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Individual and social factors associated with participation in treatment programs for drug users

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Abstract

Since only about one third of people who are dependent on drugs are in treatment, there is a need to promote both treatment entry and retention. Previous research has described the role of individual and social characteristics in drug treatment participation, but little is known about the interaction of individual and social factors. Injecting and non-injecting drug users (2002–2004; N=581) were recruited in Baltimore, MD (SHIELD Study) and were administered a structured questionnaire. The mean age of participants was 43.6 years, 41% were female, 50% had high school education, and 16% self-reported being HIV infected. Logistic regression analyses of interaction terms revealed that compared to those with no plans to stop and no friends encouraging them to enter treatment those who planned to cease drug use or whose friends encouraged treatment were more likely to attend a 12-step program. Furthermore, compared to those with no problems with drug use and no friends encouraging them to enter treatment those with greater perceived drug problem severity or with friends encouraging treatment were more likely to attend methadone maintenance, as were those who did not receive free drugs from others. The influence of friends may have a crucial modifying effect by getting into treatment less addicted individuals who have higher chances of successful recovery.

Keywords

drug treatment; injecting and non-injecting drug users; interaction; relapse; treatment entry; treatment retention; sustained treatment

Introduction

Trends in world drug markets suggest that overall levels of illicit drug use remain stable (United Nations Office on Drugs and Crime, 2007). In the U.S., the cost associated with illicit drug use has been estimated to be about 180 billion US dollars per year (Office of National Drug Control Policy, 2004). Treating drug addiction is one of the most effective ways to reduce costs associated with drug use (National Institutes on Drug Abuse, 1999). In addition to reducing drug use, participation in drug treatment programs also reduces the risk of infection with HIV and hepatitis (Langendam et al. 2000; Metzger et al. 1998). Both longitudinal and cross-sectional studies demonstrate that those who participate in drug treatment, compared to those who do not, and those who stay longer in treatment programs compared to those who stop attending treatment, have lower seroconversion rates for infections and report engaging in less

high-risk sexual and injecting behaviors (Hartel and Schoenbaum, 1998; Magura et al. 1998; Stark et al. 1996).

Several forms of treatment programs exist. In addition, there are programs that are not formal treatment but promote abstinence. Methadone is a synthetic narcotic that has been used to treat opiate addiction – it is taken orally, and it suppresses symptoms associated with opiate withdrawal (Broekhuysen, 2000). Many methadone treated patients remain in treatment for several years. Twelve-step programs are a community-based recovery resource that promotes abstinence from alcohol, drugs and other addictive behaviors (AA Services, 2002). The principle of 12-step is a set of twelve guiding points, and meetings are held by addicts who help each other to overcome their addiction.

Of people who are dependent on drugs, only about one third are in treatment and about one fifth participate in 12-step programs (Compton et al. 2007). Thus, there is a need to promote both treatment entry and retention. To promote treatment, it is important to identify factors that impede or facilitate treatment participation. Prior studies on drug treatment programs suggest that injecting drug users, females, and those who are older, have prior treatment experience, use heroin, have higher education, have a smaller number of friends who use drugs, who do not receive public assistance, and those infected with HIV are more likely to enter or remain in treatment; on the other hand, lack of motivation and readiness to change, homelessness, cocaine or crack use, child care problems, and need to travel longer distance traveled to treatment are barriers for participation (Appel et al. 2004; Beardsley et al. 2003; Booth et al. 2003; Laudet, 2003; Schutz et al. 1994; Shah et al. 2000; Vaughn et al. 2002).

Although several studies have found that social factors, specifically affiliating with active drug users are linked to relapse (Goehl et al. 1993; Termorshuizen et al. 2005; Wasserman et al. 2001), few studies have examined how social interactions and communications among network members may promote entry into drug treatment. Lloyd and colleagues (Lloyd et al. 2005) found that individuals who lived with family or friends were almost three times more likely to enter methadone treatment. Yet little is known about the effect of social factors and the interaction of social influences and individual factors. Key questions are whether individual factors and social factors work synergistically to promote drug treatment and whether the presence of social factors can override the absence of individual factors.

The aim of this analysis was to assess how individual-level characteristics, specifically, perceived problems of drug use, intentions of stopping, and perceived ability to control drug use may combine with social factors (peers encouraging treatment, discussing reducing drug use, encouraging drug use, and receiving free drugs) to predict treatment participation among injecting and non-injecting drug users in Baltimore City. Based on prior studies on the importance of social support and treatment retention, we hypothesize that while both individual- and social-level domains alone influence drug treatment participation, the combination of these characteristics is a better predictor for treatment participation than either of them alone (Gifford and Humphreys, 2007; Gogineni et al. 2001; Knight and Simpson, 1996).

