institute Inc, Cary, NC).

Results

At the time of the study, the 28 clinics in Zhejiang and Jiangxi Provinces had collectively and cumulatively treated 7,671 clients, of whom 3,944 were still in treatment. The overall retention rate was 51.4%, and coverage was 9.1%. The clinic characteristics are presented in Table 1. The number of current clients ranged from 35 to 420, with slightly more than half of the clinics had fewer than 100 clients. About half of the clinics had 45–60% retention rates, and 5–15% coverage at the time of the survey. Slightly less than half of the clinics were affiliated with the local CDC, while the others were affiliated with either hospitals or voluntary detoxification centers. Each clinic had an average of 6.4 service providers. One quarter of the clinics had been established for more than two years. About one third were open less than six hours per day, and about 60% of the clinics closed during the noon hour. Half of the clinics had only one or two service providers who had received national-level MMT training. More than half of the clinics provided comprehensive services such as individual psychological counseling, HIV/AIDS education, and group counseling. The psychological counseling was provided on a monthly basis or as needed, but it was somewhat informal in most of the clinics because few service providers had received standard training in a related field. Relatively few clinics provided skills training for the clients or counseling to their family members. About half of the clinics gave various kinds of incentives such as monetary reward or free methadone doses to compliant clients or those who helped to recruit new clients. The level of compliance of a client was determined by treatment attendance and urine test result. The amount of incentive and criteria for giving out these incentives varied across the clinics (Table 1).

When comparing current client numbers, retention rates, and coverage across different structural-level factors (Table 2), we found that the CDC-affiliated clinics, those clinics open for more than eight hours per day, and the clinics which provided more than two types of comprehensive services had significantly more clients, higher retention rates, and greater coverage. Providing incentives for compliant clients and those who recruited new clients was

also associated with more clients and better retention rates and coverage. The clinics that closed during noon hour had far fewer clients and lower coverage. Clinics open for more than two years had more clients but lower retention rates than newly opened clinics.

Correlation coefficients of clinic characteristics are reported in Table 3. The CDC-affiliated clinics were significantly positively associated with longer operating hours (r=0.17), providing more than two types of comprehensive services (r=0.50), and providing incentives for compliant clients (r=0.50) and those who recruited new clients (r = 0.14). The clinics that had been established longer had more staff members (r=0.21) and more service providers who had received national-level training (r=0.29). Having more service providers in the clinic had a positive relationship with longer operating hours (r=0.28) and staying open during the noon hour (r=0.25). Providing comprehensive services was positively correlated with providing incentives for compliance (r=0.87) and for recruiting new clients (r=0.36).

Table 4 presents the odds ratios of the multilevel regression models. Among the 560 participants, 152 (27.1%) self-reported concurrent opiate use throughout the MMT participation and 139 (24.8%) had a positive urine test result. A total of 211 (37.7%) clients reported concurrent illicit drug use or had a positive urine test. The agreement level of these two measures is moderate (Kappa=0.40), which indicates that a substantial percentage of participants met one or the other criteria for poor outcomes, but not both. The results indicate that the clients in clinics with two or more types of comprehensive services (OR=0.42, P<0.05) and incentives for treatment compliance (OR=0.39, P<0.05) were less likely to concurrently use illicit drugs. The longer the client stayed in MMT, the less likely he or she was to concurrently use illicit drugs (OR=0.68, P<0.01). The current dosages were marginally associated with concurrent drug use in MMT clinics (OR=1.01, p<0.05).

Discussion

The scale-up for MMT programs in China has been very fast, benefiting tens of thousands of drug users with outcomes such as decreased drug use, criminality, and increased quality of life and employment (Sullivan & Wu, 2007, Pang et al, 2007). The communities have also profited from the ancillary effects of the program, including the reduction in size of local drug markets and corresponding crime rates and improved public security (Pang et al, 2007). However, given the relatively short history there are many barriers facing the current MMT programs.

