



# **American Addiction Centers Outcomes Study**

## **Long-Term Outcomes Among Residential Addiction Treatment Clients**

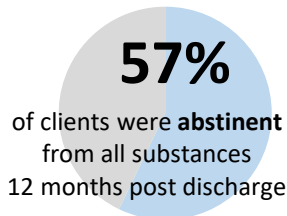
Centerstone Research Institute

2018

## Executive Summary

As part of a third-party evaluation commissioned by American Addiction Centers (AAC), an outcome monitoring system was developed and integrated into the clinical workflow of multiple AAC facilities nationwide. The outcomes monitoring system was designed to support the development of individualized treatment plans, strengthen clinical decision making, and track changes in outcomes over time. In order to measure key treatment outcomes, standardized, reliable assessments were selected and embedded into AAC’s electronic health record. These assessments are administered at intake and discharge by AAC staff trained in the evaluation. To assess the long term effects of treatment, a follow up study was conducted by the evaluation team, reaching out to clients by telephone two months, six months, and twelve months after their discharge date.

Overall, clients who received treatment at AAC experienced improvements in all of the functional domains assessed from intake to twelve months post discharge. Over half of the clients reported

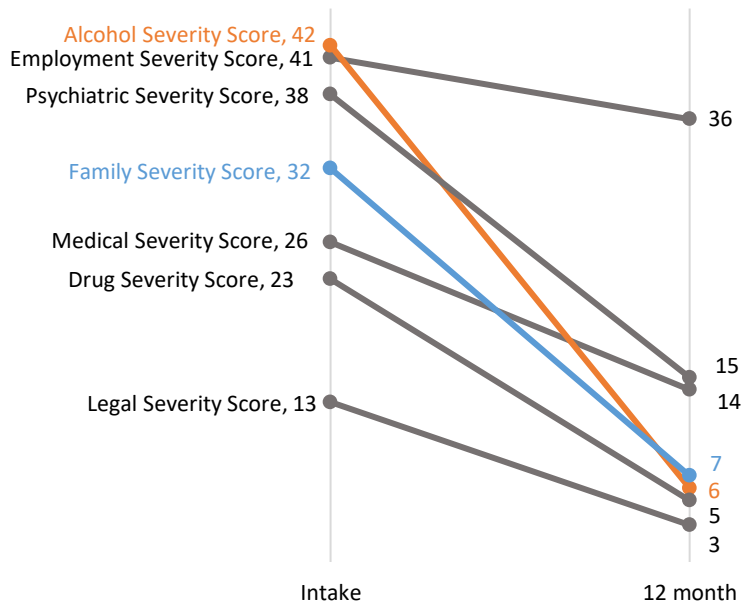


abstinence in the previous 30 days, with 69% reporting abstinence at the two month follow up and 57% reporting abstinence at the twelve month follow up. From intake to the twelve month follow up, clients experienced significant decreases in the number of days using substances in the past 30 days: an 83% decrease for alcohol use, 90% decrease in days using heroin, and a 94% decrease in days using other opiates. At the twelve month follow up, there were significant decreases in the number of clients reporting

mental health symptoms in the past 30 days, including a 93% decrease in serious depression and a 52% decrease in serious anxiety. There was also a 94% drop in clients reporting suicidal thoughts and a 100% decrease in suicide attempts, both in the past 30 days.

In addition to these substantial and sustained improvements in substance use, AAC clients improved their physical health, employment status, legal status, family relationships, and mental health, as measured by the Addiction Severity Index Composite Scores. Higher composite scores denote higher severity or impairment. The composite scores that improved the most from intake to the twelve month post discharge follow up were Alcohol Severity, which dropped 86%, and Drug Severity and Family Severity, which each dropped 78%. All of these decreases in severity were statistically significant, demonstrating that the benefits of AAC treatment are sustained a year after treatment.

**Impairment decreased** from intake to 12 months post discharge in all domains. **Alcohol** and **Family** severity decreased the most.



## Purpose of this Paper

Addiction and addiction treatment are extremely complex. Both the causes and results of addiction affect many areas of a person's life, including job performance, family and social relationships, and mental and emotional well-being. The process of addiction recovery is similarly multifaceted and expands far beyond abstinence versus relapse. American Addiction Centers (AAC) approaches treatment and recovery from a holistic perspective, supporting clients to build the quality of life they want in all domains, including physical health, mental and emotional health, family and social systems, and vocational functioning. Aligned with best practices as well as what is known about best programming and optimal outcomes, treatment at AAC—which includes a combination of therapies and other support services—varies depending on the type of addiction and characteristics of each client seeking treatment.

In consideration of this broader view of recovery and a dedication to delivering client-centered, effective treatment, AAC partnered with Centerstone Research Institute (CRI), an independent non-profit research organization, to build a client outcome monitoring system that supported the systematic collection of client outcome data at intake, discharge, and post-discharge. This client outcome monitoring system was embedded within the electronic health record and integrated into the clinical workflows for staff who interface with AAC clients day-to-day. The function of this system was to standardize data collection across AAC's multiple facilities to permit comparison, process improvement, and collect longitudinal data about clients' experiences post discharge. AAC selected six facilities across the United States to participate in the outcomes monitoring project.

This paper includes a description of the client population that received care at participating AAC facilities and an examination of changes in key client outcomes from intake to two, six, and twelve months post-discharge. Longitudinal analyses were conducted to examine change over time in the areas of alcohol use, drug use, medical problems, mental health, family functioning, legal matters, and vocational issues.