Methods

Setting and participants

SHIELD (Self-Help in Eliminating Life-Threatening Diseases) was a randomized controlled network intervention study to help stop the spread of HIV and hepatitis infections in the community. Participants learned techniques for personal risk reduction, correct condom use, and safer sex negotiation skills. The intervention also addressed injection drug use risk and the avoidance of risky situations. After being trained to perform community outreach, participants

promoted HIV prevention among their networks and community contacts. Between August 1997 and March 1999, participants were recruited into the SHIELD study through targeted outreach in Baltimore, MD (Latkin et al. 2004; Latkin et al. 2003). Ethnography and geocoding drug-related arrests identified areas in the city where drug users are likely to congregate. Potential participants were told about the aims of the study and were administered a brief screener questionnaire to determine eligibility. Those who were 18 years old or older and had weekly contact with drug users in the community were eligible to participate, and were followed up every nine months for a total of five follow-up periods. Of those who were screened eligible to participate, and, although refusal was possible at any time during the interview, nobody refused to participate. Data collection took place at the project field office in East Baltimore. Altogether 838 participants were interviewed at wave five; the average retention rate per wave was over 85%. Participants were compensated for their time (\$20 for baseline interviews and \$25 for follow-up interviews). The study was approved by the Johns Hopkins School of Public Health's Institutional Review Board.

This report is based on cross-sectional data collected at the fifth wave, between July 2002 and June 2004. We used wave five data because the focus of the SHIELD study was on teaching communication skills, and treatment-related variables were asked only at wave five. Those who were followed up at wave five were significantly ($p < 0.05$) more likely than those who did not complete wave five to be female. There were no significant differences in age, education, employment status, drug injecting in the past 6 months, HIV status, or lifetime drug treatment participation.

Those who reported having used any drugs (marijuana, speedball, sedatives, speedball, injected or non-injected heroin, injected or non-injected cocaine, crack or other illicit drugs) in the past 6 months were included in this analysis. Of the 838 participants, 581 reported that they used drugs in the past 6 months at wave 5, and are included in this analysis.

Measures and variables

After providing their informed consent, participants were administered a structured, face-to-face computer assisted interview. Audio computer-assisted self-interviewing (ACASI) was used to assess HIV risk behaviors. The dependent variables in this analysis were participation in a 12-step meetings at least once a week in the past 6 months and participation in a methadone maintenance program for at least 3 months in the past 6 months. We chose these cutoff points based on the distribution of these variables: in the past 6 months 91% of those in methadone program, a quarter of the sample (25%), stayed for at least 3 months in the program, and similarly, about a quarter of the sample (27%) attended a 12-step meeting about once week. Furthermore, participation in 12-step meetings at least weekly was found to be associated with abstinence (Fiorentine, 1999). In addition, the aim of the analysis was to assess individual and social factors that lead to sustained treatment. We chose to examine participation in these two programs because these are the programs that have been associated with the highest rates of success as measured by drug free days (Maddux and Desmond, 1992; Mattick et al. 2003). While 12-step programs are not fee-for-services treatment programs nor are they considered treatment, but as self-help groups promoting abstinence they offer an alternative or a complement to other, more formal forms of treatment (Fiorentine, 1999; Fiorentine and Hillhouse, 2000), which often require insurance or have waiting lists for uninsured clients.

Independent variables included individual attitudes toward drug use, social characteristics and control variables. For the measurement of individuals' attitudes toward drug use variables, we used ethnographic methods of focus groups and observations of intervention group sessions to develop a list of common reports of participants' motivations to seek treatment. Three themes emerged from the qualitative analyses: concerns about withdrawal symptoms and other problems with drug use, strategies to control drug use, and desire to stop drug use. We recorded

statements about these three themes and developed a quantitative scale containing 17 items. Some of these items are similar to items in the TCU Treatment Motivation Scales (Knight et al. 1994). Psychometric methods were used to evaluate the items (Cronbach's alpha = 0.79). Using this scale, individual attitudes toward drug use variables were created by means of principal component analysis with varimax rotation (for a detailed description of these variables and their factor loadings see Table 1). Variables with factor loadings above 0.5 or below -0.5 were used to derive three individual characteristic factors: problems with drug use, plans to stop and plans to control drug use. The factor scores were then dichotomized based on median split for easier interpretation (0=low vs. 1=high scores).

Social characteristic variables included were whether or not friends encourage drug treatment participation (0=none vs. 1=any), drug using peers discuss reducing drug use (0=never, rarely, or often vs. 1=very often), whether participant was given free drugs in the past 6 months (0=gets free drugs vs. 1=does not get free drugs), and whether participant was encouraged by friends to use drugs (0=any friends encourage them vs. 1=no friends encourage them). Control variables included demographic variables such as age, gender and at least part-time employment; self-reported awareness of HIV serostatus; whether participant injected drugs in the past 6 months; and participating in methadone treatment and daily drug use in the past 6 months (12-step program participation analysis); or participating in 12-step program and daily opiate use in the past 6 months (methadone program participation analysis) (Schutz et al. 1994; Shah et al. 2000; Vaughn et al. 2002; Zule and Desmond, 2000).

Statistical analysis

Two sets of regression models were constructed, one for each of the dependent variables (Hosmer and Lemeshow, 1989). Many of the participants who had not used opiates in the past 6 months were recovering opiate users in methadone programs. These participants had actively used opiates in the past, but currently they use other drugs and attend the methadone program to maintain their abstinence from their previous opiate addiction. Thus, only those participants were included in the methadone program participation analysis who reported that they had ever used opiates (n=535, 92.1% of the total sample). All participants were included in the analysis examining 12-step participation (n=581).

