ED 449 437   CG 030 675

AUTHOR	Greenfield, Lawrence; Finkbiner, Richard; Bishop, Sharon
TITLE	The Effect of Substance Abuse Treatment on High Risk Behaviors in the National Treatment Improvement Evaluation Study (NTIES).
INSTITUTION	National Evaluation Data Services, Rockville, MD.; Caliber Associates, Fairfax, VA.
SPONS AGENCY	Substance Abuse and Mental Health Services Administration (DHHS/PHS), Rockville, MD. Center for Substance Abuse Treatment.
PUB DATE	2000-12-00
NOTE	81p.
CONTRACT	270-97-7016
PUB TYPE	Reports - Evaluative (142)
EDRS PRICE	MF01/PC04 Plus Postage.
DESCRIPTORS	*Alcohol Abuse; *At Risk Persons; Behavior Modification; Counseling; National Programs; Outcomes of Treatment; Prevention; *Public Health; *Rehabilitation Counseling; *Sexuality; Substance Abuse
IDENTIFIERS	*Addiction Counseling

ABSTRACT

          Substance abusers are at particular risk for becoming
infected with, and for spreading, a number of serious communicable diseases.
The value of substance abuse treatment in helping to reduce the associated
risk behaviors for these diseases is the focus of this technical report. This
analysis examines the risk behaviors of injection drug use and sex exchange
among clients in the National Treatment Improvement Evaluation Study (NTIES).
It describes the characteristics and drug use patterns of clients who
practiced these behaviors before they entered treatment, the types of
services they received during treatment, and the changes in these behaviors
following treatment. A statistical model is employed to predict which clients
will practice these behaviors in the follow-up period. Overall the findings
supported the hypothesis that substance abuse treatment reduces or even
prevents the practice of the high risk behaviors of injection drug use or sex
exchange. The findings nonetheless showed strong relationships between the
clients' pre-treatment risk behaviors and their post-treatment behaviors and
outcomes. It concludes with a summary and recommendations for substance abuse
treatment research, practice, and policy. (Contains 69 references.) (JDM)

NEDS

NATIONAL EVALUATION DATA SERVICES

THE EFFECT OF SUBSTANCE ABUSE TREATMENT ON HIGH RISK BEHAVIORS IN THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY (NTIES)

December 2000

CSAT
Center for Substance
Abuse Treatment
SAMHSA

BEST COPY AVAILABLE

CALIBER
A S S O C I A T E S

ERIC

2

NEDS

NATIONAL EVALUATION DATA SERVICES

THE EFFECT OF SUBSTANCE ABUSE TREATMENT ON HIGH RISK BEHAVIORS IN THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY (NTIES)

Prepared by

Lawrence Greenfield, Ph.D.
Richard Finkbiner, Ph.D.
Sharon Bishop, M.S.S.

Caliber Associates
10530 Rosehaven Street, Suite 400
Fairfax, Virginia 22030
Tel: (703) 385-3200
Fax: (703) 385-3206

December 2000

CSAT
Center for Substance
Abuse Treatment
SAMHSA

3

ERIC

TABLE OF CONTENTS

FOREWORD

The Center for Substance Abuse Treatment (CSAT) works to improve the lives of those affected by alcohol and other substance abuse, and, through treatment, to reduce the ill effects of substance abuse on individuals, families, communities, and society at large. Thus, one important mission of CSAT is to expand the knowledge about, and the availability of, effective substance abuse treatment and recovery services. To aid in accomplishing that mission, CSAT continues to invest significant resources in the development and acquisition of high quality data about substance abuse treatment services, clients, and outcomes. Sound scientific analysis of this data provides evidence upon which to base answers to questions about what kinds of treatment are most effective for what groups of clients, and about which treatment approaches are cost-effective methods for curbing addiction and addiction-related behaviors.

In support of these efforts, the Program Evaluation Branch (PEB) of CSAT established the National Evaluation Data Services (NEDS) contract to provide a wide array of data management and scientific support services across various programmatic and evaluation activities and to mine existing data, the potential of which has not been fully explored. Essentially, NEDS is a pioneering effort for CSAT in that the Center previously had no mechanism established to assemble databases for broad analytic purposes or to house databases produced under a wide array of activities. One of the specific objectives of the NEDS project is to provide CSAT with a flexible analytic capability to use existing data to address policy-relevant questions about substance abuse treatment. This report has been produced in pursuit of that objective.

This analysis examines the risk behaviors of injection drug use and sex exchange among clients in the National Treatment Improvement Evaluation Study (NTIES). The report describes the characteristics and drug use patterns of clients who practiced these behaviors before they entered treatment, the types of services they received during treatment, and the changes in these behaviors following treatment. A statistical model is employed to predict which clients will practice these behaviors in the follow-up period. The report concludes with a summary and recommendations for substance abuse treatment research, practice, and policy.

Sharon Bishop
Project Director
National Evaluation Data Services

ACKNOWLEDGMENTS

EXECUTIVE SUMMARY

Substance abusers who inject drugs and/or practice unsafe sexual behaviors are at particular risk for becoming infected with, and for spreading, a number of serious communicable diseases. These diseases include sexually transmitted diseases (STDs) such as syphilis and gonorrhea, human immunodeficiency virus and acquired immune deficiency syndrome (HIV/AIDS), and hepatitis C virus (HCV), among others.

1. INTRODUCTION

Prior research has established the relationship of injection drug use (IDU) and sexual risk behaviors to the transmission of HIV/AIDS, STDs, and other viral infections among substance abusers. The research literature has also shown a relationship between substance abuse treatment and reductions in risk behaviors following treatment, although reductions in IDU are reported more consistently than reductions in sexual risk behaviors.

The value of substance abuse treatment in helping to reduce the associated risk behaviors for these diseases is the focus of this technical report. Data collected for the National Treatment Improvement Evaluation Study (NTIES) from clients in substance abuse treatment funded by the Center for Substance Abuse Treatment (CSAT) were analyzed to predict the practice of high-risk behaviors among substance abusers, assess the effectiveness of substance abuse treatment in reducing the incidence of such behaviors, and identify the factors that affect changes in risk behaviors after treatment. Specifically, the six analytic questions addressed in this report are:

- What were the characteristics of clients who reported injection drug use, sex exchange, or both behaviors compared to those who report neither?

- What treatment services were received by different risk behavior groups?

- Were significant changes in risk behaviors reported by clients between treatment intake and follow-up?

- What were the relationships among injection drug use, sex exchange, and other risk behaviors and HIV/AIDS diagnosis?

- What factors were associated with injection drug use and sex exchange behaviors at intake?

- What were the client and SDU-level variables that predicted injection drug use, sex exchange, or both at follow-up?

2.   METHODS

We employed the following items from the NTIES intake questionnaire to construct four risk behavior groups based on two components of risk behavior:

■ **Injection drug use behaviors**. These behaviors were identified based on the client's responses to the questions: "Have you ever, even one time, used a needle to inject drugs to get high or for other non-medical effects?" and "When was the last time you used a needle to take drugs to get high or for other non-medical effects?"

■ **Sex exchange behaviors**. These behaviors were identified based on the client's affirmative response to the question: "Have you ever had sex for money or drugs (prostitution)?"

In order to directly assess the characteristics and variables (both client- and SDU-level) associated with high-risk behaviors, we constructed four groups of clients based on the questions listed above. The outcome analysis sample of 4,411 clients in NTIES was reduced by 709 for clients who received treatment while incarcerated, leaving 3,702 clients who were classified into one of four risk behavior groups:

■ Injection drug use (IDU) and sex exchange (n=157)

■ Injection drug use only (n=594)

■ Sex exchange only (n=613)

■ Neither behavior (n=2,338).

The actual number of clients for whom complete data were available on the variables of interest varied for the different analyses conducted.

Several statistical approaches were used to identify important patterns among these client groups. Descriptive statistics in the form of cross-tabulated percentages (with Chi-square statistics) were used to examine demographic variables and client characteristics within and between each risk behavior group. To assess changes in risk behaviors over time, we used Cochran's Q test to measure the significance of differences between pre-treatment and post-treatment. Finally, logistic regression and hierarchical linear modeling (HLM) techniques were used to assess the degree to which risk behaviors were predicted by client, modality, and SDU-level variables.

3.   RESULTS

Overall, the findings supported the hypothesis that substance abuse treatment reduces or even prevents the practice of the high risk behaviors of injection drug use or sex exchange. The findings nonetheless showed strong relationships between the clients' pre-treatment risk behaviors (as indicated by our categorization of clients in injection drug use and sex exchange risk behavior groups) and their post-treatment behaviors and outcomes. The following summary highlights the main analysis findings from each analytic question:

- **Client Characteristics and Demographics.** There were significant differences observed between each of the high-risk behavior groups in terms of gender, education level, unemployment and housing status, racial/ethnic status, pre-treatment substance use, as well as prior drug and alcohol treatment(s). As expected, past 30-day use of drugs that are readily injectable (heroin and powdered cocaine) was highest among clients who practiced IDU behaviors, while clients who reported sex exchange behaviors were more likely to report past 30-day use of crack cocaine.

- **Services Received.** The most frequently provided services were medical (61%), other drug and alcohol counseling (47%), assertiveness training (43%) and transportation services (41%). Generally, clients reporting the lowest frequency of services were in the IDU only risk group. Compared to clients in other risk behavior groups, the IDU only clients also reported being in contact with their primary providers the least often and for the shortest amounts of time.

- **Changes in Risk Behaviors After Treatment.** Overall, the percentage of clients reporting one or both risk behaviors declined significantly at follow-up while the percentage of clients reporting neither behavior increased significantly. The percentages of clients in each group who reported sex with an IDU decreased significantly between treatment entry and follow-up. For two groups—the IDU and sex exchange and the IDU only groups—the frequency of needle sharing also declined between pre-treatment and follow-up. With the exception of IDU only clients, who showed low baseline rates of sexual activity, the rates of having sex with multiple partners (i.e., 10+) also decreased following treatment. Significant reductions were also observed for all risk behavior groups in post-treatment rates of heroin, cocaine and crack use.

- **Relationships Between Risk Behavior Groups and Related Variables.** Consistent with our ad hoc categorization of NTIES clients into risk behavior groups, distinct patterns of other risk behaviors were displayed by each group. Compared to the neither behavior group, the odds of reporting sex with an IDU were 30 times higher for the IDU and sex exchange group, 10 times higher for the IDU only group, and 3 times higher for the sex exchange only group. In addition, compared to the neither

behavior group, reports of an HIV/AIDS diagnosis were significantly more likely among the IDU and sex exchange and the IDU only groups.

■ **Factors Associated with Pre-treatment Risk Behaviors.** Multiple substance use (e.g., clients who used both heroin and cocaine/crack) was the strongest predictor of IDU and sex exchange and IDU only prior to clients' entry to treatment. Additional client characteristics associated with membership in each of the three high-risk groups were increased age, being homeless and being court involved.

■ **Predictors of Risk Behavior During Follow-up: SDU-level Variables.** The SDU-level variables that predicted high risk behavior during follow-up were the treatment modality and more frequent individual counseling sessions provided by the SDU. Clients who received outpatient methadone treatment, compared to the clients treated in the other three modalities combined, had higher odds of practicing risk behaviors at follow-up. Lower risk behavior was associated with the frequency of individual counseling for non-methadone clients only.

■ **Predictors of Risk Behavior During Follow-up: Client-level Variables.** The most important client variables in predicting high risk behaviors at follow-up were the client's pre-treatment risk behaviors (IDU only, sex exchange only, or IDU and sex exchange). The client's length of stay in treatment also predicted high risk behaviors during follow-up. With each 1-month increase in length of stay, clients were 9 percent less likely to practice risk behavior during follow-up.

4. IMPLICATIONS FOR TREATMENT RESEARCH, POLICY AND PRACTICE

These findings have direct implications for ongoing substance abuse treatment research, policy, and practice initiatives. Specifically:

■ **Research.** We recognize the limitations inherent in our analysis and in the NTIES design and recommend not only replication of our findings, but substantial expansion of comprehensive evaluation efforts.

■ **Policy.** We discuss the need to increase the effectiveness of treatment by adopting policies and practices that increase clients' length of stay/retention in substance abuse treatment and expanding access to treatment services, especially for high-risk groups.

■ **Practice.** We recommend targeting services to high risk behavior groups, increasing the intensity of individual counseling services to those groups, and developing better profiles of high risk clients to assess their treatment services needs.

I. INTRODUCTION

Substance abusers who inject drugs and/or practice unsafe sexual behaviors are at particular risk for becoming infected with, and for spreading, serious communicable diseases. These diseases include sexually transmitted diseases (STDs) such as syphilis and gonorrhea, human immunodeficiency virus/acquired immune deficiency syndrome (HIV/AIDS), and hepatitis C virus (HCV), among others.

The value of substance abuse treatment in helping to reduce risk behaviors for these diseases is the focus of this technical report. Data collected for the National Treatment Improvement Evaluation Study (NTIES) from clients in substance abuse treatment funded by the Center for Substance Abuse Treatment (CSAT) were analyzed to predict the practice of high-risk behaviors among substance abusers, assess the effectiveness of substance abuse treatment in reducing the incidence of such behaviors, and identify the factors that affect changes in risk behaviors after treatment.

This chapter presents a brief review of prior relevant research, the purpose and parameters of the present analysis, and the organization of this report.

1. OVERVIEW OF RELEVANT RESEARCH

Prior research has established the relationship of injection drug use and sexual risk behaviors to the transmission of HIV/AIDS, STDs and other viral infections among substance abusers. The research literature has also shown a relationship between substance abuse treatment and reductions in risk behaviors, although reductions in injection risk behavior are reported more consistently than reductions in sexual risk behaviors. We also review the research on the accuracy of client self reports of risk behavior data.

1.1 Injection Drug Use and Sexual Risk Behaviors

The risk behaviors associated with the injection of drugs, including the sharing of contaminated injection equipment (needle sharing), significantly contribute to the transmission of HIV/AIDS (Des Jarlais et al., 2000; Holmberg, 1996), hepatitis C (HCV) (Osmond et al., 1993; Wyld et al., 1997; and Hershow et al., 1998) and hepatitis B (Garfein et al., 1996). Similarly, sexual risk behaviors, including sex with injection drug users (IDUs), sex with multiple partners and sex without condoms, significantly contribute to the transmission of syphilis, gonorrhea and other STDs.

Particularly alarming is the fact that in 1999, 23 percent of newly identified HIV/AIDS cases were among women (CDC, 1999). Of these cases, 27 percent of the women contracted the HIV/AIDS virus through injection drug use behaviors, 27 percent through having sex with an HIV-infected partner, and 11 percent by having sex with one or more IDUs. Should they become pregnant, many of these women will run the risk of transmitting the disease to their offspring. Among men, 20 percent of new HIV/AIDS cases in 1999 were attributed to injection drug use. Sex with an injection drug user accounted for only 2 percent of new cases among males, and sex with an HIV-infected person about 4 percent.

Hepatitis C (HCV) is considered the most common blood-borne viral infection. Approximately 4 million Americans are infected with HCV, and injection drug use is a major risk factor for its transmission. Garfein et al. (1996), found the risk of acquiring HCV in new IDUs to be 65 percent within 6 to 12 months of an individual's first injection of drugs.

The substances primarily associated with injection drug use and the sharing of contaminated injection equipment over the past decade are heroin and powdered cocaine in a solution form. With regard to sexual risk behaviors, research suggests that the rise of crack cocaine use during the late '80s and '90s was highly associated with increases in unsafe sexual practices, such as exchanging sex for money and/or drugs (sex exchange) and having sex with multiple partners (Hoffman et al., 2000; Logan, Leukefeld and Farabee, 1998; Longshore and Anglin, 1995; Fullilove et al., 1990; Edlin, 1994; and Logan and Leukefeld, 2000).

Another substance of abuse that has recently been shown to contribute to the practice of high risk behaviors is methamphetamine. Researchers have found that, as an injectable stimulant, methamphetamine is associated with both injection and sexual risk behaviors (Shoptaw et al., 1998; Zule and Desmond, 1999; and Molitor et al., 1999).[1]

Unsafe needle use and high-risk sexual practices may be related. Booth (1995) found that IDUs who engaged in unsafe needle use were more likely to report sex without condoms than IDUs who practice safer needle practices. Booth et al. (2000) found that two behaviors—drinking alcohol and having an IDU as a sexual partner—were both associated with having unprotected sex (i.e., without condoms).

---

[1] Methamphetamine was not, however, specifically identified as a substance of abuse in the NTIES study; therefore, the patterns of risk behaviors associated with this substance could not be included in this analysis.

1.2   Substance Abuse Treatment and Risk Behavior Reductions

A number of behavioral therapeutic approaches have been found to be effective in the treatment of opiate and stimulant abuse/dependence. Drug substitution therapies such as methadone maintenance have been shown to reduce drug use and associated high risk behaviors effectively. While these pharmacologic replacement therapies are a viable treatment option for heroin and other opiate dependence, they are not currently available for the treatment of dependence on stimulants such as cocaine.

In methadone treatment settings, many clients combine opiates and various forms of cocaine, and the treatment challenges are very real. For example, Grella, Anglin, and Wugalter (1995) examined cocaine and crack use and HIV risk behaviors among high-risk methadone maintenance clients. Cocaine users presented a higher risk profile for human immunodeficiency virus (HIV), engaged in a wider variety of criminal activities, reported more alcohol use, and showed more signs of psychological disturbance. Additionally, clients who smoked crack cocaine differed from non-crack cocaine users in ethnicity, alcohol use, criminal activity, needle use, and marital status, suggesting different profiles of risk among these drug use groups.