## Treatment at AAC

Clients seek treatment at AAC from across the United States and are matched to AAC facilities based on their specific needs. AAC provides a variety of evidence-based, substance use and co-occurring mental health disorder treatments, with an emphasis on *treating the whole person, not just the addiction*. Treatment includes individual, group, and family therapy and relies on a variety of evidence-based therapeutic approaches such as motivational interviewing, cognitive behavioral therapy, and trauma-informed counseling. In addition to traditional therapy formats, AAC's comprehensive treatment includes alternative approaches such as yoga, meditation, nutrition, and physical fitness. All of the facilities use AAC's treatment curriculum *Embracing change: Recovery for Life*. Once a client completes treatment and discharges from services, they are connected with AAC's alumni program which provides aftercare support.

## Methods

### Procedures

AAC chose six facilities across the enterprise to participate in the outcome monitoring system. Facilities included were Recovery First, Greenhouse, Desert Hope, Forterus, and San Diego Addiction Treatment Center. These facilities are located across the continental United States and are considered to be representative of AAC's client base and offered services.

AAC utilizes the Addiction Severity Index (ASI), 5<sup>th</sup> edition with all clients who enter care at the participating facilities. The ASI is a validated, reliable tool that assesses clients' needs in seven key domains critical to overall quality of life and functioning: Medical, Education/Employment, Alcohol, Drug, Legal, Family/Social, and Psychiatric. The ASI is well aligned with the primary treatment goals of improving client's overall functioning, and serves as the foundation for developing an individualized treatment plan. A score is generated for each of the domains indicating the severity of the client's needs in that domain. These scores are called Composite Scores and are validated measures of change over time in treatment outcomes.

To prepare AAC staff for the adoption of the ASI, CRI delivered intensive in-person evaluation training for staff at each facility to ensure fidelity in administering the ASI. Therapists completed the ASI with all new clients within 48 hours of admission to the facility. While the intake and discharge ASI were a routine part of the provision of care at AAC, participation in the follow-up interviews was strictly voluntary. The outcome monitoring study was explained to clients and they were given the opportunity to consent or decline to participate. Clients were informed that declining to participate would in no way affect the care provided by AAC. The discharge ASI was administered to clients by their primary therapist within one to two days of their discharge date.

### Sample

This outcome evaluation utilized a naturalistic sampling strategy, attempting to recruit and collect follow up data from all clients who received treatment from the 6 participating facilities. All clients who consented to participate in the follow-up interviews were contacted and asked to complete the follow-up ASI at two months, six months, and twelve months after their discharge dates. All follow up interviews were collected via phone interviews by CRI's trained data collectors. Follow up data collection began in November of 2015 and continued through January of 2017. Due to the timing of the follow ups, far more clients became eligible for their two month post discharge follow up than the other time points, and relatively few clients had become eligible for their twelve month post discharge follow up. A total of 4,399 eligible clients were contacted for their two month follow up; 1,852 eligible clients were contacted for their six month follow up; and 221 eligible clients were contacted for their twelve month follow up. A total of 1,133 two month interviews, 515 six month interviews, and 80 twelve month interviews were collected. Follow up rates are included in the table below. Upon the conclusion of each 20-30 minute follow-up interview, clients were compensated with a gift card, which was sent electronically within three days of completing the respective follow-up survey.

#### *Naturalistic Sample Follow Up Rates*

<b>Timepoint</b>	<b>Eligible</b>	<b>Completed</b>	<b>Follow Up Rate</b>
2 Month	4,399	1,133	26%
6 Month	1,852	515	28%



### Random Sample Sub-Study at the 12 Month Time Point

To address threats to the generalizability of the findings posed by the relatively low follow up rates in the naturalistic follow up study, CRI conducted a randomized sub-study. The eligibility criteria to be included in the sampling frame was clients whose twelve month follow up window opened between February 6, 2017 and March 3, 2017. Two hundred and seventy clients would be open for their twelve month post discharge follow up during the sub-study period, and all of them had discharged from Desert Hope, Greenhouse, or Recovery First. Due to the staggered roll out of the evaluation, no clients from other facilities who had the opportunity to give consent had reached their twelve month post discharge anniversary. The 270 eligible clients were stratified by facility to account for differences in the size of the facilities. One hundred and sixty eight (168) clients were selected at random, with the distribution of facilities matching the distribution among the list of eligible clients.

In order to achieve the maximum possible follow up rate, intensive tracking strategies were used for the sub-study that were not used in the naturalistic sampling strategy, resulting in 94 completed surveys out of the 168 randomly selected clients, for a follow up rate of 56%. The results from the randomly selected sub-sample closely mirrored the results of the larger outcome monitoring study, strengthening the credibility of the data as representative of outcomes for the broader AAC population. The results of this sub-study are published in the white paper *12 month post discharge outcomes among a randomly selected sample of residential addiction treatment clients*.

**The sub-study achieved a follow up rate of 56% at the 12 month post discharge time point**

### Generalizability of the Data

Two analyses were completed to assess the generalizability of the data collected through the naturalistic sampling strategy. First, a comparison of baseline data from clients who completed at least one follow up with those clients who did not complete any follow ups was conducted. Significance tests (independent t-tests for continuous data and chi-square test for categorical data) were performed on key variables from the intake ASI for the two groups. Some variables had statistically significant differences. However, all variables that tested significant also had effect sizes (as measured by Cohen's d) that did not meet the threshold for a small effect size, suggesting that the significance may be due to the large sample size. ***Therefore, the differences between those who responded to the follow up interviews and those who did not are negligible.*** Full results of these analyses can be found in the Technical Appendix.

Second, data collected from the 12 month random sample were compared with data from the 12 month naturalistic sample. Given the relatively low follow up rates in the naturalistic sample, there was concern that clients who had relapsed or were more impaired were less likely to respond to the follow up. If this were the case, a random sample with more intensive tracking strategies and a resulting higher follow up rate could be expected to reflect higher rates of relapse and higher severity generally. This was not observed in this sub-study, in which a higher percent of clients reported abstinence (**see White Paper 1**). Additionally, the two groups were compared at baseline to determine if the naturalistic sample of 12 month follow ups was significantly different from the 12 month random sample. Overall the two groups

were very similar, with statistically significant differences in only four areas. The random sample included more women than the naturalistic sample, was an average of four years older, had higher Medical Severity Scores at intake, and had a higher average number of days using barbiturates at intake.