First, simultaneous multivariate models were built with all candidate individual, social and control variables included. In addition, univariate contingency tables with univariate significance testing (Wald Chi-square) were constructed to describe the distribution of each variable. Then, interaction terms (X1*X2) were introduced to the simultaneous models to test for significant interactions (manual stepwise selection). This approach allowed us to examine the presence and absence of statistically significant social and individual factors in the same model and to model the relative importance of social and individual factors. Keeping the statistically significant (p<0.05) interaction terms and their main effects in the model, we constructed a simultaneous multivariate regression model with all potential correlates and interaction terms to calculate odds ratios and 95% confidence intervals for the full model. In this simultaneous model, odds ratios were not calculated for interaction terms and their main effects, but parameter estimates of the logs of the odds are reported. We then used backward elimination of the other variables that were not part of the interaction to identify statistically significant independent correlates of treatment participation. After the final regression models were built, interaction dummy variables were created to calculate the odds ratios and 95% confidence intervals of the interaction category levels in the final models. SAS version 9.1 was used for all analyses.

Results

Description of the sample

Of the 581 participants who reported drug use at wave five, 41% were female (Table 2). The mean age of the sample was 43.6 years ($SD=7.4$). Half (50%) had at least high-school education, most (78%) were unemployed, 40% had an average monthly income of less than \$500, and about one in five (17%) were homeless. About a quarter (26%) used more than one drug with the same frequency; the primary substance for those who used only one drug most frequently was crack (28%), speedball (heroin injected together with cocaine; 19%), marijuana (10%), non-injected heroin (9%) and other (sedatives, stimulants, injected heroin, non-injected cocaine or injected cocaine; 10%). At wave 5, about one quarter participated in a 12-step program at least once a week in the past 6 months (27%) or methadone treatment (25%), and about one in ten in both (11%). Baseline reports of drug treatment participation of the 581 participants who reported using drugs at wave 5 were as follows: 21% indicated that they had ever participated in methadone maintenance, and 67% indicated that they had even been to 12-step meetings (data not shown).

Univariate analyses

Statistically significant correlates of 12-step participation were problems with drug use, plans to stop, friends encouraging treatment, drug injecting, and current participation in methadone program. Correlates of methadone maintenance participation were plans to stop, plans to control drug use, not getting free drugs from others, current participation in 12-step, and female gender. Using opiates daily was inversely correlated with participation in methadone maintenance.

Multivariate analyses

Multivariate interaction analysis showed that plans to stop using drugs and friends encouraging treatment participation was significant when assessing participation in 12-step programs (Table 3). Significant independent correlates of participation in 12-step (final regression model) were the interaction of plans to stop and friends encouraging to enter treatment: compared to those with no plans to stop and no friends encouraging them to enter treatment (reference category), those with no plans to stop but having friends who encourage them to enter treatment, and those who plan to stop regardless whether or not their friends encouraged them to enter treatment had almost four times the odds of participating in the 12-step program (Table 5). In addition, those who participated in methadone program at the time of the study had almost three times the odds of also participating in 12-step.

The interaction of problems with drug use and friends encouraging treatment participation was significant when examining multivariate interactions related to methadone treatment (Table 4). Significant multivariate correlates of participation in methadone maintenance were the interaction categories of problems with drug use and friends encouraging to enter treatment the following way: compared to those with no problems with drug use and no friends encouraging them to enter treatment (reference category), those with no problems with drug use but having friends who encourage them to enter treatment, and those with problems with drug use regardless whether or not their friends encouraged them to enter treatment were between two to three times more likely to participate in the methadone maintenance program (Table 5). Furthermore, those who did not get free drugs from others had twice the odds, those who participated in 12-step program at the time of the study had almost three times the odds, and females had three times the odds of participating in methadone maintenance. Older age also showed a positive association. In addition, those who used opiates daily in the past 6 months were about half as likely to participate in methadone maintenance.

Discussion

In this analysis, we assessed how individual-level characteristics combine with social factors to predict treatment participation among injecting and non-injecting drug users in Baltimore City. We tested the hypothesis that the combination of individual- and social-level domains is a better predictor for treatment participation than either of them alone. We found that compared to those with no plans to stop and no friends encouraging them to enter treatment, those with no plans to stop but having friends who encourage them to enter treatment, and those who plan to stop regardless whether or not their friends encouraged them to enter treatment were more likely to participate in 12-step program. In addition, compared to those with no perceived problems with drug use and no friends encouraging them to enter treatment, those with no perceived problems with drug use but having friends who encourage them to enter treatment, and those with perceived problems with drug use regardless whether or not their friends encouraged them to enter treatment were more likely to participate in the methadone maintenance program.

Our analysis also found that participation in formal treatment increased participation in 12-step and vice versa and that different reasons may play a role in participation in different treatment types. Since participation in more than one treatment modality may give better treatment outcomes than participation in one only (Fiorentine and Hillhouse, 2000)(Gilman et al. 2001; Laudet et al. 2003), participants in methadone programs may benefit from being encouraged to participate in 12-step programs. However, not all 12-step programs are supportive of methadone use..

