Employment Outcomes of Chemical Dependency Treatment: Analyses from Washington State

August 2002

Washington State Department of Social and Health Services
Management Services Administration
Research and Data Analysis Division

EMPLOYMENT OUTCOMES OF
CHEMICAL DEPENDENCY TREATMENT:

ANALYSES FROM WASHINGTON STATE

An Interim Report

August 2002

Bill Luchansky, Ph.D.
Northwest Crime and Social Research, Inc.

Lijian He, Ph.D.
Washington State Department of Social and Health Services
Research and Data Analysis

When ordering, please refer to Report 4.45
www1.dshs.wa.gov/RDA/

ACKNOWLEDGEMENTS

CONTENTS

APPENDICES

Purpose

The purpose of this study was to assess the employment outcomes of clients who received publicly funded substance abuse treatment in Washington State. We considered two outcomes. The first was labor market participation, or whether clients were getting employed after treatment. The second outcome was quarterly wages for the six quarters following treatment. For this outcome, we analyzed only those clients that became employed in the follow-up period. Our outcome period consisted of the six quarters following the end of an index episode of treatment.

Study Population

Our study population was all publicly-funded clients, between and including the ages of 18 and 64, who began and ended an episode of treatment in 1995. For purposes of analysis, the sample was divided into two subgroups: ADATSA (n=5260) or Non-ADATSA (n=5024). The ADATSA program (Alcohol and Drug Abuse Treatment and Support Act, passed by the state legislature in 1987) was designed for indigent clients deemed unemployable due to addiction. For them there is a distinct assessment, admission and treatment planning process. These clients were often treated in an inpatient setting. Other clients, those who usually have less severe addictions, typically receive outpatient treatment. In this report, they are referred to as Non-ADATSA clients.

Certain clients were identified as having lower employment prospects than others. These included Aid to Families with Dependent Children (AFDC) recipients, Supplemental Security Income (SSI) recipients, pregnant women and those recently convicted of a felony.

Treatment Episodes

Treatment episodes were created to reflect a continuum of care, and whether successive admissions were considered part of the same episode depended on the amount of time between the discharge date from one admission and the admission date of the following admission. If that time was 30 days or less, then the admissions were grouped into a single episode. If that time was greater than 30 days, then the admissions were considered part of two separate episodes.

Results

Our analyses showed that completing treatment was associated with positive outcomes for both types of clients and for both outcomes.

Labor Market Participation

- For both ADATSA and Non-ADATSA clients, the odds of getting employed were significantly higher for those completing their treatment episode compared with non-completers (38% higher for ADATSA, 30% higher for Non-ADATSA).

- In addition to the effect of completing treatment, the length of the treatment episode had a significant effect on the odds of employment. For ADATSA clients, the odds of getting employed were 17% higher for clients whose episodes were 90 days or longer, while the odds of getting employed were 20% higher for Non-ADATSA clients with longer episodes.

Wages

- Completing the index treatment episode was associated with a $257 quarterly increase in wages for ADATSA clients, and a $346 quarterly increase for Non-ADATSA clients.

- The length of the treatment episode was associated with wages as well, above and beyond the effect of completing treatment. Both ADATSA and Non-ADATSA clients with episodes lasting 90 days or longer earned significantly more than clients whose episodes were shorter than 90 days ($240 per quarter more for ADATSA clients, $523 per quarter more for Non-ADATSA clients).

Conclusions

This study showed that completing treatment and having a treatment episode of at least 90 days in length were associated with beneficial employment outcomes. The primary goal of treatment is abstinence and successful recovery. However, these results suggest that treatment can benefit employment as well. This was true even with publicly funded clients who were significantly addicted, were regarded as unemployable, and who had relatively few support systems. It was suggested that combining employment programs with chemical dependency treatment might be a way to improve employment outcomes even more.

INTRODUCTION

For addicted persons in recovery, employment serves several functions. Employment can assist in social reintegration, help to prevent relapse, and promote economic self-sufficiency (Metzger and Platt 1990; Catalano et al. 1988; Westermeyer 1989). These beneficial effects, beneficial for both the individual in recovery and the public at large, make employment an important outcome when evaluating substance abuse treatment. This report presents results from analyses of employment outcomes on a cohort of clients receiving publicly funded treatment in Washington State.

This study builds upon past research efforts (Luchansky et al. 2000; Brown, et al., 1997; Longhi et al., 1994). It does so by incorporating innovative uses of administrative data and innovative analytic techniques. A discussion of the decisions made in the performance of this study is contained in Appendix A. Details on the problems presented by longitudinal data (sometimes called "panel data") and the techniques used to alleviate those problems can be found in Appendix B.

RESEARCH DESIGN

Data Sources

This study used several sources of administrative data. The first was the Treatment and Assessment Report Generation Tool (TARGET), the Division of Alcohol and Substance Abuse's (DASA's) Management Information System (MIS). TARGET contains a record of assessments, treatment admissions, and admissions to detoxification services, as well as discharge and activity records for all clients receiving publicly funded substance abuse services in Washington State. In addition, a wide variety of demographic data are available on each client.

The second source of data was the Unemployment Insurance (UI) Wage file kept by Washington State's Employment Security Division (ESD). Every quarter, employers in Washington State are required by law to report the wages earned and hours worked of each of their employees to the ESD.

We used the Washington State Patrol's Criminal History Database, a file containing data on all arrests statewide for felonies and gross misdemeanors. Data in this file came from local police departments that are required by law to report all such events to the State Patrol. We used arrest data to identify clients arrested in the year before the start of their index episode and incorporated it as a variable in our statistical models.

Incarceration and court conviction records from the Washington State Department of Corrections were used to identify clients incarcerated during the follow-up period, and to identify those convicted of a felony either in the year before treatment or during the index episode.

Vital statistics from the Washington State Department of Health were used to identify clients that died during their treatment episode or during the follow-up period.

Study Population

Our study population was all clients, between and including the ages of 18 and 64, who began and ended an episode of treatment in 1995. Episodes were categorized into two general types, those with a single admission and those with multiple admissions. For clients with a single admission, episodes began at the admission date and ended at discharge, or date of last contact. Multiple admissions made defining the beginning and end of an episode more complicated.

When clients had multiple admissions, the issue was whether they should be considered as part of the same episode. Based on an examination of admission and discharge records (See Appendix D), we found that subsequent admissions following a discharge had a very high probability of occurring within 30 days. For this reason, it was determined that if

the length of time between discharge and a subsequent admission was 30 days or less, then both admissions were considered part of the same episode. If the subsequent admission occurred 31 days or more after the preceding discharge date, then that admission was considered part of a new episode.

We made a distinction between the types of publicly funded clients. One group includes only clients eligible for and funded through the ADATSA program.   The Alcohol and Drug Abuse Treatment and Support Act (ADATSA), passed by the state legislature in 1987, provides assessment and treatment to severely addicted, indigent clients deemed unemployable because of their addiction. These are some of the most severely impaired of all publicly funded clients. All began their search for treatment at a local Community Services Office, where their eligibility for public funding is determined. Then, they were referred to an ADATSA assessment center, where their clinical eligibility and addiction severity was determined. If clients were determined to be eligible for public funding, severely addicted, unemployable, and judged to be amenable to treatment, they were eligible for ADATSA-funded treatment. Once determined eligible, a treatment plan was constructed to suit their particular needs (for more details on the operations of the ADATSA program see Longhi et al. 1991). Most clients in Washington State receiving inpatient treatment were funded through the ADATSA program.

Another group of clients entered treatment with less severe addictions. For them, the primary mode of treatment was typically outpatient. For this group, there was no centralized system of assessment and admission: clients sought treatment directly with a local treatment provider. In this report, we refer to these people simply as non-ADATSA clients.

Certain clients were deleted from our analyses: those who died after the completion of their episode and those who received opiate substitution treatment. Because of the nature of opiate addiction and the unique treatment for it, the use of treatment services for opiate substitution clients should be examined separately.

Employment Prospects of DASA Clients

In the process of analyzing employment outcomes, one challenge was to identify client characteristics that help or hinder employment prospects. Figure 1 shows graphically the division of clients into two groups, those with low employment prospects and those with higher prospects.   Before categorizing clients, we removed those whose records did not contain a Social Security number (SSN). SSNs are necessary because they are the only way to link substance abuse treatment records to employment data. Our study population included 10,284 clients, but of those only 9158 had valid SSNs (i.e., 89%). Having to delete 11% of the sample might have biased our analyses or employment outcomes. However, analyses of the treatment experiences of clients without valid SSNs suggests that eliminating these clients did little to bias our results (see Appendix E for a more detailed discussion of missing SSNs and these analyses).

4

We hypothesized that the presence of one of several conditions would hinder employment prospects. Because of this, it was important that such conditions be identified for analysis purposes. These include:

1. **Receiving AFDC:** Recall that our sample includes clients whose treatment episode began and ended in 1995, when the primary assistance program for families was not Temporary Assistance to Needy Families (TANF) but Aid to Families with Dependent Children (AFDC). AFDC did not have the emphasis on employment that TANF does, and that combined with the presence of children in the family and the probability of being pregnant (most AFDC recipients were young women) might result in lower rates of employment and lower wages. Information on AFDC status came from DASA's MIS, TARGET.

