

## Highlights

The four studies confirm the efficacy of the drug treatment programs included in their respective samples:

- Significant declines in the use of all major drugs were found in all four studies and in all treatment modalities with only a few exceptions.
- All studies showed a marked reduction in illegal activities and suicidal tendencies, and some improvements in physical health.



## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies



### NEDS Analytic Summary Series

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 CSAT mission is to expand the knowledge about effective substance abuse treatment and recovery services. In support of these efforts, CSAT established the National Evaluation and Data Services (NEDS) contract to provide a wide array of secondary data analysis products to the substance abuse treatment field.

Specifically, the NEDS contract focuses on providing CSAT with analytic capability to use existing data to address policy and practice-relevant topics as well as future research and evaluation activities. NEDS has developed several product lines designed to provide analytic findings for analytic substance abuse treatment policy makers, service providers, services researchers and evaluators in a format that is most useful to the end user.

The Analytic Summary is one of the NEDS product lines. The purpose of the Analytic Summary is to provide a brief summary of each technical report produced by NEDS, written in non-technical language. Readers who find the Analytic Summary results of interest can contact the original NEDS technical report authors for more detailed information. Through this process, the NEDS Analytic Summaries provide information to the substance abuse treatment field and promote linkages among different areas in the field.

### This Analytic Summary

This NEDS Analytic Summary is based on the NEDS Technical Report entitled *Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large Scale Follow-up Studies* (Gerstein, D.R. and Johnson, R.A., July 1999). For a more thorough discussion of the analysis and findings, please obtain a copy of the complete Technical Report. Information for doing so is provided on the last page of this summary.

### Contents

Analytic Importance . . . . .	2
Analytic Approach . . . . .	2
Findings . . . . .	4
Implications . . . . .	8
Future Steps . . . . .	9

# Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies

## Analytic Importance

Most large-scale studies have shown that substance abuse treatment is effective, but do not pinpoint the effective treatment components or specify how treatment can be made more effective. One important function of CSAT is to expand the knowledge about and the availability of effective treatment services for those affected by substance abuse. In sponsoring secondary analyses of treatment outcome data, CSAT is attempting to gain useful insight into the fundamental questions: *What actually constitutes effective (and cost effective) treatment?*

The report summarized herein is based on a compendium of four large-scale substance abuse treatment studies that together form one of the largest collections of substance abuse treatment data available for analysis. Together, they represent over 10,000 clients and more than 300 substance abuse treatment facilities that provided five major modalities or types of treatment.

## Analytic Purpose

The purpose of the analyses was to answer two primary questions:

- How does substance abuse treatment affect use of the most common drugs?
- What other outcomes result from treatment programs, and do these differ by modality?

## Analytic Approach

**Methodological characteristics of the four studies.** The many method-

ological similarities provide a foundation for combining the results in the studies to produce a substantial set of information about substance abuse treatment. There are some areas where methodological differences among the studies may affect interpretation of the results of the comparative analysis, however. The studies that form the basis for this analysis, the sample size, and other distinguishing methodological differences are summarized in Exhibit 1.

All four studies share some methodological similarities:

- **Large-scale samples.** Each study followed up well over 1,000 clients.
- **Early 1990's time frame.** All clients were discharged from treatment between 1989 and 1994.
- **Data collection method.** All four studies rely on interviews with the clients to provide the fundamental data.
- **Geographical area.** The studies are based on widespread geographical areas; in most cases they represent nationwide samples.
- **Follow-up period.** All four studies included retrospective data from at least a year after treatment in the post-discharge follow-up designs.
- **Response rates.** The four studies achieved relatively high multistage response rates.
- **Monetary incentives.** Participants in the interviews for all four studies received a monetary incentive of \$15.

These analyses attempt to answer the following questions:

- What is the outcome of substance abuse treatment, as measured in the four studies?
- How does substance abuse treatment affect use of the most common drugs?
- What other outcomes result from drug treatment programs, and do these differ by modality?



## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

This analysis yielded key findings in the following areas:

- Provider and client characteristics.
- Treatment results as measured by:
  - Drug Use Outcomes
  - Other Outcomes.



Exhibit 1 Pertinent Characteristics of Four Studies of Substance Abuse Treatment Outcomes		
Study Title	Sample Size	Description Of Methodological Differences
California Drug and Alcohol Treatment Assessment (CALDATA)	N=1,826/ 3,055	Stratified random sample; one retrospective client interview. Study is confined to California. Some may argue that California is a microcosm of the country; in any case, one eighth of the U.S. population lives in California.
Services Research Outcomes Study (SROS)	N=1,799/ 3,047	Stratified random sample; one retrospective client interview. This study collected data five years after treatment exit, rather than the approximately 1 year time-frame of the other three studies.
National Treatment Improvement Evaluation Study (NTIES)	N=3,702/ 5,388	Purposive sample involving repeated measures over time. More urban; more represented by non-white clients. Data collected prospectively and retrospectively; follow-up response rate of 82% is highest of 4 studies.
Drug Abuse Treatment Outcome Study (DATOS)	N=2,966/ 4,786	Purposive sample involving repeated measures over time. Clients with longer lengths of stay were over-sampled. Smaller and less stable service delivery units were excluded from the study.

- **Data collection organization(s).** Data for all of the studies were collected by two organizations, the National Opinion Research Center (NORC) and the Research Triangle Institute (RTI), in one case, collaborating with each other.
  - **Long-term residential programs,** primarily therapeutic communities, were represented in all four studies.
  - **Outpatient programs** (non-methadone) were represented in all four studies.
  - **Methadone programs.** Clients in CALDATA, NTIES, and SROS who continued in maintenance through the follow-up period were analyzed separately from those who were discharged. DATOS methadone maintenance clients who stayed with the methadone treatment were merged together with clients who had been discharged from methadone treatment.
- Major treatment modalities.** The four studies looked at the effects of some combination of five treatment modalities; however, there are some differences among the studies in the way these modalities were classified:
- **Short-term residential programs.** All short-term residential units in CALDATA were “California Social Model” programs, while the short-term residential units in the DATOS and SROS studies were hospital inpatient programs. Short-term residential programs in NTIES enrolled clients in a mixture of hospital-based wards, spiritually guided Salvation Army-type programs, and social model-oriented programs.
- Statistical analysis.** The comparisons of pre- and post-treatment characteristics among clients with both measures employed t-tests and other standard approaches to determine the significance of the differences. These tests describe the extent to which differ-

## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

ences of this specific magnitude could have occurred by chance. The difference scores reported in this analysis were constructed using the following formula:  $(\text{POST} - \text{PRE})/\text{PRE}$ . These results were expressed as percentage changes.

### Key Findings

#### Provider and Client Characteristics

Information on treatment provider and client characteristics help to furnish insight into variations in treatment effectiveness, and how effectiveness may differ among the four studies and the different treatment modalities.

- **Source of revenue.** For the two studies that included this measure, the percentage of total revenue from public sources was higher for long-term residential and outpatient methadone programs, a little lower for outpatient non-methadone programs, and quite a bit lower for short-term residential programs.
- **Stability of ownership or administration.** In general, about one-fourth of the programs experienced recent changes in ownership or administrative oversight.
- **Client involvement in treatment goals.** Overall, most of the treatment units allowed clients to participate in setting own treatment goals. There were no clear patterns across modalities and studies, however.
- **Client demographic factors.** When comparisons were made, the demographic composition of the client samples, across the four stud-

ies, showed few distinct patterns in treatment modality participation:

