Published in final edited form as:

Drug Alcohol Depend. 2011 November 1; 118(2-3): 335–340. doi:10.1016/j.drugalcdep.2011.04.014.

Motivational Profiles of Clients Seeking Methadone Maintenance Therapy in China

Li Li^{a,*}, Yingying Ding^a, Wenhong Lai^b, Chunqing Lin^a, and Wei Luo^c

^a Semel Institute for Neuroscience and Human Behavior, Center for Community Health, University of California at Los Angeles, Los Angeles, CA, U.S.A.

^b Sichuan Provincial Center for Disease Control and Prevention, Chengdu, China

^c China Center for Disease Control and Prevention, Beijing, China

Abstract

Objective—This study applied a stage-of-change model to examine the motivational profiles of clients seeking methadone maintenance therapy (MMT) in China.

Methods—Face-to-face interviews were conducted with a total of 179 clients from six MMT clinics. The University of Rhode Island Change Assessment (URICA) scale was used to measure the participants' motivation and readiness to change. Cluster analysis was performed to classify the sample into subgroups with respect to their change dimensions.

Results—The study sample was allocated into five distinct clusters: uninvolved, denial, pre-participation, ambivalent, and participation. Participants who were classified in the denial cluster were older than those in the pre-participation and participation clusters. A higher level of motivation to change was positively associated with continued heroin use and more severe drug problems.

Discussion—It would be beneficial to evaluate motivational profiles of individual clients in the treatment planning process and provide tailored interventions for sustained treatment retention and outcomes.

Keywords

drug use; methadone maintenance therapy; stage-of-change; China

© 2011 Elsevier Ireland Ltd. All rights reserved.

*Corresponding Author: Li Li, UCLA Semel Institute - Center for Community Health, 10920 Wilshire Blvd., Suite 350, Los Angeles, CA 90024, U.S.A., Tel: (310) 794-2446, Fax: (310)-794-8297, lililili@ucla.edu.

Contributors

Li Li contributed to the conception and design of the study and led the writing of the article. Chunqing Lin and Yingying Ding performed data analysis and drafted study results. Wenhong Lai contributed to the study implementation. Wei Luo assisted with data management and the draft of manuscript.

Conflict of Interests

All authors have no conflict declared.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

1. Introduction

Based on the Transtheoretical Model of Change, the stage-of-change model, as articulated by Prochaska and DiClemente, provides a way of conceptualizing people's motivation and readiness to modify addictive behaviors (Prochaska and DiClemente, 1983; Prochaska et al., 1992; 1994). The model suggests that, as a person changes a given behavior, he or she progresses through a multidimensional process of intentional behavior change stages with each stage representing a distinct collection of attitudes, behaviors, and intentions regarding the problem behavior (Prochaska et al., 1992). For example, *Precontemplation stage* describes individuals with minimal awareness of the problem and no intention to change the problem behavior in the near future. During the *Action stage*, a person takes specific steps to modify the behavior (Bellack and DiClemente, 1999). Motivation is believed to play an important role throughout the entire process of change (DiClemente et al., 2004).

Applied to a drug-using population, the stage-of-change model offers a framework for understanding the process of people changing addictive behaviors and a means of predicting drug treatment outcomes. A study of 2,265 persons in 11 U.S. cities revealed that indicators of motivation, in particular readiness for drug treatment, predicted treatment engagement and retention (Joe et al., 1998). Another study found that the stage of change in readiness for cessation of drug use was predictive of treatment entry (Booth et al., 1998). Drug relapse and treatment failures were found to be related to lack of motivation to change (Belding et al., 1995; Joe et al., 1998; Longshore and Teruya, 2006). Prochaska and colleagues (1992) suggest that matching an individual's addictive treatment to his or her stage of change can enhance the efficacy of therapy.