Significantly lower rates of drug use and risk behaviors have been found for IDUs in treatment versus those not in treatment (Metzger, Navaline and Woody, 1998). Such findings have documented that substance abuse treatment can play a significant role in AIDS prevention. Evidence further suggests that the effectiveness of methadone treatment in reducing risk behavior increases with longer retention in treatment. A well-documented finding in the literature is that clients maintained on methadone for long periods of time tend to reduce their high-risk behaviors compared to clients who are discharged after relatively short stays in treatment (Ball et al., 1988; Abdul-Quadar et al., 1987; Longshore et al., 1993). Retention in treatment can also reduce rates of HIV seroconversion (Metzger et al., 1993). The effectiveness of methadone treatment in reducing risk behaviors during follow-up may also apply to opiate-addicted cocaine users receiving methadone (Magura et al., 1998). The benefits of methadone treatment with respect to risk behavior, however, may be moderated by the presence of psychiatric concurrent disorders such as Antisocial Personality Disorder (Brooner et al., 1993).

Sorensen and Copeland (2000) documented 22 longitudinal studies (e.g., Longshore et al., 1994; Magura et al., 1998; and Rhoades et al., 1998), in which clients reported on their risk behaviors after varying levels of time in treatment. Declines in injection drug use risk were reported over time in all 22 studies, whereas declines in sexual risk behavior were reported in only 13 (e.g., Magura et al., 1990; Williams et al., 1992; Longshore et al., 1994; McCusker et al.,

1994; Camacho et al., 1996). Among these 22 studies, 19 examined Outpatient Methadone Treatment (OMT) clients exclusively and only 3 assessed non-OMT clients (including McCusker et al., 1994; McCusker et al., 1995; and Hubbard et al., 1997). In nine of the studies, the injection risk behavior of clients who received substance abuse treatment was compared to the risk behavior of untreated controls (e.g., Longshore et al., 1993; Caplehorn et al., 1995; Greenfield et al., 1995). In eight of these nine studies, the treatment group received OMT. In all nine, significantly lower injection drug use risk was reported for the treatment group compared to the controls. Only one of the nine studies reported lower sexual risk behavior for the treatment group. Finally, an additional nine studies have examined treatment versus untreated control groups in regard to HIV-seroprevalence (one study), -seroincidence (six studies), and -seroconversion (two studies) (Williams et al., 1992; Metzger et al., 1993). In each of these studies, more optimal outcomes were found for the treatment group(s).

Two treatment components—more frequent individual and group counseling (Fiorentine and Anglin, 1996) and the provision of psycho-educational counseling (El-Bassel and Schilling, 1992; Sorensen et al., 1994; and Mallow et al., 1994)—have been found to be associated with reductions in risk behaviors for clients in treatment. In a study of clients from 26 drug treatment programs, Fiorentine and Anglin (1996) found that clients who received more frequent individual and group counseling sessions were less likely to relapse into drug use in the 6 months after follow up. This finding remained significant even after controlling for the number of weeks in treatment and treatment completion status. In the El-Bassel and Schilling study, a small group, skills building psycho-educational intervention was conducted by female drug counselors. Up to five sessions were administered in methadone maintenance clinics as part of a 15-month follow-up to treatment. The women who participated in the sessions increased the frequency of their partners' condom use compared with women who received HIV/AIDS information only.

Regarding treatment services, evidence for a relationship between homelessness and risk behavior was found in a study of correlates of crack cocaine use among migrant workers. The findings suggested that assistance with living arrangements and social support may prevent risk behavior (Weatherby et al., 1999).

1.3   Client Reporting Accuracy in Studies of Risk Behavior

The biologically based outcomes reported in several of the studies discussed above (e.g., Williams et al., 1992; Metzger et al., 1993) have generally been consistent with those findings based on self-reported data, offering convergent support for the cumulative findings from those studies. Earlier research by Greenfield et al. (1995), however, highlighted a number of potential

difficulties with self-reported risk behavior data. In comparisons with urinalysis data, the accuracy of the self reports varied during the course of the study. These authors recommended the use of urinalysis as a means of confirming self-reported injection drug use for IDUs.

Other studies have suggested that client self reports may be subject to social desirability bias. In developing the NTIES design, the National Opinion Research Center (NORC) did in fact compare urinalysis and self-reported drug use data for a sample of respondents. Finding similar rates of drug use among both the self report and urinalysis data, the accuracy of the drug use data were largely confirmed. Urinalysis can not be employed for validating sexual risk behavior, nor can it be used in most cases to confirm or refute a client-reported HIV or STD diagnosis. Therefore, it would be optimal for study designs to incorporate both self-reported data along with biological marker data such as seroconversion.

In the absence of such biological marker data, it may yet be possible to obtain reliable and valid self reports. In prior research by McCusker et al. (1992), truthful self reports of HIV status were almost always obtained. The factors resulting in improved data reliability for self-reported sexual behavior data include the use of shorter recall periods (Kauth, Lawrence and Kelly, 1991; McElrath et al., 1994) and the use of standardized data collection instruments (Weinhardt et al., 1998; Darke et al., 1991).

2.   PURPOSE AND PARAMETERS OF THE PRESENT ANALYSIS

The present analysis was designed to examine the effectiveness of substance abuse treatment in reducing risk behaviors for infectious disease using data from the National Treatment Improvement Evaluation Study (NTIES). NTIES was conducted by the National Opinion Research Center (NORC) for the Center for Substance Abuse Treatment (CSAT) to evaluate the effectiveness of comprehensive treatment services provided by CSAT-sponsored demonstration projects. The NTIES project collected longitudinal data from purposive samples of substance abuse treatment clients drawn from service delivery units (SDUs)[2]. Data on substance use, criminal behaviors, employment status, income, housing, risk behaviors, and other psychosocial measures were collected at intake (pre-treatment), during treatment, and at post-treatment follow-up. Data are available for a total of 4,411 NTIES clients. (For more details on NTIES, see Appendix A.)

---

[2] An SDU is defined by CSAT as a single site providing a single level of care (NORC, 1997). The classification of level of care is based on three parameters: (1) facility type (e.g., hospital, etc.); (2) intensity of care (e.g., 24-hour, etc.); and (3) type of service (e.g., outpatient, etc.) (Caliber Associates, 1999).

The present analysis extends prior NTIES work by examining risk behaviors for HIV/AIDS and other viral infections/STDs at admission and follow-up, and by identifying other factors that account for changes in these risk behaviors following treatment. This analysis focused primarily on two specific types of risk behavior:

■ Injection drug use

■ Exchange of sex for money and drugs (sex exchange).

Injection drug use was determined from the clients' responses to the following questions: "Have you ever, even one time, used a needle to inject drugs to get high or for other non-medical effects?" and "When was the last time you used a needle to take drugs to get high or for other non-medical effects?" Sex exchange was determined from the response to the question, "Have you ever had sex for money or drugs (prostitution)?"

The specific analytic questions addressed were:

■ What were the characteristics of clients who reported injection drug use, sex exchange, or both behaviors compared to those who report neither?

■ What treatment services were received by different risk behavior groups?

■ Were significant changes in risk behaviors reported by clients between treatment intake and follow-up?

■ What were the relationships among injection drug use, sex exchange, and other risk behaviors and HIV/AIDS diagnosis?

■ What factors were associated with injection drug use and sex exchange behaviors at intake?

■ What were the client and SDU-level variables that predicted injection drug use, sex exchange, or both at follow-up?

The substances of abuse that were primarily associated with injection drug use in NTIES were heroin and (in an injectable form) powdered cocaine. Since methamphetamine use in NTIES was not independently reported, it was not feasible to assess the risk behaviors associated with the use of this substance. The present analysis could not address the potential impact of gender/sexual orientation issues as they might relate to risk behaviors and client outcomes because these variables were not captured as part of the NTIES interview protocol.

3.   ORGANIZATION OF THE REPORT

This chapter has provided an overview of prior relevant research and identified the analytic questions. *Chapter II. Methods* presents the analytic approach taken and the statistics used. *Chapter III. Results* presents the findings for each of the analytic questions. Conclusions and recommendations for policy, practice, and future research are presented in *Chapter IV*.

II. METHODS

To address the six analytic questions identified in the preceding section, we constructed four ad hoc risk behavior groups from the NTIES client sample, based on hypothesized levels of risk for HIV/AIDS, STDs and other viral infections. The four risk behavior groups were clients at intake to treatment who reported:

- Both injection drug use (IDU) and sex exchange

- Injection drug use (IDU) only

- Sex exchange only

- Neither behavior (no injection drug use or sex exchange).

Since IDU and sex exchange are known to be risk behaviors, it was predicted that clients reporting both behaviors would be at highest risk, while clients reporting one of the two behaviors would be at intermediate risk, and clients reporting neither behavior would be at lowest risk.

The full outcome analysis sample from NTIES was 4,411, from which we excluded 709 clients who received substance abuse treatment while incarcerated, leaving a total of 3,702 clients for the present analysis. The actual number of clients for whom complete data were available on the variables of interest varied by data collection point as shown in Exhibit II-1, below.

	EXHIBIT II-1 NUMBER OF CLIENTS IN RISK BEHAVIOR GROUPS BY DATA COLLECTION POINT				
Data Collection Point	IDU and Sex Exchange	IDU Only	Sex Exchange Only	Neither Behavior	Total
Intake	157 (4%)	594 (16%)	613 (17%)	2,338 (63%)	3,702
In-treatment	136 (5%)	508 (17%)	493 (16%)	1,896 (63%)	3,033
Follow-up	126 (5%)	479 (18%)	400 (15%)	1,666 (62%)	2,671

From the 3,702 non-incarcerated clients for whom data were collected at intake, 668 did not complete an in-treatment interview, leaving 3,033 available for the in-treatment analysis. An additional 362 clients were not linked to a specific service delivery unit (SDU) and were excluded from the follow-up data analysis, which required data on SDU-level variables. The

analysis of clients at follow-up was limited to those (n=2,671) with both in-treatment data and SDU-level data.

The percentages of clients who had reported each type of risk behavior at intake remained relatively constant, despite the change in sample sizes at different data collection points. Approximately 4 to 5 percent reported both injection drug use and sex exchange, while 15 to 18 percent reported either injection drug use or sex exchange, and 62 to 63 percent reported neither behavior.

While the methodological approach used to address specific analytic issues varied across the six questions, all of the analyses contrasted differences among the four risk behavior groups in either client characteristics, services received, or the outcomes of substance abuse treatment. The specific sample used, variables analyzed and statistics employed are discussed in the following sections for each of the six analytic questions.

1. CLIENT CHARACTERISTICS AND DEMOGRAPHICS

The demographic variables examined in this set of analyses were the client's gender, race, age, and level of education (i.e., highest grade completed). The pre-treatment characteristics examined were prior drug and alcohol treatment and past 30-day drug and alcohol use.

Descriptive statistics in the form of cross-tabulated percentages were used to portray the demographic variables and overall client characteristics within each risk behavior group. Group differences were tested for significance using Chi-square statistics.

2. SERVICES RECEIVED

This analytic question focused on specifying the services received by clients during the NTIES treatment episode. For each type of service, the percentage of clients who received the service was determined for each of the four risk behavior groups. In addition, the modalities in which clients received treatment were described. Modalities included outpatient methadone, non-methadone outpatient, short-term residential and long-term residential. The differences were tested for significance using Chi-square statistics.

3.   CHANGES IN RISK BEHAVIORS AFTER TREATMENT

This analytic question focused on identifying the degree to which clients changed their high risk behaviors between the intake and follow-up periods. In the first series of analyses, we compared the pre- and post-treatment percentages of clients who practiced both risk behaviors of injection drug use and sex exchange, injection drug use only, sex exchange only, and neither behavior. Therefore, the client groupings and percentages for this series of analyses directly corresponded to the four risk behavior groups previously constructed for analytic (e.g., modeling predictors of risk behavior) and descriptive purposes.

In a second series of analyses, we extended the range of behaviors examined by measuring pre- to post-treatment changes in the four risk behavior groups for the following risk and protective behaviors:

- Having engaged in the sharing of syringes (needle sharing)

- Having engaged in sex with intravenous drug users

- Having engaged in sex with 10 or more partners

- Having been sexually abstinent

- Having used condoms in 50 percent or more of past sexual encounters.

In the final set of analyses related to this analytic question, we examined pre- to post-treatment changes for the four groups in past 30-day drug use, specifically heroin, cocaine and crack. For these analyses, we reasoned that treatment modality would be an important moderating variable systematically related to any observed differences. To assess changes in risk behaviors over time, we used Cochran's Q test to measure the significance of differences between pre-treatment and post-treatment. Chi-square statistics were used to test between group differences.

4.   RELATIONSHIPS BETWEEN RISK BEHAVIOR GROUPS AND RELATED VARIABLES

This analytic question focused on identifying the extent to which client assignment to one of the four risk behavior groups was associated with other related variables, including:

■ Having a self-reported "diagnosis" for HIV/AIDS

■ Having engaged in sex with intravenous drug users

■ Having engaged in sex with 10 or more partners

■ Having engaged in needle sharing

■ Not having used condoms in 50 percent or more of past sexual encounters.

The relationship between the variables was first tested for independence using Chi-square statistics. We then performed a series of Logistic Regression (LR) analyses to measure the relationship between risk group membership and each of the related risk variables listed above. Each of these variables was examined as a separate dependent variable. Risk behavior group was included as four-level, categorical predictor variable, in which the IDU and sex exchange, IDU only, and sex exchange only groups were each contrasted with the neither behavior group.

Additional variables were statistically controlled in these regressions, including age, gender, past 30-day drug use, treatment history, and criminal behavior. Odds ratios (ORs) were reported for each variable in the analysis (e.g., gender). ORs greater than 1 for males, for example, would suggest that males had higher odds of practicing a given behavior relative to female clients. Alternatively, an OR lower than 1 for males would suggest that males had lower odds of practicing the behavior in question relative to females.

In an additional analytic step, using Chi-square statistics we compared clients who practiced more frequent sex exchange with those who practiced less frequent sex exchange. This type of descriptive analysis was thought to be useful in order to understand the relationship between this high risk behavior and other risk behaviors and outcomes better.

5.   **FACTORS ASSOCIATED WITH RISK BEHAVIORS AT INTAKE**

This analytic question focused on identifying the pre-treatment client demographics and drug use variables that were related to the pre-treatment risk behaviors of injection drug use and/or sex exchange. We performed a series of three LR analyses to measure the relationship between pre-treatment, demographic and drug use variables and assignment to one of the following risk behavior groups:

- IDU and sex exchange risk group versus neither behavior (n=2,446)

- IDU only risk group versus neither behavior (n=2,879)

- Sex exchange only risk group versus neither behavior (n=2,898).

In performing these analyses, clients who belonged in the risk behavior group were coded as "1," and those who practiced neither behavior (i.e., "low-risk"comparison group) were coded as "0." In each of the three regression analyses, clients in the remaining risk behavior groups (e.g., IDU only and sex exchange only, for the first regression) were excluded from that particular analysis, because they were not applicable to that particular contrast. All LR analyses employed a step-wise procedure using backward elimination methods. A complete listing of the pre-treatment client characteristics and drug use variables that were included in these analyses may be found in Appendix C.

6. PREDICTING RISK BEHAVIORS AT FOLLOW-UP USING CLIENT- AND SDU-LEVEL VARIABLES

This analytic question focused on identifying the client-level pre-treatment and in-treatment variables that would predict high risk behaviors at follow-up. In this set of analyses, the three high risk behavior groups—IDU and sex exchange, IDU only, and sex exchange only—were collapsed into a single high risk group. This group was compared to the group of clients who practiced neither high risk behavior.

In this set of analyses, we also identified and employed SDU-level variables that might account for risk behaviors observed at follow up. This analytic approach necessitated the use of multilevel regression modeling approaches due to the "nested" (i.e., clients within SDUs) nature of the data.

The specific client-level variables employed in these analyses were obtained through the NTIES client interviews, and included:

- Pre-treatment characteristics and behaviors

- Counseling and other services received during treatment

- Length of stay in treatment

- Duration of the follow-up period.

In order to analyze SDU-level variables, we used items from the NTIES Baseline Administrative Report (NBAR), which contained information from program directors on the characteristics of the SDU. Among the SDU-level variables examined were:

- Program staffing

- Treatment planning practices

- Client-counselor matching practices

- Frequency of individual and group counseling sessions.

The dependent variables for these analyses were the presence or absence of either or both injection drug use and sex exchange behavior following treatment. Clients who engaged in either or both risk behaviors during follow-up were coded "1" while those who did not engage in these behaviors during follow-up were coded "0." A comprehensive listing of the client- and SDU-level variables used in these analyses may be found in Appendix C.

A Hierarchical Linear Modeling (HLM) technique was applied to these multilevel data. HLM is a regression approach used to adjust for the non-random "nesting" of clients within particular SDUs. The dependent variable in these analyses was any injection drug use or sex exchange behavior during the follow-up period. A two-level model was developed including client-level and SDU predictor variables. Due to the dichotomous (i.e., risk versus no risk) status of the dependent variable, a non-linear Bernoulli solution was employed (see Appendix B for additional technical details). In addition, one variable—the four-level treatment modality variable—was excluded from these analyses (see Appendix C, *Client-level Variables*). Instead, three dichotomous SDU-level variables were employed, including methadone, non-methadone outpatient and short-term residential. Each of these "modality variables" was compared to the three other modalities combined. Clients in the fourth modality, namely, long-term residential treatment were included as part of the comparison group.

III. RESULTS

Findings for each of the six analytic questions are discussed in the following corresponding sections:

- Client characteristics and demographics at intake

- Services received

- Changes in risk behaviors after treatment

- Relationships between risk behavior groups and related variables

- Factors associated with risk behaviors at intake

- Predicting risk behaviors at follow-up.

As discussed in the sections below, significant differences were observed among the four risk behavior groups (injection drug use and sex exchange, injection drug use only, sex exchange only, and neither behavior) on many of the pre-treatment and post-treatment variables of interest.

1. CLIENT CHARACTERISTICS AND DEMOGRAPHICS AT INTAKE

At intake to substance abuse treatment, clients in each of the risk behavior groups had demographic and pre-treatment profiles that distinguished them from the other groups. In terms of age at admission, IDU only (mean age=37) and IDU and sex exchange clients (mean age=34) were somewhat older than the sex exchange only (mean age=31) or the neither behavior group (mean age=31). There were also significant differences among groups in terms of gender, education level, unemployment and housing status, racial/ethnic status, pre-treatment substance use, as well as prior drug and alcohol treatment(s), as shown in Exhibit III-1.