2. **Pregnant at the Start of the Treatment Episode:** Being pregnant at the start of treatment most likely means that a woman will be caring for an infant after treatment. The effects of providing that care on employment are obvious. Pregnancy was identified from the TARGET data system from the public assistance field. Clients on AFDC might have been pregnant as well, but that information was not explicit.

3. **Receiving Supplemental Security Income (SSI):** SSI is a national benefit program for individuals that are blind or disabled in some way, as determined by the Social Security Administration. Self-reported data stored in TARGET was how we identified SSI recipients.

4. **Being Incarcerated during the Follow-up Period:** Clients that entered state prison facilities at any point in the one-year follow-up period were identified. Other conditions in this list hinder employment potential, while this condition eliminates it.

5. **Convicted of a Felony in the Year before the Start of Treatment, or During Treatment:** Many, but not all convicted felons were imprisoned. Some received community custody sentences, where they were supervised by the Department of Corrections (DOC) but not housed in secure facilities. These people did have the opportunity to be employed, but their criminal involvement would have hindered that. Data on convictions came from the DOC, which collects conviction records from courts across the state.

Figures 1 and 2 show the number of clients with low employment prospects and the number with higher prospects, for ADATSA and Non-ADATSA clients respectively. In addition, they show how many clients were affected by each of the conditions that limit employment prospects. While we have identified five such conditions, it should be noted that they are not mutually exclusive. The same client might be in more than one group. Thus, if the number in each condition is summed, it will exceed the number of clients we've identified as having low employment prospects.

Figure 1 shows that 1181 of the 4846 ADATSA clients were considered to have lower employment prospects, or about 24% of that group. The majority of those with low prospects were either convicted of a felony in the year before treatment or were AFDC recipients. Figure 2 shows that 1800 of the 4312 Non-ADATSA clients had lower employment prospects, or about 42% of that group. Most of those 1800 were AFDC recipients (n=1073) and 444 were pregnant.

Figure 1:

Categorizing ADATSA Clients Based on their Prospects for Employment.
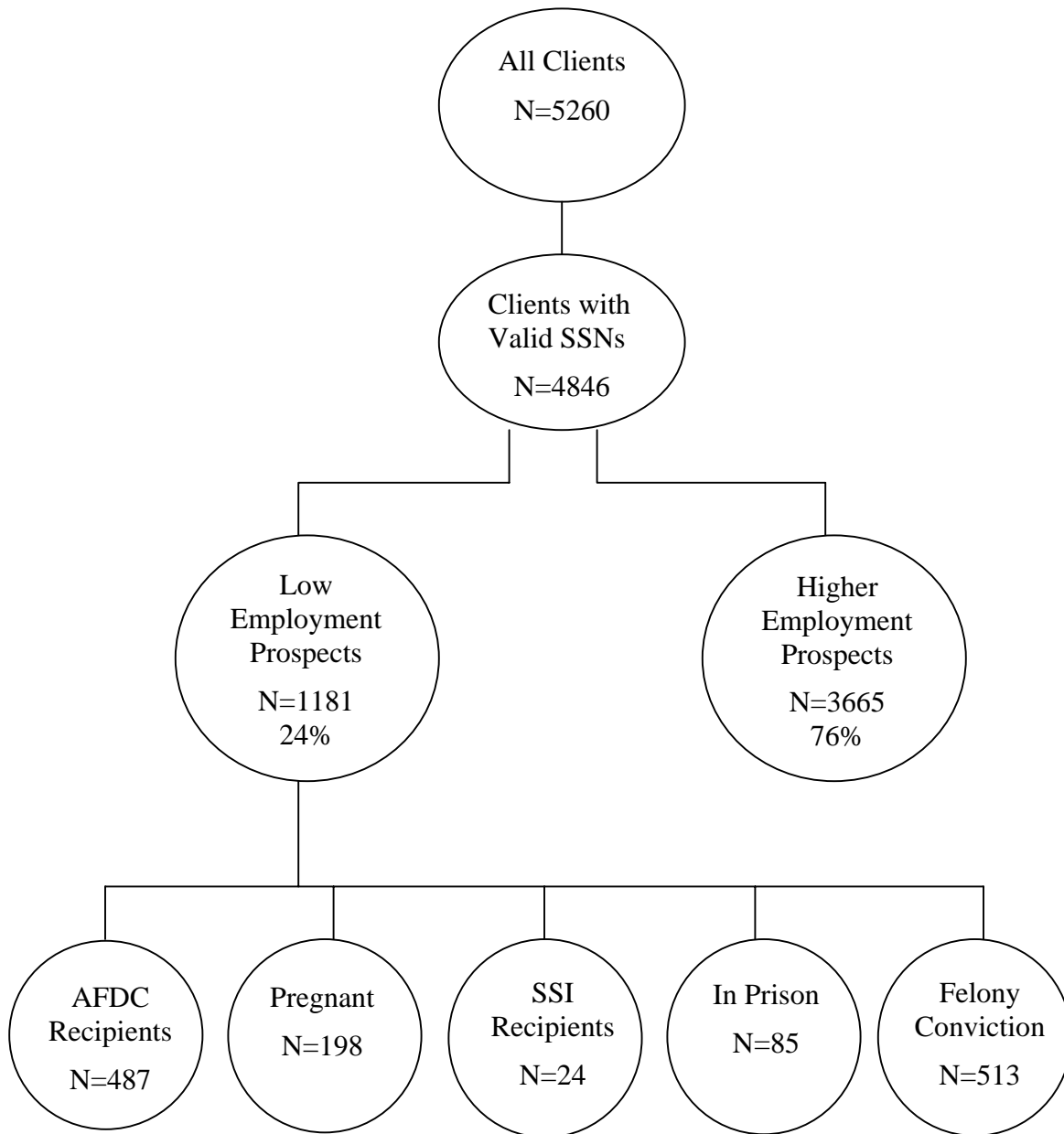
Figure 2:

Categorizing Non-ADATSA Clients Based on their Prospects for Employment.
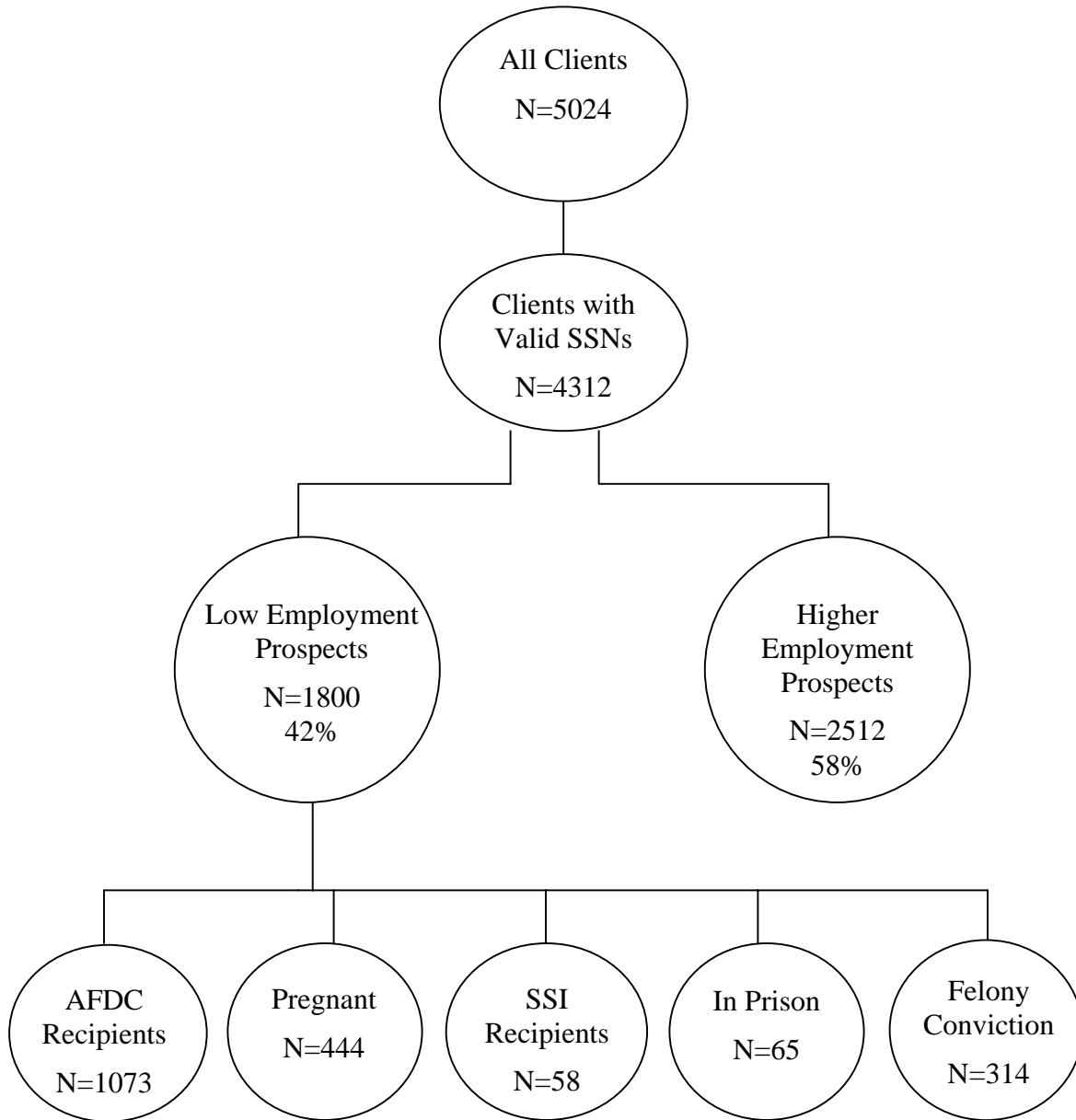
Analyses

We have analyzed the data using both descriptive and multivariate statistical techniques. Descriptively, we present data on the proportion of clients employed over time, both before and after treatment, and on wages over time. These data are presented separately for ADATSA and Non-ADATSA clients. Multivariate techniques were first used to estimate the impact of treatment and other covariates on the probability of labor market participation, and then, for employed clients, on quarterly wages. Additional detail on our statistical analyses can be found in Appendices B and C.