Methadone maintenance therapy (MMT) was first initiated in China in 2004, and it has been expanded to a nationwide program encompassing more than 680 clinics serving some 242,000 clients (Yin et al., 2010). The scale-up for MMT programs in China has been fast, benefiting tens of thousands of drug users with decreased drug use, criminality, and increased quality of life and employment (Pang et al., 2007; Sullivan and Wu, 2007). Despite this success, Chinese programmers, researchers, and policy makers face special challenges. Previous studies have reported a high drop-out rate and a great number of clients who continued to use heroin or other illicit drugs during methadone treatment (Lin et al., 2010; Liu et al., 2008). The rapid scale-up of the MMT programs and the continually increasing number of clients seeking services result in a gap between clients' needs and service availability as well as providers' counseling and behavioral intervention skills (Yin et al., 2010). The clients' motivational status has not been adequately investigated and addressed. In this study, our goal was to provide motivational profiles of clients seeking MMT in China. We addressed the issue with three objectives: 1) describe the distribution of motivational subtypes in a sample of MMT clients; 2) compare the motivational profile of MMT clients in China to other drug treatment populations; and 3) analyze drug avoidance self-efficacy, drug severity, and continued drug use behavior across different cluster subtypes.

2. Methods

2.1. Participants and procedures

This study uses baseline data from a study designed to pilot an intervention in MMT clinics in China. Participants for this study were recruited from February to March 2010 from six MMT clinics in Sichuan Province, China. In order to be eligible for the study, potential participants had to be at least 18 years old and currently receiving methadone maintenance treatment in one of the participating MMT clinics.

Research staff approached prospective participants in the waiting rooms of participating MMT clinics where they normally received services. After receiving a full disclosure of information and a complete description of the study, MMT clients who agreed to participate in the study signed informed consent forms with a refusal rate less than 10%. Face-to-face interviews were conducted in a private room at the clinic, with each interview lasting 30–45 minutes. The participants were paid 45 yuan (U.S. \$7) for the assessment. The Institutional Review Board of the University of California, Los Angeles and the Chinese Center for Disease Control and Prevention approved all study documents and procedures for this study.

2.2. Measures

University of Rhode Island Change Assessment Scale (URICA)—The URICA scale is one of the most commonly used instruments for assessing stages of change and has demonstrated solid psychometric properties for theoretical consistency and scale composition among substance dependent populations (DiClemente and Hughes, 1990; Edens and Willoughby, 1999; 2000; McConaughy et al., 1983). The scale consists of 32 items with four summary scores corresponding to the four stages: Precontemplation, Contemplation, Action, and Maintenance, as defined by DiClemente and Prochaska (1982; 1985). Responses are given on a 5-point Likert format (1 = strong disagreement to 5 = strong agreement). In this study, Cronbach's alpha values, measuring internal consistency, were 0.70, 0.71, 0.77, and 0.67 for each of the subscales, respectively. The URICA Readiness score was a variable determined by summing the subscale scores on Contemplation, Action, and Maintenance, and subtracting from that sum the score of the Precontemplation subscale (Blanchard et al., 2003).

Drug Avoidance Self-Efficacy Scale (DASES)—This scale consists of 16 items assessing clients' self-efficacy to resist drug use in different situations in which they might be tempted to use (Martin et al., 1995). For each item, participants were asked to imagine themselves in a particular situation and to rate their level of confidence (self-efficacy) to resist drug use in that situation. Responses are recorded in a 5-point Likert format (1 = certainly yes to 5 = certainly no). In this study, the overall scale was the sum of the individual items. Some items were reverse-coded so that a higher score indicates higher level of self-efficacy in drug avoidance. Cronbach's alpha for this scale was 0.77.

Addiction Severity Index (ASI)-Drug Use—Frequency and severity of substance use in the prior 30 days was measured using the drug use section of the Addiction Severity Index (ASI) (McLellan et al., 1992). The ASI has been a widely used instrument for the assessment of substance use and related problems and its psychometric properties are well established (Alterman et al., 1994, 2001; Cacciola et al., 1997). A drug composite score was calculated as a measure of the severity of drug problems in the prior 30 days.

Continued Heroin Use—Urine specimen collection was collected and tested for morphine. The result was compared with self-reports of how many days participants had used heroin in the prior 30 days assessed using ASI. Continued heroin use was defined as positive if a client either self-reported the use of heroin at least one day in the prior 30 days or if a positive morphine urine results was found.

Demographic information, including age, gender, marital status, education, and length of drug use and duration of MMT, was collected for this study.