#### Average Composite Score at Intake

ASI Domain	Naturalistic Sample Average at Intake	Random Sample Average at Intake
Medical Severity Score	21	36
Employment Severity Score	43	42
Alcohol Severity Score	38	41
Drug Severity Score	24	24
Legal Severity Score	11	15
Family Severity Score	37	39
Psychiatric Severity Score	39	37

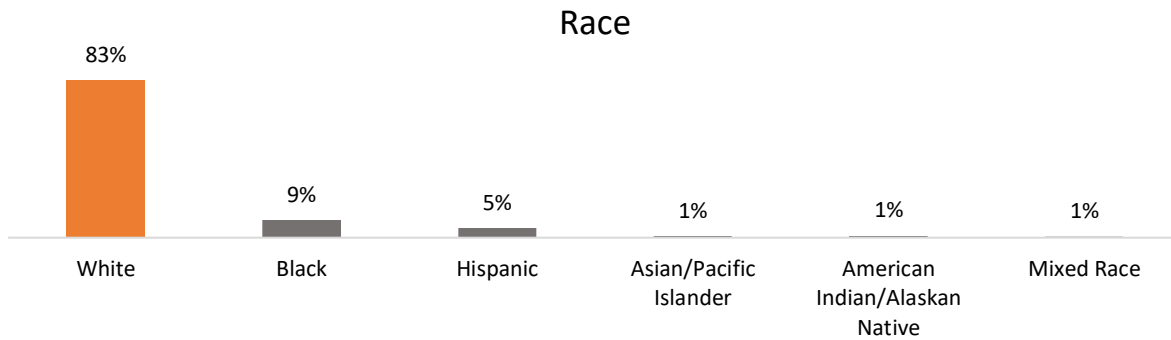
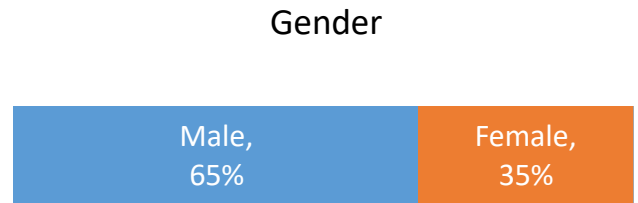
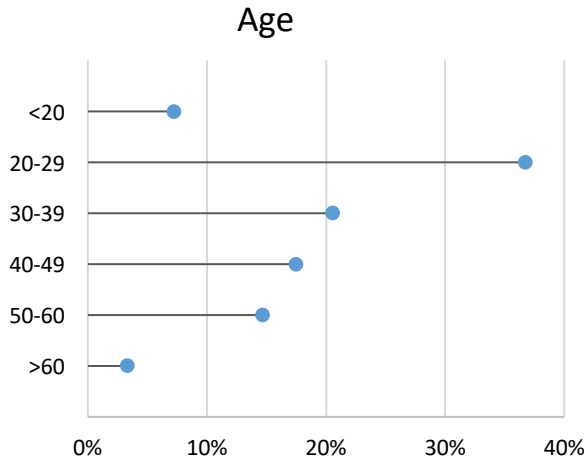
## Data Analysis

The primary goal of this study was to explore the long-term effectiveness of AAC treatment in a variety of functional areas related to recovery by examining change over time from intake to two month, six month, and twelve month post-discharge follow-up. CRI conducted hierarchical linear modeling, an analysis technique that includes all data from all timepoints, regardless of the number of follow up interviews completed by the client. The analysis assessed changes in outcome indicators from the ASI, including composite scores, problem days, and days of substance use, and whether these indicators changed to a statistically significant degree. Restricted maximum likelihood parameter estimation was used to estimate parameters within fixed and repeated effects models. Data analysts set significance levels for all statistical tests at  $p < 0.05$  as a conservative means of detecting differences. Specifically, significant results have a high likelihood of resulting from AAC's treatment rather than occurring by chance. Full output from analyses are included in the Technical Appendix.

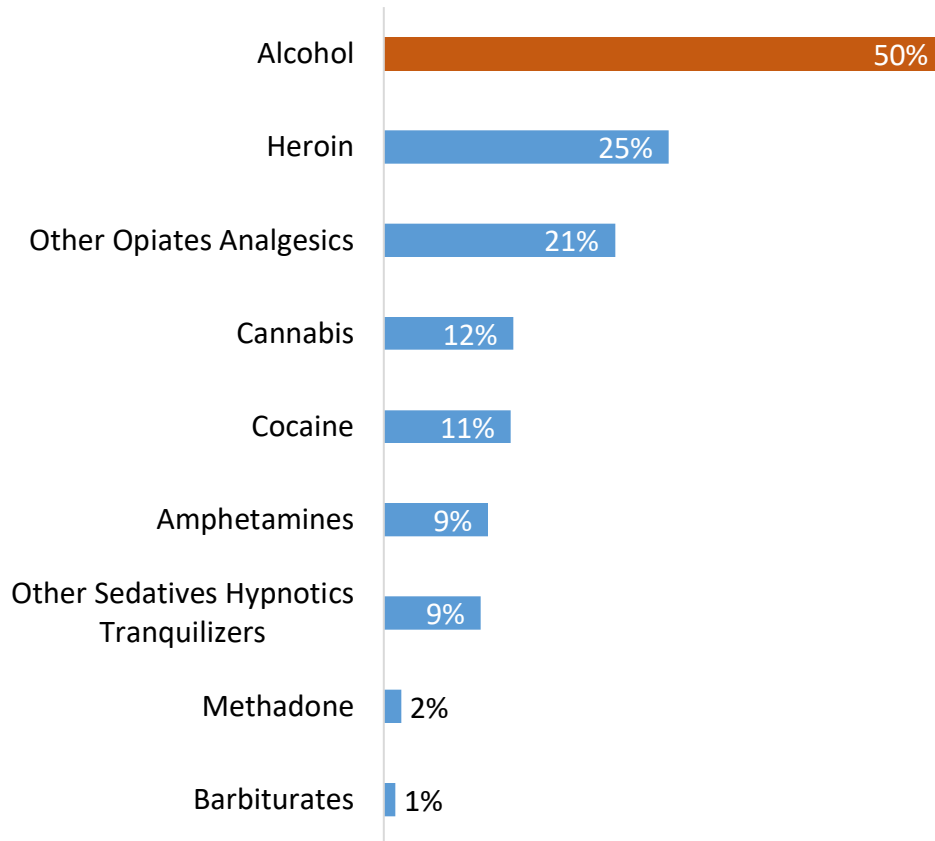
## Characteristics of AAC Clients at Intake

