



 American Addiction Centers

OUTCOMES STUDY

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY | AAC THREE-YEAR OUTCOME STUDIES

STUDY BACKGROUND

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 patients 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 patient seeking treatment.

In consideration of this broader view of recovery and a dedication to delivering patient-centered, effective treatment, AAC hired a third-part independent non-profit research organization, Centerstone Research Institute (CRI), to build a patient outcome monitoring system that supported the systematic collection of patient outcome data at intake, discharge, and post-discharge. This patient outcome monitoring system was embedded within the electronic health record and integrated into the clinical workflows for staff who interface with AAC patients 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 long term data about patients' experiences post discharge over a 3-year study period.

EVALUATION WHITE PAPER I: IMMEDIATE TREATMENT OUTCOMES

The primary goal of this study was to assess the immediate impact of AAC's treatment program on substance use, family functioning, mental health, physical health and other key outcomes. Over a 3-year period, more than 4,000 people enrolled in the study. Upon entry to AAC, patients were experiencing significant impairment in many life domains. Forty-eight (48%) percent of patients reported alcohol use as a problem at intake, and 49% reported heroin or prescription opiates. Smaller numbers reported use of cocaine, cannabis, amphetamines, and sedatives. Sixty-seven percent (67%) reported using multiple substances during the month prior to admission. In addition to substance use disorder, most patients reported significant mental health problems (depression, anxiety, or trauma) and family conflict at admission to treatment.



ALCOHOL PROBLEM DAYS REDUCED FROM 11 TO 3, A 78% DECREASE



DRUG PROBLEM DAYS REDUCED FROM 16 TO 3, AN 81% DECREASE

NOTE: "Problem Days" while in treatment can include days experiencing significant withdrawal or cravings.

PHQ-9 INTAKE TO DISCHARGE



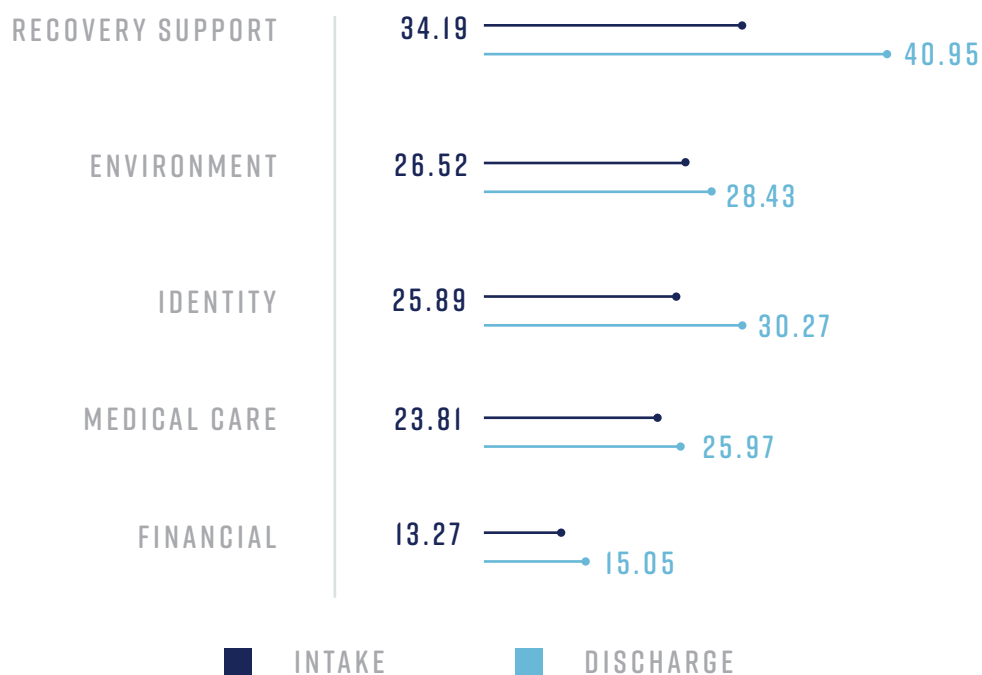
CLIENTS SHOWED A **9.16 POINT DECREASE** IN DEPRESSION SYMPTOMOLOGY. THIS INDICATES THAT CLIENTS ENTERED AAC WITH MODERATE TO MODERATELY HIGH LEVELS OF DEPRESSION SYMPTOMS, AND **LEFT AAC WITH VERY LOW SYMPTOMS.**

AAC Outcome data clearly indicate that patients entering treatment report a significant level of depression (admission PHQ-9 score of 11.53, which is considered moderate). At discharge, PHQ-9 scores decrease to 2.43, which is considered minimal or no depression.