2.3. Data analysis

Cluster analyses were used to classify participants with respect to motivational profiles across the different dimensions in stages of change. Cluster analysis has the advantage of

providing an empirically based approach to identify subgroups with similar characteristics (Velicer et al., 1995). In previous studies, the URICA yielded two to nine distinct clusters (Blanchard et al., 2003; DiClemente and Hughes, 1990; McConaughy et al., 1983, 1989; Prochaska and DiClemente, 1983), and motivational subtypes exhibited good concurrent validity in some samples (Carney and Kivlahan, 1995; Edens and Willoughby, 1999). First, a hierarchical agglomerative method (minimum variance) with squared Euclidean distance as the distance measure was employed (Johnson, 1967). To determine the number of clusters, both the hierarchical tree and the clustering coefficients were used. In this study, five clusters appeared to adequately differentiate groups of participants. These five clusters were then subjected to a K-means iterative partitioning clustering procedure (Punj and Stewart, 1983). As part of this procedure, the scores were converted to standardized *t* scores ($X=50$, $s=10$) prior to being used to form clusters. The cluster analysis was performed using SPSS software (Version 17.0; SPSS Inc; Chicago, IL).

After the participants were grouped into clusters based on their stage-of-change profile, the cluster subtypes in this study were compared to two other studies with similar populations. In addition, ANOVA and Pearson chi-square test were used to compare three major clusters in terms of drug avoidance self-efficacy, ASI drug severity score, and continued heroin use. Statistical analyses were performed using the SAS 9.2 statistical software package (SAS Institute Inc., Cary, NC).

3. Results

3.1. Sample characteristics

The study sample consisted of 179 clients who were seeking methadone maintenance therapy in six clinics in China. The majority of the sample (65.4%) were males and 40 years or older (62%). Approximately 44.1% were married or living as married at the time of the assessment, and 82.1% had an education level of junior high or above. The average length of drug use was 12.6 years and the average duration of MMT was 2.0 years.

3.2. Cluster subtypes

The cluster analysis resulted in a total of five distinct clusters (Fig. 1a–e). Three clusters were classified as major clusters, each involving 18 to 84 participants. Two clusters were classified as minor clusters, each including 4 to 5 participants.

Cluster 1—The 84 participants (46.9 %) in this cluster were characterized by below average scores on Precontemplation stage, slightly above average scores on Contemplation and Action stages, and slightly below average on Maintenance stage (Fig. 1a). Participants were somewhat involved in thinking about, acting on, and maintaining changes and tended not to ignore the existence of the problem. This cluster, then, was profiled as a “pre-participation” group.

Cluster 2—The 68 participants (38.0%) in this cluster were characterized by above average scores on Precontemplation stage and below-average scores on Contemplation, Action, and Maintenance stages (Fig. 1b). This group was described as the “denial” cluster.

Cluster 3—The 18 subjects (10.1%) in this cluster were characterized by below average score on Precontemplation stage and above-average scores on Contemplation, Action, and Maintenance stages (Fig. 1c). These subjects were not ignoring the presence of a problem; rather, they were engaged in thinking about the problem, taking some action on changing it, and maintaining changes already made. This cluster, then, was associated with the “participation” profile.

Cluster 4—The five participants (2.8%) in this cluster were characterized by below average scores on Precontemplation, Contemplation, Action, and Maintenance stages (see Fig. 1d). This group demonstrated the lack of an action component to their profile and was characterized as the “uninvolved” profile.

Cluster 5—The four participants (2.2%) in this cluster were characterized by above average scores on Precontemplation, Contemplation, Action, and Maintenance stages (see Fig. 1e). This cluster, then, was related to the “ambivalent” profile.

3.3. Comparing profiles to other drug using populations

When comparing the subtypes to two studies with similar populations (Table 1), we found that the participants in our study were more likely to be classified in clusters that indicated a lower motivational level than a sample of veterans seeking substance abuse treatment (Carney et al., 1995) and a higher motivational level than a sample of incarcerated, drug-using women (EI-Bassel et al., 1998).

3.4. Cluster differences

The differences on demographics, drug-related variables and overall readiness score among the three major clusters are presented in Table 2. We included the three clusters that accounted for approximately 95% of study sample and represented different levels of motivation from denial to participation. We excluded the other two clusters to avoid the instability of the results due to small sample size. Participants in the participation cluster (believed to indicate higher motivation to change) were more likely to report continued heroin use and more severe drug use problems than participants in the pre-participation and denial clusters. Participants who were classified in the denial cluster (believed to indicate lower motivation to change) were older than those in the pre-participation and participation clusters. Not surprisingly, the clusters differed significantly in respect to the overall readiness score—the cluster indicated higher motivation was associated with a higher readiness score. No significant differences were found for other demographics.