To be included in the analysis, each follow up had to match to the client's intake assessment. Due to missing intake data, sample sizes varied at each time point, with 1,231 clients at intake, 1,009 clients at the two month follow-up, 439 clients at the six month follow-up, and 168 clients at the twelve month follow-up. The data collection timeframe established by AAC was September 1, 2015 through March 3, 2017. Based on the demographic data collected at intake, over half were male (65%), with the largest age group between 20-29 years old. The majority of clients were White (83%), followed by Black (9%) and Hispanic (5%).

At intake, clients were asked to identify their problem substance, and could report more than one as their problem substance. Half (n=613, 50%) of the clients in the sample reported that alcohol was a problem substance at intake. The next most common substances were heroin (n=312, 25%) and other opiates (n=253, 21%).



## Problem Substances at Intake % of Sample



## Intake to Follow-up Outcomes

### Change Over Time in ASI Composite Scores

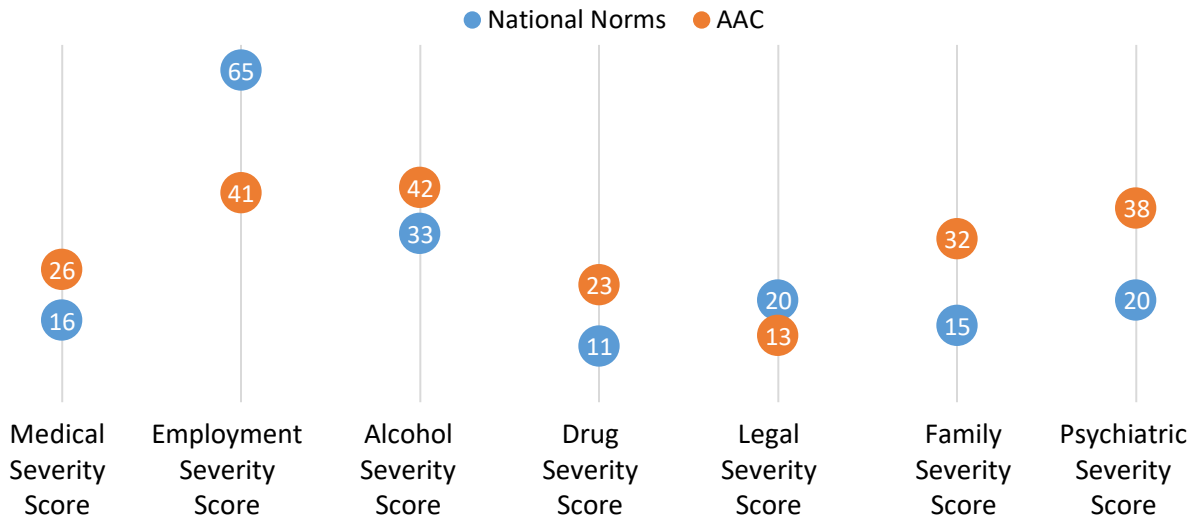
The ASI measures the severity of client's unmet needs in each domain based on a scale of 0 to 100<sup>1</sup>, where a higher score indicates higher severity in that domain. These scores are referred to as Composite Scores and have been validated as measures for change in severity over time. Compared to national norms published for the ASI Composite Scores from a nationally representative sample of inpatient treatment facilities<sup>2</sup>, AAC's population is generally more impaired at intake, with higher intake composite scores in every domain except employment and legal.

<sup>1</sup> ASI composite scores range from 0 to 1. For ease of interpretation, all scores were multiplied by 100 to transform them into whole numbers.

<sup>2</sup> McLellan, A. T., Cacciola, J. C., Alterman, A. I. Rikoon, S. H., and Carise, D. (2006). The addiction severity index at 25:Origins, contributions and transitions. *American Journal of Addiction*, 15(2): 113-124.



## Baseline ASI Composite Scores National Treatment Norms versus AAC Scores



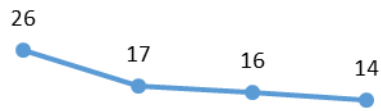
To examine change over time, a separate mixed model analysis was conducted on each of the Composite Scores at intake and all follow-up timepoints. For each domain, results indicated statistical significance of the overall model ( $F$  and  $p$  values provided in the table below), which suggests that **clients' composite scores improved to a statistically significant degree in all domains after completing treatment at AAC**. The largest improvements were in the Alcohol domain, which dropped by 86%, followed by the Drug and Family domains, which each dropped 78%. The smallest improvement was in the Employment domain, which dropped 12%.