Females and blacks were over-represented among the IDU and sex exchange and the sex exchange only groups. In contrast, the IDU only and neither behavior clients (i.e., clients who did not practice sex exchange) were predominantly male and more likely to be either white or Hispanic. Clients in the sex exchange only group were the least likely to have received a high school diploma or GED and were the most likely to be currently unemployed. These same clients were, however, the least likely to be under current court supervision.

EXHIBIT III-1 CLIENT CHARACTERISTICS AND DEMOGRAPHICS IN FOUR RISK BEHAVIOR GROUPS (IN PERCENT)						
Client Characteristic/ Demographic Variable	IDU and Sex Exchange (n=157) %	IDU Only (n=594) %	Sex Exchange Only (n=613) %	Neither Behavior (n=2,338) %	Chi- square	p
Gender - Female	62	23	68	27	455	0.001
HS Diploma or GED	57	62	52	60	17	0.001
Unemployed	88	82	92	75	93	0.001
Under Court Supervision	35	36	20	37	66	0.001
Homeless	31	16	32	15	111	0.001
Prior Alcohol Treatment	35	30	41	35	18	0.001
Prior Drug Treatment	70	68	66	41	246	0.001
Race/Ethnicity						
White	26	35	6	24	145	0.001
Black	60	40	86	57	285	0.001
Hispanic	13	24	6	15	80	0.001
Past Substance Use						
Past 30-day alcohol use	50	51	59	58	12	0.01
Past 30-day cocaine use	38	38	13	11	320	0.001
Past 30-day crack use	37	17	56	25	275	0.001
Past 30-day heroin use	47	63	6	7	1225	0.001

Each of the three high risk behavior groups were more likely to report prior drug treatment compared to the neither behavior group. As expected, recent use (past 30 days) of drugs that are readily injected—heroin and powdered cocaine—was highest among clients who practiced IDU behaviors (i.e, IDU and sex exchange and IDU only). Clients who practiced sex exchange (IDU and sex exchange and sex exchange only) were more likely to report past 30 day crack use than the IDU only and neither behavior groups. This latter finding is consistent with the research literature, summarized earlier in Chapter I, reporting positive relationships between sex exchange and crack use. Lastly, clients in the sex exchange only and neither behavior groups (i.e., those who did not inject drugs) were more likely to report past 30 day alcohol use.

2.   SERVICES RECEIVED

In this section, we describe the types of services received by clients in each risk behavior group, the modalities in which they received care, and the frequency and duration of their therapeutic encounters with their primary treatment provider.

2.1   Types of Services

Across the risk behavior groups, the most frequently received treatment services were medical services (60%), other drug/alcohol counseling (47%), assertiveness training (43%), and transportation (42%). One-third of all clients received family counseling services, while smaller percentages (10% to 17%) received housing services, job skills, life skills training, GED classes, and physical/sexual abuse counseling. The data on services received by risk behavior group is presented in Exhibit III-2.

With the exception of family counseling services, significant differences were found among the risk behavior groups in the percentages of clients receiving specific types of treatment services. In general, the IDU only group received the fewest services compared to clients in the other three risk behavior groups. For example, 28 percent of the IDU only clients received assertiveness training compared to 39 to 55 percent of the remaining groups. Only 8 percent of the IDU only group received housing services compared to 15 to 26 percent of the other three groups.

The sex exchange only group generally received the highest, or next to the highest, levels of treatment services compared to the other risk behavior groups. About two-thirds of these clients received medical services (66%) compared to the other groups (57-63%). Similarly, more sex exchange only clients received assertiveness training (55%) compared to the other groups (28-43%), and also transportation services (52%) compared to the other groups (38-41%).

EXHIBIT III-2
TYPES OF SERVICES RECEIVED CLIENTS BY RISK BEHAVIOR GROUP
(IN PERCENT)

Service	IDU and Sex Exchange (n=136) %	IDU Only (n=508) %	Sex Exchange Only (n=493) %	Neither Behavior (n=1,896) %	Total (n=3,033) %	Chi-square	p
Physical/Sexual Abuse Counseling	11	6	13	11	10	23	0.001
Family Counseling	35	34	28	33	33	6	ns
Assertiveness Training	39	28	55	43	43	75	0.001
Classes for GED/Diploma	7	8	14	18	15	41	0.001
Job Skills	10	7	13	14	13	23	0.001
Housing Services	21	8	26	15	16	69	0.001
Transportation	38	40	52	41	42	24	0.001
Medical	63	57	66	61	60	9	0.027
Life Skills Training	18	10	23	17	18	31	0.001
Other Drug/Alcohol Counseling	49	38	50	47	47	17	0.012

ns=not significant

2.2 Modalities of Treatment by Risk Behavior Group

Some of the observed differences between risk behavior groups in the treatment services received by clients might be partially accounted for by the different treatment modalities in which these clients were treated. As indicated in Exhibit III-3, the four risk behavior groups had different distributions of clients across treatment modalities. Specifically, about one-third (31%) of the IDU and sex exchange, and about one-half (47%) of the IDU only risk behavior groups received outpatient methadone treatment. In contrast, only 1 percent of the sex exchange only and 4 percent of the neither behavior clients were treated in the methadone modality. A third of the sex exchange only (33%) and over half (52%) of the neither behavior clients were treated in non-methadone outpatient settings, whereas only 18 percent of the IDU and sex exchange clients and 19 percent of the IDU only clients were treated in that modality. About 20 to 26 percent of clients in each risk behavior group were treated in the short-term residential modality. Lastly, fewer IDU only (13%) clients were treated in long-term residential modalities compared with other risk behavior groups, where long-term residential treatment ranged from 20 to 40 percent.

	IDU and Sex Exchange (n=157) %	IDU Only (n=594) %	Sex Exchange Only (n=613) %	Neither Behavior (n=2,338) %
EXHIBIT III-3 **DISTRIBUTION OF RISK BEHAVIOR GROUP CLIENTS BY TREATMENT MODALITY (IN PERCENT)**				
Treatment Modality				
Outpatient Methadone (n=422)	30	48	1	4
Non-methadone Outpatient (n=1566)	19	19	33	52
Short-term Residential (n=873)	24	20	26	24
Long-term Residential (n=841)	27	13	40	20
Total (N=3,702)	100	100	100	100

2.3 Frequency and Duration of Contacts with Primary Service Providers

Clients in the IDU only risk behavior group reported relatively fewer contacts with their primary providers and shorter sessions compared to clients in the remaining groups. These findings are summarized in Exhibit III-4. While only 47 percent of the IDU only clients indicated that they met with their primary providers more than once a week, between 63 percent and 72 percent of the clients in the other three risk behavior groups had this intensity of services. Similarly, IDU only clients reported having the briefest contacts with their primary providers, compared to clients in the other risk behavior groups. Only 37 percent of the IDU only clients reported that they usually met with their primary provider for an hour or longer, compared to between 45 percent and 53 percent of the clients in the other three risk behavior groups.

Contact Frequency/Duration	IDU and Sex Exchange (n=125)	IDU Only (n=452)	Sex Exchange Only (n=454)	Neither Behavior (n=1,764)	Total (N=2,795[a])	Chi-square	p
EXHIBIT III-4 **FREQUENCY AND DURATION OF CONTACTS WITH PRIMARY PROVIDER BY HIGH RISK BEHAVIOR GROUP (IN PERCENT)**							
Usually Met > Once/Wk.	67	47	72	63	62	62	0.001
Usually Met >1 Hr./Session	45	37	47	53	51	35	0.001

[a] Data were missing for 238 clients who did not report having a primary provider.

30   BEST COPY AVAILABLE

In summary, among the risk behavior groups, clients in the IDU only group were found to have received fewer services and had less intensive contacts with their primary service providers. Corresponding to the consistent findings showing that the IDU only clients compared to the other high risk behavior groups received fewer services, there was evidence in NTIES suggesting that IDU only clients believed that they had less need for many of these services. For example, only 47 percent of the IDU only and neither behavior clients indicated that help with housing problems was very important, but more than 60 percent of the IDU and sex exchange and the sex exchange only clients indicated that these services were critical. Similarly, only about 40 percent of the IDU only and neither behavior clients indicated that family counseling was very important, whereas 50 percent of the IDU and sex exchange and 56 percent of the sex exchange only clients indicated this was true. Therefore, the lower levels of client-perceived need for services among some risk behavior groups may be associated with lower levels of client receipt of those same services.

3. CHANGES IN RISK BEHAVIORS AFTER TREATMENT

In this section, we examine the degree to which clients appear to moderate or change their high risk behaviors between entry to treatment and post-treatment follow-up. We first examine changes in the pre- and post-treatment percentages of clients who practiced both the risk behaviors of injection drug use (IDU) and sex exchange, injection drug use (IDU) only, sex exchange only, or neither behavior. These sub-samples correspond to the four risk behavior groups that are utilized in subsequent sections for constructing models predicting risk behavior outcomes. We also examine changes in other risk behaviors and in reported levels of past 30-day drug use.

3.1 Changes in Injection Drug Use and Sex Exchange Behaviors

Pre- to post-treatment changes in two risk behaviors—injection drug use and sex exchange (and their combination)—are displayed in Exhibit III-5. Overall, the findings were consistent with the hypothesis that substance abuse treatment reduces, or in some cases prevents, the practice of high risk behaviors following treatment. Specifically, we observed that:

■ The percentage of clients reporting both IDU and sex exchange declined from 5 percent during the pre-treatment period to 1 percent at follow-up ($p<.001$)

■ The percentage of clients reporting IDU only declined from 18 percent during the pre-treatment period to 12 percent at follow-up ($p<.001$)

■ The percentage of clients reporting sex exchange only behavior declined from 15 percent during the pre-treatment period to 4 percent at follow-up (p<.001).

An especially promising finding was that the percentage of clients reporting neither risk behavior increased from 62 percent at pre-treatment to 83 percent at follow-up. It should also be noted that males and females appeared to benefit equally from treatment, insofar as they showed similar risk behavior reductions over time.

EXHIBIT III-5
PERCENTAGE OF CLIENTS REPORTING EITHER, BOTH OR NEITHER
HIV/AIDS RISK BEHAVIORS PRE- AND POST-TREATMENT
(N=2,671)

Pre-Tx   Post-Tx

100%

80%   83%

60%   62%

40%

20%   18%
                     12%   15%
       5%   4%
       1%
0%
   IDU and Sex Exchange   IDU Only   Sex Exchange Only   Neither Behavior
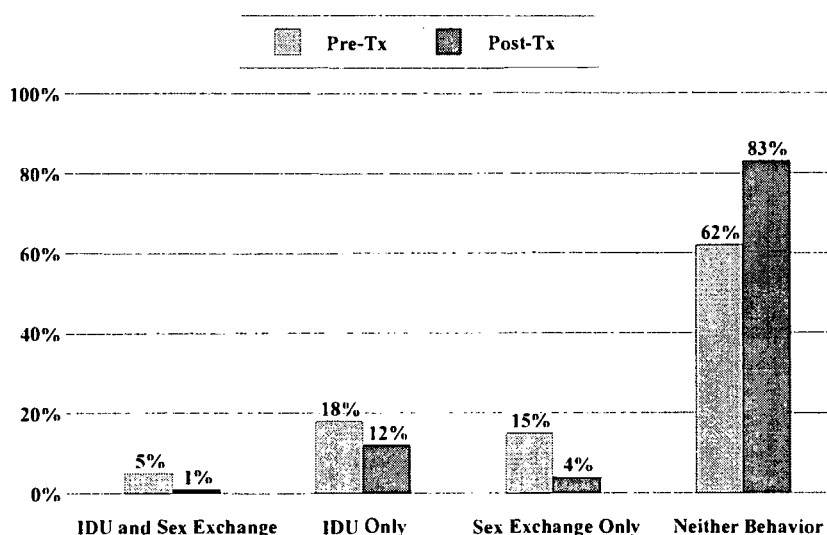
3.2   Changes in Other Risk Behaviors

In this set of analyses, we extended the range of behaviors examined by measuring pre- to post-treatment changes for the four risk behavior groups for the following risk and protective behaviors:

■ Having engaged in needle sharing

■ Having engaged in sex with intravenous drug users

■ Having been sexually abstinent

■ Having engaged in sex with 10 or more partners

■ Having used condoms in 50 percent or more of past sexual encounters.

As shown in Exhibit III-6, significant reductions in needle sharing occurred for the IDU and sex exchange and IDU only clients. For the IDU and sex exchange group, rates of needle sharing declined from 46 percent to 14 percent, and for the IDU only group, needle sharing declined from 38 percent to 14 percent. Self-reported injection drug use was by definition absent among the sex exchange only and neither behavior groups at intake and remained virtually zero.

EXHIBIT III-6 PERCENTAGE REPORTING OTHER HIGH RISK BEHAVIORS PRE- AND POST-TREATMENT BY RISK BEHAVIOR GROUP					
Risk Behavior/Risk Group	n	Pre %	Post %	Q	p
Needle Sharing					
IDU and sex exchange	126	46	14	33.3	0.001
IDU only	479	38	14	91.9	0.001
Sex exchange only	400	0	1	3	0.083
Neither behavior	1666	0	0	3	0.083
Sex with IDUs					
IDU and sex exchange	117	58	25	33.8	0.001
IDU only	469	29	17	25.2	0.001
Sex exchange only	352	13	3	24	0.001
Neither behavior	1621	5	2	17.5	0.001
Sexual Abstinence					
IDU and sex exchange	119	4	12	7.4	0.007
IDU only	475	13	8	19.3	0.001
Sex exchange only	391	3	11	27.5	0.001
Neither behavior	1639	11	16	22.2	0.001

Among the IDU only and sex exchange only clients, 58 percent reported having sex with an IDU in the pre-treatment period compared to only 25 percent in the follow-up period. Among the IDU only clients, 29 percent reported sex with an IDU at pre-treatment compared to 17 percent at follow-up. Significant reductions were also found among the sex exchange only and neither behavior clients.

Rates of sexual abstinence increased significantly from pre-treatment to follow-up for clients in each risk behavior group, except for IDU only clients, as follows:

■ Among IDU and sex exchange clients, rates of sexual abstinence increased from 4 percent to 12 percent post-treatment

■ Among sex exchange only clients, sexual abstinence rates increased from 3 percent to 11 percent

■ Among neither behavior clients, sexual abstinence rates increased from 11 percent to 16 percent.

The percentages of clients having sex with 10 or more partners declined significantly in three of the four risk behavior groups as indicated in Exhibit III-7. Specifically, among the IDU and sex exchange clients, 40 percent reported sex with 10 or more partners in the pre-treatment period compared to only 13 percent during follow-up. Among the sex exchange only clients these rates declined from 43 percent to 11 percent, and for the neither behavior group, the rates declined from 10 percent before treatment to 4 percent after treatment. The IDU only clients had very low baseline rates of sexual activity with more than 10 partners, and these rates did not change significantly between the pre- and post-treatment periods.

EXHIBIT III-7 PERCENTAGE REPORTING OTHER HIGH RISK BEHAVIORS PRE- AND POST-TREATMENT BY RISK BEHAVIOR GROUP					
	n	Pre %	Post %	Q	p
10+ Sex Partners					
IDU and sex exchange	123	40	13	27.9	0.001
IDU only	475	5	3	2.8	ns
Sex exchange only	391	43	11	110	0.001
Neither behavior	1644	10	4	51.4	0.001
Used Condoms ≥50%					
IDU and sex exchange	104	58	45	5.1	0.024
IDU only	345	30	32	0.68	ns
Sex exchange only	340	58	53	1.69	ns
Neither behavior	1268	43	43	0	ns

ns=not significant

BEST COPY AVAILABLE

Only sexually active clients were included in the analysis of pre- to post-treatment changes in the frequency of condom use. As shown in Exhibit III-7, with the exception of the injection drug use and sex exchange group, condom use remained essentially unchanged between the pre-treatment and follow-up periods. For the IDU and sex exchange group, however, condom use declined moderately from 58 percent to 45 percent post-treatment.

3.3   Changes in Drug Use

Across the risk behavior groups, past 30-day drug use of heroin, crack cocaine and powdered cocaine declined following substance abuse treatment. All of the reductions in drug use were statistically significant, as shown in Exhibit III-8. Among the IDU and sex exchange group, rates of past 30-day heroin use declined from 50 percent in the pre-treatment period to 30 percent during follow-up. Similarly, among IDU only clients, heroin use declined from 68 percent to 35 percent during follow-up. Despite low pre-treatment rates of heroin use among clients in the sex exchange only and neither behavior groups, reductions in heroin use after treatment were also statistically significant. Similar, statistically significant reductions in the past 30-day use of crack and powdered cocaine were found for each of the four risk behavior groups (all $ps < 05$).

EXHIBIT III-8 PERCENTAGE OF CLIENTS REPORTING PAST 30-DAY DRUG USE PRE-TREATMENT AND POST-TREATMENT RISK BEHAVIOR GROUP (N=2,671)				
	Pre-treatment %	Post-treatment %	Q	p
Heroin				
IDU and sex exchange	50	30	12.7	0.001
IDU only	68	35	111.7	0.001
Sex exchange only	8	4	11.6	0.001
Neither behavior	7	3	44.7	0.001
Crack Cocaine				
IDU and sex exchange	37	22	7	0.008
IDU only	15	11	4	0.047
Sex exchange only	54	24	82	0.001
Neither behavior	25	9	195.2	0.001

EXHIBIT III-8 (CONT.) PERCENTAGE OF CLIENTS REPORTING PAST 30-DAY DRUG USE PRE-TREATMENT AND POST-TREATMENT RISK BEHAVIOR GROUP (N=2,671)				
	Pre-treatment %	Post-treatment %	Q	p
Powdered Cocaine				
IDU and sex exchange	39	28	3.6	0.05
IDU only	41	19	59	0.001
Sex exchange only	13	7	9.3	0.002
Neither behavior	12	5	43	0.001

4. RELATIONSHIPS BETWEEN RISK BEHAVIOR GROUPS AND RELATED RISK VARIABLES

This section examines the relationship among injection drug use, sex exchange and other risk behaviors, as well as a self-reported HIV/AIDS diagnosis. The specific variables analyzed were:

- Having an HIV/AIDS diagnosis

- Having sex with an injection drug user (IDU)

- Having sex with 10 or more partners

- Sharing needles

- Using condoms more than half the time.