The intercorrelations between the overall URICA readiness score, drug self-avoidance efficacy scale, ASI drug severity composite score, and continued heroin use are presented in Table 3. The readiness score was positively associated with continued drug use. Lower drug avoidance self-efficacy was related to a longer history of drug use and a higher level of drug use severity.

4. Discussion

This was the first study to systematically examine motivational profiles among MMT clients in China. The results provide support for the segmentation of the process of change among this population. It was revealed that a considerable proportion of the MMT clients in China were still in the uninvolved, denial, or pre-participation stage to modify their addictive behavior. This result implies that some clients come to participate in the treatment without being fully motive and ready to make changes, which possibly leads to a high dropout or relapse rate as found in other studies (Joe et al., 1998; Longshore and Teruya, 2006). The clients enter the MMT program from various sources: some are linked to clinic by the mandatory detoxification center, some are referred by public security, social worker, or service provider in local CDC, some are recommended by their families and some are introduced by their drug-using peers. Motivation for treatment might differ across these entry patterns which deserve further investigation in future studies. Motivational interviewing and motivation enhancement therapy (Miller et al., 1992; 2002a), which were designed specifically to enhance motivation for behavior change, have been shown to be

effective and efficacious in the treatment of drug use (Miller et al., 2002b) and could be adapted to MMT programs in China.

The stage-of-change framework is useful to identify different levels of motivation in individual clients to improve the effectiveness of treatment. Clinical staff would need to be trained in the assessment of motivational stage of clients using validated psychological measures, and to tailor strategies and programs appropriate to the needs of their clients. Cognitive and behavioral processes that individuals use to effect therapeutic change have been identified. These processes represent activities ranging from consciousness raising (increasing awareness about the existence of a problem in need of change) to stimulus control (avoiding the stimuli that spurs the problem behavior) (Belding et al., 1995; Prochaska et al., 1992). For example, for those individuals who are not interested in staying in treatment, a more appropriate program might include educational interventions designed to increase awareness of the need for change, and provide personalized information about risks and benefits. On the other hand, individuals who are ready to plan how to quit using drugs can be assisted with developing and implementing concrete action goals. For those who are in the action stage, individualized feedback, problem-solving skills, and social support can be the components to focus on. Measures of stage of change may also be a useful tool for early identification of individuals at risk of dropping out and help reduce the spread of HIV among drug users, as previous a study reported that clients retained in MMT program were less likely to be involved in HIV risk behaviors, such as injecting drug use and multiple sexual partners (Wells et al., 1996). The implications for the improvement and outcomes of MMT programs in China deserve further investigation.

Previous studies have found processes of change have clinical relevance, as cluster membership was associated with alcohol and drug use severity, treatment history, problem acknowledgement, and concern about use (Carney and Kivlahan, 1995; Connors et al., 2001; DiClemente and Hughes, 1990; Edens and Willoughby, 1999; 2000; Willoughby and Edens, 1996). Although we anticipated that those clients in later stages of change might be associated with lower continued heroin use, the result showed the opposite, in which participants with higher levels of motivation were associated with more severe drug problems than those with lower motivation. This result was supported by previous studies. Velasquez et al. (1999) demonstrated that higher levels of motivation were related to more severe alcohol use. More recently, Pantalon et al. (2002) reported that participants with higher motivation had more severe cocaine problems than did those with lower motivation. The positive correlation between drug use and processes associated with the later stages of change might be explained as greater problems confer greater readiness to change.

It is interesting that older participants reported lower motivation than younger ones in this study. The result is contradictory to previous studies, which documented that older patients in addictive treatment showed more advanced stages of change than younger patients (Freyer et al., 2005; Nigg et al., 1999). One possible explanation is that the older persons had a longer history of drug use and were more likely accommodated themselves to the drug using lifestyle. The association suggests the need for more attention to older clients' motivation to adhere to the treatment.

Several limitations of this study must be noted. First, the study used a cross-sectional design, so the association identified might be due to the temporal ambiguity and unknown confounders. Second, the small sample size may have led to reduced statistical power for finding other significant differences. Third, the items in the URICA were not written for a specific problem but focused on a general problem defined by the individual subjects that may or may not be related to drug use; and the transtheoretical model has been subject to criticism, as the stages reflect a disputable categorization of an underlying continuous

variable instead of discrete, qualitatively different (de Vet, 2005). Finally, the assessment could suffer from problems common to all self-report instruments (i.e., respondents might not be able to provide accurate estimates of their own readiness to change).