- **Gender.** About one-third of the population in each study was female. Females were slightly less likely to be represented in short-term residential than in the other modalities.
- **Age.** Almost two-thirds of the total sample were over age 30. The oldest client group was in outpatient methadone programs. Short-term residential clients were older than those in long-term residential.
- **Race/ethnicity.** There was no consistent pattern of different ethnic groups across treatment modalities. In all modalities, NTIES and DATOS drew heavily from public programs in urban centers and had consistently higher proportions (approximately 66%) of respondents who were African American or Hispanic than the two random sample studies (approximately 40%).
- **Education.** About two-thirds of the sample had a high school or GED diploma. Representation in different modalities did not appear to be related to education level.
- **Living situation.** Those clients who were married or living as married were less likely to be in long-term residential facilities than those who were single. Slightly less than one-third of the total sample was married or living as married.

#### Treatment Results - Drug Use Outcomes

Within each study, the same population was included in both the pre- and

Overall, significant declines in drug use were reported in almost all studies and modalities.



## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

post-treatment statistics, to facilitate comparisons. Overall, significant declines in drug use were reported in all studies and almost all modalities.

**Marijuana.** In all modalities, in all studies, marijuana use declined significantly following treatment (see Exhibit 2). While about one-half of all clients had used marijuana before treatment, only about one-fourth used marijuana in the post-treatment follow-up period. Among the residential programs, similar results were obtained in CALDATA, NTIES, and DATOS. Among the outpatient programs, changes were more disparate, particularly in DATOS where the methadone clients reported relatively low levels of change and the non-methadone clients reported higher levels of change. The other three studies reported similar levels of decline in marijuana use for methadone and non-methadone modalities.

**Cocaine.** As with marijuana use, all modalities in all studies reported significant declines in cocaine use, from

about one-half of the pre-treatment sample to less than one-fourth, post-treatment. Methadone discharge clients, however, had higher levels of both pre-treatment and post-treatment cocaine use than clients in the other modalities.

**Crack cocaine.** Three of the four studies (CALDATA, SROS, and NTIES) differentiated between cocaine and crack cocaine (see Exhibit 3). Pre- and post-treatment crack cocaine use was lower than either marijuana or cocaine use, with approximately one-third reporting pre-treatment use and less than one-fourth of the clients reporting post-treatment use. The residential modalities in NTIES and CALDATA yielded results similar to each other but the SROS results over the longer time frame showed significantly lower pre- and post-treatment crack cocaine use. There was no significant decline in crack cocaine for two modalities in two studies (methadone and non-methadone outpatient treatment in SROS; methadone maintenance in NTIES).

In all modalities, in all studies, marijuana and cocaine use declined significantly following treatment. While about one-half of all clients had used marijuana and/or cocaine before treatment, only about one-fourth used these drugs in the post-treatment follow-up period.

In three of the four studies, the reduction in crack cocaine use was just as large.



Exhibit 2 Percent Change in Marijuana Use Before and After Treatment by Study and Treatment Modality				
	CALDATA (n=1,826)	SROS (n=1,799)	NTIES (n=3,702)	DATOS (n=2,966)
After Treatment Follow-up Period	1 Year	5 Years	1 Year	1 Year
	Percent Change	Percent Change	Percent Change	Percent Change
Short-Term Residential	-53%	-35%	-57%	-65%
Long-Term Residential	-51%	-32%	-51%	-55%
Methadone Discharge	-31%	-33%	-42%	-19%
Methadone Maintenance	-20%	N/A	-42%	
Outpatient Non-Methadone	-34%	-19%	-42%	-67%