We hypothesized that clients who reported either injection drug use and/or sex exchange behaviors would be more likely to engage in related risk behaviors or to report a positive HIV/AIDS diagnosis than clients reporting neither behavior. The results of the logistic regression (LR) analyses for the three high risk behavior groups compared to the neither behavior group are shown in Exhibit III-9. Client characteristics and baseline drug use were controlled for in each regression analysis.

BEST COPY AVAILABLE

EXHIBIT III-9
LOGISTIC REGRESSION ODDS RATIOS (ORs)[a] FOR REPORTED BEHAVIORS BY IDU AND SEX EXCHANGE, IDU ONLY AND SEX EXCHANGE ONLY RELATIVE TO NEITHER BEHAVIOR GROUP

| Reported Risk Behavior | n | Risk Behavior Groups | | |
		IDU and Sex Exchange	IDU Only	Sex Exchange Only
Positive HIV/AIDS Diagnosis	3,635	7.58**	4.55**	1.08
Sex with an IDU	3,527	30.68**	9.86**	3.12**
10 or more sexual partners	3,627	7.96**	-1.56*	6.32**
Ever shared needles	3,632	25.56**	20.68**	1.16
Used condoms >half time-vaginal sex	3,635	2.13**	-1.16	2.12**

[a] With other variables controlled, each Odds Ratio (OR) shows the likelihood of a given reported risk behavior occurring in a particular risk behavior group relative to the neither (Control) group.
* <.05, **p<.01

The results for each variable are discussed in the sections that follow. In these sections we also examine any significant differences between clients who report more frequent sex exchange (i.e., 21 or more times in past 12 months) versus clients who report less frequent sex exchange (i.e., 20 times or fewer in the past 12 months) and differences between male and female clients.

4.1 Positive HIV/AIDS Diagnosis

Logistic Regression (LR) analyses revealed that compared to the neither behavior group, the odds of reporting a positive HIV/AIDS diagnosis at entry to treatment were 8 times higher in the IDU and sex exchange group and 5 times higher in the IDU only group. These differences were statistically significant (p<.01). In contrast, the odds of reporting an HIV/AIDS diagnosis was not significantly higher in the sex exchange only group compared to the neither behavior group.

Similar results were found in a univariate analysis. As shown in Exhibit III-10, the IDU and sex exchange group reported the highest rate of infection (15%), followed by the IDU only group (7%). The sex exchange only (4%) and the neither behavior (2%) groups had similar reports of HIV/AIDS. The overall differences between the groups were statistically significant. With the exception of the sex exchange only group, the findings tended to support the validity of the constructed risk groups, because the IDU and sex exchange group, which had the highest predicted risk, also reported the highest rate of a positive HIV/AIDS status.

EXHIBIT III-10
PERCENTAGE OF CLIENTS REPORTING HIV/AIDS BY
RISK BEHAVIOR GROUP
(N=3,702)
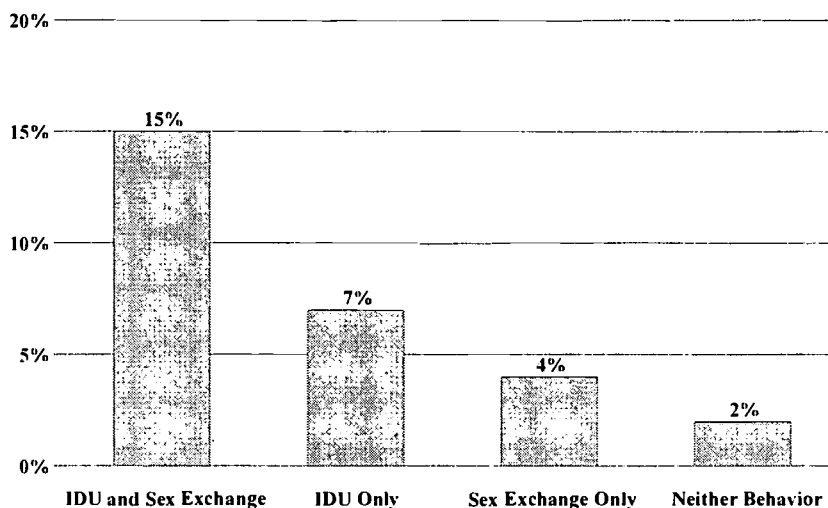
As predicted, clients who practiced more frequent sex exchange (i.e., 21 or more times in a year) were more likely to report an HIV/AIDS diagnosis than clients practicing less frequent sex exchange. Among the clients who practiced more frequent sex exchange, 6 percent reported an HIV/AIDS diagnosis, compared to only 3 percent of the clients who reported less frequent sex exchange, and 2 percent of the clients who reported no sex exchange. The univariate differences were statistically significant (Chi-square=17.87, df=2, p<.001); however, multivariate LR analyses, which controlled for other pre-treatment variables, failed to support the finding of statistically significant differences between these groups.

4.2   Sex with an IDU

In comparison to the neither behavior group, the odds of reporting sex with an IDU were 31 times higher for the IDU and sex exchange group, 10 times higher for the IDU only group and 3 times higher for the sex exchange only group. Each of these differences was statistically significant (p<.01). The percentage of clients in each risk behavior group who reported sex with an IDU is shown in Exhibit III-11. As expected, the IDU and sex exchange group again reported the highest risk exposure, followed by IDU only, sex exchange only and the neither behavior groups. These differences were statistically significant (Chi-square=626, p<.001).

EXHIBIT III-11
**PERCENTAGE OF CLIENTS REPORTING SEX WITH AN IDU BY
RISK BEHAVIOR GROUP
(N=3,593)**
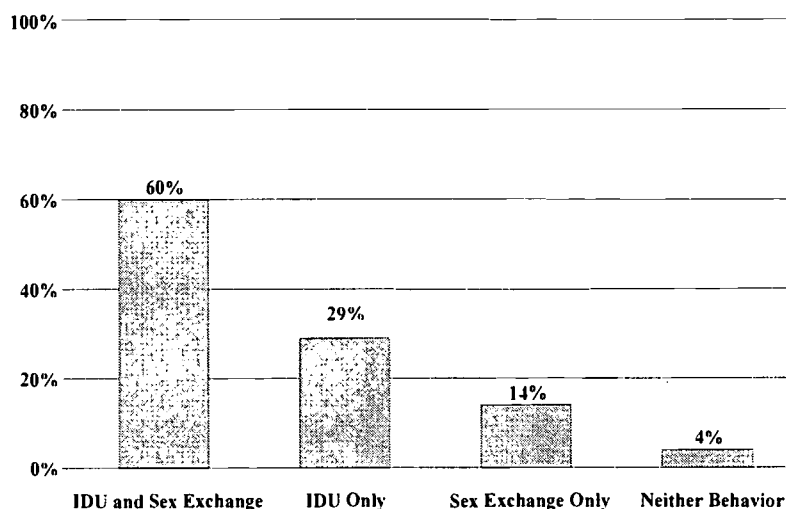
Clients who practiced more frequent sex exchange during the past 12 months (i.e., 21 or more times) reported more frequent sex with an IDU (23%) compared to clients reporting less frequent (10%) or no sex exchange (4%) (Chi-square=112, df=2, p<.001). LR analyses confirmed these patterns. Compared to the neither behavior group, the odds of reporting sex with an IDU were 5 times higher for clients who exchanged sex more frequently (p<.001), and only 2 times higher for those clients who exchanged sex less frequently (p<.001).

Compared to males, females more often reported having sex with an IDU in three of the four risk behavior groups. Only in the IDU and sex exchange group, where sex with an IDU was reported by 61 percent of the females and 57 percent of the males, was the gender difference not statistically significant.

4.3   Sex with 10 or More Partners

In this set of LR analyses, it was found that the IDU and sex exchange group had 8 times higher odds of reporting sex with 10 or more partners (p<.01). The sex exchange only group had 6 times higher odds of multiple partner sex compared to the neither behavior group (p< .01). Exhibit III-12 shows the percentage of clients in each risk behavior group who at intake reported having sex with 10 or more partners during the past 12 months. Significantly more clients in the IDU and sex exchange group (44%) and sex exchange only group (43%) reported having sex

with 10 or more partners, compared to the IDU only (5%), and neither behavior (10%) groups (Chi-square=541, p<.001).

EXHIBIT III-12
PERCENTAGE OF CLIENTS REPORTING 10 OR MORE SEX
PARTNERS BY RISK BEHAVIOR GROUP
(N=3,674)
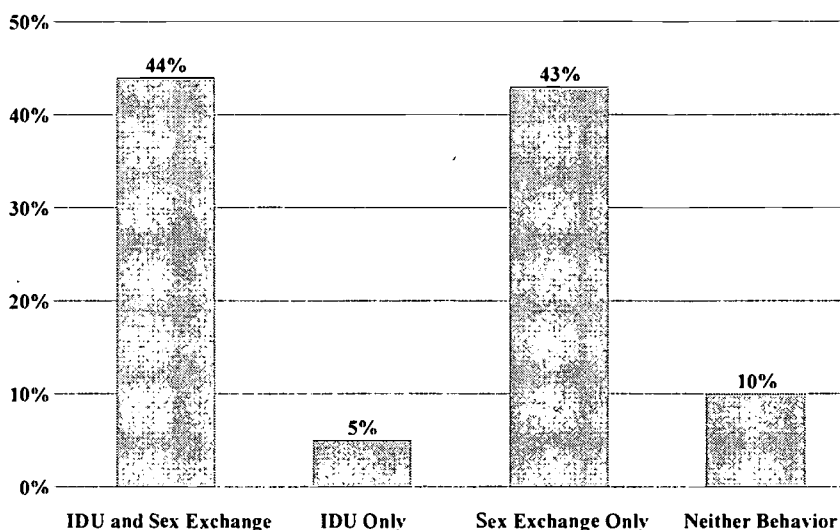
As would be expected, clients who reported more frequent sex exchange (i.e., 21 or more times) were more likely to report sex with 10 or more partners than either the clients who reported less frequent or no sex exchange. Over 80 percent of the frequent sex exchange clients reported sex with 10 or more partners, compared to 25 percent of the less frequent sex exchange clients, and 10 percent of the no sex exchange clients. Multivariate LR techniques supported these findings. The odds of having sex with 10 or more partners was 48 times higher for the group who practiced more frequent sex exchange (p>.001) and only 3 times higher for the group with less frequent sex exchange, compared to the neither behavior group (i.e., no sex exchange) (p>.001).

Higher percentages of female clients reported having sex with 10 or more partners in the IDU and sex exchange group (females 51% versus males 29%) (Chi-square =7.4, p<.007), and in the sex exchange only group (females 41% versus males 25%) (Chi-square=13.1, p<.001). Higher percentages of male clients reported having sex with 10 or more partners compared to females in the IDU only and neither behavior risk groups.

BEST COPY AVAILABLE

4.4   Needle Sharing

The risk behavior of needle sharing during the past 12 months was assessed for 907 clients in the IDU and sex exchange and IDU only groups. No clients in the sex exchange only or neither behavior groups reported having injected drugs during the past 12 months. Differences between the IDU and sex exchange (44%) and the IDU only (38%) groups were not statistically significant for sharing needles in the past 12 months.

In contrast, significant differences were found in the analysis of lifetime needle sharing (for which clients in each of the four risk behavior groups were assessed). About three quarters of the IDU and sex exchange clients (73%) reported ever having shared needles, compared to the IDU only group (66%), the sex exchange only group (13%), and the neither behavior groups (1%) (Chi-square=1154, p<.01).

Employing LR, the odds of lifetime needle sharing were 26 times higher for the IDU and sex exchange group, and 21 times higher for the IDU only group compared to the neither behavior group. The odds of lifetime needle sharing for the sex exchange only group did not differ significantly from the neither behavior group.

Rates of past 12-month needle sharing were similar for male and female IDUs across the groups. For lifetime rates of needle sharing, among the IDU and sex exchange clients, 81 percent of males and 67 percent of females reported these behaviors (Chi-square=3.63, p=.057). Among the sex exchange only clients, 18 percent of males and 11 percent of females reported needle sharing (Chi-square=5.38, p=.02), and among the neither behavior clients, 10 percent of males and 7 percent of females reported needle sharing (Chi-square=7.69, p=.006).

4.5   Condom Use

The odds of reporting condom use more than half the time for vaginal sex was 2 times higher in the IDU and sex exchange and the sex exchange only groups compared to the neither behavior group. There were no significant differences observed for the IDU only group compared to the neither behavior group. Insufficient data were available to assess the odds of reported condom use for oral or anal sex.

Higher rates of condom use were reported by the IDU and sex exchange and sex exchange only groups compared to the IDU only and neither behavior groups. About 60 percent of the clients in the IDU and sex exchange and sex exchange only groups reported using

condoms more than half the time. In contrast, 33 percent of the IDU only and 44 percent of the neither behavior groups reported this practice (Chi-square=82, p<.001). The more frequent use of condoms by the injection drug use and sex exchange and sex exchange only may be associated with the higher rates of sex with multiple partners in these groups.

Compared to the neither behavior group, no significant differences were found in the odds of condom use for clients who exchanged sex more frequently or less frequently. Differences were observed, however, when the clients who exchanged sex more and less frequently were directly compared (i.e., a two-group comparison). Using LR analysis with other variables controlled, the clients who exchanged sex more frequently reported 2 times higher odds of using condoms for vaginal sex compared to clients who reported no sex exchange. Similar results were found in univariate analysis, as 67 percent of the more frequent sex exchange group (n=117), compared to 55 percent of the less frequent sex exchange group (n=262), reported condom use at least half the time (Chi-square=4.86, p<.05).

In the sex exchange only group, higher percentages of female clients (63% versus 50%) reported using condoms at least half the time (Chi-square=8.31, p=.004). While not statistically significant, the results in the IDU and sex exchange group were in the same direction: 60 percent of female clients versus 46 percent of male clients reported using condoms at least half the time (Chi-square=2.75, p=.097). In contrast, no gender differences in reported condom use were found in the IDU only and neither behavior groups.

5.   FACTORS ASSOCIATED WITH RISK BEHAVIORS AT INTAKE

In this section, we identify and discuss the variables that were associated with injection drug use and/or sex exchange behaviors during the pre-treatment period. For this purpose, three Logistic Regression (LR) models were developed. In three sequential models, predictor variables were used to correctly classify clients into one of the three risk behavior groups—IDU and sex exchange, IDU only, or sex exchange only. In each of these regression analyses, the neither behavior clients represented the comparison group, as follows:

■ Model 1: IDU and sex exchange versus neither behavior (n=2,446)

■ Model 2: IDU only versus neither behavior (n=2,879)

■ Model 3: Sex exchange only versus neither behavior (n=2,898).

The variables that were found to be associated with injection drug use and/or sex exchange are presented in Exhibit III-13. In the following sections, we discuss each of the three models in turn, identifying the specific variables in each that are related to risk behaviors.

EXHIBIT III-13 ODDS RATIOS FOR PREDICTORS OF PRE-TREATMENT RISK BEHAVIORS IN THREE LOGISTIC REGRESSION (LR) MODELS (N=3,702)			
Predictors	IDU and Sex Exchange	IDU Only	Sex Exchange Only
Client Characteristics			
Age	1.05**	1.07**	1.02**
Race	NS		
Other vs. white	–	-1.75	2.05
Hispanic vs. white	–	-1.1	1.88
Black vs. white	–	-3.6**	5.06**
Gender: Female vs. male	3.88**	NS	3.11**
Prior drug treatment	1.97**	2.14**	2.06**
Employment/Homelessness			
Unemployed currently	NS	NS	1.92**
Homeless currently	3.88**	1.82**	2.06**
Victimization/Suicide Attempt			
Ever sexually abused	NS	NS	2.55**
Ever been beaten up	1.8**	NS	NS
Ever been attacked by someone with a weapon	1.9**	1.46**	NS
Ever been kicked out of parent's home before age 18	NS	NS	1.4**
Ever been sexually abused	NS	NS	NS
Ever attempted suicide	1.9*	NS	NS
Criminality			
Court involvement—Currently	1.62**	1.75**	1.4*

BEST COPY AVAILABLE

EXHIBIT III-13 (CONT.) ODDS RATIOS FOR PREDICTORS OF PRE-TREATMENT RISK BEHAVIORS IN THREE LOGISTIC REGRESSION (LR) MODELS (N=3,702)			
Predictors	IDU and Sex Exchange	IDU Only	Sex Exchange Only
Past 30-Day Heroin/Powdered Cocaine/Crack Use			
Heroin + powdered cocaine/crack vs. Neither	11.84**	19.5**	1.39
Powdered cocaine + crack vs. Neither	3.19**	2.6**	2.42**
Heroin only vs. Neither	4.64**	11.18**	1.31
Powdered cocaine only vs. Neither	1.82	2.37**	1.37
Crack only vs. Neither	-1.72	-1.65*	2.48**
Treatment Modality			
Methadone vs. long-term residential	1.63	2.14**	-2.92*
Non-methadone outpatient vs. long-term residential	-3.22**	1.82	-1.55**
Short-term residential vs. long-term residential	-1.56	-1.39	-1.12

$*p<.05$, $**p<.01$
NS=not selected

5.1   IDU and Sex Exchange Predictive Model

The strongest variable associated with IDU and sex exchange was past 30-day heroin and cocaine/crack use. Those clients who reported the dual use of opiates and stimulants had 12 times higher odds of practicing injection drug use and sex exchange compared to clients who reported no use of either substance. The next strongest predictors were past 30-day heroin use only (5 times higher odds), female gender (4 times higher odds), and living in a homeless shelter in the past 12 months (4 times higher odds). The following variables predicted twice greater odds of IDU and sex exchange:

- Having ever been beaten up

- Having been attacked by someone with a weapon

- Ever attempting suicide

- Current court involvement

- Past 30-day use of powdered and crack cocaine.