Some studies have found that those who used drugs more frequently were more likely to be in or enter treatment (Schutz et al. 1994; Zule and Desmond, 2000), and other research has found an association between treatment and greater severity of dependence (Booth et al. 2004; Ferri et al. 2002). One reason why users of legal or illegal substances may want to stop use or seek treatment is that their drug use is perceived to be too costly. (Gallus et al. 2006; Gruber et al. 2003; Townsend et al. 1994): in this relation, frequent use may be a marker for a more expensive substance use habit. In our study the frequency of drug use was not associated with treatment participation but we found an interactive association between treatment and the level of problems that drug use created. Specifically, we found an interaction between friends encouraging treatment and identifying that there is a problem related to drug use that needs to be addressed (plans to stop in the case of 12-step participation and reported greater problems with drug use in the case of methadone participation). Those who perceived that they had a drug problem were more likely to seek treatment (Prochaska et al. 1997). A key finding of our study is, however, that those who did not believe they had a drug problem were just as likely to seek treatment as those who did if they are encouraged by their friends to do so. Thus, friends may play an important role in the process of motivating a person to realize they had a drug problem before the drug problem leads the person to recognize their own need for treatment. As such, friends may help drug users with low severity of drug problems to get treatment before serious drug problems arise, thus decrease the length of addiction career and indirectly minimize the many costly consequences of drug use to the individual and society.

The association between not receiving free drugs from peers and methadone maintenance participation may have several explanations. First, drug users may enter methadone treatment because it is a way for them to cut down on their drug expenses. In this context, not receiving free drugs may be an important motivator for entering treatment. On the other hand, receiving free drugs may promote a relapse into drug use while in methadone treatment, thus not receiving free drugs is the reason for being able to remain in treatment. The receipt of free drugs may also indicate the presence of social ties that reinforce drug use.

Study's limitations

One limitation of the study is that this is not a random sample of drug users, but based on street recruitment and network recruitment. Hence the results of this analysis may not generalize to all drug users; for example, those drug users who are more socially integrated may be underrepresented in our sample (Gyarmathy and Neaigus, 2005). Background characteristics collected about participants were limited to those necessary to understand factors related to the aims of the SHIELD study, and no data was collected about other descriptive information about participants, such as personal and other resources, coping strategies, and other psycho-social characteristics. In addition, our data on drug use and treatment are based on self-report, which, due to social desirability, may lead to under- or over-reporting. However, since neither drug use nor drug treatment participation were criteria for eligibility to enter the study, participants had minimal motivation to distort their reports. Furthermore, our analysis is based on cross-sectional data, which limits causal inferences. In addition, the study did not assess other key factors that may be associated with treatment entry and outcomes, such as program gatekeepers, treatment quality (content and staff) and appropriateness, the effect of significant others, community and neighborhood factors, drug availability, and individual level factors such as medical and mental health conditions, e.g., hepatitis and depression and life events. Some treatment may have been court mandated and policing practices such as arresting drug users for loitering may have also induced some individuals to enter treatment. Moreover, simply entering into treatment should not be equated to engaging and participating in treatment, and ceasing substance use. Finally, our study used a measure of problems with drug use that has not been validated in other drug using populations. Our goal, however, was not to diagnose drug addiction, but to examine how drug users' perceptions of their problem use is linked to treatment.

Conclusions

Based on this analysis, we conclude that social influence may not only promote entry into treatment but also the success of treatment results. The results of this study suggest that friends may play a critical positive role in encouraging users to be in treatment (Booth et al. 2003; Wasserman et al. 2001). These social characteristics appear to interact with individuals' perceived ability to control their drug use and their intentions to stop drug use. These results have several implications. Interventions that teach drug using individuals the importance of controlling their drug use may promote their participation in methadone maintenance. Such methods may include encouraging them to stay away from drug-related cues (people, places and things - Booth et al. 2003; Costenbader et al. 2006), with a special emphasis on avoiding situations that offer easy access to drugs. By reducing interactions with other drug users, it is likely that the non-users in their social networks will have greater influence on their treatment behaviors. In addition, drug users should be advised to interact with friends who encourage treatment, with a cautionary note that if drug users are not ready to change they may not want to socialize with people who are trying to get them to change. Motivational interviewing is one method that has been successful in enhancing treatment entry (Booth et al. 2004; Booth et al. 1998); one possible mechanism may be through increasing drug users' awareness of problems caused by drug use, which in turn facilitates their desire to stop drug use. Strategies to increase treatment entry and other forms of help seeking may want to consider the involvement of peers in the process of motivational interviewing to encourage drug users' entry into treatment.

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Glossary

Treatment

Treatment can be defined as a planned, goal directed change process, which is *bounded* (culture, place, time, etc.) and can be categorized into professional-based, tradition-based, mutual-help based (AA, NA, etc.) and self-help (“natural recovery”) models

Methadone

A synthetic opiate, used to treat opiate addiction by reducing withdrawal symptoms. It is also used to detoxify users of opiates

Recovery

Remission from drug dependence and/or misuse, usually as a result of successful and prolonged drug treatment participation

Geocoding

Assigning codes to geographic areas, such as street addresses and zip codes. These geographic components then can be mapped

Sustained treatment

When participants in a treatment program remain in treatment for a longer period of time