For this report, we analyzed only those who entered treatment, and our primary interest will be in comparing those that completed with those that did not complete an episode of treatment. Thus, all clients elected to participate in treatment. Employment outcomes were tracked for 18 months following the end of the index episode.

When analyses are done to assess outcomes on such large and diverse populations, there is always the possibility that the relationship between treatment and outcomes varies based on other client characteristics. For example, the relationship between completing treatment and labor market participation might be significantly different for men than it is for women. When this happens, an interaction exists. Significant interactions complicate the analysis process. If they exist and are not detected, misinterpretations of results will likely follow. For this reason, we tested whether significant interactions existed between treatment completion and length of treatment on the one hand, and gender and a dichotomous variable indicating whether clients had been employed in the year prior to the treatment episode on the other. In addition, we tested for interactions between our treatment variables (completion and length) and conditions that limit employment (i.e. being an AFDC recipient, an SSI recipient, being pregnant, etc.).

8

ORGANIZATION OF THIS REPORT

We will present data and the results of analyses that address the following six questions:

1. What were some of the characteristics of treatment episodes beginning and ending in 1995? Did those characteristics differ by program type (ADATSA, Non-ADATSA)?
2. What were some of the characteristics of clients beginning and ending an episode of treatment in 1995?
3. What were the trends in employment across time, both before and after the 1995 treatment episode?
4. For employed clients, what were the trends in wages across time, both before and after the 1995 treatment episode?
5. What factors were associated with labor market participation in the six quarters following the end of the index episode?
6. What factors were significantly associated with wages in the six quarters following the end of the index episode?

QUESTIONS AND FINDINGS

Question 1: What were some of the characteristics of treatment episodes beginning and ending in 1995? Did those characteristics differ by program type (ADATSA, Non-ADATSA)?

Table 1: Characteristics of Treatment Episodes Beginning and Ending in 1995.

CHARACTERISTIC	PROGRAM		
	ADATSA	NON-ADATSA	TOTAL
NUMBER OF EPISODES ENDING IN 1995	**5167**	**6215**	**11382**
EPISODES INVOLVING ONE ADMISSION			
1. PERCENT OF TOTAL PROGRAM EPISODES	50%	96%	
2. FREQ. OF INPATIENT EPISODES	1914	719	2633
3. PERCENT OF INPATIENT EPISODES COMPLETED	49%	48%	49%
4. FREQ. OF OUTPATIENT EPISODES	682	5223	5905
5. PERCENT OF OUTPATIENT EPISODES COMPLETED	**39%**	**10%**	**14%**
EPISODES INVOLVING MORE THAN ONE ADMISSION			
1. PERCENT OF TOTAL PROGRAM EPISODES	50%	4%	
2. FREQ. W/AN INPATIENT ADMISSION	2498	125	2623
3. FREQ. W/AN INPATIENT COMPLETION	2272	74	2346
5. PERCENT OF EPISODES W/AT LEAST ONE COMPLETION	**91%**	**52%**	**87%**
6. FREQ. WHERE THE LAST MODALITY WAS COMPLETED	918	51	969
7. PERCENT OF EPISODES WHERE LAST ADMISSION COMPLETED	**36%**	**19%**	**34%**

Main Points

- ADATSA clients were more likely to have episodes involving more than one admission to treatment (50% v. 4%)*

- For episodes involving one admission: Both ADATSA and Non-ADATSA clients had the same completion rate if admitted to inpatient treatment. However, if admitted to outpatient treatment, ADATSA clients, when compared to Non-ADATSA clients, were much more likely to complete it (39% v. 10%)*.
- For episodes with more than one admission, ADATSA clients, when compared to Non-ADATSA clients, were more likely to have at least one completion (91% v. 52%), and more likely to complete the final admission (36% v. 19%)*.
- *differences are statistically significant (p<.001)

Question 2: What were some of the characteristics of clients beginning and ending an episode of treatment in 1995?

Table 2: Characteristics of Clients Beginning and Ending an Episode of Treatment in 1995 by Program Type.

	PROGRAM		
	ADATSA (N=5260)	**Non-ADATSA (N=5024)**	**Total (N=10284)**
Gender (% female)	**32%**	**43%**	**38%**
Race			
White	72%	69%	70%
Black	15%	11%	13%
Native American	8%	8%	8%
Hispanic	4%	9%	7%
Other	1%	2%	2%
Age	**32**	**32**	**32**
Education (% > 12 yrs)	**16%**	**19%**	**17%**
Primary Drug			
Alcohol	53%	62%	57%
Marijuana	9%	11%	10%
Amphetamines	14%	8%	11%
Heroin/Cocaine	23%	16%	20%
Other	1%	3%	2%
Living Arrangement			
Alone	34%	23%	29%
With family	48%	64%	56%
With friends	18%	12%	15%
Unknown	<1%	<1%	<1%
Current Mental Health Problem	**8%**	**17%**	**13%**
Employed in the Prior Year	**49%**	**56%**	**52%**
Treated in the Prior Year	**23%**	**14%**	**19%**

Note: Chi-Square tests show significant associations (p<.001) between groups for all variables except age.

Main Points

- There were important differences in the primary drug of clients. ADATSA clients were more likely to use heroin and cocaine (23% v. 16%), and less likely to use alcohol (53% v. 62%), when compared to Non-ADATSA clients.

- The living arrangements of non-ADATSA clients were more conducive to recovery when compared to ADATSA clients: more live with family (64% v. 48%), fewer live alone (23% v. 34%).

- There were important gender differences in the programs: the percentage of females was higher among non-ADATSA clients (43%) than among those in ADATSA (32%).

- ADATSA clients were more likely than non-ADATSA clients to have received treatment in the year prior to their 1995 episode (23% v. 14%).

Question 3: What were the trends in employment across time, both before and after the 1995 treatment episode?

Figure 3: Percent of ADATSA Clients Employed during the Four Quarters before Admission until Six Quarters following discharge from Chemical Dependency Treatment (n=4846)
(Completers=1853   Non-Completers=2993)
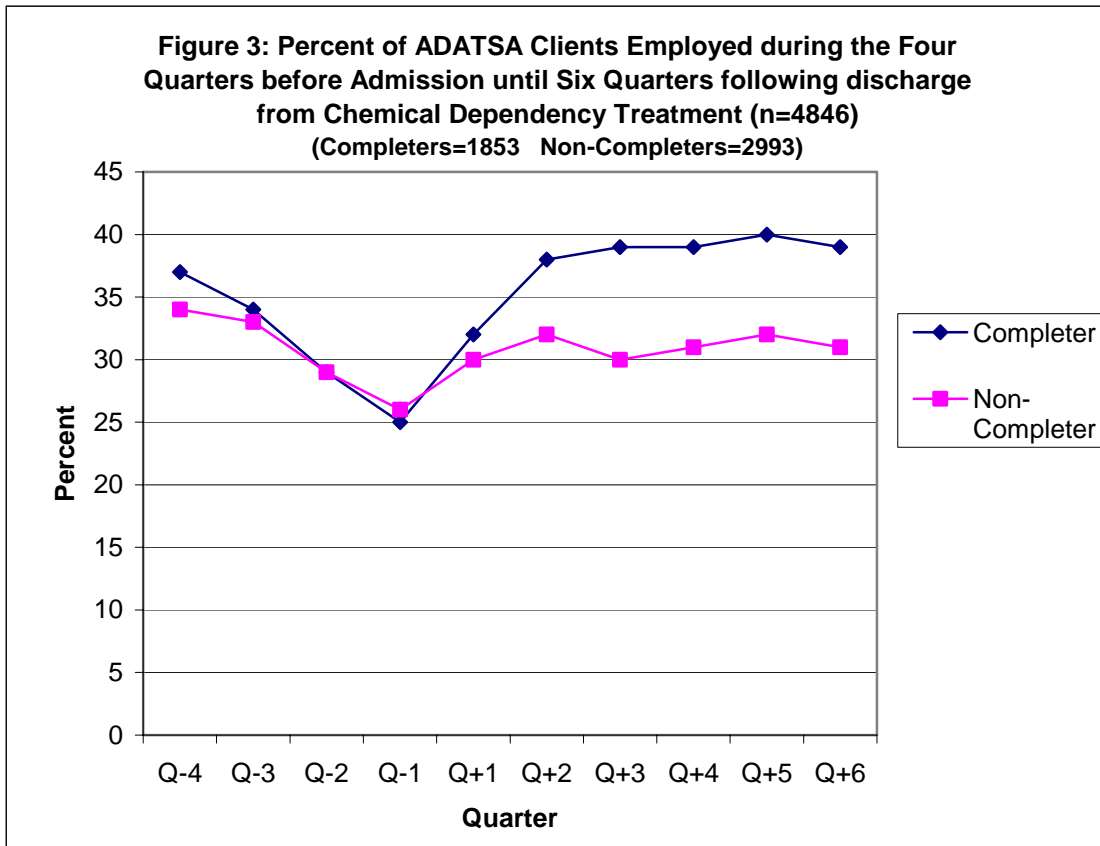
Main Points