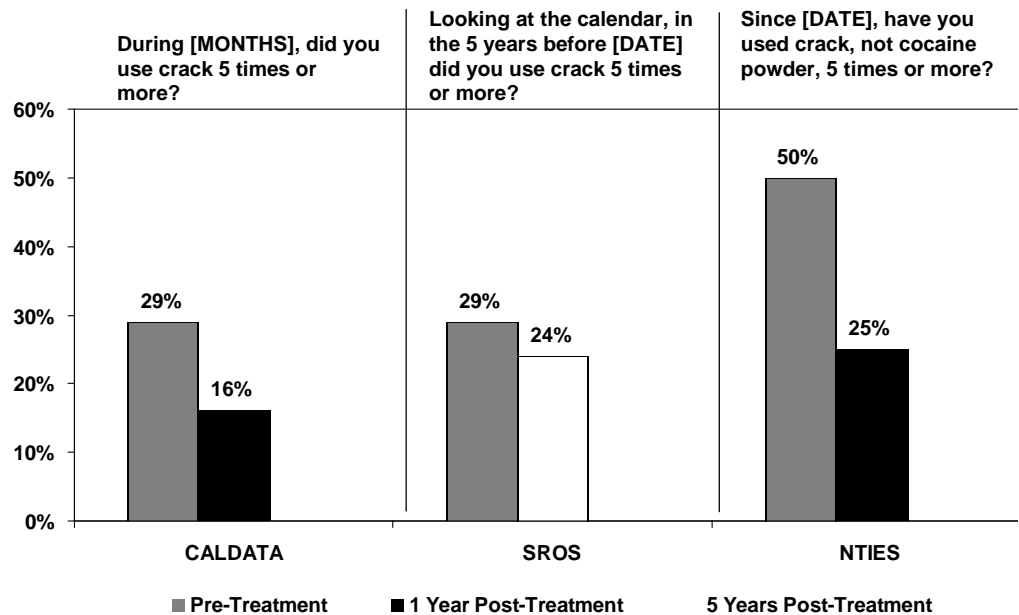
## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

Besides reductions in the extent of drug use, desirable outcomes from the treatment services represented in the four studies include the following:

- Reductions in criminal activity including selling drugs
- Improvements in physical and mental health
- Increased levels of full-time employment.



Exhibit 3  
Treatment Effects on Crack Cocaine Use  
(All Modalities) By Study



**Heroin.** Over one-third of the sample used heroin before treatment and less than one-fourth used heroin after treatment. The distribution of heroin use, however, is very skewed over the treatment modalities. Heroin use was nearly universal among methadone clients with almost 90 percent using it just before treatment and approximately 50 percent after treatment. Pre-treatment heroin use ranged from six percent to 29 percent in other modalities with statistically significant declines in all modalities in NTIES, CALDATA, and DATOS.

### Treatment Results - Other Outcomes

Besides reductions in the extent of drug use, desirable outcomes from the treatment services represented in the four studies included reductions in criminal activity such as selling drugs, improvements in physical and mental

health, and increased levels of full-time employment.

**Criminal activity.** Significant declines in criminal activity were consistently reported by each of the four studies; however, somewhat different criminal activity measures were focused on in each of the reports (see Exhibit 4). Significant improvements were noted by one or more studies in the proportion of clients arrested and committing any illegal activity as well as specific illegal activities including: drug sale/manufacturing/possession; vehicle theft; DUI/DWI; shoplifting; prostitution and procurement; fraud/forgery; theft/larceny; burglary, and assault. Short and long-term residential programs showed very similar levels of decline in arrests. Among methadone clients, the maintenance groups in CALDATA and NTIES reported the largest reductions in arrests with lesser reductions in CALDATA and NTIES methadone discharge

## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

Besides reductions in drug use, the following desirable outcomes were also noted:

- With regard to employment status, long-term residential treatment services had the best outcomes among the treatment modalities.
- In the CALDATA residential units, despite the “social” rather than the medical emphasis, only half as many clients reported fair or poor health after treatment as before.
- Nearly all groups in all four studies reported significant reductions in suicidal thoughts or attempts.