Treatment entry

Starting treatment participation

Treatment retention

Remaining in treatment - the first step in achieving sustained treatment

References

- AA Services. Alcoholics Anonymous: The Story of How Many Thousands of Men and Women Have Recovered from Alcoholism. Alcoholics Anonymous World Services; 2002.
- Appel PW, Ellison AA, Jansky HK, Oldak R. Barriers to enrollment in drug abuse treatment and suggestions for reducing them: opinions of drug injecting street outreach clients and other system stakeholders. *Am J Drug Alcohol Abuse* 2004;30:129–53. [PubMed: 15083558]
- Beardsley K, Wish ED, Fitzelle DB, O’Grady K, Arria AM. Distance traveled to outpatient drug treatment and client retention. *J Subst Abuse Treat* 2003;25:279–85. [PubMed: 14693257]
- Booth RE, Corsi KF, Mikulich-Gilbertson SK. Factors associated with methadone maintenance treatment retention among street-recruited injection drug users. *Drug Alcohol Depend* 2004;74:177–85. [PubMed: 15099661]
- Booth RE, Corsi KF, Mikulich SK. Improving entry to methadone maintenance among out-of-treatment injection drug users. *J Subst Abuse Treat* 2003;24:305–11. [PubMed: 12867204]
- 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(Suppl 1):116–28. [PubMed: 9722817]
- Broekhuysen, ES. Methadone fact sheet. White House Office of National Drug Control Policy. 2000. <http://www.whitehousedrugpolicy.gov/publications/factsht/methadone/>
- Compton WM, Thomas YF, Stinson FS, Grant BF. Prevalence, correlates, disability, and comorbidity of DSM-IV drug abuse and dependence in the United States: results from the national epidemiologic survey on alcohol and related conditions. *Arch Gen Psychiatry* 2007;64:566–76. [PubMed: 17485608]
- Costenbader EC, Astone NM, Latkin CA. The dynamics of injection drug users’ personal networks and HIV risk behaviors. *Addiction* 2006;101:1003–13. [PubMed: 16771892]
- Ferri CP, Gossop M, Rabe-Hesketh S, Laranjeira RR. Differences in factors associated with first treatment entry and treatment re-entry among cocaine users. *Addiction* 2002;97:825–832. [PubMed: 12133121]

- Fiorentine R. After drug treatment: are 12-step programs effective in maintaining abstinence? *Am J Drug Alcohol Abuse* 1999;25:93–116. [PubMed: 10078980]
- Fiorentine R, Hillhouse MP. Drug treatment and 12-step program participation: the additive effects of integrated recovery activities. *J Subst Abuse Treat* 2000;18:65–74. [PubMed: 10636609]
- Gallus S, Schiaffino A, La Vecchia C, Townsend J, Fernandez E. Price and cigarette consumption in Europe. *Tob Control* 2006;15:114–9. [PubMed: 16565459]
- Gifford E, Humphreys K. The psychological science of addiction. *Addiction* 2007;102:352–61. [PubMed: 17298641]
- Gilman SM, Galanter M, Dermatis H. Methadone Anonymous: A 12-Step Program for Methadone Maintained Heroin Addicts. *Subst Abus* 2001;22:247–256. [PubMed: 12466684]
- Goehl L, Nunes E, Quitkin F, Hilton I. Social networks and methadone treatment outcome: the costs and benefits of social ties. *Am J Drug Alcohol Abuse* 1993;19:251–62. [PubMed: 8213691]
- Gogineni A, Stein MD, Friedmann PD. Social relationships and intravenous drug use among methadone maintenance patients. *Drug Alcohol Depend* 2001;64:47–53. [PubMed: 11470340]
- Gruber J, Sen A, Stabile M. Estimating price elasticities when there is smuggling: the sensitivity of smoking to price in Canada. *J Health Econ* 2003;22:821–42. [PubMed: 12946461]
- Gyarmathy VA, Neaigus A. Marginalized and Socially Integrated Groups of IDUs in Hungary: Potential Bridges of HIV Infection. *J Urban Health* 2005;82:iv101–iv112. [PubMed: 16107433]
- Hartel DM, Schoenbaum EE. Methadone treatment protects against HIV infection: two decades of experience in the Bronx, New York City. *Public Health Rep* 1998;113(Suppl 1):107–15. [PubMed: 9722816]
- Hosmer, DW.; Lemeshow, S. *Applied logistic regression*. John Wiley and Sons, Inc; 1989.
- Knight DK, Simpson DD. Influences of family and friends on client progress during drug abuse treatment. *J Subst Abuse* 1996;8:417–29. [PubMed: 9058354]
- Knight, K.; Holcom, M.; Simpson, DD. *TCU Psychosocial Functioning and Motivation Scales: Manual on Psychometric Properties*. Fort Worth, Texas: Christian University, Institute of Behavioral Research; 1994.
- Langendam MW, van Brussel GH, Coutinho RA, van Ameijden EJ. Methadone maintenance and cessation of injecting drug use: results from the Amsterdam Cohort Study. *Addiction* 2000;95:591–600. [PubMed: 10829334]
- Latkin CA, Hua W, Davey MA. Factors Associated with Peer HIV Prevention Outreach in Drug-Using Communities. *AIDS Educ Prev* 2004;16:499–508. [PubMed: 15585427]
- Latkin CA, Sherman S, Knowlton A. HIV prevention among drug users: outcome of a network-oriented peer outreach intervention. *Health Psychol* 2003;22:332–9. [PubMed: 12940388]
- Laudet AB. Attitudes and beliefs about 12-step groups among addiction treatment clients and clinicians: toward identifying obstacles to participation. *Subst Use Misuse* 2003;38:2017–47. [PubMed: 14677780]
- Laudet AB, Magura S, Cleland CM, Vogel HS, Knight EL. Predictors of retention in dual-focus self-help groups. *Community Ment Health J* 2003;39:281–97. [PubMed: 12908643]
- Lloyd JJ, Ricketts EP, Strathdee SA, Cornelius LJ, Bishai D, Huettner S, Havens JR, Latkin C. Social contextual factors associated with entry into opiate agonist treatment among injection drug users. *Am J Drug Alcohol Abuse* 2005;31:555–70. [PubMed: 16320434]
- Maddux JF, Desmond DP. Methadone maintenance and recovery from opioid dependence. *Am J Drug Alcohol Abuse* 1992;18:63–74. [PubMed: 1562007]
- Magura S, Rosenblum A, Rodriguez EM. Changes in HIV risk behaviors among cocaine-using methadone patients. *J Addict Dis* 1998;17:71–90. [PubMed: 9848033]
- Mattick RP, Breen C, Kimber J, Davoli M. Methadone maintenance therapy versus no opioid replacement therapy for opioid dependence. *Cochrane Database Syst Rev* 2003:CD002209. [PubMed: 12804430]
- Metzger DS, Navaline H, Woody GE. Drug abuse treatment as AIDS prevention. *Public Health Rep* 1998;113(Suppl 1):97–106. [PubMed: 9722815]
- National Institutes on Drug Abuse. *Principles of drug addiction treatment - a research-based guide*. Bethesda, MD: National Institutes of Health; 1999.
- Office of National Drug Control Policy. *Washington, DC: Executive Office of the President; 2004.*