In conclusion, our findings underscore the importance and the need of assessing and enhancing motivation for change among MMT clients in China. Future investigations should build on the findings of this study by evaluating the processes of change and providing individual clients with tailored counseling and programs for sustained treatment retention and outcomes.

Acknowledgments

Role of Funding Source:

This paper was completed with the support of the National Institute of Mental Health (grant # R34MH083512).

We would like to thank project team members in Sichuan, Beijing, and Los Angeles for their contributions to this study.

References

- Alterman AI, Brown LS, Zaballero A, McKay JR. Interviewer severity ratings and composite scores of the ASI: a further look. *Drug Alcohol Depend.* 1994; 34:201–209. [PubMed: 8033757]
- Belding MA, Iguchi MY, Lamb RJ, Lakin M, Terry R. Stages and processes of change among polydrug users in methadone maintenance treatment. *Drug Alcohol Depend.* 1995; 39:45–53. [PubMed: 7587974]
- Bellack AS, DiClemente CC. Treating substance abuse among patients with schizophrenia. *Psychiatr Serv.* 1999; 50:75–80. [PubMed: 9890583]
- Blanchard KA, Morgenstern J, Morgan TJ, Labouvie E, Bux DA. Motivational subtypes and continuous measures of readiness for change: concurrent and predictive validity. *Psychol Addict Behav.* 2003; 17:56–65. [PubMed: 12665082]
- Booth RE, Kwiatkowski C, Iguchi MY, Pinto F, John D. Facilitating treatment entry among out-of-treatment injection drug users. *Public Health Rep.* 1998; 113:116–128. [PubMed: 9722817]
- Cacciola JS, Alterman AI, O'Brien CP, McLellan AT. The Addiction Severity Index in clinical efficacy trials of medications for cocaine dependence. *NIDA Res Monogr.* 1997; 175:182–191. [PubMed: 9467798]
- Carney MM, Kivlahan DR. Motivational subtypes among veterans seeking substance abuse treatment: profiles based on stages of change. *Psychol Addict Behav.* 1995; 9:135–142.
- Connors, GJ.; Donovan, DM.; DiClemente, CC. Substance abuse treatment and the stages of change: selection and planning interventions. Guilford Press; New York: 2001.
- DiClemente CC, Hughes SO. Stages of change profiles in outpatient alcoholism treatment. *J Subst Abuse.* 1990; 2:217–235. [PubMed: 2136111]
- DiClemente CC, Prochaska JO. Self-change and therapy change of smoking behavior: a comparison of processes of change in cessation and maintenance. *Addict Behav.* 1982; 7:133–142. [PubMed: 7102444]
- DiClemente, CC.; Prochaska, JO. Processes and stages of change: coping and competence in smoking behavior change. In: Shiffman, S.; Wills, T., editors. *Coping and Substance Use*. Academic Press; New York: 1985. p. 319–344.
- DiClemente CC, Schlundt D, Gemmell L. Readiness and stages of change in addiction treatment. *Am J Addict.* 2004; 13:103–119. [PubMed: 15204662]
- de Vet, E. Doctoral dissertation. Maastricht University; Maastricht, the Netherlands: 2005. Testing the Transtheoretical Model of Behavior Change: Validity and Applicability for Fruit Intake.
- Edens JF, Willoughby FW. Motivational profiles of polysubstance dependent patients: do they differ from alcohol-dependent patients? *Addict Behav.* 1999; 24:195–206. [PubMed: 10336101]