### *Overall Change-Over-Time Models in HLM Analysis for Each Composite Domain*

<b>Domain</b>	<b>F</b>	<b>p</b>
Medical Severity Score	449.23	<.001
Employment Severity Score	2548.40	<.001
Alcohol Severity Score	1251.65	<.001
Drug Severity Score	1575.47	<.001
Legal Severity Score	364.47	<.001
Family Severity Score	1301.77	<.001
Psychiatric Severity Score	1789.59	<.001

## ASI Severity Scores Change Over Time

### Medical Severity Score



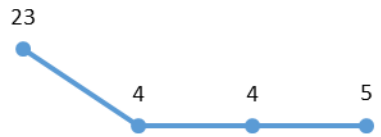
Time Point	n
Intake	n=1206
2 Month	n=1004
6 Month	n=436
12 Month	n=166

### Employment Severity Score



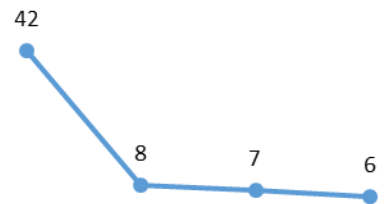
Time Point	n
Intake	n=1169
2 Month	n=990
6 Month	n=439
12 Month	n=168

### Drug Severity Score



Time Point	n
Intake	n=1140
2 Month	n=999
6 Month	n=434
12 Month	n=168

### Alcohol Severity Score



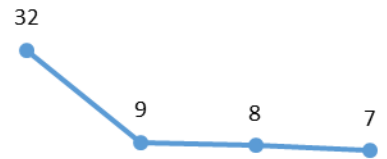
Time Point	n
Intake	n=1185
2 Month	n=1003
6 Month	n=435
12 Month	n=166

### Legal Severity Score



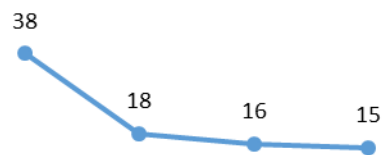
Time Point	n
Intake	n=1030
2 Month	n=1005
6 Month	n=439
12 Month	n=168

### Family Severity Score



Time Point	n
Intake	n=1168
2 Month	n=1003
6 Month	n=438
12 Month	n=166

### Psychiatric Severity Score



Time Point	n
Intake	n=1095
2 Month	n=998
6 Month	n=430
12 Month	n=165

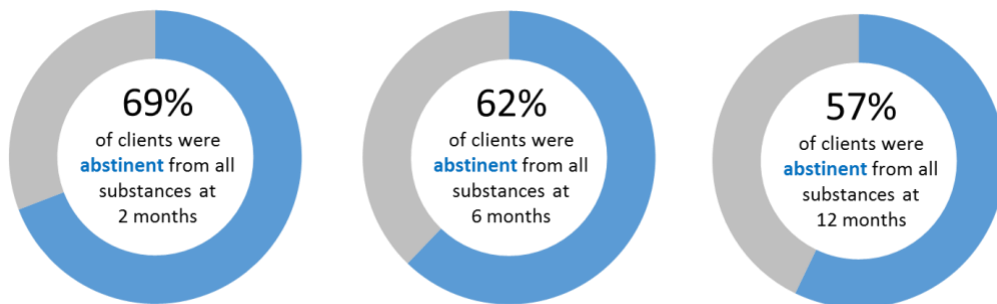
## Substance Use

Clients were asked at intake and all follow-up timepoints to report the number of days in the past 30 they used substances and the number of days in the past 30 in which they experienced problems related to substance use. At each follow-up time point, clients were also asked if they had used any substances since they discharged from treatment at AAC.

### *Abstinence since Discharge and in the Past 30 Days*

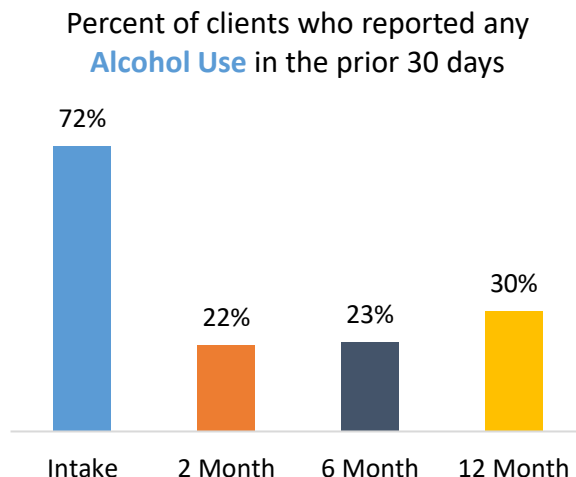
At each follow-up time point, a large proportion of clients (two month=64%, six month=56%, twelve month=45%) reported that they had **remained abstinent from all substances since leaving treatment at AAC**. Over half of the sample (two month=69%, six month=62%, twelve month=57%) at each time point reported they had **used no substances in the previous 30 days**.

### Abstinence in the Past 30 Days at Each Time Point

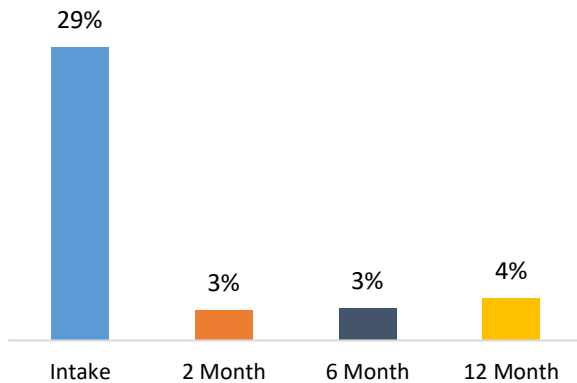


### *Reduction in Percent of Sample Using*

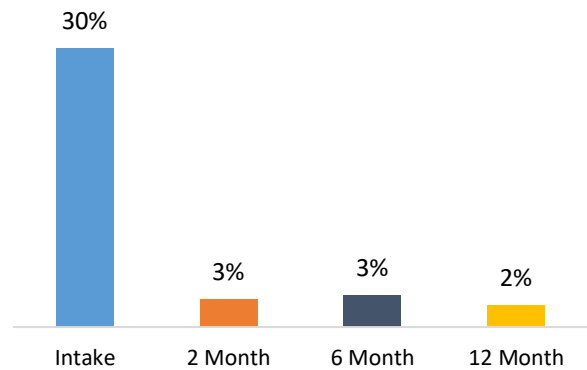
The percentage of clients reporting use of alcohol, heroin, and other opiates in the prior 30 days decreased from intake to each follow up time point. The largest drop was in the percent of clients reporting **other opiate use in the prior 30 days, which decreased by 93%**. There was an **86% drop in the percent of clients reporting heroin use**, and a **58% drop in the percent of clients reporting alcohol use**, both in the prior 30 days.