Increases in a client's age were also associated with the practice of injection drug use and sex exchange. With each one-year increase in a client's chronological age, the odds of practicing these behaviors increased by 5 percent. Lastly, the odds of practicing IDU and sex exchange were 3 times lower for clients in non-methadone outpatient compared to long-term residential treatment.

5.2   IDU Only Predictive Model

As in the model for IDU and sex exchange, the variable most often associated with injection drug use only was past 30-day heroin and cocaine/crack use. These clients had a 20 times higher odds of practicing injection drug use only compared to clients who reported no use of either substance. The next strongest predictors were: past 30-day heroin use only (11 times higher odds), and being black versus white (5 times higher odds).

Among the other variables which significantly increased the odds of using injection drugs only were:

- Prior drug treatment

- Homeless in past 12 months

- Ever been attacked with a weapon

- Current court involvement

- Past 30-day powdered cocaine and crack use

- Past 30-day powdered cocaine use only

- Methadone outpatient treatment versus long-term residential.

In addition, clients had 7 percent higher odds of practicing IDU only behavior with each 1-year increase in age and 2 times lower odds with the use of crack only in the past 30 days.

5.3   Sex Exchange Only Predictive Model

The strongest predictors of sex exchange only behavior were race (4 times higher odds for blacks), having been sexually abused (3 times higher odds), and past 30-day crack use only (2.5

times higher odds). The remaining predictors of sex exchange only behaviors (with 2 times higher odds) were:

- Female

- Unemployed

- Homeless in the past 12 months

- Having prior drug treatment(s)

- Having been forced to leave home prior to age 18

- Current court involvement

- Past 30-day powdered cocaine and crack use (with no heroin).

There was a 2 percent higher odds of practicing sex exchange only with every 1-year increase in chronological age. Lastly, the modalities of methadone and non-methadone outpatient treatment each predicted *decreases* in sex exchange only behavior compared to the long-term residential modality (each with 3 times lower odds).

5.4   Model Accuracy for Classifying Pre-treatment Risk Behaviors

Data on the accuracy of the three models for classifying pre-treatment risk behaviors is displayed in Exhibit III-14. This measure was based on the correct classification of clients who did and did not practice these risk behaviors. Generally, all three models were successful in correctly classifying neither behavior clients (i.e., as 99 percent, 96 percent and 94 percent of the not at risk clients were correctly classified in the three models, respectively). Similarly, each model was highly successful in classifying cases overall, as 95 percent, 89 percent and 84 percent of clients were correctly classified overall. The models were relatively less accurate, on the other hand, in classifying at risk clients into their respective risk behavior groups. Of the three models, the IDU only cases were predicted most accurately (61%), sex exchange only was second (45%) and injection drug use and sex exchange was last (29%).

The variance accounted for by each model was also assessed, but is not shown in the exhibit. The IDU only model accounted for the largest percentage of variance, with low and high estimates of 34 percent and 53 percent, respectively. The model classifying injection drug use and sex exchange accounted for the smallest percentage of variance, 15 percent and 40 percent,

respectively, and the model classifying sex exchange only was intermediate with corresponding estimates of 25 percent and 39 percent, respectively.

EXHIBIT III-14 PREDICTIVE ACCURACY OF MODELS			
Criteria	IDU and Sex Exchange %	IDU Only %	Sex Exchange Only %
Not-at-risk Cases Correctly Classified	99	96	94
At-risk Cases Correctly Classified	29	61	45
All Cases Correctly Classified	95	89	84
Variance Explained—Low Estimate	15	34	25
Variance Explained—High Estimate	40	53	39

6.   PREDICTING RISK BEHAVIOR AT FOLLOW-UP

In this section, the analyses used to predict follow-up risk behaviors are described. In order to predict risk behavior at follow-up, a hierarchical linear model (HLM) consisting of Service Delivery Unit (SDU) and client variables was developed that included fixed and random effects. In the fixed effects part of the model, SDU-level variables are described before the client-level variables. Next, a random effects model is described. Finally, in univariate analyses, the independent relationships between the selected variables and follow-up risk behavior were assessed.

6.1   The HLM Model

A model for predicting risk behavior in the follow-up period was developed through hierachical linear modeling (HLM). Based on the fixed effects model, the SDU variables that predicted a lower frequency of high risk behavior after treatment were: (1) non-methadone versus methadone treatment, and (2) relatively more frequent counseling sessions offered by the SDU (to the average client). Client variables that predicted a lower frequency of risk behavior after treatment were (1) the practice of risk behaviors before treatment, (2) a longer stay in treatment, and 3) attending classes/school during treatment for the purpose of obtaining a GED or diploma. Exhibit III-15 shows these SDU and client variables that were included in the fixed effects model. For each of the latter variables, Exhibit III-16 shows the percentage of variance that was accounted for by each of the above variables in the random effects model.

BEST COPY AVAILABLE

EXHIBIT III-15 CLIENT AND SDU VARIABLES INCLUDED IN HLM FIXED EFFECTS MODEL					
	Coefficient	SE	T	OR	p
SDU Variables					
Intercept	-3.26	0.148	-22.1	-26	0.001
Methadone vs. all others	1.6	0.279	5.7	4.9	0.001
SDU counseling frequency	-0.31	0.145	2.1	-1.4	0.037
Client Variables					
IDU and sex exchange pre-treatment	3.09	0.232	13.3	22	0.001
IDU only pre-treatment	2.81	0.175	16.1	17	0.001
Sex exchange only pre-treatment	1.56	0.191	8.2	5	0.001
Length of stay	-0.003	0.001	-4.9	-1.003	0.001
Attending school/classes	-0.448	0.259	1.95	-1.6	0.057

EXHIBIT III-16 REDUCTION IN VARIANCE AT EACH STEP IN HLM RANDOM EFFECTS MODEL					
Source	Variance Total	DF	p	Percent Reduction Total	Percent Reduction This Step
No Variables in Model	1.550	51	0	0	0
Methadone vs. All Others	0.493	51	0	68.2	68.2
IDU and Sex Exchange Pre-treatment	0.452	50	0	70.8	2.6
IDU Only Pre-treatment	0.283	50	0	81.8	11.0
Sex Exchange Only Pre-treatment	0.203	50	0.002	86.9	5.1
Length of Stay	0.150	50	0.015	90.3	3.4
SDU Counseling Frequency	0.124	49	0.023	91.1	1.8
Attending School/Classes	0.111	49	0.068	91.9	0.8

SDU Variables

According to the HLM model, the comparison of methadone to the other modalities accounted for the most variation in the practice of high risk behavior during follow-up. Specifically, clients in methadone treatment had a 5 times higher odds of reporting risk behavior compared to clients in other modalities. Additionally, methadone treatment accounted for 68 percent of the variance in mean SDU follow-up risk behavior (see Exhibit III-16).

BEST COPY AVAILABLE

A second SDU variable was the reported frequency of counseling sessions offered by the SDU. As employed in the model, the frequency of individual counseling or therapy for the typical client was rated by the SDU on a 5-point scale ranging from once a month or less at the lowest frequency to four to six times per week at the highest frequency. SDUs that offered more frequent counseling had a 40 percent lower odds of having clients who practiced high risk behavior after treatment, compared to SDUs that provided less frequent counseling. The SDU counseling frequency accounted for almost 2 percent of the variance in mean SDU follow-up risk behavior.

Client Variables

The most important client variable in predicting follow-up risk behavior was, as might be expected, pre-treatment risk behavior. For example, clients who practiced both IDU and sex exchange behavior prior to treatment had 22 times higher odds of practicing these behaviors at follow-up. Similarly, the clients who practiced IDU only prior to treatment had 17 times higher odds of reporting either injection drug use or sex exchange behavior at follow-up. Finally, the clients who practiced sex exchange only pre-treatment had 5 times higher odds of reporting either or both risk behaviors at follow-up. These variables accounted for variance reductions of 3 percent, 11 percent and 5 percent, respectively, in SDU mean risk behavior.

Longer stays in treatment were associated with a reduction in the likelihood of risk behavior. Specifically, with each additional month in treatment the odds of risk behavior during follow-up was reduced by about 20 percent. Length of stay in treatment accounted for about a 9 percent variance reduction in SDU mean risk behavior.

The next client variable was in-treatment attendance in school/classes (i.e., for the purpose of receiving a GED/diploma). Clients who reported attending classes had a 60 percent lower odds of engaging in high risk behavior during follow-up. Examining the random effects model, this variable accounted for almost 1 percent of the remaining variance in the SDU mean risk behavior.

6.2   Overall Model Accuracy

Overall, the model accounted for 92 percent of the total SDU variance in the mean risk behavior between SDUs after treatment. Next, the variance was accounted for separately by the SDU and client variables. In this analysis, the client variables were entered into the model first, followed by the SDU. While the two SDU variables accounted for most of the variance, i.e., 63

percent, subsequently, the client variables when entered together, accounted for the additional 29 percent.

In the next section, a univariate analysis is presented showing the relationship of each of the above SDU and client variables individually to the practice of high risk behavior during the post-treatment or follow-up period.

## 6.3   Client and SDU Predictors: Univariate Analysis

The univariate relationships between the SDU and client variables in the model and high risk behavior after treatment were assessed without controlling for other variables. First, these relationships are shown for the SDU variables, namely, treatment modality and counseling frequency, as reported by the SDU. Subsequently, similar results are presented for the client variables, including pre-treatment risk behaviors, length of stay in treatment, attending school or classes while in treatment for the purpose of receiving a GED/diploma and amount of contact time with the counselor.

SDU Variables

The relationship of the SDU variables, treatment modality and counseling frequency, to high risk behavior after treatment is discussed in the sections that follow.

Treatment modality. According to the HLM statistical model, there were significant differences in high risk behaviors after treatment between clients in methadone treatment and those in the three non-methadone modalities combined (e.g., outpatient non-methadone, short-term residential, and long-term residential). Methadone-treated clients, however, also reported more injection drug use behavior in the pre-treatment periods than non-methadone treated clients. The difference between pre-treatment and follow-up injection drug use and sex exchange behaviors for methadone clients and for clients treated in the three other modalities combined is shown in Exhibit III-17.

EXHIBIT III-17
PERCENTAGE OF CLIENTS REPORTING ANY INJECTION DRUG USE
AND ANY SEX EXCHANGE PRE-AND POST-TREATMENT BY
TREATMENT MODALITY
(N=2,670)
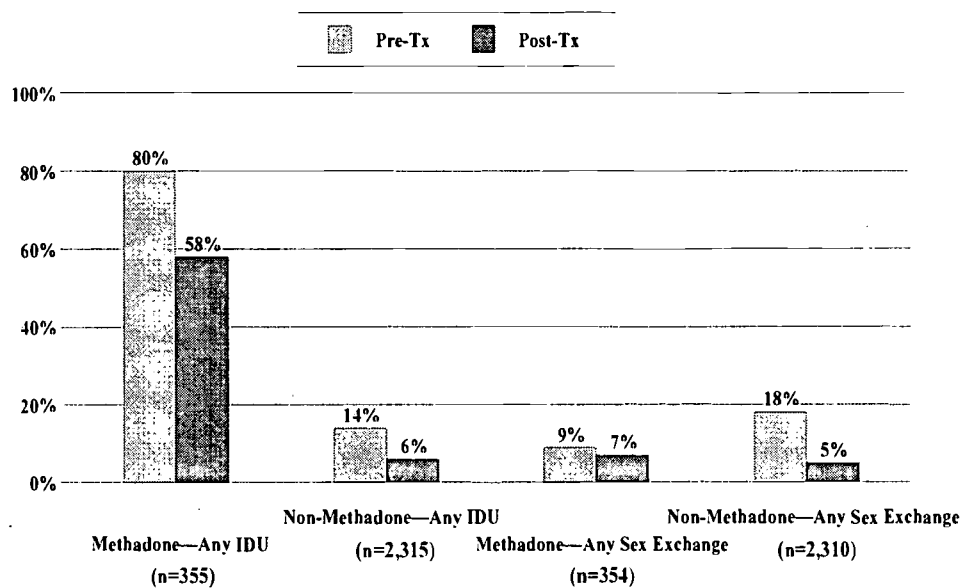
Methadone clients reported more injection drug use in both pre-treatment and follow-up periods compared to clients in the three other modalities combined, while the non-methadone treated clients reported more sex exchange behavior in the pre-treatment period only. While both methadone and non-methadone groups significantly reduced their injection drug use behavior, only the non-methadone clients significantly reduced sex exchange behavior. Thus, methadone clients reduced their injection drug use behavior by 28 percent from 80 percent in the pre-treatment period to 58 percent during follow-up (p<.001). Similarly, non-methadone treated clients reduced their injection drug use behavior by 57 percent, from 14 percent at pre-treatment to 6 percent at follow-up (p<.001). In contrast, methadone clients only reduced their sex exchange behavior by 28 percent from 9 percent to 7 percent between periods (not significant), while non-methadone clients reduced their sex exchange behavior from 18 percent to 5 percent (p<.001).

More frequent individual counseling within SDUs. A treatment variable that predicted reduced injection drug use and sex exchange behaviors among clients after treatment was how frequently the service delivery units (SDUs) offered individual counseling. In further analysis of methadone versus all other modalities combined (non-methadone), lower risk behavior was associated with the frequency of individual counseling provided by the SDU for non-methadone

clients only. Of the non-methadone clients in SDUs that typically provided individual counseling less than once a week, 17 percent reported injection drug use or sex exchange at follow-up, compared to only 10 percent of the non-methadone clients within SDUs that typically provided individual counseling less than once a week (Chi-square=9.55, p<.01). Unfortunately, the data did not support a similar analysis of group counseling.

Client Variables

In this section, we describe the relationship of each client variable included in the HLM model to high risk behavior(s) after treatment. In order to develop the HLM model, in the prior analyses, many pre-treatment and in-treatment variables were controlled. In the present analysis, either no additional variables were controlled, or only a single variable was controlled, namely, treatment modality. Where treatment modality was controlled, either data were presented separately for all four modalities, clients receiving methadone treatment were compared to clients in the three remaining treatment modalities (combined), or clients in long-term and short-term residential treatment were compared to clients in outpatient methadone and outpatient non-methadone treatment The first variable that predicted the absence of injection drug use or sex exchange behaviors in the post-treatment or follow-up period was their absence in the pre-treatment period. The second variable was a longer stay in treatment. The third variable was being enrolled in school/classes during treatment for the purpose of obtaining a GED/diploma. The relationship of each of these variables to risk during and after treatment is described below.

Client pre-treatment risk behaviors. Clients' pre-treatment levels of risk behaviors strongly predicted the post-treatment rates. Specifically, among clients who practiced any risk behavior (IDU and/or sex exchange) before treatment, 39 percent reported risk behavior(s) after treatment. Of the clients who did not report any risk behavior before treatment, only 4 percent reported either risk behavior(s) after treatment. Clients who practiced any risk behavior(s) before treatment were most likely to practice the same risk behavior(s) after treatment.

Longer stays in treatment. Longer stays in treatment reduced high risk behaviors following treatment. These results are shown in Exhibit III-18. Clients who reported no risk behaviors after treatment were in treatment longer than those who reported one or both risk behaviors after treatment. Clients with longer stays in methadone, outpatient non-methadone, and short-term residential modalities were significantly less likely to report risk behaviors after treatment than those with shorter stays. When the pre-treatment risk behaviors of the clients in each modality were taken into account, these differences were significant only for the methadone and outpatient non-methadone modalities.

EXHIBIT III-18
AVERAGE NUMBER OF DAYS IN TREATMENT FOR CLIENTS WITH AND
WITHOUT RISK BEHAVIORS AT FOLLOW-UP BY TREATMENT MODALITY
(N=2,671)
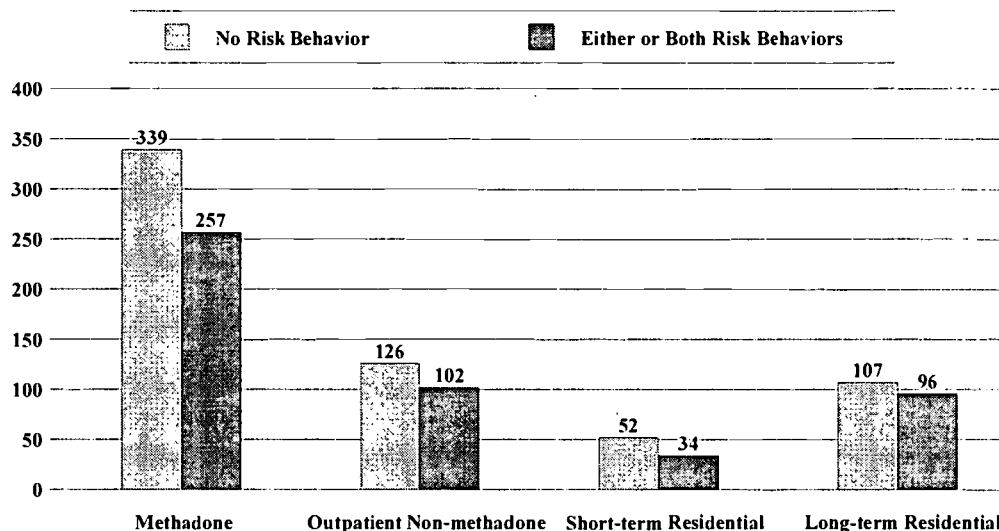
In-treatment school/class attendance. In-treatment school/class attendance reduced high risk behaviors following treatment. Among the 393 clients treated in the three non-methadone modalities (combined) who attended school/classes during treatment, 5 percent reported one or both risk behaviors after treatment compared to 12 percent of clients who did not attend school/classes during treatment. These differences remained significant after accounting for the clients' pre-treatment risk behaviors. The number of methadone clients (n=18) who attended school/classes was too small to analyze. The majority (60%) of the three non-methadone modalities (combined) offered in-treatment classes, compared to less than half (44%) of the methadone modality. On average, clients in the methadone modality were older (average age=38) than clients in the three non-methadone modalities combined (average age range=30 to 32), which may have influenced the need for and availability of in-treatment classes.