- Prior to treatment, both completers and non-completers experienced declining rates of employment. 37% of completers were employed in the fourth quarter prior to treatment but only 25% in the quarter immediately prior to treatment. For non-completers, the decline during the same period was 34% to 26%.

- In the quarter immediately before the start of the index episode, the rate of employment for completers and non-completers was nearly the same (25% v. 26 %).

- After treatment, employment rates rose for both groups, but the rise is greater for those that complete treatment. During the sixth quarter after treatment, 39% of the completers were employed compared to 31% of the non-completers.

15

Figure 4: Percent of Non-ADATSA Clients Employed during the Four Quarters before Admission until Six Quarters after Discharge from Chemical Dependency Treatment (n=4312). (Completers=1430   Non-Completers=2219)
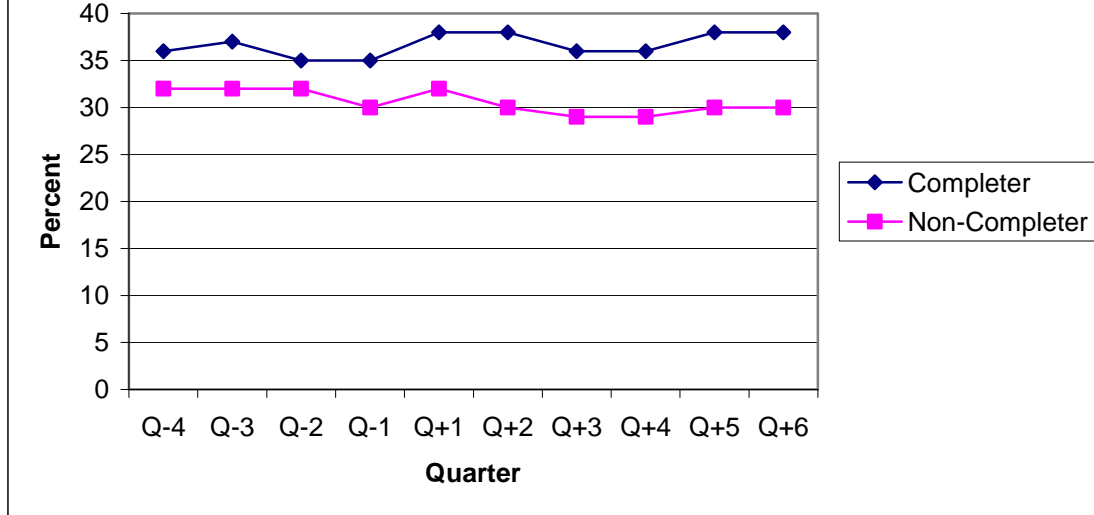
Main Points

- Prior to treatment, there were relatively stable differences in the rate of employment between completers and non-completers.   36% of completers were employed in the fourth quarter prior to treatment compared with 35% in the quarter immediately prior to treatment. For non-completers, the rates during the same quarters were 32% and 30%.

- After treatment, the employment rate for completers rose slightly (35% in the first quarter to 38% in the sixth quarter), while the rate for non-completers declined slightly (32% in the first quarter and 30% in the sixth quarter).

16

Question 4: For employed clients, what were the trends in wages across time, both before and after the 1995 treatment episode?

Figure 5: Quarterly Wages for ADATSA Clients during the Four Quarters before Admission until Six Quarters after Discharge from Chemical Dependency Treatment (n=3092) (Completers=1232   Non-Completers=2052)

Main Points

- For ADATSA clients who were employed, the pattern in wages for completers and non-completers was similar. For both groups, wages began to decline four quarters before the beginning of treatment, and continued to decline until the treatment begins.

- After treatment, wages rose for both groups. However, the rise in wages for treatment completers was more pronounced than for non-completers.

- During the sixth quarter following the end of the index episode, completers earned on average $1316 while non-completers earned $941, a difference of $375.
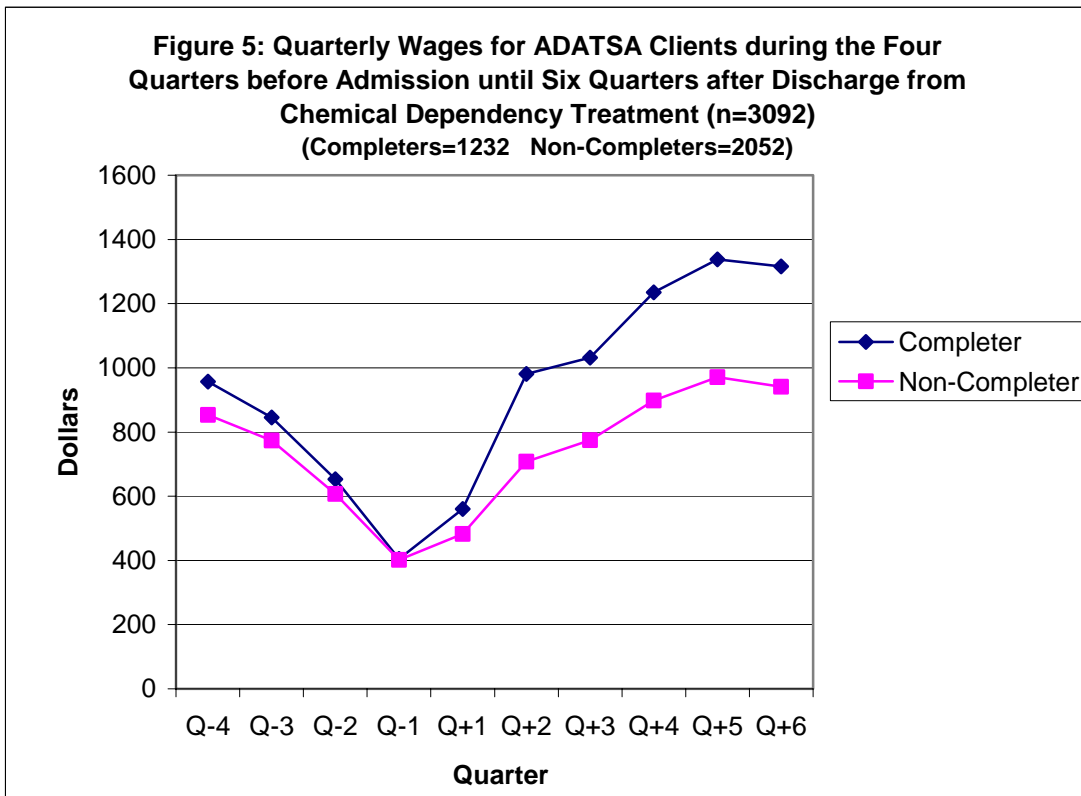
Figure 6: Quarterly Wages for Non-ADATSA Clients during the Four Quarters before Admission until Six Quarters after Discharge from Chemical Dependency Treatment (n=1917) (Completers=337 Non-Completers=1580)
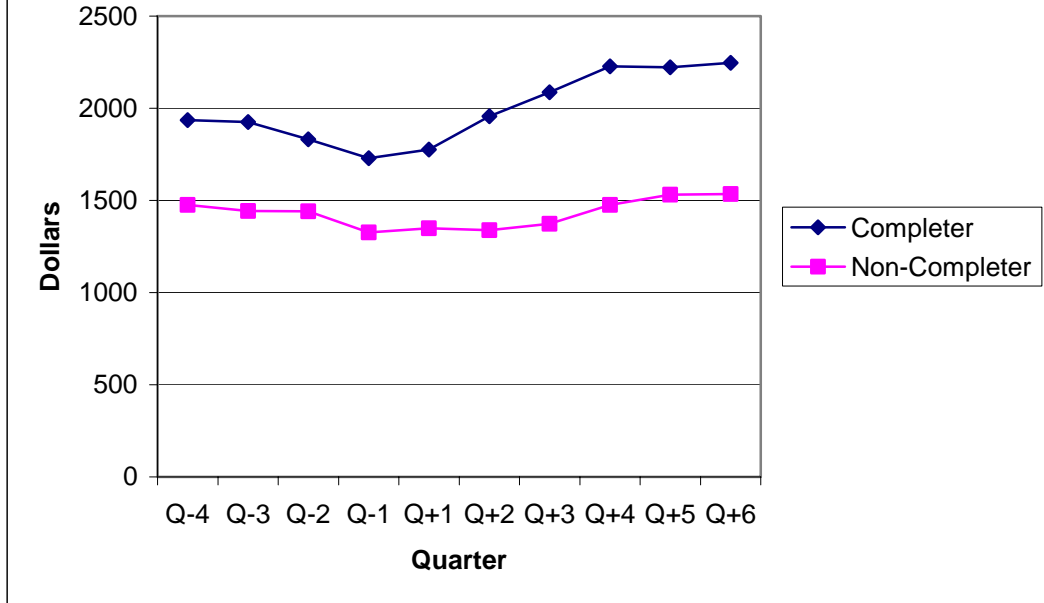
Main Points