Percent of clients who reported any **Heroin Use** in the prior 30 days



Percent of clients who reported any **Other Opiate Use** in the prior 30 days



### Days of Use

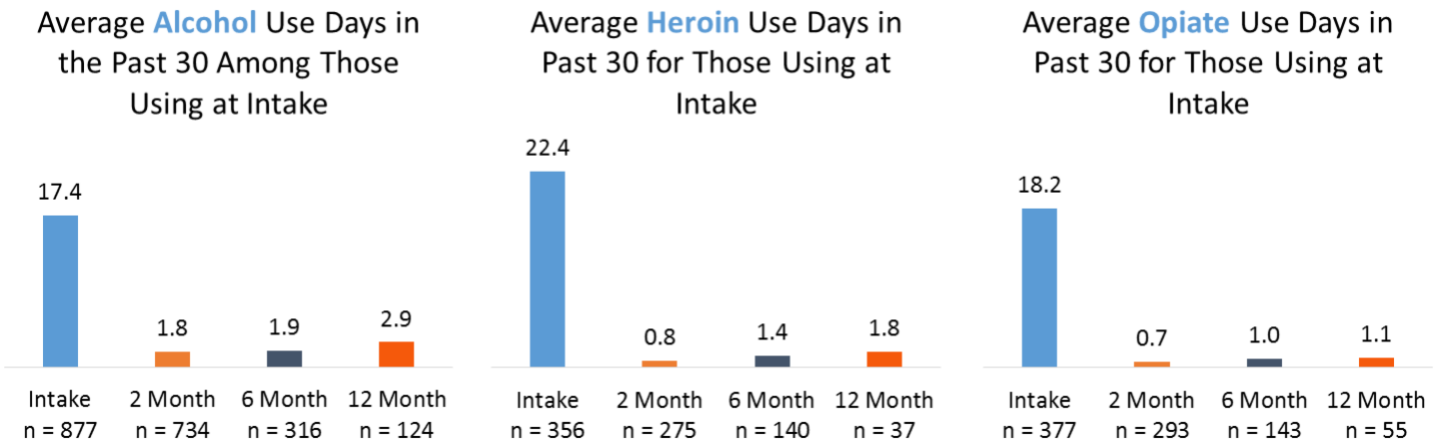
The average number of days clients used each substance decreased from intake to each of the follow-up timepoints. Results of the mixed model analysis indicated statistical significance of the overall model for all substances ( $F = 1490.46, p = <.001$ ), which suggests that AAC clients experienced a statistically significant **reduction in total days of substance use after discharge which was sustained twelve months post-discharge**. Mixed model analysis of the number of days using each substance were run separately, and all indicated statistical significance of the overall model.

### Overall Change-Over-Time Models in HLM Analysis for Days of Use in Past 30

Item	F	p
Days of Alcohol Use in Past 30	776.84	<.001
Days of Heroin Use in Past 30	304.161	<.001
Days of Other Opiate Use in Past 30	227.31	<.001

Among those reporting any **alcohol use** at intake (n=877), the average number of days using in the past 30 **decreased by 15.5 days or 89%** at the two and six month follow-ups and **14.5 days or 83%** at the twelve month follow-up. Average days of **heroin use** in the past 30 among clients who were using heroin at intake (n=349) **decreased by 20.6 days or 92%** from intake to the twelve month follow-up, the largest average

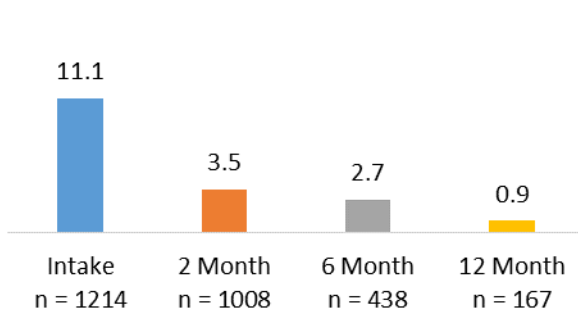
decrease. Average days of **other opiate use** in the past 30 among those who reported use at intake (n=367) **decreased by 17.1 days or 94%** from intake to each of the follow-up time points.



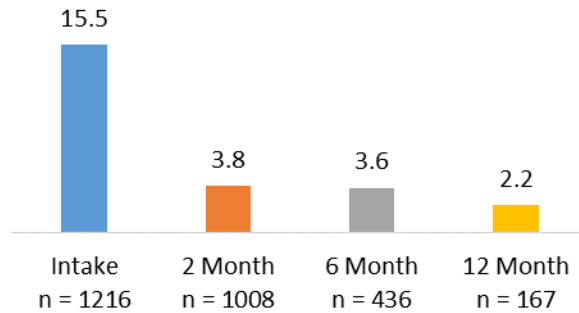
#### Alcohol and Drug Problem Days

In addition to reporting number of days using each substance, clients were asked to report the number of days within the past 30 in which they experienced problems due to their alcohol use, and separately the number of days within the past 30 that they experienced problems due to their drug use. Problem days could include days the client experienced cravings, withdrawal symptoms, other disturbing effects of drug or alcohol use, or not being able to stop thinking about a substance. Results of the mixed model analyses indicated statistical significance of the overall model for both alcohol problem days ( $F = 631.17, p = <.001$ ) and for drug problem days ( $F = 788.81, p = <.001$ ), which suggests that AAC clients experienced a statistically significant **reduction in total number of problem days for both alcohol and drugs after discharge which was sustained twelve months post-discharge**. Among all clients, the average number of alcohol related problem days in the past 30 decreased by 92% from intake to twelve month, while the average number of drug related problem days in the past 30 decreased by 86%.