IV. SUMMARY AND RECOMMENDATIONS

In this final chapter of the report, we review the main findings from the analyses performed and discuss their implications for future research and for substance abuse treatment policy and practice. This discussion of analysis findings highlights the utility of our approach to categorizing and assessing high-risk behaviors. In most cases, the predicted patterns of results were affirmed by our analytic approach, as highlighted below.

1. SUMMARY

Overall, the findings supported the hypothesis that substance abuse treatment reduces or even prevents the practice of the high-risk behaviors of injection drug use (IDU) and/or sex exchange. The findings nonetheless indicated a strong relationship between the clients' pre-treatment behaviors (as indicated by our categorization of clients in injection drug use and sex exchange risk behavior groups) and their post-treatment behaviors and outcomes. The findings for each analysis question are summarized below.

1.1 Client Characteristics and Demographics

There were significant differences observed between each of the high risk behavior groups in terms of gender, education level, unemployment and housing status, racial/ethnic status, pre-treatment substance use, as well as prior drug and alcohol treatment(s). As expected, past 30-day use of drugs that are readily injectable (heroin and powdered cocaine) was highest among clients who practiced IDU behaviors, while clients who reported sex exchange behaviors were more likely to report past 30-day use of crack cocaine. The IDU only group tended to be more often male and white or Hispanic while the sex exchange groups (IDU and sex exchange and sex exchange only) tended to be more often female and black.

1.2 Services Received

The most frequently provided services were medical (60%), other drug and alcohol counseling (47%), assertiveness training (43%) and transportation services (41%). Generally, clients reporting the lowest frequency of services were in the IDU only risk group. Compared to clients in other risk behavior groups, the IDU only clients also reported being in contact with their primary providers the least often and for the shortest amounts of time.

1.3   Changes in Risk Behaviors After Treatment

Overall, the percentage of clients reporting one or both risk behaviors (injection drug use/sex exchange) declined significantly at follow-up while the percentage of clients reporting neither behavior increased significantly. Significant reductions were also observed in related risk behaviors and in drug use after treatment.

The percentages of clients in each group who reported sex with an IDU decreased significantly between treatment intake and follow-up. For two groups—the IDU and sex exchange and the IDU only groups—the frequency of needle sharing also declined between pre-treatment and follow-up. With the exception of IDU only clients, who showed low baseline rates of sexual activity, the rates of having sex with multiple partners (i.e., 10+) also decreased following treatment. Significant reductions were also observed for all risk behavior groups in post-treatment rates of heroin, cocaine and crack use.

1.4   Relationships Between Risk Behavior Groups and Related Variables

Consistent with our ad hoc categorization of NTIES clients into risk behavior groups, distinct patterns of other risk behaviors were displayed by each group. For example, compared to the neither behavior group, the odds of reporting sex with an IDU were 30 times higher for the IDU and sex exchange group, 10 times higher for the IDU only group, and 3 times higher for the sex exchange only group. In addition, compared to the neither behavior group, reports of an HIV/AIDS diagnosis were significantly more likely among the IDU and sex exchange and the IDU only groups.

1.5   Factors Associated with Pre-treatment Risk Behaviors

Multiple substance use (e.g., clients who used both heroin and cocaine/crack) was the factor most often associated with IDU and sex exchange and IDU only prior to clients' entry to treatment. Additional client characteristics associated with injection drug use and/or sex exchange were increased age, being homeless and being court involved.

1.6   Predictors of Risk Behavior at Follow-up

This analysis question examined the SDU- and client-level variables that were most predictive of post-treatment risk behavior(s). A hierarchical linear modeling (HLM) technique

was employed to address this question. The variables that were significant predictors are described next.

SDU-level Variables

The SDU-level variables that predicted high risk behavior during follow-up were the treatment modality in which clients received services and the frequency of individual counseling sessions provided by the SDU. Clients who received outpatient methadone treatment, compared to the clients treated in the other three modalities combined, had higher odds of practicing injection drug use and/or sex exchange risk behaviors at follow-up. In addition, clients treated in an SDU that provided more frequent counseling (on average) were much less likely to practice these high-risk behaviors during follow-up.

Client-level Variables

The most important client variables in predicting high-risk behaviors at follow-up were the client's pre-treatment risk behaviors. For example, compared to clients who did not practice either risk behavior during pre-treatment, clients who practiced IDU and sex exchange, IDU only, or sex exchange only during the pre-treatment period had 22, 17 and 5 times higher odds of practicing one or both of these risk behaviors during follow-up. The client's length of stay in treatment also predicted high-risk behaviors during follow-up. With each 1-month increase in length of stay, clients were 9 percent less likely to practice risk behavior during follow-up.

2. RECOMMENDATIONS

The findings from this analysis can lay a framework for future work by scientists, policy makers, and treatment practitioners. In the sections that follow, we discuss the analysis results in the context of their implications for research, policy, and practice. We also acknowledge the practical limitations inherent in any set of secondary analyses or evaluation designs.

2.1 Implications for Research

We identify and discuss four main implications of our work for future analysis and research—the specific limitations of the NTIES evaluation design, the reliance on self report, the omission of key variables in NTIES, and the need for both replication and expanded evaluation efforts.

Design Limitations

The NTIES evaluation design was limited in part because it included in-treatment samples only. According to a review of the literature by Sorensen et al. (2000), the strongest designs for measuring treatment effectiveness are ones that compare treated and untreated samples and also validate the clients' self reports using biological markers, such as urine toxicology and blood test results. Metzger et al. (1993), for example, demonstrated the effectiveness of methadone treatment in reducing seroconversion rates, and found an association between self-reported risk behavior and seroconversion. Since an untreated comparison group was not employed in the NTIES study, the possibility that the observed reductions may have occurred spontaneously (i.e., without treatment) could not be completely ruled out.

Reliance on Self Report Data

The reliance of the present analysis on self-reported data from clients raises the question of data validity. Prior research by Greenfield et al. (1995) found that clients tended to underestimate their reported drug use and recommended that urinalysis results be assessed in studies of injection drug use behavior. Group comparisons of urinalysis and self-reported drug use were performed in NTIES and the results showed high concordance (NORC, 1997). While urinalysis results cannot directly validate IDU behavior and needle sharing, they might be useful in validating the reported changes in drug use that often accompany such high-risk behaviors. An analytic approach using biological markers to assess drug use and, by extension, risk behaviors, was beyond the scope of this analysis. We do recommend that findings from this analysis be replicated in the future using biological marker data to further validate the clients' self report.

Absent Variables

Another limitation in NTIES was the absence of several important variables that may either interact with other variables that were included, or account for their relationship to treatment outcomes. One such variable is treatment readiness (e.g., Prochaska, DiClemente and Norcross, 1992). Recent studies have suggested that treatment readiness is important for achieving favorable treatment outcomes to the extent that it is associated with client motivation and contributes to a more favorable client-counselor relationship (Simpson et al., 1997). One possibility is that treatment readiness could account for the reductions in risk behavior with longer stays in treatment and longer counseling sessions, as clients who are more "ready" for treatment may also be more motivated to remain longer in treatment and participate in counseling

sessions. Another variable is psychiatric comorbidity, i.e., DSM IV classification. For example, Brooner et al. (1993) found higher frequencies of needle sharing behavior among opiate users who were diagnosed with Antisocial Personality Disorder (ASPD), compared to non-diagnosed opiate users.

Need for Replication and Expanded Evaluation Efforts

The validity of any set of analytic findings is bolstered through systematic replication by other researchers and evaluators. Particularly in need of replication are findings that are not well documented in the research literature. One of these is the positive association between school/class attendance and reduced risk behaviors following treatment. This association was only significant for clients in treatment modalities other than methadone. More research is needed to determine if these effects were due to the fact that methadone clients may have had relatively fewer opportunities to attend school/classes, and tended to be older than clients in other modalities.

Another finding that may need further exploration was that longer stays in treatment were associated with reduced risk behaviors only for those NTIES clients treated in outpatient modalities (i.e., methadone and non-methadone outpatient). Prior large-scale, multisite evaluations have shown strong effects of client length of stay on a variety of outcomes, and these effects generally are not modality-specific (Simpson and Sells, 1982; Hubbard et al., 1989; Hubbard et al., 1997). Client risk behaviors for STDs and viral infections have not been extensively studied as treatment outcomes, per se, and thus will need to be examined further in this context.

This analysis is one of the first efforts to examine pre- to post-treatment changes in IDU and sexual risk behaviors among clients in non-methadone modalities. Most of the existing studies in this area have documented that treatment can be effective in changing clients' drug-related risk behavior, but have not demonstrated the same level of reductions in sexual risk behaviors (Sorenson, 2000). In addition, little is known from this prior research about the effectiveness of non-methadone modalities. While our analyses represent a strong initial research effort, we believe further study of risk behavior in other client treatment modalities is necessary.

Finally, the overall relationship among client variables, substance abuse, risk behaviors, treatment services and treatment outcomes identified in this analysis is worthy of a more comprehensive and systematic exploration. Both our analysis and the NTIES study on which it is

based have inherent limitations that should be addressed in the design of new and expanded evaluation research efforts. To simultaneously assess the complex relationships between substance abuse, client risk and protective factors, treatment services, and behavioral and physical outcomes, evaluation efforts need to be well designed, with larger samples, comparison groups, more complete data on clients and treatment services, and multiple follow-up data collection points (short-term, intermediate and long-term). Such evaluation efforts will require substantial commitment and resources.

2.2   Implications for Substance Abuse Treatment Policy

In this section, we discuss the implications of the report's findings for influencing future substance abuse treatment policy. The main recommendations for treatment policy include increased efforts to improve the effectiveness of outpatient methadone treatment by increasing clients' length of stays in treatment and expanding clients' access to treatment services.

Improve Effectiveness of Treatment by Increasing Lengths of Stay

We recognize that the effectiveness of substance abuse treatment could be increased by adopting policies and practices that increase clients' length of stay/retention in treatment. In this analysis, longer stays in treatment were associated with significant reductions in the likelihood of post-treatment risk behaviors. Specifically, with each additional month in treatment, the odds of any risk behavior at follow-up was reduced by about 20 percent. The need to increase client lengths of stay and/or increase retention in substance abuse treatment may be particularly important for methadone outpatient modalities. In an unpublished analysis of NTIES that compared methadone maintenance clients (i.e, clients who remained in treatment throughout the follow-up period), to methadone discharged clients (i.e., those who were terminated from treatment prior to follow-up) there was a 20 percent difference in the rate of clients in each group (47 and 67 percent, respectively) who reported injecting drugs at follow-up. Those findings were comparable to Sees et al. (2000), who reported that 50 percent of methadone treated clients continued to use opiates 12 months after initiating treatment. Practices that have been shown to increase client retention in methadone treatment could be supported by policy makers (e.g., expansion of the administration of LAAM, and the administration of higher doses of methadone).

Expand Access to Substance Abuse Treatment in All Modalities

We recommend access to substance abuse treatment be expanded wherever feasible as a means of preventing the practice of high-risk behaviors and the spread of viral infections/STDs.

This recommendation is supported by the significant reductions in drug use and associated risk behaviors following substance abuse treatment observed in the present analysis. We found significant reductions in the use of heroin, cocaine and crack following treatment across groups of clients who were previously engaged in risk behaviors. Additionally, other risk behaviors, including injection drug use, needle sharing, sex exchange, sex with an IDU, and sex with 10 or more partners, were substantially reduced following substance abuse treatment. Only the protective factor of routine condom use failed to show increases for the majority of clients in the follow-up period relative to the pre-treatment period. For the most part, the present findings are consistent with prior research, including longitudinal studies of in-treatment samples and comparative studies of treated and untreated samples (Metzger, 1993; Sorensen, in press). Taken together with prior research, the present findings suggest that substance abuse treatment is effective in reducing risk behaviors for viral infections/STDs and should be expanded as a means of preventing the spread of such infections, including HIV, other STDs and hepatitis C.

2.3   Implications for Treatment Practice

Finally, our results have significant implications for the way treatment practice might be optimized for high-risk groups. We recommend targeting services to high-risk behavior groups, increasing the intensity of individual counseling services to those groups, and developing better profiles of high-risk clients to assess their treatment services needs.

Target Services to High-risk Behavior Groups

Clients in the IDU and sex exchange group who practiced both types of high risk behaviors should be targeted with preventive services, as they reported the highest rates of HIV/AIDS and sex with an IDU, as well as high rates of sex with multiple partners in the pre-treatment period. They also had relatively high rates of multiple drug use, including past 30-day heroin use in combination with cocaine/crack. These findings suggest a need to provide such clients with additional services in order to prevent the spread of viral infections/STDs. These services might include HIV/AIDS education and counseling and HIV testing. According to research by Weinhardt et al. (1999), after counseling and testing, HIV-positive couples modified their high risk sexual behavior (e.g., increased their condom use) more than untested couples.

Increase Intensity of Individual Counseling Services to High-risk Behavior Groups

The findings suggest that the frequency of individual counseling services should be increased for substance abusers who report injection drug use and/or sex exchange at intake. In

predicting risk behavior during follow-up, clients treated in SDUs that offered more frequent individual counseling had 40 percent lower odds of engaging in injection drug use or sex exchange behavior during follow-up.

In further analyses, this finding held up for clients in SDUs that provided non-methadone outpatient and residential treatment only. Clients in SDUs that offered counseling once a week or more reported lower rates of risk behavior after treatment than did clients in SDUs that offered less frequent counseling. Accordingly, more frequent counseling sessions are recommended in these settings. These results are consistent with findings by Florentine and Anglin (1996), which revealed that more frequent individual and group counseling was associated with lower levels of relapse into drug use. The same study showed that the favorable outcomes associated with more frequent counseling in the present analysis were independent of clients' retention in treatment.

Develop Better Profiles of High-risk Clients to Assess the Need for Services

In order to achieve reductions in risk behaviors after treatment, better methods of assessing the service needs of clients at risk ought to be developed. In the present analysis, specific client characteristics, drug use and background variables were found to be highly associated with injection drug use and sex exchange behaviors prior to treatment. For example, injection drug use, either alone or in combination with sex exchange, was highly associated with the use of multiple substances in the 30 days prior to treatment, including heroin plus cocaine and/or crack, but not crack alone. This finding was confirmed in recent research by Metzger (Personal Communication), who found that a similar pattern of drug use predicted HIV seroconversion. Also predictive of injection drug use either alone or in combination with sex exchange were homelessness in the past 12 months and a history of physical abuse. In contrast, the use of crack alone and a history of sexual abuse were among the best predictors of pre-treatment sex exchange behavior. To the extent that clients who fit such behavioral profiles can be identified, appropriate services can be offered to them. For example, more frequent counseling sessions and the opportunity to attend school/classes in pursuit of a GED may be offered to high-risk clients who practice injection drug use and sex exchange. In the present analysis, these services were associated with reductions in these risk behaviors during follow-up.

REFERENCES

Abdul-Quadar, A.S., Friedman, S.R., Des Jarlais, D., et al. (1987). Methadone maintenance and behavior by intravenous drug users that can transmit HIV. *Contemporary Drug Problems, 14*, 425-434.

Ball, J.C., & Ross, A. (1991). *The effectiveness of methadone maintenance treatment: Patients, programs, services, and outcome.* New York: Springer-Verlag.

Ball, J.C., Lang, W.R., Myers, C., & Friedman, S.R. (1988). Reducing the risk of AIDS through methadone maintenance treatment. *Journal of Health and Social Behavior, 29*, 214-226.

Battelle Centers for Public Health Research and Evaluation. (2000). *Treatment components and their relationships with drug and alcohol abstinence.* National Evaluation Data Services (NEDS), Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment. U.S. Department of Health and Human Services. Caliber/NEDS Contract No. 270-97-7016.

Booth, R.E., Kwiatkowski, C., Citwood, D.D. (2000). Sex related HIV risk behaviors: Differential risk among injection drug users, crack smokers, and injection drug users who smoke crack. *Drug and Alcohol Dependence, 58*, 212-226.

Booth, R.E. (1995). Gender differences in high risk sex behaviors among heterosexual drug injectors and crack smokers. *American Journal of Drug and Alcohol Abuse, 21*, 419-432.

Brooner, R.K., Greenfield, L., Schmidt, C.W., & Bigelow, G.E. (1993). Antisocial Personality Disorder and HIV infection in intravenous drug abusers. *American Journal of Psychiatry, 150*, 53-58.

Brown, B.S. (1998). *HIV/AIDS and drug abuse treatment services literature review.* http://www.nida.nih.gov/HSR/da-tre/BrownHIV.html.

Bryk, A.S., Raudenbush, S.W., & Cogdon, R. (1996). *HLM: Hierarchical linear and nonlinear modeling with the HLM/2L and HLM/3L programs.* Scientific Software International, Inc., Chicago, IL.

Bryk, A.S., & Raudenbush, S.W. (1992). *Hierarchical linear models.* Sage Publications, Newbury Park, CA.

Caliber Associates. (1999). *Minimum evaluation data set: Core data lists.* National Evaluation Data Services (NEDS), Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment.

Camacho, L.M., Bartholomew, N.G., Joe, G.W., Cloud, M.A., Simpson, D.D. (1996). Gender, cocaine and during-treatment HIV risk reduction among injection opioid users in methadone maintenance. *Drug and Alcohol Dependence, 41,* 1-7.

Caplehorn, J.M.M., & Ross, M.W. (1995). Methadone maintenance and the likelihood of risky needle sharing. *International Journal of the Addictions, 30*, 685-698.