- Prochaska, J.; Redding, C.; Evers, K. The Transtheoretical Model and Stages of Change. Glanz, K.; Lewis, FM.; Rimer, BK., editors. San Francisco, CA: Jossey-Bass Publishers; 1997. p. 60-84.
- Schutz CG, Rapiti E, Vlahov D, Anthony JC. Suspected determinants of enrollment into detoxification and methadone maintenance treatment among injecting drug users. *Drug Alcohol Depend* 1994;36:129–38. [PubMed: 7851280]
- Shah NG, Celentano DD, Vlahov D, Stambolis V, Johnson L, Nelson KE, Strathdee SA. Correlates of enrollment in methadone maintenance treatment programs differ by HIV-serostatus. *AIDS* 2000;14:2035–43. [PubMed: 10997409]
- Stark K, Muller R, Bienzle U, Guggenmoos-Holzmann I. Methadone maintenance treatment and HIV risk-taking behaviour among injecting drug users in Berlin. *J Epidemiol Community Health* 1996;50:534–7. [PubMed: 8944860]
- Termorshuizen F, Krol A, Prins M, Geskus R, van den Brink W, van Ameijden EJ. Prediction of relapse to frequent heroin use and the role of methadone prescription: an analysis of the Amsterdam Cohort Study among drug users. *Drug Alcohol Depend* 2005;79:231–40. [PubMed: 16002032]
- Townsend J, Roderick P, Cooper J. Cigarette smoking by socioeconomic group, sex, and age: effects of price, income, and health publicity. *BMJ* 1994;309:923–7. [PubMed: 7950662]
- United Nations Office on Drugs and Crime (2007) World Drug Report. United Nations.
- Vaughn T, Sarrazin MV, Saleh SS, Huber DL, Hall JA. Participation and retention in drug abuse treatment services research. *J Subst Abuse Treat* 2002;23:387–97. [PubMed: 12495801]
- Wasserman DA, Stewart AL, Delucchi KL. Social support and abstinence from opiates and cocaine during opioid maintenance treatment. *Drug Alcohol Depend* 2001;65:65–75. [PubMed: 11714591]
- Zule WA, Desmond DP. Factors predicting entry of injecting drug users into substance abuse treatment. *Am J Drug Alcohol Abuse* 2000;26:247–61. [PubMed: 10852359]

Biographies

V. Anna Gyarmathy, PhD, MS, MPH, is a Scientific Writer at the European Monitoring Centre for Drugs and Drug Addiction. Her work has concentrated on the epidemiology of HIV/AIDS and hepatitis infections among disadvantaged and at-risk populations, such as injecting and noninjecting drug users, in domestic and international settings, with an emphasis on social and risk networks. She has experience in both quantitative and qualitative research methods.

Carl A. Latkin, PhD is Professor at the Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health. His research area is HIV prevention among disadvantaged populations. He has studied domestic and international approaches to behavior change, with an emphasis on social and personal network analysis, neighborhood factors and health behaviors. In his work among injection drug users, he has studied the social contexts and risk behaviors, integrating qualitative and quantitative methods.