One of the most important predictors of long-term success is called Recovery Capital, which is a way of assessing improvements in a patient's recovery support resources, their identity in recovery, recovery environment, and access to medical and financial resources. Outcome measures also indicated a substantial reduction in relapse risk.

Family involvement and support is critical to long-term recovery. Outcomes scores on the Family Assessment Device (FAD) and Addiction Severity Index (ASI) indicate significant improvements in family functioning with 30 days or more of treatment.

ALL RECOVERY CAPITAL DIMENSIONS ON THE RCS IMPROVED FROM INTAKE TO DISCHARGE.



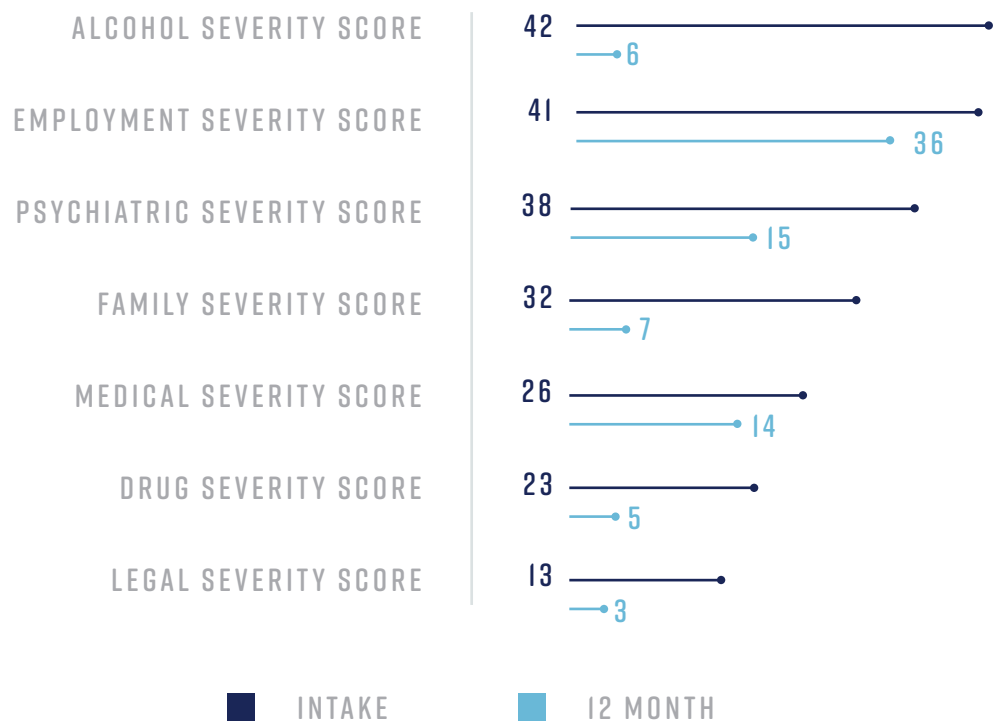
FAMILY CONFLICT DAYS REDUCED FROM **6** TO **2**, A **74%** DECREASE

EVALUATION WHITE PAPER 2: LONG TERM OUTCOMES (TOTAL POPULATION SAMPLE)

Among the entire study population, patients who received treatment at AAC experienced statistically significant improvements in all of the functional domains assessed from intake to twelve months post discharge. Over half of the patients 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, patients 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 patients reporting mental health symptoms in the past 30 days, including a 93% drop in serious depression and a 52% drop in serious anxiety. There was also a 94% drop in patients 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 patients 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.



EVALUATION WHITE PAPER 3: TWELVE MONTH OUTCOMES (STRATIFIED RANDOM SUBSAMPLE)