Average Number of **Alcohol** Problem Days, Past 30 Days



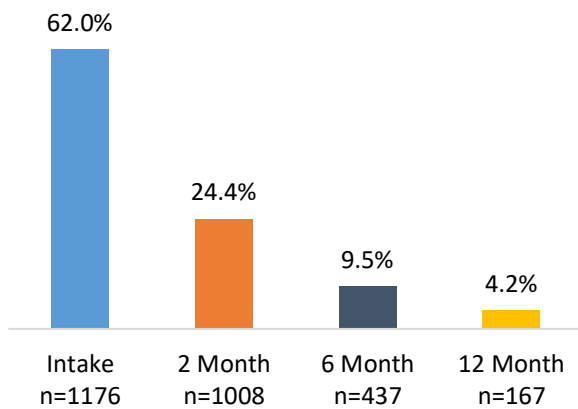
Average Number of **Drug** Problem Days, Past 30 Days



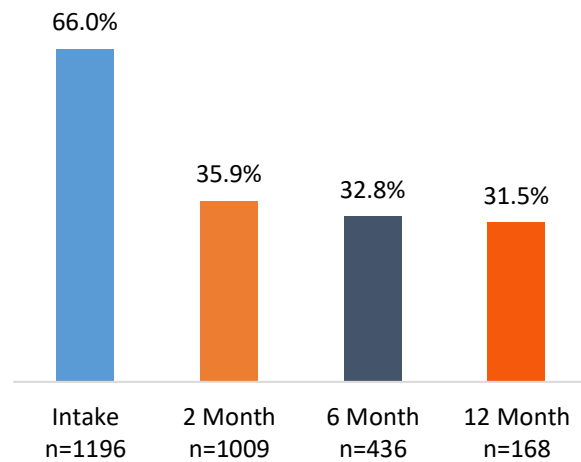
### Emotional and Mental Wellness

At intake and each follow-up time point, clients were asked if they had experienced serious depression, serious anxiety, suicidal thoughts, or attempted suicide in the previous 30 days. The percentage of clients reporting these experiences decreased from intake to each of the time points. The percentage of clients reporting serious depression as well as the percent of clients reporting suicidal thoughts each decreased by 93% from intake to twelve month. Serious anxiety decreased by 52% from intake to twelve month. No clients reported suicide attempts in the prior 30 days at the twelve month follow up, for a 100% reduction.

Percent of Clients Reporting **Serious Depression**, Past 30 Days

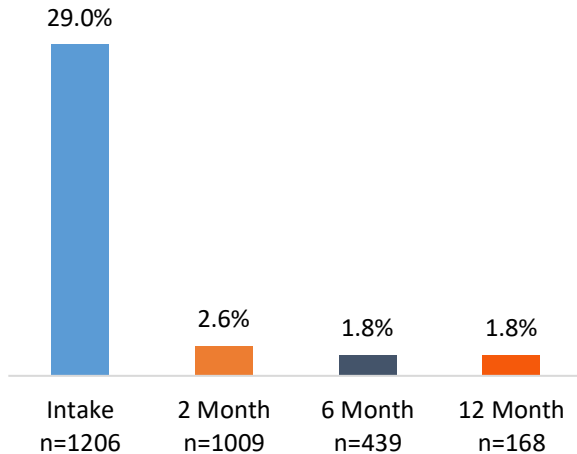


Percent of Clients reporting **Serious Anxiety**, Past 30 Days

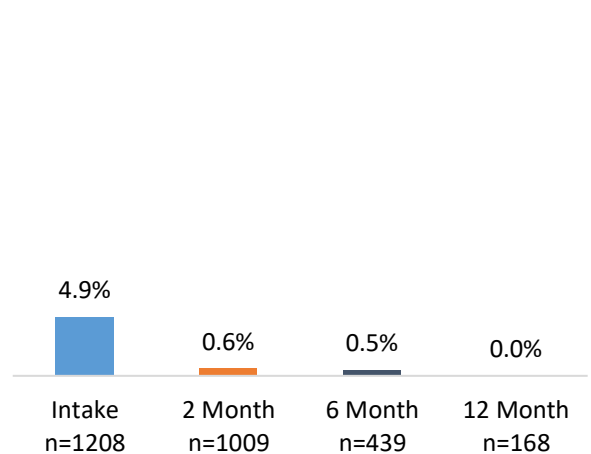




Percent of Clients reporting Suicidal Thoughts, Past 30 Days

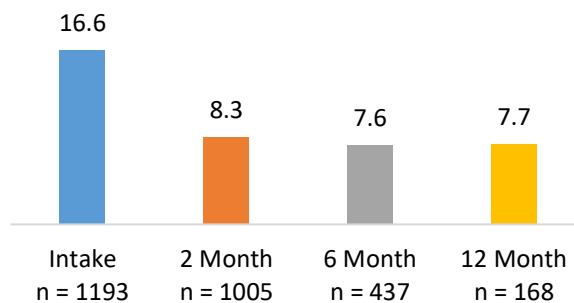


Percent of Clients reporting Suicide Attempts, Past 30 Days



Clients were asked to report the number of days within the past 30 they experienced problems related to their psychological well-being. Results of the mixed model analysis indicated statistical significance of the overall model ( $F = 1104.50, p = <.001$ ), which suggests that AAC clients experienced a statistically significant **reduction in psychological problem days after completing treatment**.