- Prior to treatment, both completers and non-completers who were employed experienced small declines in earnings. Completers earned on average $1936 in the fourth quarter before treatment and $1731 in the quarter immediately before treatment. During the same period, average wages for non-completers went from $1475 to $1327.

- The gap between the wages of completers and non-completers increased over the follow-up period. In the first quarter after treatment, completers earned $427 more than non-completers ($1776 v. $1349). In the sixth quarter after treatment, the gap increased to $711 ($2246 v. $1535).

18

Question 5: What factors were associated with labor market participation in the six quarters following the end of the index treatment episode?

Table 3: Factors with Statistically Significant Associations with Post-Treatment Labor Market Participation for ADATSA and Non-ADATSA Clients.

Independent Variables	Effect on the Odds of Any Employment (negative numbers reflect a decrease in the odds, positive numbers reflect an increase in the odds)	
	ADATSA (N=4846)	Non-ADATSA (N=4312)
Treatment Variables		
Completed 1995 Episode	38%	30%
Had Inpatient Treatment only in their 1995 Episode (compared to outpatient only)	-30%	
Episode Length > 90 Days	17%	20%
Client Characteristics		
Male	34%	20%
Age 18-30 (compared to age > 45)	182%	83%
Age 31-45 (compared to age > 45)	103%	57%
Married	N.S.	17%
Had a Current Mental Health Problem	-31%	-45%
High School Graduate	22%	18%
Employed in the Year prior to the Episode	227%	600%
Used Heroin/Cocaine Primarily (compared to alcohol)	N.S.	-18%
Used Amphetamines/Methamphetamines Primarily (compared to alcohol)	N.S.	-23%
Conditions Limiting Employment Prospects		
SSI Recipient	-35%	-62%
AFDC Recipient	-34%	-32%
General Assistance Pregnant	-57%	-75%
Felony Conviction in the year before the Episode	N.S.	-42%
Incarcerated (for at least part of the follow-up period)	-48%	-53%

(Note: all coefficients are statistically significant to the 0.05 level.)

Main Points

- Completing treatment was associated with higher odds of getting employed in the follow-up period for both ADATSA (a 38% increase) and Non-ADATSA clients (a 30% increase).

- In addition to an association with completion, having an episode length of greater than 90 days was associated with an increase in the odds of employment, 17% for ADATSA clients and 20% for Non-ADATSA clients.

- Younger clients were more likely to become employed. For both ADATSA and Non-ADATSA clients, those between 18 and 30 had higher odds of employment than

those over 45 (182% and 83% respectively). Those between 31 and 45 had higher odds as well: 103% and 57% respectively.

Note: None of the interaction terms were statistically significant. Thus, there is no evidence to suggest that the magnitude of the association between treatment and the odds of becoming employed varies across different subgroups of clients.

Question 6: What factors were significantly associated with wages in the six quarters following the end of the index treatment episode?

Table 4: Factors with Statistically Significant Associations Post-Treatment Wages for ADATSA Clients in the Six Quarters Following the End of the Index Episode (Low Employment Prospect Clients Removed from Analyses).

Independent Variables	Effect on Quarterly Earnings (positive numbers reflect increases in earnings, negative numbers reflect decreases in earnings)	
	ADATSA (N=2333)	Non-ADATSA (N=1537)
Treatment Variables		
Completed 1995 Episode	$257	$346
Length of Episode > 90 Days	$240	$523
Inpatient Treatment Only in 1995 Episode (compared to outpatient only)	-$277	
Client Characteristics		
White (compared to Non-White)	$128	N.S.
Male	$269	$321
Average Quarterly Wages Before Treatment	$0.40	$0.68
Current Mental Health Problem	N.S.	-$443
Married	N.S.	$334

Main Points

- Completing treatment was associated with an increase in quarterly wages for both ADATSA and Non-ADATSA clients ($257 and $346 respectively).

- Wages were also associated with length of the treatment episode: ADATSA clients that had an episode of greater than 90 days earned $240 more than those with shorter episodes, while the difference for Non-ADATSA clients was $523.

- Males in both the ADATSA and Non-ADATSA groups made more than females ($269 for ADATSA and $321 for Non-ADATSA).

- Ethnicity had an effect on wages, but only for ADATSA clients: being white was associated with an increase of $128 per quarter.

Note: None of the interaction terms were statistically significant. Thus, there is no evidence to suggest that the magnitude of the association between treatment and quarterly wages varies across different subgroups of clients.

DISCUSSION

The goal of this study was to examine employment outcomes after substance abuse treatment, for a cohort beginning and ending a treatment episode in 1995. Our findings suggest that completing treatment *and* having an episode of at least 90 days in length were associated with beneficial effects on employment outcomes. In addition the positive association between treatment and employment outcomes did not vary to a significant degree across clients with different characteristics. For example, both males and females, and young and older clients experienced similar increases in the odds of employment after treatment, even though their eventual outcomes might differ. Further, it is noteworthy that these improved outcomes held for clients with lower employment prospects including publicly funded ADATSA clients who were significantly addicted, were regarded as unemployable, and who had relatively few support systems. Treatment completion and length is associated with an increase in employment outcomes for these groups as well.

The primary goal of treatment is abstinence and successful recovery. However, these results suggest that treatment can benefit other social functions, such as employment, as well. While these results are positive, it should be acknowledged that they might not rise to the expectations of policy makers and the general public. Welfare reform at the federal level, with its time limits on benefits, strongly emphasizes self-sufficiency. Some clients in this study, particularly those with employment experience prior to treatment, will meet those expectations. However, many will need targeted employment assistance in addition to care for their substance abuse, or will be forced to rely on local or state income assistance programs. Past research in Washington State has shown that clients receiving vocational services in addition to substance abuse treatment have better employment outcomes (Luchansky et al. 2000; Longhi et al. 1994), while similar results were found elsewhere as well (McLellan 1993). This points to the potential benefit of combining publicly funded treatment for addiction with employment programs. This has been handled in one of two ways.

Both Washington State and Oregon have adopted one approach, where they make alcohol and drug treatment available to clients of welfare employment programs (Kirby et al. 1999). They have accomplished this by locating alcohol and drug professionals in welfare offices statewide, creating an interface between the two systems and enabling a much more efficient form of identification and referral. However, the limitation to this approach is that not all clients who need this combination of services are enrolled in welfare employment programs. Until recently, Washington State had another approach as well. Some clients had the opportunity to receive additional vocational services in addition to substance abuse treatment. In the Vocational Opportunities Training and Education Programs (VOTE), clients in three Washington State cities' enrolled in a seven-week program emphasizing job search and interviewing skills as they continued their recovery. Unfortunately, at this time, funding this program has been eliminated. Clearly, to impact all clients in need of both substance abuse treatment and employment services, a combination of both approaches appears most promising.

Limitations and Future Research

There were several possible limitations to this study. Data used for this study was obtained from the Employment Security Department which, in turn, relies on reports from employers. While there are sanctions for failing to report, it is possible that some clients had earnings that were not reported. However, there is little reason to believe that such a situation would have introduced systematic bias to our analyses. In other words, it was not likely that employer-reporting failures would have affected either completers or non-completers differentially.

A second potential limitation exists. The differences we observed in employment outcomes between completers and non-completers could have come from two sources, from treatment or from client differences that impacted those outcomes. The primary approach we used to minimize the effect of client differences consisted of statistically controlling for factors relevant to employment outcomes that were measured, like gender and a client's pre-employment status. While this approach represents nearly all that can be done regarding this problem, some unmeasured client differences could have affected our results.

The results of this study suggest several avenues for future research. While completing treatment, and remaining in treatment for at least 90 days had positive effects on employment outcomes, not all clients obtained employment, and among those that did, not all earned enough to rise above poverty. Campbell et al (In Press) have explored specific barriers to employment that clients in recovery face. Some of these barriers may be personal, such as a lack of employable skills, education or related to health, and some may be environmental, such as labor market characteristics, resistance among employers to hiring those in recovery or transportation issues. Research or case management designed to identify barriers to employment, and interventions designed to lessen their impact, might boost employment outcomes.