Despite the rapid scale-up, the coverage rates across the population of registered opiate addicts are not dissimilar from that observed in U.S. (Kleber, 2008). It is unknown whether the actual number of opiate addicts in the area surrounding these clinics approximates the known number of registered addicts, but it likely is higher, which further reduces the estimates of coverage for MMT in this report. Similar to the U.S., the programs in China also demonstrate problems in enrolling and retaining clients (Fiellin & O'Connor, 2002; Merrill et al., 2005). Between clinic differences were observed in numbers of clients, retention rates, and extent of coverage as a factor of CDC-affiliated clinics and non-CDC-affiliated clinics. An understanding of the factors that lead to these disparities reflects different funding resources for these two types of clinics. CDC-affiliated clinics receive funding from the HIV/AIDS prevention program of the central government, whereas hospitals rely on client charges. MMT clinics in hospitals may not receive sufficient funding and other institutional support to provide comprehensive services for clients. In addition, it appeared that the service providers in hospitals were not as experienced in providing psychological counseling, HIV/AIDS and health education, and other additional services to clients as staff in CDC-affiliated clinics.

These results indicate that in MMT clinics with comprehensive services, the numbers of clients and retention rates were higher, and the clients were less likely to use illicit drugs while taking

methadone. This finding is also reported in other studies. For example, Stevens' 2008 study suggested that psychological counseling and motivational enhancement therapy increases MMT effectiveness (Stevens, 2008). In a review of 12 trials, Amato and colleagues (2004) found that adding psychosocial treatment to standard pharmacological MMT contributed to higher effectiveness in terms of treatment retention. However, comprehensive services have been provided only sparingly in China (Wu, et al, 2007). The frequency, format, and quality of these services are not consistent across clinics (Pang et al, 2007). More needs to be done to improve client recruitment, retention, and compliance by involving and improving comprehensive services such as psychological counseling, skills training, health education, and group activities in MMT clinics.

Service providers play an important role in the success of MMT programs and client outcome. However, there were wide variations in levels of training and qualifications of service providers working in MMT clinics in China (Gill & Okie, 2007; Humeniuk & Ali, 2005). Although there are national trainings available, half of the MMT clinics in our study had only one or two service providers who had received it, and the others only learned indirectly from those who were trained. In some clinics, none of the providers had the chance to receive national level training. Ongoing in-service training has been absent. Furthermore, very limited training was given to the service providers on behavioral intervention, psychological counseling, and health education for clients (Pang, 2007). Inadequate training may contribute to service providers' failure to prescribe an adequate methadone dosage due to concerns over malpractice (China CDC, 2007). Without the knowledge of cognitive-behavioral strategies, service providers were not able to address clients' motivation to change, personalized risk management, and other problems related to continued drug use and MMT drop-out. Appropriate training on behavioral intervention, psychosocial counseling, and side-effects management is urgently needed by service providers working in the MMT clinics in China.

Clients pay 10 Yuan per day (1.47 USD) for their treatment in China (Ministry of Health, Ministry of Public Security of China, and State Food and Drug Administration, 2006). Although this payment is relatively small, it may be a financial barrier to treatment, especially for those who are unemployed or do not receive adequate support from their families. Our study revealed that providing incentives for compliance and abstaining from concurrent drug use was positively correlated with more clients, better retention rates, greater coverage, and lower concurrent drug use. Other studies showed similar relationships. In a pilot study in Sichuan China, incentives were given to clients who participated in the program continuously, which resulted in significantly increased retention rates in the intervention group and significantly reduced self-reported drug use and risky sex behaviors, as compared to the control group (Gao, 2006). The positive outcomes of incentives may possibly be due to reduced financial burden and improved self-esteem and satisfaction through being rewarded. Incentives need not always be monetary, however. A well-developed literature in Western cultures describes outcomes using take home medications as incentives for positive behaviors in MMT programs (Chutuape, Silverman & Stitzer, 1999; White, Ryan & Ali, 1996). However, this option is currently not allowed in China (Ministry of Health, Ministry of Public Security of China, and State Food and Drug Administration, 2006).

There are other active structural changes that may be useful in increasing treatment enrollment and retention. The clinics that were opened more than eight hours per day or stayed open during the noon hour were more likely to have more clients and greater coverage. Sufficient operating hours of MMT clinics strongly facilitates recruitment by providing convenience for the clients, especially those who are working. MMT clinics that provide extended hours of operation and operation during off-hours enable employed clients to access treatment within their work and family schedules. It remains, however, that these are associational finding that are also correlated to clinic size. It is not known whether the clinics that have extended hours do so in

order to be able to meet the needs of a larger client base or become larger by first facilitating access to MMT by increasing operating hours.