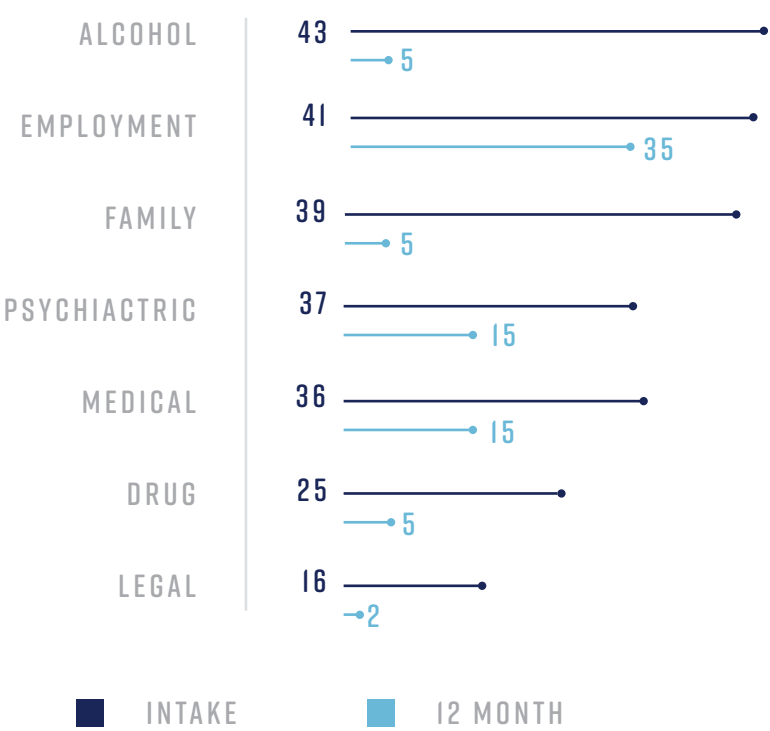
A NOTE ON RESEARCH METHODOLOGY:

The final White Paper reports findings from a stratified random subsample of patients at the longest follow up period, 12 months. Although the sample size in White Paper #3 is comparatively smaller, this sampling methodology is the most statistically valid approach to understanding true patient outcomes across a large population and reduces possible bias in results from a large scale total population sample such as the one described in White Paper #2 above. The good news is that the results of the larger total population sample and the smaller stratified random sample reveal a similar pattern of outcomes, supporting the the overall validity of the research findings. Because the 12-month subsample represents a stronger research methodology, those are the results used for general reporting of outcomes. That said, all White Papers are provided.

KEY FINDINGS: CHANGE OVER TIME IN COMPOSITE SCORES

The Addiction Severity Index (ASI) measures the severity of client’s unmet needs in each domain, on a scale of 0 to 100¹. These scores are referred to as Composite Scores and have been validated as measures for change in severity over time. The average Composite Scores decreased from intake to 12 month follow up in all domains, reflecting improvement in that status of client’s lives in each domain. The most dramatic decreases in severity were in the Alcohol domain, dropping from 43 to 5, followed by the Family domain, dropping from 39 to 5. The smallest decrease was in Employment. These decreases were statistically significant.

ALL SCORES ON THE ASI DECREASED FROM INTAKE TO 12 MONTHS POST DISCHARGE



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

SUBSTANCE USE AT 12 MONTHS

At the 12 month follow up, 48% (n=39) of clients reported that they had not abused any substances since leaving treatment, meaning that they had no slips or relapses since leaving AAC. Sixty-three percent (n=51) of clients had not used any substances in the past 30 days. Of the clients who reported that they had been using in the past 30 days, the majority reduced their use as compared to their patterns at intake.



OF CLIENTS WERE ABSTINENT FROM
ALL SUBSTANCES AT 12 MONTHS

*Comparative national benchmark for
12 month abstinence is 30% .*

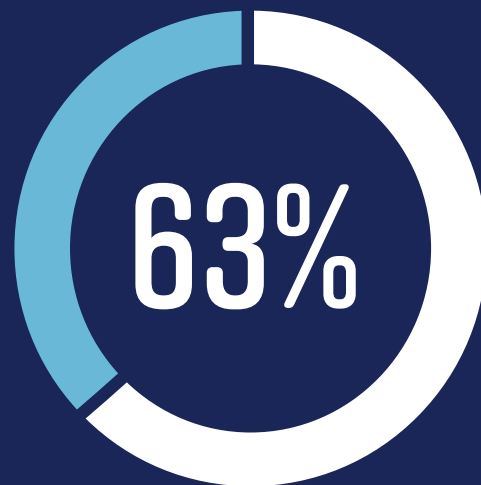
Specifically, clients were asked how many days in the past 30 they used each substance. Among those who reported use in the 30 days prior to intake, the average number of days using each substance decreased from intake to 12 month. For those reporting any alcohol use at intake, the average number of days decreased from 15 to 3 days at the 12 month follow up. For those reporting any heroin or other opiate use at intake, the average number of days reduced from 24 days to 3 days and from 21 days to 1 day respectively.

Clients who reported they had used a substance in the 30 days prior to the twelve month follow up also saw a significant decrease in the average number of days of use, indicating harm reduction.