Center for Substance Abuse Treatment. (1997). *The National Treatment Improvement Evaluation Study: Final report.* Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services, Rockville, MD.

Center for Substance Abuse Treatment. (1993). *Screening for infectious diseases among substance abusers, Treatment Improvement Protocol (TIP) Series 6.* Substance Abuse and Mental Health Services Administration, U.S. Department of Health and Human Services, Rockville, MD. DHHS Publication No. (SMA) 93-2048.

Centers for Disease Control and Prevention. (1996). *HIV/AIDS surveillance report—U.S. HIV and AIDS cases reported through June 1996.* Atlanta, GA: Author.

Chou C.P., Hser Y.I., & Anglin, M.D. (1998). Interaction effects of client and treatment program characteristics on retention: An exploratory analysis using hierarchical linear models. *Substance Use Misuse, 33,* 2281-301.

Darke, S., Hall, W., Heather, N., Ward, J., & Wodak, A. (1991). The reliability and validity of a scale to measure HIV risk-taking behavior among intravenous drug users. *AIDS, 5,* 181-185.

Des Jarlais, D.C., Perlis, T., Friedman, S.R., Chapman, T., Kwok, J., Rockwell, R., Paone, D., Milliken, J., & Monterroso, E. (2000). Behavioral Risk reduction in a declining HIV epidemic: Injection drug users in New York City, 1990-1997. *American Journal of Public Health, 90,* 1112-1117.

Dole, V.P., & Nyswander, M.E. (1965). A medical treatment for diacetyl-morphine (heroin) addiction. *Journal of the American Medical Association, 193,* 646.

Edlin, B.R., Irwin, K.L., Faruque, S., McCoy, C.B., et al. (1994). Intersecting epidemics—Crack cocaine use and HIV infection among inner-city young adults. *New England Journal of Medicine, 331,* 1422-1427.

El-Bassel, N., & Schilling, R.F. (1992). *15-month follow-up of women methadone patients taught skills to reduce heterosexual HIV transmission.*

Etheridge, R.M. Hubbard, R.L. Anderson, J:, et al. (1967). Treatment structure and program services in the Drug Abuse Treatment Outcome Study. *Psychology of Addictive Behaviors, 11,* 244-261.

Florentine, R., & Anglin, M.D. (1996). More is better: Counseling participation and the effectiveness of drug treatment. *Journal of Substance Abuse Treatment, 13,* 341-348.

Fullilove, R.E., Fullilove, M.T., Bowser, B.P., & Gross, S.A. (1990). Risk of sexually transmitted disease among black adolescent crack users in Oakland and San Francisco, California. *Journal of the American Medical Association, 263*, 851-855.

Garfein, R.S., Vlahov, D., & Galai, N., et al. (1996). Viral infections in short-term injection drug users: The prevalence of the hepatitis C, hepatitis B, human immunodeficiency, and human T-lymphotropic viruses. *American Journal of Public Health, 86*, 655-61.

Greenfield, L. (1999). *Methadone treatment outcomes in the National Treatment Improvement Evaluation Study (NTIES)*. Caliber Associates: Fairfax, VA.

Greenfield, L., Brady, J.V., Besteman, K.J., & DeSmet, A. (1996). Patient retention in mobile and fixed-site methadone maintenance treatment. *Drug and Alcohol Dependence, 42*, 125-131.

Greenfield, L., Bigelow, G.E., & Brooner, R.K. (1995). Validity of intravenous drug users' self-reported changes in HIV high-risk drug use behaviors. *Drug and Alcohol Dependence, 39*, 91-98.

Grella, C.E., Anglin, M.D., & Wugalter, S.E. (1997). Pattern and predictors of cocaine and crack use by clients in standard and enhanced methadone maintenance treatment. *American Journal of Drug and Alcohol Abuse, 23*, 15-42.

Hershow, R.C., Kalish, L.A., Sha, B., Till, M., & Cohen, M. (1998). Hepatitis C virus infection in Chicago women with or at risk for HIV infection: Evidence for sexual transmission. *Sexually Transmitted Diseases, 25*, 527-532.

Hoffman, J.A. (2000). Frequency and intensity of crack use as predictors of women's involvement in HIV-related sexual risk behaviors. *Drug and Alcohol Dependence, 58*, 227-236.

Holmberg, S.D. The estimated prevalence and incidence of HIV in 96 large U.S. metropolitan areas. *American Journal of Public Health, 86*, 642-654.

Hubbard, R.L., Craddock, S.G., Flynn, P.M., Anderson, J., & Etheridge, R.M. (1997). Overview of 1-year follow-up outcomes in the Drug Abuse Treatment Outcome Study (DATOS). *Psychology of Addictive Behaviors, 11*, 261-278.

Hubbard, R.L., Marsden, M.E., Rachal, J.V., Harwood, H.J., Cavanaugh, E.R., & Ginzburg, H.M. (1989). Clients in the major modalities. In R.L. Hubbard, M.E. Marsden, J.V. Rachal, H.J. Harwood, E.R. Cavanaugh, & H.M. Ginzburg (Eds.), *Drug Abuse Treatment: National Study of Effectiveness* (pp. 71-98). Chapel Hill: University of North Carolina Press.

Kauth, M.R., St. Lawrence, J.S., & Kelly, J.A. (1991). Reliability of retrospective assessments of sexual HIV risk behavior: A comparison of biweekly, 3-month, and 12-month self-reports. *AIDS Education and Prevention, 3*, 207-214.

Logan, T.K., & Leukefeld, C. (2000). Sexual and drug use behaviors among female crack users: A multisite sample. *Drug and Alcohol Dependence, 58*, 237-245.

Logan, T.K., Leukefeld, C., & Farabbee, D. (1998). Sexual and drug use behaviors among women crack users: Implications for prevention. *AIDS Education and Prevention, 10*, 327-340.

Longshore, D., & Anglin, M.D. (1995). Number of sex partners and crack cocaine use: Is crack an independent marker for HIV risk behavior?" *Journal of Drug Issues.*

Longshore, D., Hsieh, S., Danila, B., & Anglin, D.P. (1994). Reducing HIV risk behavior among injection drug users: Effects of methadone maintenance treatment on number of sex partners. *International Journal of the Addictions, 28*, 983-996.

Longshore, D., Hsieh, S., Danila, B., & Anglin, D.P. (1993). Methadone maintenance and needle/syringe sharing. *International Journal of the Addictions, 28*, 983-996.

Magura, S., Rosenblum, A., & Rodriguez, E.M. (1998). Changes in HIV risk behaviors among cocaine-using methadone patients. *Journal of Addictive Diseases, 17*, 71-90.

Magura, S., Shapiro, L.L., Siddiqi, Q., & Lipton, D.S. (1990). Variables influencing condom use among intravenous drug users. *American Journal of Public Health, 80*, 82-84.

Malow, R.M., West, J.A., Corrigan, S.A., Pena, J.M. & Cunningham, S.C. (1994). Outcome of psychoeducation for HIV risk reduction. *AIDS Education and Prevention, 6*, 113-125.

Marco, M., & Schouten, J. (2000). *The hepatitis report: A critical review of the research and treatment of hepatitis C virus (HCV) and hepatitis & HIV coinfection.* Treatment Action Group, NY, NY (http//www.aidsinfonyc.org/tag/comp/heprpt.html).

McCusker, J., Bigelow, C., Luippold, R., Zorn, M., Lewis, B.F. (1995). Outcomes of a 21-day drug detoxification program: Retention, transfer to further treatment, and HIV risk behavior and criminality: A meta-analysis. *Addiction, 93*, 515-532.

McCusker, J., Bigelow, C., Stoddard, A.M., Zorn, M., & Lewis, B.F. (1994). Human immunodeficiency virus type I antibody status and changes in risk behavior among drug users. *Annals of Epidemiology, 4*, 466-471.

McCusker, J., Stoddard, A.M., & McCarthy, E. (1992). The validity of self-reported HIV antibody test results. *American Journal of Public Health, 82*, 567-569.

McElrath, K., Chitwood, D.D., Griffink D.K., & Comerford, M. The consistency of self-reported HIV risk behavior among injection drug users. *American Journal of Public Health, 12,* 1965-1970.

Metzger, D.S. (2000). Personal communication.

Metzger, D.S., Woody, G.E., McLellan, A.T., et al. (1993). Human immunodeficiency virus seroconversion among intravenous drug users in- and out-of-treatment: An 18-month prospective follow-up. *Journal of Acquired Immunodeficiency Syndromes, 6,* 1049-1056.

Molitor, F., Ruiz, J.D., Flynn, N., Mikanda, J.N., Sun, R.K., & Anderson, R. (1999). Methamphetamine use and sexual and injection risk behaviors among out-of-treatment injection drug users. *American Journal of Drug and Alcohol Abuse, 25,* 475-493.

National Institute on Drug Abuse. (May, 2000). *Community drug alert bulletin,* U.S. Department of Health and Human Services, National Institutes of Health. Bethesda, MD. (Distributed by the National Clearinghouse for Alcohol and Drug Information, NCADI)

National Opinion Research Center (NORC). (1997). *Final report: National Treatment Improvement Evaluation Study.* U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Center for Substance Abuse Treatment, Rockville, MD.

Osmond, D.H., Padian, N.S., Sheppard, H.W., Glass, S., Shiboski, S.C., & Reingold, A. (1993). Risk factors for hepatitis C virus seropositivity in heterosexual couples. *Journal of the American Medical Association, 269,* 361-365,

Prochaska, J.O., DiClemente, C.C., & Norcross, J.C. (1992). In search of how people change. Applications to addictive behaviors. *American Psychologist, 47,* 1102-1114.

Rhoades, H.M., Creson, D., Elk, R., Schmitz, J., & Grabowski, J. (1998). Retention, HIV risk, and illicit drug use during treatment: Methadone dose and visit frequency. *American Journal of Public Health, 88,* 34-39.

Sees, K.L., Delucchi, K.L., Masson, C., et al. (2000). Methadone maintenance vs. 180-day psychosocially enriched detoxification for treatment of opioid dependence. *Journal of the American Medical Association, 283,* 1303-1310.

Shoptaw, S., Rback, C.J., Frosch, D.L., & Rawson, R.A. (1998). Stimulant abuse treatment as HIV prevention. *Journal of Addictive Diseases, 17,* 19-32.

Sorensen, J.L., & Copeland, A.L. (In press). Drug abuse treatment: An HIV prevention strategy. *Drug and Alcohol Dependence.*

Sorensen, J.L., London, J., Heitzmann, C, Gibson, D.R., Morales, E.S., Dumontet, R., & Acree, M. (1994). Psychoeducational group approach: HIV risk reduction in drug users. *AIDS Education and Prevention 6,* 95-112.

Simpson, D.W., Joe, G.W., Rowan-Szal, G.A. & Greener, J.M. (1997). Drug abuse treatment process components that improve retention. *Journal of Substance Abuse Treatment, 14,* 565-572.

Simpson, D.D., & Sells, S.B. (1982). Effectiveness of treatment for drug abuse: An overview of the DARP research program. *Advances in Alcohol and Substance Abuse, 2,* 7-29.

Weatherby, N.L., McCoy, H.V., Metsch, L.R., Bletzer, K.V., McCoy, C.B., & de la Rosa, M.R. (1999). Crack cocaine use in rural migrant populations: Living arrangements and social support. *Substance Use and Misuse, 34,* 685-706.

Weinhardt, L.S., Carey, M.P., Johnson, B.T., & Bickham, N.L. (1999). Effects of HIV counseling and testing on sexual risk behavior: A meta-analytic review of published research, 1985-1997. *American Journal of Public Health, 89,* 1397-1405.

Weinhardt, L.S., Forsyth, A.D., Carey, M.P., et al. (1998). Reliability and validity of self-report measures of HIV-related sexual behavior: Progress since 1990 and recommendations for research and practice. *Archives of Sexual Behavior, 27,* 155-180.

Williams, A.B., McNelly, E.A., & D'Aquilla, R.T. (1992). Methadone maintenance treatment and HIV type 1 seroconversion among injecting drug users. *AIDS Care, 4,* 35-41.

Wyld, R., Robertson, J.R., Brettle, R.P., Mellor, J., Prescott, L. & Simmonds, P. (1997). Absence of hepatitis C virus transmission but frequent transmission of HIV-1 from sexual contact with doubly-infected individuals. *Journal of Infectious Diseases, 35,* 163-166.

Zule, W.A., & Desmond, D.P. (1999). An ethnographic comparison of HIV risk behaviors among heroin and methamphetamine injectors. *American Journal of Drug and Alcohol Abuse, 25,* 1-23.

APPENDIX A:
DESCRIPTION OF THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY AND CENTER FOR SUBSTANCE ABUSE TREATMENT DEMONSTRATIONS (1990-1992)

The National Treatment Improvement Evaluation Study (NTIES) was a national evaluation of the effectiveness of substance abuse treatment services delivered in comprehensive treatment demonstration programs supported by the Center for Substance Abuse Treatment (CSAT). The NTIES project collected longitudinal data between FY 1992 and FY 1995 on a purposive sample of clients in treatment programs receiving demonstration grant funding from CSAT. Client-level data were obtained at treatment intake, at treatment exit, and 12 months after treatment exit. Service delivery unit (SDU) administrative and clinician (SDU staff) data were obtained at two time points one year apart.

1.   THE NTIES DESIGN

The NTIES study design had two levels—an administrative or services component and a clinical treatment outcomes component.

1.1   The Administrative/Services Component

This study component was designed to assess how CSAT demonstration funds were used, what improvements in services were implemented at the program level, and what kind and how many programs and clients were affected by the demonstration awards. Four data collection instruments were used to gather administrative/services data: the NTIES Baseline Administration Report (NBAR), the NTIES Continuing Administrative Report (NCAR), the NTIES Exit Log, and the NTIES Clinician Form (NCF).

The unit of analysis for the administrative component was the SDU, defined by CSAT as a single site offering a single level of care. The classification of *level of care* is based on three parameters: (1) facility type (e.g., hospital, etc.); (2) intensity of care (e.g., 24-hour, etc.); and (3) type of service (e.g., outpatient, etc.). An SDU could be a stand-alone treatment provider or it could be one component of a multitiered treatment organization. For example, a large county mental health agency may be the *organization* within which the SDU is located. The organization may have multiple substance abuse treatment components, such as a county hospital and a county (ambulatory) mental health center. The county hospital may have multiple SDUs, such as an inpatient detoxification service, an outpatient counseling service, and a hospital

satellite center providing transitional care. In summary, the SDU provided NTIES evaluators with a stable, uniform level of comparison for examining service delivery issues.

A range of key clinician-specific data elements (within the administrative component) were assessed using the NCF. The NCF items were an important adjunct to the facility (SDU)-level instruments; these items assessed clinician training, experience, client exposure, and service provision, and were completed by all counseling and clinical (medical and therapeutic) staff at the individual SDUs.

1.2   Clinical Treatment Outcomes Component

The unit of analysis for the clinical treatment outcomes component was individual client data. NTIES measured the clinical outcomes of treatment primarily through a "before/after" or "pre- to post-treatment" design. This method compares behaviors or other individual characteristics in the same participants, measured in similar ways, before and after an intervention.

Information about clients' lives for the *before* period was obtained from the NTIES Research Intake Questionnaire (NRIQ), which was administered sometime during the clients' first three weeks of treatment. The specific areas assessed included:

- Drug and alcohol use

- Employment

- Criminal justice involvement and criminal behaviors

- Living arrangements

- Mental and physical health.

Information about clients' lives for the *after* period were obtained from the NTIES Post-discharge Assessment Questionnaire (NPAQ), with the same areas assessed at roughly 12 months post-treatment. Other client data sources included a treatment discharge interview (NTIES Treatment Experience Questionnaire, NTEQ), abstracted client records, urine drug screens collected at the time of the follow-up interview, and arrest reports from State databases.

1.3   The Outcome Analysis Sample

Between August 1993 and October 1994, research staff successfully enrolled 6,593 clients at 71 SDUs to participate in three waves of an in-person, computer-assisted data collection protocol. These SDUs were chosen from the universe of treatment units receiving demonstration grant funding from CSAT. Some of the selected facilities were wholly supported by CSAT awards, while others received only indirect support or none.

Clients were interviewed at admission to treatment, when they left treatment, and at 12 months after the end of treatment. Less than 10 percent of the recruited clients refused or avoided participation, and more than 83 percent of the recruited individuals (5,388 clients) completed a follow-up interview. Additional sample exclusions included:

- Missing or undetermined treatment exit date

- Inappropriate length of follow-up interval (less than 5 or more than 16 months)

- Clients incarcerated for most or all of the follow-up period.

The additional sample exclusions resulted in a final outcome analysis sample of 4,411 individuals.

2.   TREATMENT DEMONSTRATION PROGRAMS

CSAT initiated three major demonstration programs and made 157 multiyear treatment enhancement awards across 47 States and several territories from 1990 through 1992. One objective common to all demonstrations was CSAT's emphasis on the provision of "comprehensive treatment" services to targeted client populations. The recipients of these awards focused special attention on the substance abuse treatment service needs of minority and special populations located primarily within large metropolitan areas. The demonstration programs are briefly described below.

2.1   Target Cities

Under this demonstration, nine metropolitan areas were selected to receive awards, half of which were included in the NTIES purposive sample. The following treatment improvement activities were explicitly provided for in the awards:

■ Establishment of a Central Intake Unit (CIU) with automated client tracking and referral systems in place

■ Provision of comprehensive services, including vocational, educational, biological, psychological, informational, and lifestyle components

■ Improved interagency coordination (e.g., mental health, criminal justice, and human service agencies)

■ Services for special populations—adolescents, pregnant and postpartum women, racial and ethnic minorities, and public housing residents.

2.2   Critical Populations

Under this demonstration program, awardees were required to implement "model enhancements" to existing treatment services for one or more of the following critical populations: racial and ethnic minorities, residents of public housing, and/or adolescents. Special emphasis was given to services provided to the homeless, the dually diagnosed, or persons living in rural areas. A total of 130 grants were awarded, covering services such as vocational support/counseling, housing assistance, integrated mental health and/or medical services, coordinated social services, culturally directed services, and others.