Table 1

Individual susceptibility component variables and their factor loadings

Description of variable	Problems with drug use	plans to stop drug use	plans to control drug use
My drug use is making my life worse and worse	0.78931	0.20057	0.01456
My drug use is a problem for me	0.77708	0.11704	-0.03972
My life is out of control due to my drug use	0.75290	0.15651	-0.04341
I am often anxious about becoming sick or ill from withdrawal	0.73875	-0.00703	0.16160
I worry a lot that my drug use will get out of control	0.72625	0.05744	0.12301
I worry a lot about getting sick or ill from withdrawal	0.72430	-0.01460	0.16786
The first thing I think about when I get up in getting drugs	0.70287	-0.09494	-0.00980
When I am depressed I tend to use drugs more frequently	0.67274	-0.03572	0.15824
My drug use is more trouble than its worth	0.60400	0.16711	-0.04961
My drug use is under control	-0.52881	0.04997	0.33866
I plan to quit using drugs in the next 30 days	0.09630	0.84877	0.10673
I am ready to quit using drugs now	0.04299	0.78579	0.12749
I plan to quit using drugs in the next 6 months	0.05325	0.75533	0.11934
I work hard to keep my drug use under control	0.06465	0.05449	0.70194
I have developed a lot of ways to keeping my drug use under control	-0.24430	0.06371	0.68035
I often think about ways of keeping my drug use under control	0.19144	0.09892	0.67514
When I am happy I tend to use drugs less frequently	0.12377	0.13316	0.53078

Cronbach's alpha = 0.79

Table 2
Description of the sample at wave 5 (N=581)

Characteristic	N (%)
Gender	
male	341 (58.7)
female	240 (41.3)
Age	43.6 (7.36)
High school education	291 (50.1)
Employment status	
full time	61 (10.5)
part time	67 (11.5)
unemployed	453 (78.0)
Monthly income less than \$500	230 (39.6)
Homeless in the past 6 months	101 (17.4)
Was in prison in the past 6 months	122 (21.0)
Marital status	
single	297 (51.1)
living together as if married	132 (22.7)
married	46 (7.9)
other	106 (18.3)
Awareness of HIV status	
never tested	4 (0.7)
never returned for results	140 (24.1)
not infected	347 (59.7)
infected	90 (15.5)
Frequency of injecting	
did not use	315 (54.2)
non-daily use	159 (27.4)
daily use	107 (18.4)
Primary substance used	
more than one drug	148 (25.6)
crack	163 (28.2)
speedball	108 (18.7)
marijuana	55 (9.5)
non-injected heroin	49 (8.5)
other (sedatives/stimulants/injected heroin/non-injected cocaine/injected cocaine)	58 (10.0)
Frequency of substance use	
non-daily use	363 (62.5)
daily use	218 (37.5)
Frequency of opiate use	
never used opiates	46 (7.9)
non-daily use	377 (64.9)
daily use	158 (27.2)
Participated in 12-step program at least once a week in the past 6 months	
no	424 (73.0)
yes	157 (27.0)
Participated in methadone treatment for at least 3 months in the past 6 months	
no	438 (75.4)
yes	143 (24.6)
Participated in both 12-step at least weekly and in methadone treatment for at least 3 months in the past 6 months	
no	518 (89.2)
yes	63 (10.8)

Table 3
Hypothesized predictors of participation in 12-step meetings at least once a week in the past 6 months

Characteristic	Total N	Percent in treatment	univariate OR (95% CI)	multivariate aOR (95% CI)
Total	581	27.0%		
Individual characteristics				
Problems with drug use scale above median				
no	265	22.6%	(reference category)	
yes	316	30.7%	1.5 (1.0, 2.2) *	1.4 (0.9, 2.2)
Plans to stop scale above median				
no	248	21.4%	(reference category)	
yes	333	31.2%	1.7 (1.1, 2.4) *	PE = 1.3131 *
Plans to control scale above median				
no	264	23.9%	(reference category)	
yes	317	29.7%	1.3 (0.9, 2.0)	1.3 (0.8, 1.9)
Social characteristics				
Friends encourage treatment				
no	207	20.3%	(reference category)	
yes	374	30.7%	1.7 (1.2, 2.6) *	PE = 1.1108 *
Drug buddies discuss using less very often				
no	498	25.9%	(reference category)	
yes	83	33.7%	1.5 (0.9, 2.4)	1.2 (0.7, 2.1)
Does not get drugs from others				
no	422	26.1%	(reference category)	
yes	159	29.6%	1.2 (0.8, 1.8)	1.1 (0.7, 1.8)
Does not get encouraged to use				
no	278	27.0%	(reference category)	
yes	303	27.1%	1.0 (0.7, 1.4)	1.0 (0.7, 1.5)
Control variables				
Injected drugs				
no	315	23.2%	(reference category)	
yes	266	31.6%	1.5 (1.1, 2.2) *	1.5 (1.0, 2.2)
Participated in methadone program				
no	438	21.5%	(reference category)	
yes	143	44.1%	2.9 (1.9, 4.3) *	2.6 (1.7, 3.9) *
Frequency of drug use - daily user				
no	363	27.8%	(reference category)	
yes	218	25.7%	0.9 (0.6, 1.3)	0.8 (0.5, 1.1)
Female gender				
no	341	25.2%	(reference category)	
yes	240	29.6%	1.2 (0.9, 1.8)	1.2 (0.8, 1.8)
Age				
mean (SD) - not in treatment		43.5 (7.6)	(reference category)	
mean (SD) - in treatment		44.0 (6.8)	1.0 (1.0, 1.0)	1.0 (1.0, 1.0)
Employed at least part time				
no	453	27.4%	(reference category)	
yes	128	25.8%	0.9 (0.6, 1.4)	1.0 (0.6, 1.7)
Self-reported HIV infected				
no	491	27.5%	(reference category)	
yes	90	24.4%	0.9 (0.5, 1.4)	0.7 (0.4, 1.3)
Interaction term				
Plans to stop * Friends encourage treatment			p = 0.0111	PE = -1.1990 *