Finally, this research shows that secondary sources of administrative data can be used to uncover general outcome trends, such as employment rates and factors associated with those rates. By employing administrative data, research can be done on large numbers of clients, with appropriately long follow-up periods. For these reasons, administrative databases should be employed when possible to assist in the management of statewide treatment systems. However, there are questions that they cannot answer, such as those pertaining to client experiences in the labor market. Carefully designed ethnographic research, interviewing clients and observing them in the relevant contexts while they attempt to become employed and to retain employment, would be an important supplement to the results reported here. Another research effort in Washington State, also funded by the TOPPS project, involves examining employment outcomes of publicly funded clients at the level of the treatment provider. That study will identify providers whose clients are doing very well in the labor market, as well as providers whose clients are not doing well. Such programs could become the focus of ethnographic research: comparing highly-effective and poorly-performing programs has the potential to expand

what we know about clients moving toward self-sufficiency, and might aid in designing more effective employment-promoting policies and programs.

REFERENCES

Allison P. 1999. Logistic Regression using the SAS System: Theory and Application. Cary, NC: The SAS Institute.

Brown M., Longhi D. and Luchansky B. 1997. Employment Outcomes of Chemical Dependency Treatment and Additional Vocational Service Publicly Funded by Washington State. Olympia, WA: Washington State Department of Social and Health Services.

Catalano RF., Howard MO, Hawkins JD, and Wells EA 1988. Relapse in Addictions: Rates, Determinants, and Promising Relapse Strategies. Report No.69 Seattle,WA, University of Washington.

Campbell, K, Baumohl, J, and Hunt, S. In Press. The Bottom Line: Employment Barriers to Work among Former SSI DA&A Beneficiaries. Contemporary Drug Problems.

Hsiao C. 1995. Analysis of Panel Data. New York: Cambridge University Press.

Kennedy P 1992. A Guide to Econometrics. Cambridge, MA: The MIT Press.

Kirby G, Pavetti L, Kauff J, Tapogna J. 1999. Integrating Alcohol and Drug Treatment into a Work-Oriented Welfare Program: Lessons from Oregon. Princeton, NJ: Mathematica Policy Research.

Kmenta J. 1986. Elements of Econometrics. New York: MacMillan.

Longhi, D., Brown M. and Comtois R. 1994. ADATSA Treatment Outcomes: Employment and Cost Avoidance. Olympia, WA: Washington State Department of Social and Health Services.

Longhi, D., Oatis S., Mudar K., Spaeth D., Van Dyck M., Shaklee M., Brown M. and Hall-Milligan J. 1991. The ADATSA Program: Clients, Services, and Treatment Outcomes. Olympia, WA: Washington State Department of Social and Health Services.

Luchansky B, Brown M, Longhi D, Stark K, Krupski A. 2000. Chemical Dependency Treatment and Employment Outcomes: Results from the ADATSA Program in Washington State. Drug and Alcohol Dependence 60: 151-159.

McLellan AT, Arndt IO, Metzger DS, Woody GE, O'Brien CP. 1993. The Effects of Psychosocial Services in Substance Abuse Treatment. Journal of the American Medical Association 269:1953-1959.

Metzger, D.S., and Platt, J.J. (1990) Solving Vocational Problems for Addicts in
    Treatment. In: The Effectiveness of Drug Abuse Treatment: Dutch and American
    Perspectives (Platt, J., Kaplan,C., and McKim,P. Eds.) pp.101-111. Krieger
    Publishing, Malabar,Florida.

Sayrs, L. 1985. Pooled Time Series Analysis. Newbury Park, CA: Sage.

Westermeyer, J. (1989) Nontreatment Factors Affecting Treatment Outcome in
    Substance Abuse. American Journal of Drug and Alcohol Abuse 15:13-29.

APPENDICES

APPENDIX A: DOCUMENTATION

Several critical decisions were made in the performance of this study. They include:

1. **Identifying ADATSA clients**: Our assumption was that there might be important differences in clients that influence how much treatment they use. These differences might involve severity of addiction, access to treatment and the impact of addiction on employability. These factors are difficult to measure, but whether or not a clients was ever deemed eligible for ADATSA can serve as a proxy for a severely addicted, unemployable clients. For this reason, much of our analysis distinguished ADATSA from non-ADATSA clients.

2. **Identifying ADATSA episodes:** In episodes with multiple admissions, one admission might be ADATSA while the other(s) might not. For this study, if any admission in an episode had ADATSA as its contract type, that episode was considered an ADATSA episode.

3. **Correcting Embedded Spans:** Embedded spans occur when the admission and discharge dates occur within a larger span of treatment. For example, a client might have been admitted on 4/1/99 and discharged 7/1/99. However, they might also have been admitted on 5/1/99 and discharged on 6/1/99. This second set of dates is inside the range of dates of the first admission. Obviously, clients can't be in the two places at the same time, so we constructed decision rules to make sense of these situations. These rules were based on two assumptions: first, data regarding inpatient treatment are more reliable than that of outpatient, and second, for outpatient treatment, admission dates are more reliable than discharge dates. The following problems were evident, and solutions are given.

    a. An inpatient span inside another inpatient span: the 'inside' span was eliminated. (10 cases)

    b. An outpatient span inside an inpatient span: the outpatient (inside) span was eliminated. (91 cases)

    c. An inpatient span inside an outpatient span: this can happen when a client enters outpatient while waiting for an inpatient bed. We created 3 admissions from these two, assuming that there was one span of outpatient treatment before inpatient, and one span after (468 cases).

    d. An outpatient span inside another outpatient span: the 'inside' span was deleted (141 cases).

4. **Correcting Overlapping Spans:** These occur when, for a single client, one admission date is before another discharge date. Again, this implies that the same client is being treated at two places simultaneously. Our corrections involved changing admission or discharge dates, depending on the situation.

    a. If an inpatient admission overlaps an inpatient discharge, then the overlapped discharge date was changed to equal the overlapping admission date (n=17).

    b. If an outpatient admission overlaps an outpatient discharge, then the overlapped discharge date was changed to equal the overlapping admission date (n=90).

    c. If an inpatient admission overlaps an outpatient discharge, then the outpatient discharge date was changed to equal the inpatient admission date (n=436).

    d. If an outpatient admission overlaps an inpatient discharge, then the outpatient admission date was changed to equal the inpatient discharge date (n=15).

5. Only clients between and including the ages of 18 to 64 are included in these analyses.

6. 344 clients died after the end of their last episode in 1995. These clients were removed from the analyses.

7. Clients receiving opiate substitution treatment in 1994 and 1995 were not included in the analyses. This treatment modality differs in many important ways from the other modalities.

APPENDIX B: ANALYZING PANEL DATA

Panel data, where observations are recorded on individual units (persons in our case), at regular temporal intervals, present some unique advantages as well as problems for statistical analysis. The advantages of panel data include a large number of data points, and the ability to answer questions that cross-sectional or time series data alone cannot. The problems concern the assumptions on which regression analysis is based. Ordinary least squares regression analysis produces estimates of the effect of one variable on another. The validity of these estimates depends on several assumptions, one of which is that the observations on the response variable in a set of data are independent from one another. With panel data, this assumption is often violated. When observations are dependent, regression errors (the difference between the observed value of the dependent variable and the predicted value) are often correlated with one another. Ignoring temporal dependence and correlated errors may lead to underestimated standard errors, overestimated test statistics, lower efficiency of the estimation and estimates of coefficients that are biased downward (see Kennedy 1992 Ch.8 for more detail).

We have quarterly employment data, covering a one-year pre-treatment period and six quarters of post-treatment data, on thousands of clients. Thus, we have a combination of cross-sections (people) and time series (quarterly employment data), and this combination raises the likelihood of observations being dependent. For example, it is highly unlikely that a client's employment outcomes in one quarter are independent of those outcomes in another quarter, yet that is the assumption that underlies the ordinary least squares regression. To insure that we get estimates with desirable statistical properties, we had to choose techniques that corrected for the problem of dependence among observations.

The choice of the appropriate statistical technique depends on how, or at what level, the response variable is measured. In our case, we had response variables that were measured in two different ways. The first was a dichotomous variable, measured repeatedly over time, indicating whether a client was employed. When a dependent variable is dichotomous and measured only once, logistic regression is the appropriate technique. But, in our study we have multiple dichotomous observations per person. Generalized estimating equations (GEE), available in SAS's GENMOD procedure, is one of the techniques which can be used to adjust for temporal dependence (Allison 1999). For this study, we used the GENMOD procedure to estimate the impact of completing treatment on labor market participation. The GENMOD procedure offers three choices for specifying the relationship among error terms, and SAS refers to those choices as structured, exchangeable or autoregressive. We chose the unstructured option for several reasons. First, it was preferable to the exchange option, where the correlation between all time points are assumed to be equal. We did not believe the correlation between a client's first quarter and second quarter earnings would be equal to the correlation between the first and sixth quarter's earnings. The data suggested that the relationship weakened over time. The autoregressive option seemed reasonable, and gave very

similar results to the exchange option. We chose the exchange option because it is the preferred option when the number of time points is small (Allison 1999:185).