Average Number of Psychological Problem Days Past 30 Days

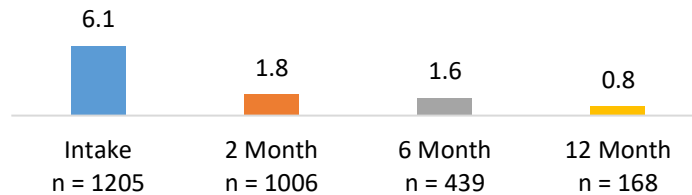


### Family Functioning

Clients were asked to report the number of days in the past 30 they experienced serious conflict with their family members. The average number of family problem days dropped from 6.1 at intake to .8 at twelve

months, an 87% reduction. Results of the mixed model analysis indicated statistical significance of the overall model ( $F = 336.53, p < .001$ ), which suggests that AAC clients experienced a statistically significant **reduction in days of serious conflict with family members after completing treatment.**

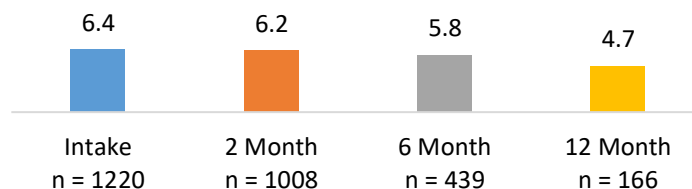
### Average Number of **Family Conflict** Days, Past 30 Days



### Physical Health

Clients were asked at intake and all follow-up timepoints to report the number of days within the past 30 days they experienced problems related to their physical health and medical issues. The average number of medical problem days dropped from 6.4 to 4.7, a reduction of 27%. Results of the mixed model analysis indicated statistical significance of the overall model ( $F = 449.23, p < .001$ ), which suggests that AAC clients experienced a statistically significant **reduction in physical and medical problem days after completing treatment.**

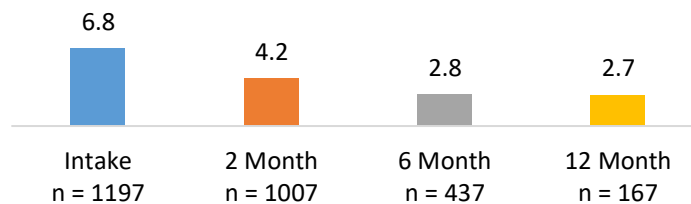
### Average Number of **Medical Problem** Days Past 30 Days



## Employment and Vocational Issues

Clients were asked at intake and all follow-up timepoints to report the number of days within the past 30 days they experienced problems related to employment and vocation. The average number of employment problem days dropped from 6.8 at intake to 2.7 at twelve month follow up, a 60% reduction. Results of the mixed model analysis indicated statistical significance of the overall model ( $F = 422.03, p = <.001$ ), which suggests that AAC clients experienced a statistically significant **reduction in vocational and work-related problem days after completing treatment**.

### Average Number of Employment Problem Days, Past 30 Days



## Limitations

Despite the strong design, this evaluation is not without limitations. Follow up data collection relied on a naturalistic sample. All data was collected from clients who answered calls from data collectors and agreed to answer follow up questions. There could be systematic differences between individuals who are more likely to answer the telephone and complete the follow-up survey than those who do not pick up the phone or refuse to participate in the follow-up survey. While several baseline differences were identified in age, days using amphetamines, days using more than one substance, and ASI employment and drug domains scores exist between the two groups, they did not meet the threshold for a small effect size ( $d = .20$ ), thus overall the naturalistic and randomly assigned groups were very similar.

There are statistically significant differences between the two groups in the racial and sexual orientation compositions as well as the number of those identifying amphetamines and alcohol as primary substances between. These differences as well as any potential differences at the follow up timepoints could threaten the validity of the evaluation. Environmental, personal and interpersonal conditions that occurred after discharge from AAC (e.g., therapy, support groups, or other outpatient services and supports, etc.), might be contributing to the positive outcomes observed, however, data was not collected on these post-discharge conditions and therefore are not controlled for in the statistical model.

Lastly, due to the nature of the longitudinal design, data was missing for the majority of the clients who responded as only six percent of the sample ( $n = 69$ ) completed the follow up survey at each timepoint. Although changes over time were analyzed using a HLM, which is a model that controls for missing data

better than alternative statistical techniques, the evaluation would be strengthened by having more complete data.

## Discussion

In 2016 an estimated 2.1 million adults age 18 years and older received substance abuse treatment at a specialty facility. However, 17.7 million adults needed treatment but did not receive it<sup>1</sup>. Multiple reasons have been cited for not seeking treatment, from lack of readiness to financial constraints. The reality is that the decision to commit to treatment is very difficult often fraught with anger, resistance, fear, and ambivalence. Once these initial hurdles are overcome and the person agrees to a residential stay, expectations are very high that treatment will indeed result in lifelong recovery. Findings of this comprehensive, 3-year evaluation suggest that individuals who complete AAC treatment can expect to experience an overall reduction in substance use, psychological and physical health problem days, as well as less family conflict, anxiety, depression, and thoughts of suicide.

The majority of clients at each follow-up timepoint (two month=69%, six month=62%, twelve month=57%) reported they had ***used no substances in the previous 30 days***. Clients experienced large decreases in the number of days using substances and the number of days they experienced problems related to their drug or alcohol use, including craving and withdrawal symptoms. Significant declines in medical, alcohol, drug, employment, legal, and psychiatric severity and problem days were also observed to a statistically significant degree. Thus, the results of this evaluation indicate that AAC's treatment is beneficial for clients in multiple areas of functioning, relapse prevention, risk reduction, and recovery. Furthermore, these benefits are maintained over time as they remain statistically significant 12 months after discharge from treatment. Ultimately, these findings suggest that AAC is achieving its mission in that individuals completing treatment can experience recovery and wellness of mind, body and spirit.