- Edens JF, Willoughby FW. Motivational patterns of alcohol dependent patients: a replication. *Psychol Addict Behav.* 2000; 14:397–400. [PubMed: 11130158]
- El-Bassel N, Schilling RF, Ivanoff A, Chen DR, Bidassie B, Hanson M. Stages of change among incarcerated drug using women. *Addict Behav.* 1998; 23:384–394.
- Freyer J, Tonigan JS, Keller S, Rumpf H, John U, Hapke U. Readiness for change and readiness for help-seeking: a composite assessment of client motivation. *Alcohol Alcohol.* 2005; 40:540–544. [PubMed: 16186144]
- Joe GW, Simpson DD, Broome KM. Effects of readiness for drug abuse treatment on client retention and assessment of process. *Addiction.* 1998; 93:1177–1190. [PubMed: 9813899]
- Johnson SC. Hierarchical clustering schemes. *Psychometrika.* 1967; 32:241–254. [PubMed: 5234703]
- Lin C, Wu Z, Rou K, Yin W, Wang C, Shoptaw S, Detels R. Structural-level factors affecting implementation of the methadone maintenance therapy program in China. *J Subst Abuse Treat.* 2010; 38:119–127. [PubMed: 20015606]
- Liu E, Wu Z, Liang T, Shen L, Zhong H, Wang B, Detels R. Risk factors associated with continued heroin use during methadone maintenance treatment in Guizhou province, China [Chinese]. *Zhonghua Yu Fang Yi Xue Za Zhi.* 2008; 42:875–878. [PubMed: 19141219]
- Longshore D, Teruya C. Treatment motivation in drug users: a theory-based analysis. *Drug Alcohol Depend.* 2006; 81:179–188. [PubMed: 16051447]
- Martin GW, Wilkinson DA, Poulos CX. The drug avoidance self-efficacy scale. *J Subst Abuse.* 1995; 7:151–163. [PubMed: 7580226]
- McConaughy EA, Prochaska JO, Velicer WF. Stages of change in psychotherapy: measurement and sample profiles. *Psychotherapy (Chic).* 1983; 20:368–375.
- McConaughy EA, DiClemente CC, Prochaska JO, Velicer WF. Stages of change in psychotherapy: a follow-up report. *Psychotherapy (Chic).* 1989; 26:494–503.
- McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Pettinati H, Argeriou M. The fifth edition of the addiction severity index. *J Subst Abuse Treat.* 1992; 9:199–213. [PubMed: 1334156]
- Miller, WR.; Zweben, A.; DiClemente, CC.; Rychtarik, RG. *Motivation Enhancement Therapy Manual: A Clinical Research Guide for Therapists.* US Government Printing Office; Washington, DC: 1992.
- Miller, WR.; Rollnick, S. *Motivational Interviewing: Preparing People for Change.* 2. Guilford Press; New York: 2002a.
- Miller WR, Wilbourne PL. Mesa grande: a methodological analysis of clinical trials of treatment for alcohol use disorders. *Addiction.* 2002b; 97:265–277. [PubMed: 11964100]
- Nigg CR, Burbank PM, Paduka C, Rossi JS, Velicer WF, Laforge RG, Prochaska JO. Stages of change across ten health risk behaviors. *Gerontologist.* 1999; 39:473–82. [PubMed: 10495586]
- Pang L, Hao Y, Mi G, Wang C, Luo W, Rou K, Li J, Wu Z. Effectiveness of first eight methadone maintenance treatment clinics in China. *AIDS.* 2007; 21:S103–S107. [PubMed: 18172377]
- Pantalon MV, Nich C, Frankforter T, Carroll KM. University of Rhode Island Change Assessment. The URICA as a measure of motivation to change among treatment-seeking individuals with concurrent alcohol and cocaine problems. *Psychol Addict Behav.* 2002; 16:299–307. [PubMed: 12503902]
- Prochaska JO, DiClemente CC, Norcross JC. In search of how people change: applications to addictive behaviors. *Am Psychol.* 1992; 47:1102–1114. [PubMed: 1329589]
- Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol.* 1983; 51:390–395. [PubMed: 6863699]
- Prochaska JO, Velicer WF, Rossi JS, Goldstein MG, Marcus BH, Rakowski W, Fiore C, Harlow LL, Redding CA, Rosenbloom D, Rossi SR. Stages of change and decisional balance for 12 problem behaviors. *Health Psychol.* 1994; 13:39–46. [PubMed: 8168470]
- Punj G, Stewart D. Cluster analysis in marketing research: review and suggestions for application. *J Market Res.* 1983; 20:134–148.
- Sullivan GS, Wu Z. Rapid scale up of harm reduction in China. *Int J Drug Policy.* 2007; 18:118–128. [PubMed: 17689354]