Many studies have demonstrated that higher methadone dosages have beneficial effects on methadone treatment in terms of retention and abstinence. A meta-analysis of randomized controlled trials found that a dose of 50 mg per day was associated with higher retention rates (Farre et al, 2002). A study by Strain and colleagues showed that high-dose methadone resulted in significantly longer retention and fewer positive urine drug-tested samples compared with moderately dosed clients (Strain et al, 1999). Hartel and Liu also found those who received less than 70 mg/day had higher levels of heroin use than those on higher dosages (Hartel et al, 1995; Liu et al, 2008). Other studies have also found an association between methadone dose, retention, and positive urine drug-test results (Blaney & Craig, 1999; Maddux et al, 1997). By contrast, we found that higher methadone doses in the clinics in China were associated with positive urine drug testing. As these data are associational, it is not possible to assign causation, although physicians prescribe higher doses to non-compliant clients. Once drug use is eliminated at higher doses, however, providers initiate dose reductions to move the client toward drug-free status. The widely held belief of providers and of clients that drug-free status is the desired outcome for MMT (instead of a prolonged stable course of MMT) may lead clients who need higher doses to terminate treatment, leaving clients who are non-compliant at the higher doses within the clinics.

There are certain limitations with regard to reliability and validity of the study. First, this study used a cross-sectional design that suffers the limitation of temporal ambiguity, so we are not able to make causal inferences. Second, both Zhejiang and Jiangxi Provinces have only a modest drug-use problem and not many reported HIV cases. The MMT programs, clients, and service providers in these areas might be different from those in other parts of China. One should be cautious in generalizing the findings to other geographic locations and populations. Nevertheless, even with the limitations noted above, this study indicates that certain structural elements associate significantly with successful outcomes in methadone treatment. At this early stage of the implementation of MMT in China, improvements in enrollments and in retention may result from providing comprehensive and supportive services to clients, offering extended operating hours, instituting incentives for compliance, and encouraging sustained, high-dose methadone for clients with severe dependence in order to eliminate drug use.

Acknowledgments

We are grateful for the support of the NIH/Fogarty international center, which supported this study through program grants (Grant number: D43 TW000013). We thank our colleagues in China Center for Disease Control and Prevention for their help and support. This study would not have been possible without local investigators and the research participants. Authors wish to thank Wendy Aft for her editorial assistance.

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Table 1

Characteristics of the 28 surveyed MMT clinics

	Number of Clinics	Percent of Clinics
Current client number		
<100	15	53.6
100–200	6	21.4
>200	7	25.0
Retention rate		
≤45%	5	17.9
45–60%	13	46.4
>60%	10	35.7
Coverage rate		
≤5%	4	14.3
5–15%	16	57.1
>15%	8	28.6
Affiliation		
CDC	13	46.4
Hospital or voluntary detoxification center	15	53.6
Duration of operation		
≤24 months	21	75.0
>24 months	7	25.0
Operating hour		
≤6 hours	10	35.7
6–8 hours	12	42.9
>8 hours	6	21.4
Client to staff ratio		
≤15	13	46.4
15–25	5	17.9
>25	10	35.7
Number of staff members national-level trained		
<2	8	28.6
2	6	21.4
>2	14	50.0
Closed during noon hour	16	57.1
Provides:		
Psychological counselling	22	78.6
HIV/AIDS-related education	16	57.1
Group counselling	17	60.7
Counselling to family members	10	35.7
Skills training	3	10.7
Reward for:		
Compliance	12	42.9

	Number of Clinics	Percent of Clinics
Recruiting clients	13	46.4

Table 2

Clinic characteristics vs. number of clients, coverage, and retention rates

	Current Client Number		Retention Rate		Coverage	
	Mean±SD		Mean±SD		Mean±SD	
Affiliation						
Non-CDC	109.1±74.2	****	48.1%±10.6%	****	9.7%±5.8%	****
CDC	177.5±108.1		60.1%±9.7%		14.1%±7.8%	
Duration of operation						
≤24 months	130.9±97.6	****	57.2%±10.8%	****	13.1%7.5%	****
> months	170.9±91.5		43.9%±9.3%		7.8%±3.9%	
Operating hours						
≤6 hours	87.1±35.5		55.3%±10.1%		10.3%±4.6%	
6–8 hours	133.8±82.7	****	53.9%±11.6%	*	11.2%±7.5%	****
>8 hours	244.5±144.4		51.6%±14.8%		15.2%±8.8%	
Client to staff ratio						
≤15	70.1±16.2		52.8%±11.6%		10.8%±5.9%	
15–25	103.0±20.5	****	51.0%±5.2%	****	8.3%±4.0%	****
>25	251.8±80.9		56.7%±14.0%		14.6%±8.7%	
Number of staff who received national level training						
<2	142.8±119.4		52.9%±14.0%		14.6%±8.0%	
2	126.1±78.2	****	55.1%±10.2%	**	10.4%±7.0%	****
>2	196.0±99.9		50.9%±13.2%		11.3%±3.8%	
Close at noon						
No	230.0±111.2	****	53.4%±13.6%		13.0%±8.3%	****
Yes	94.5±48.3		54.2%±10.5%		10.8%±6.0%	
Comprehensive intervention						
No	121.4%±87.6	****	49.7%±10.7%	****	9.1%±5.9%	****
Yes	160.4±103.1		58.1%±11.6%		14.4%±7.3%	