* p<0.05

PE = multivariate parameter estimate of main effects and interaction term

Table 4

Hypothesized predictors of participation in methadone maintenance for at least 3 months in the past 6 months among participants who ever used opiates

Characteristic	Total N	Percent in treatment	univariate OR (95% CI)	multivariate aOR (95% CI)
Total	535	26.7%		
Individual characteristics				
Problems with drug use scale above mean				
no	231	26.8%	(reference category)	
yes	304	26.6%	1.0 (0.7, 1.5)	PE = 0.8124 *
Plans to stop scale above mean				
no	227	22.0%	(reference category)	
yes	308	30.2%	1.5 (1.0, 2.3) *	1.3 (0.9, 2.0)
Plans to control scale above mean				
no	244	21.7%	(reference category)	
yes	291	30.9%	1.6 (1.1, 2.4) *	1.3 (0.8, 2.0)
Social characteristics				
Friends encourage treatment				
no	175	22.3%	(reference category)	
yes	360	28.9%	1.4 (0.9, 2.2)	PE = 1.0935 *
Drug buddies discuss using less very often				
no	457	26.3%	(reference category)	
yes	78	29.5%	1.2 (0.7, 2.0)	0.8 (0.4, 1.4)
Does not get drugs from others				
no	399	22.8%	(reference category)	
yes	136	38.2%	2.1 (1.4, 3.2) *	2.1 (1.3, 3.3) *
Does not get encouraged to use				
no	262	24.0%	(reference category)	
yes	273	29.3%	1.3 (0.9, 1.9)	1.1 (0.7, 1.7)
Control variables				
Injected drugs				
no	271	26.6%	(reference category)	
yes	264	26.9%	1.0 (0.7, 1.5)	1.1 (0.7, 1.7)
Participated in 12-step program				
no	389	20.6%	(reference category)	
yes	146	43.2%	2.9 (1.9, 4.4) *	2.7 (1.7, 4.2) *
Female gender				
no	322	19.9%	(reference category)	
yes	213	37.1%	2.4 (1.6, 3.5) *	2.8 (1.8, 4.4) *
Age				
mean (SD) - not in treatment		43.3 (6.8)	(reference category)	
mean (SD) - in treatment		44.6 (6.7)	1.0 (1.0, 1.1)	1.1 (1.0, 1.1) *
Employed at least part time				
no	419	27.7%	(reference category)	
yes	116	23.3%	0.8 (0.5, 1.3)	0.8 (0.4, 1.3) *
Self-reported HIV infected				
no	450	25.6%	(reference category)	
yes	85	32.9%	1.4 (0.9, 2.4)	1.5 (0.9, 2.6)
Frequency of opiate use - daily user				
no	377	29.2%	(reference category)	
yes	158	20.9%	0.6 (0.4, 1.0) *	0.6 (0.4, 1.0)
Interaction term				
Problems with drug use * Friends encourage treatment			p = 0.0051	PE = -1.2444 *

* p<0.05

PE = multivariate parameter estimate of main effects and interaction term

Table 5
Significant multivariate correlates of participation in 12-step meetings and methadone maintenance treatment

	Total N	in treatment N (%)	12 step aOR (95%CI)	p-value	Total N	in treatment N (%)	methadone aOR (95%CI)	p-value
Total	581	27.0%			535	26.7%		
Individual characteristics								
Does not get drugs from others					399	22.8%	2.1 (1.3, 3.3)	<.01
Interaction categories								
Plans to stop * Friends encourage treatment	99	10.1%	(reference category)					
no								
plans: no, encourage: no	149	28.9%	3.4 (1.6, 7.2)	<.01			-	
plans: yes, encourage: no	108	29.6%	3.6 (1.6, 7.8)	<.01			-	
plans: yes, encourage: yes	225	32.0%	3.7 (1.8, 7.6)	<.01			-	
Problems with drug use * Friends encourage treatment					102	16.7%	(reference category)	
encourage: no								
problems: no, encourage: no					129	34.9%	2.9 (1.5, 5.7)	<.01
problems: no, encourage: yes					73	30.1%	2.3 (1.0, 4.9)	0.04
problems: yes, encourage: no					231	25.5%	1.9 (1.0, 3.7)	0.05
problems: yes, encourage: yes								
Control variables								
Participated in methadone program	143	44.1%	2.7 (1.8, 4.1)	<.01	146	43.2%	2.7 (1.8, 4.2)	<.01
Participated in 12-step program								
Age								
Female					213	37.1%	1.0 (1.0, 1.1)	0.01
Daily opiate use					158	20.9%	2.9 (1.9, 4.4)	<.01
							0.6 (0.4, 1.0)	0.04