Our second dependent variable was quarterly wages. This variable was measured continuously, as opposed to dichotomously, for the six quarters following treatment. Again, there was a problem of dependent observations. We used SAS's TSCSREG procedure to fit a model predicting quarterly wages. There are three error structure specifications available in the TSCSREG procedure, or three different ways to model the relationship among the error terms. We chose to use the variance-component model, also known as Fuller-Battese structure. This structure assumes the error term is composed of three components, a purely random disturbance (uncorrelated across time or across individuals), variation from individual cross-sections and variation from time series. Other error structures emphasize the relationship between error terms over time (the Parks method), or assume a moving-average structure rather than any purely random component of the error term (Da Silva method). In our case, the Parks method was not appropriate. The Parks method is appropriate when the cross-sectional units are correlated (Kmenta 1986). For example, if we were analyzing economic activity in all 50 states, we would expect correlation among states, particularly those in close proximity to one another. However, we would not necessarily expect that sort of relationship among the outcomes of a cohort of clients treated across the state of Washington. Because of computational problems, we were not able to use the Da Silva method. We were not able to obtain parameter estimates using this method.

APPENDIX C: STATISTICAL MODELS

Table C1: Results from Logistic Regression Analysis for ADATSA clients Predicting the Probability of Any Employment in each of the Six Quarters Following the End of the Index Treatment Episode (N=4846).

Independent Variable	Parameter Estimate	P-Value	Odds Ratio
Treatment Variables			
Completed Index Episode	0.3210	0.0000	1.38
Inpatient Treatment only In Index Episode (compared to outpatient only)	-0.3632	0.0000	0.70
Inpatient and Outpatient in Index Episode (compared to outpatient only)	-0.0360	0.6042	0.96
Length of Episode > 90 days	0.1544	0.0147	1.17
Treated Prior to the Index Episode	-0.0725	0.2050	0.93
Client Characteristics			
Age 18-30 (compared to age >45)	1.0378	0.0000	2.82
Age 31-45 (compared to age >45)	0.7083	0.0000	2.03
Male	0.2539	0.0000	1.29
Race (1=white, 0=non-white)	-0.0275	0.5888	0.97
Married	-0.0221	0.7914	0.98
Employed in the Year Before the Episode	1.1876	0.0000	3.27
Mental Health Problem	-0.3667	0.0001	0.69
High School Graduate	0.2022	0.0000	1.22
Convicted of a Felony in the Year before the Episode	-0.1457	0.0559	0.86
Incarcerated (for at least part of The follow-up)	-0.6458	0.0000	0.52
Primary Drug (compared to alcohol)			
Marijuana	0.0148	0.8616	1.01
Amphetamines/ Methamphetamines	0.0314	0.6636	1.03
Heroin/Cocaine	-0.0523	0.3623	0.95
Other	0.1563	0.4365	1.17
Public Assistance Program			
AFDC Recipient	-0.4277	0.0000	0.65
SSI Recipient	-0.6027	0.0001	0.55
General Assistance-Pregnant	-0.8486	0.0161	0.43

Table C2: Results from Logistic Regression for Non-ADATSA clients Predicting the Probability of Any Employment in each of the Six Quarters Following the End of the Index Treatment Episode (N=4312).

Independent Variable	Parameter Estimate	P-Value	Odds Ratio
Treatment Variables			
Completed Index Episode	0.2635	0.0005	1.30
Length of Episode > 90 days	0.1863	0.0025	1.20
Treated Prior to the Index Episode	0.0129	0.8721	1.01
Client Characteristics			
Age 18-30 (compared to age >45)	0.6048	0.0000	1.83
Age 31-45 (compared to age >45)	0.4494	0.0001	1.57
Male	0.1814	0.0042	1.20
Race (1=white, 0=non-white)	-0.0298	0.6246	0.97
Married	0.1542	0.0276	1.17
Employed in the Year Before the Episode	1.9455	0.0000	7.00
Mental Health Problem	-0.6061	0.0000	0.55
High School Graduate	0.1630	0.0040	1.18
Convicted of a Felony in the Year before the Episode	-0.4868	0.0001	0.61
Incarcerated (for at least part of The follow-up)	-0.8769	0.0000	0.42
Primary Drug (compared to alcohol)			
Marijuana	-0.0133	0.8861	0.99
Amphetamines/ Methamphetamines	-0.2640	0.0158	0.77
Heroin/Cocaine	-0.1925	0.0194	0.82
Other	-0.0182	0.9209	0.98
Public Assistance Program			
AFDC Recipient	-0.3880	0.0000	0.68
SSI Recipient	-0.9412	0.0000	0.38
General Assistance-Pregnant	-1.3907	0.0000	0.25

Table C3: Results from Time Series Cross Sectional Regression Analysis For ADATSA Clients Predicting Quarterly Wages in each of the Six Quarters Following the End of the Index Episode. (N=2333)

Independent Variable	Parameter Estimate	Std. Error	P-Value
Treatment Variables			
Completed Index Episode	256.76	59.34	0.0001
Length of Episode > 90 days	239.50	77.80	0.0021
Treated Prior to the 1995 Episode	60.10	71.93	0.4035
Inpatient Treatment Only in The Index Episode (compared to outpatient only)	-276.96	77.78	0.0004
Inpatient and Outpatient Treatment in the Index Episode (compared to outpatient Only).	-142.94	85.51	0.0946
Client Characteristics			
Age 18-30 (compared to age >45)	142.49	137.51	0.3001
Age 31-45 (compared to age >45)	47.32	0.3486	0.7274
Male	269.35	65.89	0.0001
Race (1=white, 0=non-white)	128.17	63.75	0.0444
Married	20.62	108.95	0.8499
Average Quarterly Wages in The Year Before the Episode	0.4033	0.0201	0.0001
Mental Health Problem	-144.83	123.43	0.2407
High School Graduate	11.99	58.67	0.8380
Primary Drug (compared to alcohol)			
Marijuana	65.31	104.75	0.5329
Amphetamines/ Methamphetamines	103.90	88.97	0.2429
Heroin/Cocaine	-66.46	71.62	0.3535
Other	66.21	256.38	0.7962
Intercept	411.97	201.80	0.0412
R-Squared	0.057		

Table C4: Results from Time Series Cross Sectional Regression Analysis For Non-ADATSA Clients Predicting Quarterly Wages in each of the Six Quarters Following the End of the Index Episode. (N=1537).

Independent Variable	Parameter Estimate	Std. Error	P-Value
Treatment Variables			
Completed Index Episode	345.75	122.22	0.0047
Length of Episode > 90 days	522.55	105.76	0.0001
Treated Prior to the 1995 Episode	20.36	158.47	0.8978
Client Characteristics			
Age 18-30 (compared to age >45)	237.97	206.25	0.2486
Age 31-45 (compared to age >45)	245.51	205.82	0.2330
Male	321.27	108.45	0.0031
Race (1=white, 0=non-white)	169.53	107.56	0.1150
Married	333.79	119.22	0.0051
Average Quarterly Wages in The Year Before the Episode	0.6764	0.0232	0.0001
Mental Health Problem	-442.56	151.60	0.0035
High School Graduate	142.62	100.30	0.1551
Primary Drug (compared to alcohol)			
Marijuana	91.23	154.84	0.5558
Amphetamines/ Methamphetamines	128.78	198.57	0.5166
Heroin/Cocaine	-36.14	156.97	0.8197
Other	-373.06	326.99	0.2540
Intercept	-137.73	252.30	0.5852
R-Squared	0.1057		

APPENDIX D: CONSTRUCTING TREATMENT EPISODES

Our goal in constructing treatment episodes was to use administrative data to link, or group, individual admissions to treatment into a series that reflected continuous care for addiction. Episodes are necessary for the accurate evaluation of outcomes: without them, it is difficult to know when treatment begins and ends, and thus, when outcomes should be tracked. Determining whether successive admissions to treatment reflected continuous, as opposed to interrupted care was the challenge, and a general rule had to be developed that would guide us in making that determination. Given the number of clients in our study population, constructing episodes on a case by case basis was impossible.

The results of this study hinged on our definition of treatment episodes. In our multivariate analyses, the dependent variable was readmission to treatment. A readmission was conceived of as a return to treatment that marked the beginning of a new episode. Thus, this new episode had to be distinguished from continuous care. The key in assessing the continuity of care for addiction is the amount of time that elapses between discharge from one modality and admission to another. Continuing care does not necessarily mean discharge one day and readmission the next. Many factors, including client choice or treatment availability, might make such a result impossible. But clearly, if one year elapsed between a discharge from treatment and the next admission, we would consider such a case an example of interrupted care. However, when the length of time between discharge and admission grows smaller, it becomes more difficult to determine whether care was continuous or interrupted. To guide our decision-making process, we examined data from a previous, unpublished study of ADATSA clients that contained treatment records from 1994 through 1997.