- Velasquez MM, Carbonari JP, DiClemente CC. Psychiatric severity and behavior change in alcoholism: the relation of the transtheoretical model variables to psychiatric distress in dually diagnosed patients. *Addict Behav.* 1999; 24:481–496. [PubMed: 10466844]
- Velicer WF, Hughes SL, Fava JL, Prochaska JO, DiClemente CC. An empirical typology of subjects within stage of change. *Addict Behav.* 1995; 20:299–320. [PubMed: 7653313]
- Wells EA, Calsyn DA, Clark LL, Saxon AJ, Jackson TR. Retention in methadone maintenance is associated with reductions in different HIV risk behaviors for women and men. *Am J Drug Alcohol Abuse.* 1996; 22:509–521. [PubMed: 8911589]
- Willoughby FW, Edens JF. Construct validity and predictive utility of the stages of change scale for alcoholics. *J Subst Abuse.* 1996; 8:275–291. [PubMed: 8934434]
- Yin W, Hao Y, Sun X, Gong X, Li F, Li J, Rou K, Sullivan SG, Wang C, Cao X, Luo W, Wu Z. Scaling up the national methadone maintenance treatment program in China: achievements and challenges. *Int J Epidemiol.* 2010; 39:29–37.

Figure 1.

Figure 1(a): Pre-participation Cluster (n=84)

Figure 1(b): Denial Cluster (n=68)

Figure 1(c): Participation Cluster (n=18)

Figure 1(d): Uninvolved Cluster (n=5)

Figure 1(e): Ambivalent Cluster (n=4)

Table 1

Cluster Subtype Differences between this and Two Other Studies

Clusters	<u>This study</u>	<u>El-Bassel et al. (1998)</u>	<u>Carney et al. (1995)</u>
	N (%)	N (%)	N (%)
1. Uninvolved	5 (2.8)	22 (9.3)	0 (0.0)
2. Denial ^a	68 (38.0)	153 (59.5)	120 (29.7)
3. Contemplation ^b	0 (0.0)	0 (0.0)	69 (17.1)
4. Decision making ^c	0 (0.0)	33 (12.5)	0 (0.0)
5. Pre-participation	84 (46.9)	0 (0.0)	0 (0.0)
6. Ambivalent	4 (2.2)	25 (12.8)	90 (22.3)
7. Participation	18 (10.1)	24 (9.3)	125 (30.9)
Total	179 (100.0)	257 (100.0)	404 (100.0)

Note. The order of the clusters was determined by level of motivation they indicated; the level of motivation increased as the number increased.

^aDenial was defined as Precontemplation in Carney et al. (1995).

^bDecision making was characterized by below-average scores on Precontemplation and Maintenance but above average scores on Contemplation, Preparation, and Action subscales

^cContemplation was characterized by above-average scores on the Contemplation stage and below-average scores on Precontemplation, Action, and Maintenance subscales.

Table 2

Three Cluster Profile Differences

Variables	Denial (n = 68)	Pre-participation (n = 84)	Participation (n = 18)	P
Age, mean ! SD	39.1	36.9	35.1	0.0066
Male, %	69.1	65.5	50.0	0.3170
Married, %	45.6	41.7	55.6	0.5509
Years of education, mean ! SD	8.7 ! 2.6	8.8 ! 2.5	9.5 ! 2.5	0.4760
Years of drug use, mean! SD	13.5 ! 4.3	12.0 ! 3.5	13.7 ! 4.5	0.0596
Years of MMT, mean ! SD	1.9 ! 1.2	2.0 ! 1.1	2.1 ! 1.4	0.7833
Drug avoidance self-efficacy, mean ! SD	25.2 ! 6.3	26.3 ! 6.1	24.3 ! 5.4	0.3627
ASI drug severity score, mean ! SD	0.09 ! 0.05	0.08 ! 0.04	0.11 ! 0.06	0.0507
Continued heroin use, %	34.3	44.1	83.3	0.0010
Readiness score, mean ! SD	67.4 ! 4.1	75.7 ! 3.4	88.6 ! 6.6	<.0001

Note. Group differences were tested by ANOVA tests for continuous variables and chi-squares for categorical variables.

ASI—Addiction Severity Index; Readiness score—continuous measure of URICA.

Table 3
Correlations between URICA Readiness Score and Drug Use-related Variables (N=179)

Variables	Correlation coefficient					
	1	2	3	4	5	6
1. URICA Readiness score		-0.039	-0.010	-0.084	0.110	0.259**
2. Years of drug use			0.145	-0.221**	0.045	-0.001
3. Years of MMT				-0.004	0.038	0.208*
4. Drug avoidance self-efficacy					-0.162*	-0.052*
5. ASI drug severity score						0.264**
6. Continued heroin use						

* $P < 0.05$
** $P < 0.001$
*** $P < 0.0001$