	Current Client Number		Retention Rate		Coverage	
	Mean±SD		Mean±SD		Mean±SD	
Incentive for compliance						
No	121.9±82.0	****	50.2%±10.4%	*	9.1%±5.6%	****
Yes	166.1±110.3		58.8%±12.2%		15.2%5.7%	
Incentive for recruiting clients						
No	127.5±105.3	**	52.9%±11.6%	*	10.6%±5.5%	****
Yes	152.5±88.8		55.0%±12.2%		13.0%±8.5%	

* P-value<0.05;

** P-value<0.01;

*** P-value<0.001;

**** P-value<0.0001

Table 3

Correlation coefficients and significance levels for clinic characteristics

	1	2	3	4	5	6	7	8
1. CDC-affiliated clinic								
2. Duration of operation (months)	0.3310 ****							
3. Operating hours	0.1728 ****	0.1110 **						
4. Number of staff	0.3284 ****	0.2134 ****	0.2798 ****					
5. Number of staff who received national training	−0.1945 ****	0.2853 ****	0.1470 ***	0.0385				
6. Close at noon	0.2067 ****	−0.1259 **	−0.8626 ****	−0.2456 ****	−0.1568 ***			
7. Comprehensive services	0.5012 ****	−0.0559	0.2287 ****	0.1196 **	−0.1811 ****	−0.2887 ****		
8. Incentive for compliance	0.4961 ****	−0.0351	0.2364 ****	0.0038	−0.0261	−0.2708 ****	0.8660 ****	
9. Incentive for recruiting clients	0.1384 **	0.0655	0.0544	−0.2047 ****	−0.2583 ****	−0.0620	0.3580 ****	0.3514 ****

* P-value<0.05;

** P-value<0.01;

*** P-value<0.001;

**** P-value<0.0

Table 4

Multilevel regression odds ratios (OR) and confidence intervals (CI) of concurrent illicit drug use associated with clinic structural- and individual-level factors

	Model 1 OR (CI)	Model 2 OR (CI)
Structural-level factors		
CDC-affiliated		1.44 (0.82–2.52)
Established for more than 24 months		1.31 (0.64–2.68)
Operating hours		0.90 (0.60–1.35)
Client staff ratio		1.01 (0.99–1.04)
Number of staff receiving national training		0.77 (0.54–1.11)
Close at noon		1.68 (0.67–4.21)
Provide comprehensive services		0.42 (0.20–0.85)*
Incentive for compliance		0.39 (0.17–0.98)*
Incentive for recruiting clients		0.80 (0.45–1.40)
Individual-level factors		
Female	1.17 (0.73–1.86)	1.23 (0.74–2.02)
Age (years)	1.01 (0.97–1.04)	1.00 (0.97–0.04)
Years of education	1.01 (0.94–1.08)	1.01 (0.94–1.08)
Unemployed	1.23 (0.82–1.85)	1.20 (0.81–1.79)
Married or living with partner	1.13 (0.73–1.75)	1.16 (0.75–1.80)
Income (5,000 Yuan)	1.00 (1.00–1.00)	1.02 (1.01–1.03)*
Years of drug use	0.97 (0.91–1.02)	0.95 (0.90–1.00)
Injecting drug user	0.78 (0.51–1.19)	0.76 (0.48–1.19)
Registered as drug user with police	1.37 (0.77–2.45)	1.43 (0.76–2.72)
Duration in MMT (half year)	0.68 (0.52–0.88)**	0.69 (0.53–.89)*
Current dose (mg)	1.01 (1.00–1.02)*	1.01 (1.00–1.02)*
Daily commute time to clinic (half hour)	1.00 (0.99–1.00)	1.00 (0.99–1.01)

*P-value<0.05;

**P-value<0.01