We organized that data to tell us when clients returned for additional treatment, relative to the most recent discharge. In addition, we identified the modality clients left and the subsequent modality clients were admitted to. If clients experienced readmission, four possible paths were taken: from inpatient to outpatient, outpatient to outpatient, inpatient to inpatient, and outpatient to outpatient. Data on each of those paths is presented in the following four tables. Clients were divided into those completing the initial admission and those who did not. Readmissions were also grouped by the length of time from discharge of the initial admission to the admission date of the latter admission.

One fact should be noted: the following tables contain data for only those clients that experienced readmission. Many were admitted only once, and are thus not represented in these tables.

TABLE D1: Inpatient to Outpatient Readmission Data: The Number of Days between Discharge from Inpatient Treatment and a Subsequent Admission to Outpatient Treatment, by Discharge Type.

	DISCHARGE TYPE			
	COMPLETE (N=3357)		NOT COMPLETE (N=4339)	
Number of Days	**Per Cent**	**Cumulative Per Cent**	**Per Cent**	**Cumulative Per Cent**
Negative	1.4%	1.4%	1.7%	1.7%
0-7	**65.7%**	**67.1%**	**54.6%**	**56.3%**
8-14	14.2%	81.3%	13.6%	69.9%
15-29	**7.9%**	**89.2%**	**10.3%**	**80.2%**
30-60	3.9%	93.1%	5.8%	86.0%
61-90	2.7%	95.8%	3.3%	89.3%
91-120	0.7%	96.5%	1.5%	90.8%
121-180	0.7%	97.2%	2.1%	92.9%
181-365	1.1%	98.3%	2.9%	95.8%
1+ Yrs.	1.6%	99.9%	4.3%	100.1%

TABLE D2: Outpatient to Outpatient Readmission Data: The Number of Days Between Discharge from Outpatient Treatment to a Subsequent Admission to Outpatient Treatment, by Discharge Type.

	DISCHARGE TYPE			
	COMPLETE (N=944)		NOT COMPLETE (N=2278)	
Number of Days	**Per Cent**	**Cumulative Per Cent**	**Per Cent**	**Cumulative Per Cent**
Negative	3.7%	3.7%	3.5%	3.5%
0-7	**36.8%**	**40.5%**	**21.6%**	**25.1%**
8-14	11.1%	51.6%	8.2%	33.3%
15-29	**11.0%**	**62.6%**	**8.1%**	**41.4%**
30-60	9.7%	72.3%	11.2%	52.6%
61-90	5.9%	78.2%	7.5%	60.1%
91-120	4.6%	82.8%	5.2%	65.3%
121-180	4.1%	86.9%	8.0%	73.3%
181-365	6.1%	93.0%	21.9%	95.2%
1+ Yrs.	7.0%	100.0%	4.8%	100.0%

Table D3: Inpatient to Inpatient Readmission Data: Days Between Discharge from Inpatient Treatment and Subsequent Admission to Inpatient Treatment, by Discharge Type

Number of Days	DISCHARGE TYPE			
	COMPLETE (N=2102)		NOT COMPLETE (N=1015)	
	Per Cent	Cumulative Per Cent	Per Cent	Cumulative Per Cent
Negative	0.5%	0.5%	0.9%	0.9%
0-7	**64%**	**64.5%**	**63.8%**	**64.7%**
8-14	3.9%	68.4%	4.2%	68.9%
15-29	**4.6%**	**73.0%**	**5.9%**	**74.8%**
30-60	5.0%	78.0%	4.3%	79.1%
61-90	2.6%	80.6%	3.3%	82.4%
91-120	1.6%	82.2%	1.6%	84.0%
121-180	2.9%	85.1%	2.1%	86.1%
181-365	5.8%	90.9%	5.3%	91.4%
1+ Yrs.	9.1%	100.0%	8.7%	100.0%

TABLE D4: Outpatient to Inpatient Readmission Data: The Number of Days Between Discharge from Outpatient Treatment and Subsequent Admission to Inpatient Treatment, by Discharge Type.

Number of Days	DISCHARGE TYPE			
	COMPLETE (N=2376)		NOT COMPLETE (N=756)	
	Per Cent	Cumulative Per Cent	Per Cent	Cumulative Per Cent
Negative	16.0%	16.0%	14.9%	14.9%
0-7	**27.4%**	**43.4%**	**21.2%**	**36.1%**
8-14	5.6%	49.0%	6.7%	42.8%
15-29	**4.8%**	**53.8%**	**6.6%**	**49.4%**
30-60	6.4%	60.2%	6.0%	55.4%
61-90	5.0%	65.2%	6.2%	61.6%
91-120	4.2%	69.4%	3.7%	65.3%
121-180	6.0%	75.4%	6.0%	71.3%
181-365	9.7%	85.1%	11.0%	82.3%
1+ Yrs.	14.9%	100.0%	17.7%	100.0%

Results

In each table, two rows have been highlighted. The first row shows the percent of clients returning in zero to 7 days and second shows those returning in 15 to 29 days. These rows illustrate several things.

- More people were readmitted between zero and seven days after discharge than in any other time span, with the one exception being non completers moving from outpatient to outpatient (table D2). In tables D1 and D3, the majority of clients returned within that span of time.

- In nearly all cases, the majority of clients were readmitted in less than 30 days. (the exceptions were non-completers in tables D2 and D4). Thus, if clients returned for additional treatment, most did so in a short period of time.

- After 30 days, typically only very small proportions of clients are readmitted in any one time span, even though those spans become longer as we move farther from the discharge date.

Our Decision

These data show that readmissions were not randomly distributed across time. Rather, for those readmitted, their readmission dates tended to be clustered near their discharge dates. Based on this data, we felt that readmission within 30 days reflected continuing care for addiction. If the time between discharge and readmission exceeded 30 days, then the probability of serious problems with recovery increases. Thus, treatment at the subsequent admission would most likely represent the start of a new episode. Our thirty-day cut-off makes intuitive sense for two reasons. First, there are often waiting lists to get into treatment, so we would not necessarily expect that a discharge would be followed immediately by readmission. Second, it takes time to make arrangements for a readmission to treatment. In many cases a discharged client had to contact a new provider, establish financial eligibility, then be assessed by that provider. For these reasons, we established a rule that two admissions to treatment would be linked into an episode if 30 or fewer days elapsed between discharge and the subsequent readmission. Conversely, if more than 30 days elapsed, the admissions were considered part of separate episodes.

40

APPENDIX E: TREATMENT EXPERIENCES OF CLIENTS WITH MISSING SOCIAL SECURITY NUMBERS (SSNS)

Because of missing or invalid Social Security Numbers (SSNs), we deleted 414 ADATSA clients and 712 Non-ADATSA clients, or about 11% of clients beginning and ending a treatment episode in 1995. These clients had to be deleted from our analyses, because without an SSN there is no way to link to employment records.

Deleting 11% of our cohort of clients raises the issue of bias. Would our analyses of employment outcomes have been significantly different had these clients been included in the analyses? Unfortunately, there is no way to answer this question directly. But, we can shed some light on it by examining the treatment experiences of clients without SSNs.

In this study, and others, the results showed that completing treatment, and having an episode longer than 90 days, were associated with better employment outcomes. If clients without SSNs were less likely to complete treatment, and more likely to have shorter treatment episodes, then the possibility of bias would be a serious concern. Tables E1 and E2 address these relationships.

Table E1 examines the relationship between completion and SSN status. For ADATSA clients, there was no association between these variables. 8 percent of both completers and non-completers have missing SSNs. Clients without an SSN were neither more or less likely to complete treatment. For Non-ADATSA clients, there was a significant, but unexpected relationship between these variables. Clients that completed their episode of treatment were more likely to have missing SSNs than clients who did not complete treatment (18% v. 14%). Thus, the clients that were deleted from analyses were more likely to have completed treatment.

Table E1: Cross-Tabulation of Completion Status and Social Security Number Status for ADATSA and Non-ADATSA Clients (figures in the cells are percentages).

	ADATSA		Non-ADATSA	
	SSN	Missing SSN	SSN	Missing SSN
Non-Complete	92	8	86	14
Complete	92	8	82	18

For ADATSA: Chi-Square=0.265   P=0.606
For Non-ADATSA: Chi-Square=9.472   P=0.002

Table E2 examines the relationship between length of the treatment episode and SSN status.   Again, we would expect the deletion of clients with missing SSNs to lead to biased results if those clients were more likely to have shorter episodes. Table E2 shows that this is not the case: for ADATSA clients those with episodes longer than 90 days, and those with episodes shorter than 90 days had the same proportion of missing SSNs. The results for Non-ADATSA clients were very similar: there was no significant association between SSN status and length of treatment.

Table E2: Cross-Tabulation of Length of Treatment Episode (> or < 90 days) and Social Security Number Status for ADATSA and Non-ADATSA Clients (figures in the cells are percentages).

	ADATSA		Non-ADATSA	
	SSN	Missing SSN	SSN	Missing SSN
Length < 90 Days	92	8	85	15
Length > 90 Days	92	8	86	14

For ADATSA: Chi-Square=0.094   P=0.759
For Non-ADATSA: Chi-Square=0.648   P=0.421