2.3   Incarcerated and Non-incarcerated Criminal Justice Populations

Under this demonstration program, funds were directed toward improving the standard of comprehensive treatment services for criminally involved clients in correctional and other settings. Some program emphasis was placed on ethnic and/or racial minorities. Nine correctional setting demonstrations were funded: five in prisons, three in local jails, and one across a network of juvenile detention facilities. All projects included a screening component to identify substance-abusing inmates, a variety of targeted treatment interventions (e.g., therapeutic communities, intensive day treatment programs), and a substantial aftercare component.

A total of 10 non-incarcerated projects were funded. Five programs targeted interventions at clients in diversionary programs, three focused services on probationers or parolees, and two targeted both populations. Almost all of the funded demonstration projects included the following components:

■ Basic eligibility determination, followed by systematic screening and assessment

■ Referral to treatment

■ Graduated sanctions and incentives while in treatment

■ Intensive supervision in treatment

■ Community-based aftercare with supervision and service coordination.

In total, 19 criminal justice projects were funded as part of the CSAT 1990-1992 demonstrations, and, as indicated in the next section, these projects were purposively over-sampled in order to obtain a more robust evaluation of this program.

3. DESCRIPTION OF SDUs AND CLIENTS BY TREATMENT MODALITY AND PROGRAM TYPE

The 71 SDUs contributing clients to the outcome analysis sample are characterized by modality and (demonstration) program type in Exhibit A-1 below. Among the 698 SDUs in the NTIES universe: 52 percent (n=365) were Target Cities programs, 39 percent (n=274) were Critical Populations programs, and 9 percent (n=59) were Criminal Justice programs.

In terms of the SDUs sampled for the NTIES outcome analysis, 44 percent were Target Cities programs, 38 percent were Critical Populations programs, and 23 percent were Criminal Justice programs. Criminal Justice SDUs were purposely over-sampled as part of the NTIES evaluation design (CSAT, 1997). Nearly half of the sampled SDUs were non-methadone outpatient programs, and about one-quarter were long-term residential programs.

As shown in Exhibit A-2, 59 percent of all NTIES clients were sampled from Target Cities SDUs. Slightly more than 21 percent of all NTIES clients were sampled from Critical Populations SDUs, and 20 percent were sampled from Criminal Justice SDUs. Outpatient (non-methadone) SDUs treated more than one-third (35%) of the clients in the outcomes analysis sample, and almost 80 percent of these were sampled from Target Cities programs.

EXHIBIT A-1 SDUS IN THE OUTCOME ANALYSIS SAMPLE						
Program Title Number of SDUs (percent of NTIES Universe)*	NTIES Sample	Methadone	Outpatient	Long-term Residential	Short-term Residential	Correctional
Target Cities n=365 (52%)	31 (44%)	6	15	6	4	0
Critical Populations n=274 (39%)	27 (38%)	1	13	10	3	0
Criminal Justice n=59 (9%)	13 (23%)	0	5	0	0	8
Totals N=698 (100%)	71 (100%)	7	33	16	7	8

* The original NTIES universe of SDUs included a program type called *Specialized Services*. Because clients for the outcome analysis sample were not drawn from these SDUs (n=94), they are excluded from the exhibit.

EXHIBIT A-2 DISTRIBUTION OF CLIENTS IN THE OUTCOMES ANALYSIS SAMPLE					
Program Title Number of Clients (percent of Analysis Sample)	Methadone	Outpatient	Long-term Residential	Short-term Residential	Correctional
Target Cities n=2,600 (59%)	377 (89%)	1,214 (78%)	504 (60%)	505 (58%)	0
Critical Populations n=931 (21%)	45 (11%)	220 (14%)	298 (35%)	368 (42%)	0
Criminal Justice n=880 (20%)	0	132 (8%)	39 (5%)	0	709 (100%)
Totals N=4,411 (100%)	422	1,566	841	873	709

Readers who are interested in more detailed information about the NTIES project are invited to visit the NEDS Web site at http://neds.calib.com. The NEDS Web site provides the full-length version of the NTIES Final Report (1997), as well as copies of all data collection instruments employed in NTIES.

BEST COPY AVAILABLE

APPENDIX B:
THE HLM MODEL

An HLM model was used in order to adjust for the nesting of clients within SDUs. HLM was developed by Bryk and Raudenbush (1992) in order to facilitate the analysis of multilevel data. According to the model, each variable consists of random and fixed effects. In the present study, Level 1 pertains to client variables and Level 2 to SDU variables. The equations for assessing fixed and random effects in the Level 1 and Level 2 models are described below:

1. LEVEL 1 MODEL

Equation 1 presents the simplest Level 1 model, as follows:

$$(1) \quad \gamma_{ij} = B_{0j} + r_{ij}$$

In Equation 1, the outcome γ of client i in SDU j is predicted from $B_{0j} + r_{ij}$, which is the mean outcome in the jth SDU (Fixed Effect), plus the random error term r_{ij} (Random Effect). Level 1 predictors have yet to be included in the model. Since the predicted variable is dichotomous, a Bernouli solution will be employed. In employing the Bernouli solution, Equation 1a replaces Equation 1, and γ_{ij} becomes $\log[P/(1-P)]$, and the Level 1 variance=$1/[P(1-P)]$, as follows:

$$(1a) \quad \log[P/(1-P)] = B_{0j} + [1/[P(1-P)]$$

Equation 1a was used to calculate the starting variance for evaluating the Random Effects component of the model. Subsequent reductions in variance were gauged against the latter value.

2. LEVEL 2 MODEL

The simplest Level 2 model is given in Equation 2:

$$(2) \quad B_{0j} = \gamma_{00} + U_{0j}$$

In Equation 2, the mean outcome in the jth SDU is predicted from γ_{00}, which is the grand mean outcome over all SDUs, and U_{0j} is the random effect (variance) in the jth SDU.

With the addition of each Level 1 variable, the model becomes more complex. For example, with the addition of a second Level 1 variable ($B1j$), the Level 1 model becomes:

$$(3) \quad \log [P/(1-P)] = B_{0j} + B_{1j}X_{1ij} + r_{ij}$$

where:

B_{1j} is a Level 1 coefficient;
X_{1ij} is a Level 1 predictor for case i in unit j;
r_{ij} is the Level 1 random effect.

3.   EXPANDING THE LEVEL 2 MODEL

The Level 2 model now has two equations, corresponding to each Level 1 coefficient, as follows:

$$(4) \quad B_{0j} = \gamma_{00} + U_{0j}$$
$$(5) \quad B_{1j} = \gamma_{10} + U_{1j}$$

In Equation 4, B_{0j}, the coefficient for the slope of the Level 1 intercept, is predicted. In Equation 5, B_{1j}, the coefficient associated with the slope of the Level 1 variable X_{1ij}, is predicted.

Non-varying slope terms. In accord with the recommendation of Bryk and Raudenbush (1992), the error term associated with the slope in Equation 5 may be dropped when the residual is very close to 0. Such was the case in the present model, as the error terms associated with the slopes of the variables included in the model were non-varying. In this instance, Equation 5 would be replaced by Equation 5b, as follows:

$$(5b) \quad B_{1j} = \gamma_{10}$$

Adding Level 2 predictors. Level 2 predictors were added to the model in order to account for the unexplained variance. In the present model, such predictors could only be added to intercept term, since the remaining slope terms were assumed to be non-varying. Equation 6 includes such a predictor, as follows:

$$(6) \quad B_{0j} = \gamma_{00} + \gamma_{0j} W_{0j} + U_{0j}$$

where $\gamma_{0j} W_{0j}$ is a Level 2 predictor, and B_{0j} is the coefficient of the Level 1 intercept.

Criteria for building the model. As recommended by Bryk and Raudenbush (1992), each selected variable must contribute to the reduction in unexplained variance. Accordingly,

variables that reduced the percentage of unexplained variance in the model were retained, while those that did not were discarded.

Variable centering. Variables included in the model were either centered or uncentered. If a variable is uncentered, its raw scores were used in the model. If a variable is centered, the deviation of each raw score either from the grand or group (SDU) mean was used. Level 1 variables may either be centered around their group mean, centered around the grand mean, or uncentered. Level 2 variables may either be centered around the grand mean, or uncentered. In the present model, continuous variables and variables that had more than two categories were centered around the grand mean, while dichotomous variables were uncentered.

APPENDIX C:
VARIABLES INCLUDED IN ANALYTIC MODELS

The client-level variables were collected in three stages of the analysis: pre-treatment, in-treatment and follow-up. The SDU-level variables were provided by the SDU Director, who completed a mail survey at the start of the NTIES study. Accordingly, the SDU factors were not associated with any particular analytic stage. The client- and SDU-level variables employed in the analysis are shown in Appendix C. Both the client and SDU variables included dichotomous, continuous and multilevel variables. Dichotomous variables typically required a "Yes" or "No" response. In LR analysis, the "No" response typically was the reference category, against which the "Yes" response was compared. The multilevel variables were either categorical or ordinal.

1. CLIENT-LEVEL VARIABLES

We included the following dichotomous client-level variables in our analyses: pre-treatment client characteristics, in-treatment services, and past 30-day use of alcohol and marijuana. The continuous variables were age, highest grade attended, length of stay in treatment, and past 30-day alcohol use. The categorical variables were past 30-day use of heroin, cocaine and crack, marijuana, race, modality, average session time and the client's risk behavior group membership.

2. SDU-LEVEL VARIABLES

We included the following dichotomous, categorical variables in the analyses:

- Availability of case managers and volunteers

- Whether clients were involved in the development of their treatment plans

- Practice of client/counselor matching

- Tailoring of staff assignments to specific client characteristics

- Provision of HIV/AIDS testing.

In addition, the treatment modality of clients was coded within three categorical variables: methadone versus all others; non-methadone outpatient versus all others, and short-term residential versus all others.

The continuous variables we assessed included the percentage of privately insured clients, the percentage of minority staff, and the percentage of staff in recovery. One SDU-level variable with an ordinal scale was the frequency of individual counseling which the SDU offered to the typical client: (1) less than once a week, (2) once a week, (3) two to three times a week, and (4) four to six times a week.

EXHIBIT C-1 CLIENT- AND SDU-LEVEL VARIABLES AT PRE-TREATMENT, IN-TREATMENT, AND FOLLOW-UP			
	Pre-tx	**In-tx**	**Follow-up**
A. Client-level Variables			
Dichotomous (Yes/No*)			
Male	X		
Married	X		
Employed	X		
Homeless (past 12 months)	X		
Under court supervision	X		
Ever forced to have sex	X		
Ever run away from home before age 18	X		
Ever beaten up by someone	X		
Ever attacked by someone with a weapon	X		
Ever beat someone up	X		
Importance of medical treatment	X		
Attempted suicide in last 12 months	X		
Prior alcohol treatment	X		
Prior drug treatment	X		
Marijuana use in past 30 days	X		X
AIDS prevention counseling/services		X	
Physical/sexual abuse counseling		X	
Other family problems (counseling)		X	
Assertiveness training		X	
Attending school/classes (GED/Diploma)		X	
English language classes		X	
Job skills services		X	
Housing		X	
Child care		X	
Transportation		X	
Medical		X	
Life skills training		X	
Help to secure government payments		X	
Contact with provider 2+ times per week		X	
All risk behavior—IDU or sex exchange			X

BEST COPY AVAILABLE

EXHIBIT C-1 (CONT.) CLIENT- AND SDU-LEVEL VARIABLES AT PRE-TREATMENT, IN-TREATMENT, AND FOLLOW-UP			
	Pre-tx	**In-tx**	**Follow-up**
Continuous			
Age	X		
Highest grade attended	X		
Past 30-day alcohol use (A 6-category continuous variable)			
None	X		
One day	X		
2-5 days	X		
6-10 days	X		
11-20 days	X		
21 days or more	X		
Multi-level (Categorical)			
Past 30-day heroin/cocaine/crack use			X
Heroin and cocaine/crack	X		X
Cocaine and crack	X		X
Heroin only	X		X
Cocaine only	X		X
Crack only	X		X
No use*	X		X
Race			
Other, e.g., Asian	X		
Hispanic	X		
Black	X		
White*	X		
Multi-level (Categorical)			
Modality	X		
Methadone	X		
Non-methadone outpatient	X		
Short-term residential (STR)	X		
Long-term residential (LTR)*	X		
Average session time with provider		X	
Less than 30 minutes*		X	
30-59 minutes		X	
An hour or more		X	

EXHIBIT C-1 (CONT.) CLIENT- AND SDU-LEVEL VARIABLES AT PRE-TREATMENT, IN-TREATMENT, AND FOLLOW-UP			
	Pre-tx	In-tx	Follow-up
Risk behavior group	X		X
Injection drug use and sex exchange	X		X
IDU only	X		X
Sex exchange only	X		X
Neither behaviors*	X		X
B. SDU-level Variables[1]			
SDU has case managers			
SDU is supported by volunteers			
Percentage of privately insured clients			
Clients sign their treatment (tx) plans			
Clients help develop their tx plan time lines			
Clients help develop their tx plan content			
Clients can request revisions to their tx plans			
SDU matches counselors to clients			
SDU tailors staff to the client population			
HIV/AIDS testing is provided			
Modality1 - Methadone (vs. All Others)			
Modality2 - Non-meth. Outpatient (vs. All Others)			
Modality3 - Short-term resid. (vs. All Others)			
Continuous			
Percent minority staff			
Percent staff in recovery			
Multi-level (Ordinal)			
Individual counseling frequency (Recoded)			
Less than once a week*			
Once a week			
Two to three times a week			
Four to six times a week			

* Used in LR as the reference category

[1] The phase in which the variables were measured is applicable only for client-level variables.

BEST COPY AVAILABLE

REPRODUCTION RELEASE
(Specific Document)

I. DOCUMENT IDENTIFICATION:

Title: THE EFFECT OF SUBSTANCE ABUSE TREATMENT ON HIGH RISK BEHAVIORS IN THE NATIONAL TREATMENT IMPROVEMENT EVALUATION STUDY

Author(s): LARRY GREENFIELD, PhD ; RICHARD FINKBINER, PhD. ; SHARON BISHOP, MSS

Corporate Source: CALIBER ASSOCIATES

Publication Date: DECEMBER 2000

II. REPRODUCTION RELEASE:

In order to disseminate as widely as possible timely and significant materials of interest to the educational community, documents announced in the monthly abstract journal of the ERIC system, *Resources in Education* (RIE), are usually made available to users in microfiche, reproduced paper copy, and electronic media, and sold through the ERIC Document Reproduction Service (EDRS). Credit is given to the source of each document, and, if reproduction release is granted, one of the following notices is affixed to the document.

If permission is granted to reproduce and disseminate the identified document, please CHECK ONE of the following three options and sign at the bottom of the page.

The sample sticker shown below will be affixed to all Level 1 documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

1

Level 1
⊠

Check here for Level 1 release, permitting reproduction and dissemination in microfiche or other ERIC archival media (e.g., electronic) *and* paper copy.

The sample sticker shown below will be affixed to all Level 2A documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE, AND IN ELECTRONIC MEDIA FOR ERIC COLLECTION SUBSCRIBERS ONLY, HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2A

Level 2A
☐

Check here for Level 2A release, permitting reproduction and dissemination in microfiche and in electronic media for ERIC archival collection subscribers only

The sample sticker shown below will be affixed to all Level 2B documents

PERMISSION TO REPRODUCE AND DISSEMINATE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

Sample

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

2B

Level 2B
☐

Check here for Level 2B release, permitting reproduction and dissemination in microfiche only

Documents will be processed as indicated provided reproduction quality permits.
If permission to reproduce is granted, but no box is checked, documents will be processed at Level 1.

I hereby grant to the Educational Resources Information Center (ERIC) nonexclusive permission to reproduce and disseminate this document as indicated above. Reproduction from the ERIC microfiche or electronic media by persons other than ERIC employees and its system contractors requires permission from the copyright holder. Exception is made for non-profit reproduction by libraries and other service agencies to satisfy information needs of educators in response to discrete inquiries.

Sign here,→ please

Signature: Richard Finkbiner, PhD

Organization/Address: CALIBER ASSOCIATES 10530 ROSEHAVEN ST. STE 400 FAIRFAX, VA 22030

Printed Name/Position/Title: RICHARD FINKBINER, PhD / SERIES EDITOR

Telephone: 703-385-3200

FAX: 703-385-3206

E-Mail Address: finkbine@calib.com

Date: 02/07/01

III. DOCUMENT AVAILABILITY INFORMATION (FROM NON-ERIC SOURCE):

If permission to reproduce is not granted to ERIC, or, if you wish ERIC to cite the availability of the document from another source, please provide the following information regarding the availability of the document. (ERIC will not announce a document unless it is publicly available, and a dependable source can be specified. Contributors should also be aware that ERIC selection criteria are significantly more stringent for documents that cannot be made available through EDRS.)

Publisher/Distributor:
Address:
Price:

IV. REFERRAL OF ERIC TO COPYRIGHT/REPRODUCTION RIGHTS HOLDER:

If the right to grant this reproduction release is held by someone other than the addressee, please provide the appropriate name and address:

Name:
Address:

V. WHERE TO SEND THIS FORM:

Send this form to the following ERIC Clearinghouse:
University of Maryland
ERIC Clearinghouse on Assessment and Evaluation
1129 Shriver Laboratory
College Park, MD 20742
Attn: Acquisitions

However, if solicited by the ERIC Facility, or if making an unsolicited contribution to ERIC, return this form (and the document being contributed) to:

ERIC Processing and Reference Facility
1100 West Street, 2nd Floor
Laurel, Maryland 20707-3598

Telephone: 301-497-4080
Toll Free: 800-799-3742
FAX: 301-953-0263
e-mail: ericfac@inet.ed.gov
WWW: http://ericfac.piccard.csc.com