Exhibit 4 Percent Change in Criminal Arrests by Study and Modality				
	CALDATA (n=1,826)	SROS* (n=1,799)	NTIES (n=3,702)	DATOS (n=2,966)
After Treatment Follow-up Period	1 Year	5 Years	1 Year	1 Year
	Percent Change	Percent Change	Percent Change	Percent Change
Short-Term Residential	-67%	-11%	-63%	–
Long-Term Residential	-68%	-9%	-62%	-40%
Methadone	-50%	–	-41%	-19%
Methadone Discharge	-38%	Not Significant	-34%	–
Methadone Maintenance	-82%	–	-55%	–
Outpatient Non-Methadone	-66%	-28%	-60%	-31%
*Arrests Only				

groups and the least change in the DATOS methadone groups.

**Employment.** All studies collected data on the extent and duration of full-time employment, although the definition of “full-time” and the reference period differed somewhat among the different studies. Overall, there was limited change in employment status. Long-term residential treatment services had the best outcomes among the treatment modalities, with a 32 percent increase in “any employment” in NTIES and an 85 percent increase in “continuous full-time employment” in DATOS. Results differed by study, with NTIES and DATOS reporting improvements and SROS and CALDATA showing declines in employment.

**Physical Health.** There was quite a lot of variability in health outcomes among studies and treatment modalities. The CALDATA residential units, despite the “social” rather than the medical emphasis of the short-term modality, obtained the most promising results: only half as many clients reported fair

or poor health after treatment as before. The other studies reported more modest changes. For methadone clients, CALDATA and NTIES discharge groups reported no change, with other groups reporting 13 to 21 percent declines in reported fair or poor health. *Outpatient* results ranged from no change in NTIES to a 41 percent reduction in disabling conditions in DATOS.

**Suicide attempts or thoughts of suicide.** There was uniformity in the important mental health status measure of suicidal thoughts or attempts. Nearly all groups in all four studies reported significant reductions.

### Conclusion

Four studies, combining large samples both of treatment programs and clients, confirm the efficacy of substance abuse treatment. The use of all major drugs declined. Pre-post treatment improvements occurred in all four studies and in nearly all treatment measures and modalities, with few exceptions. All studies noted a marked

## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

Implications of these analyses for research and future analysis are as follows:

- Investigate analyzing raw data
- Analyze subpopulations
- Conduct multivariate analysis
- Analyze and compare 5-year data from DATOS and SRDS studies
- Collect longer term follow-up data from CALDATA and NTIES studies
- Investigate reasons for differing response rates across four studies
- Develop standard interview questions
- Collect more information at follow-up interviews.



reduction in illegal activities and suicidal tendencies, and some improvements in physical health. Less encouraging, but also more peripheral to the goals and focus of treatment, were the findings of stable or declining full-time employment rates in each of the studies.

### Implications

Statistical and conceptual analyses were used to explicate these data, yet the results leave the major question unanswered: *What actually constitutes effective (and cost-effective) treatment, and for what populations?* The current analysis is a major step in answering this question, but at a high level of abstraction. It would be possible to be more specific if methodological improvements were implemented, both currently and in the future.

### Implications for Research/Analysis

- **Investigate feasibility of analyzing “raw” data.** Reliance on published results, rather than access to the databases themselves, limits the depth and richness of the analysis that can be accomplished. For a complete analysis of the conjunction of the four research studies, conducting an analysis directly from the databases would vastly enhance the quality of the analytic findings.
- **Conduct sub-population analyses.** In order to determine what types of treatment are effective for sub-populations (e.g., women, clients under 30, Hispanics), the data must be analyzed multi-dimensionally; this can best be done with combined datasets.
- **Conduct multivariate analysis.** Complex multivariate analysis will help answer more of the 5-year outcome major research questions.
- **Compare 5-year retrospective periods.** The SROS 5-year outcome data frequently showed an attenuation of the change measures, with lower rates of improvement than the other studies. This may reflect the longer follow-up time frame of the SROS study or the need to select different measures for such time frames. To test these matters, a sample of the subjects that participated in the other studies should be recontacted to determine whether additional time affects the results as hypothesized. A recently completed 5-year follow-up of the DATOS sample can be subjected to comparative analysis with the SROS data.
- **Collect longer term follow-up data from the CALDATA and NTIES samples.** CALDATA has the most complete sampling frame, while NTIES has the best response rates. Longer term follow-up data for these studies would improve analytic capabilities and enable generalization to the wider population of drug abusers.
- **Investigate the methodological causes of the different response rates achieved in the four studies.** Why is the NTIES rate so much higher, and the DATOS lower, than that for the other studies? Understanding the causes of this differential would help to improve response rates in future studies, thereby strengthening the data.

## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

The findings of these analyses suggest additional questions, the answers to which would contribute much to the study of the effectiveness of substance abuse treatment:

- Why do clients in residential programs more often experience positive outcomes than those in out-patient programs?
- Why do clients who have been discharged from (rather than maintained on) methadone generally experience less positive outcomes than the other treatment groups?



- **Collect additional follow-up data from clients.** Taking advantage of follow-up interviews to probe more deeply into the causes of successful and unsuccessful outcomes would provide greater insights.

### Implications for Policy-Makers

Across the outcome domains of drug use, crime, income and health, several findings invite further intensive study. In particular, we would like to better understand the reasons for the following findings:

- **Clients in residential programs more often experience positive outcomes than those in outpatient programs.** Improvements in drug use, health, crime and employment are more likely to be experienced by clients in residential programs. This may be caused by non-random assignment to different programs, but an understanding of the reasons for this disparity is necessary to achieving improvement in drug treatment. This is particularly true because of cost differentials among these modalities.
- **Clients who have been discharged from (rather than maintained on) methadone generally experience less positive outcomes than the other treatment groups.** Again, assignment to the groups is itself a possible factor in this finding; however, better understanding is needed to enable resources to be appropriately allocated. In this regard, it would be helpful to analyze combined databases, rather than published data, from the four studies. This requirement has

been mentioned previously, but in this case could be used to shed light on the reasons for discharge rather than maintenance of methadone clients.

### Implications for Treatment Providers/Clients

The results of this analysis should provide encouragement for providers and clients. The many positive outcomes show that there is benefit in the treatment programs they currently attend. The reduction in drug use and unlawful behavior combined with more positive physical and mental health status indicate a generally beneficial result.

### Future Steps

Much more needs to be learned about the effectiveness of substance abuse treatment options and different situational factors. The cost of substance abuse, whether it is measured financially or in human suffering, is great. The more we know about effective treatment, the better we understand drug use and other addictions. The potential benefits to be gained by additional research applications in this area include:

- **Cost-effective assignment to programs.** Research that clarifies the relationship between treatment programs, characteristics of clients, and outcomes would produce better results for lower cost in the long run, allowing people to participate in programs that are effective for their particular problems.

## Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large-Scale Follow-up Studies (cont.)

- **Waste avoidance.** Focusing attention and resources on components of treatment that research shows to be most effective would result in time and cost savings for both individuals and programs.

### References

Gerstein, D.R., & Johnson, R.A., *Prospective and Retrospective Studies of Substance Abuse Treatment Outcomes: Methods and Results of Four Large Scale Follow-up Studies*. July 1999. Prepared under the NEDS contract.

National Opinion Research Center, *The National Treatment Improvement Evaluation Study Final Report*, March 1997. Prepared for the Center for Substance Abuse Treatment, U.S. Department of Health and Human Services, under contract 270-92-0002.

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### National Treatment Improvement Evaluation Study (NTIES)

This analysis was performed on data derived from the National Treatment Improvement Evaluation Study (NTIES). The 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. Data are derived from client interviews conducted at three points in time: treatment intake, treatment exit, and 12 months after treatment exit.

*For more information, please contact the National Evaluation Data Services analysis team at (703) 385-3200, or visit the NEDS Web site.*

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*The author of this Analytic Summary is Elizabeth Thune, Ph.D.*

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