OVERALL USE FROM INTAKE TO FOLLOW UP

OF THOSE WHO REPORTED USING THESE SUBSTANCES AT INTAKE, THE AVERAGE
NUMBER OF DAYS DECREASED SIGNIFICANTLY. MANY OF THESE CLIENTS REPORTED
THEY WERE NOT USING THESE SUBSTANCES AT ALL AT 12 MONTHS.





OF CLIENTS WERE
ABSTINENT FROM
ALL SUBSTANCES
AT 12 MONTHS

OTHER OPIATE USE DECREASED
BY AN AVERAGE OF **95%**

HEROIN USE DECREASED
BY AN AVERAGE OF **88%**

ALCOHOL USE DECREASED
BY AN AVERAGE OF **80%**

ALCOHOL USE

Three-quarters of the sample (75%, n=61) reported alcohol use in the 30 days prior to intake. At the 12 month follow up, only 26% (n=21) of the sample reported any alcohol use in the prior 30 days, representing a decrease of more than half. The average number of problem days decreased by 91%, from 12 days at intake to 1 day at the twelve month follow up. Clients were asked to rate how troubled or bothered they were by the alcohol problems they experienced in the previous 30 days, and over half of the sample (54%, n=44) reported that they were less troubled or bothered at the follow up as compared to their response at intake. An additional 40% (n=33) of clients reported that they were not at all bothered by alcohol problems at either the intake or follow up time point. Finally, the average amount of money clients spent on alcohol in the past 30 days decreased by 84% from intake to the follow up, from \$140 to \$22.



ALCOHOL PROBLEM DAYS REDUCED FROM **12** TO **1**, A **92%** DECREASE

DRUG USE

Similar to the reduction in alcohol use, the proportion of clients who reported any drug use in the prior 30 days decreased from 74% (n=60) at intake to 26% (n=21) at the twelve month follow up. The average number of days clients' experienced drug related problems dropped 86%, from 14 days to 2 days. Fifty seven percent (n=46) of the clients reported a reduction in how troubled or bothered they were by drug related problems at the 12 month follow up, and an additional 35% (n=29) reported they were not at all bothered by any drug related problems at either intake or the follow up. The average amount of money spent on drugs in the prior 30 days decreased by 87%, from \$700 at intake to \$91 at the follow up.



DRUG PROBLEM DAYS REDUCED FROM **14** TO **2**, AN **82%** DECREASE

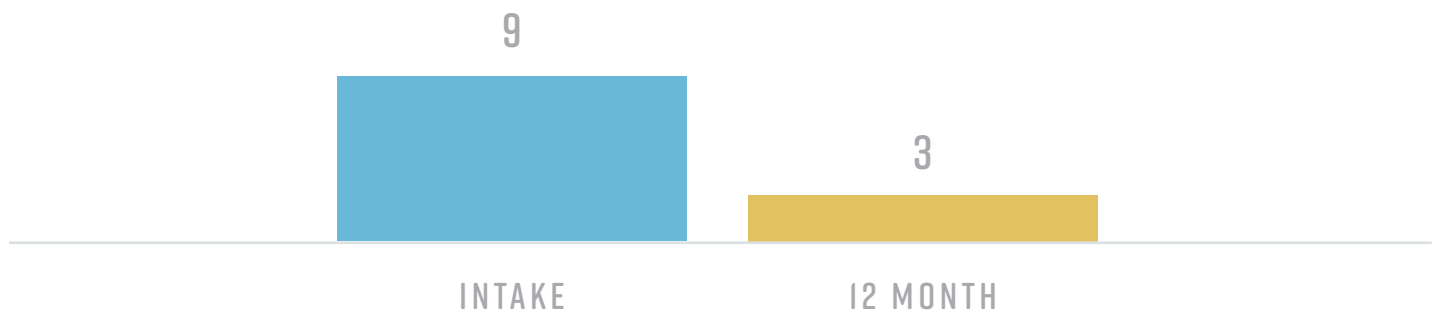


NOTE: "Problem Days" while in treatment can include days experiencing significant withdrawal or cravings.

PHYSICAL HEALTH AT 12 MONTHS

Very few clients reported hospitalizations for physical health reasons. Nine clients (11%) reported one hospitalization for physical health reasons in the 30 days prior to admission, and only 3 clients (5%) reported one hospitalization in the 30 days prior to the twelve month interview.

HOSPITALIZATIONS FOR PHYSICAL HEALTH REASONS WERE UNCOMMON, AND REDUCED BY HALF FROM INTAKE TO 12 MONTH



At the 12 month follow up, clients were asked if they had gone to the emergency room for any reason in the previous 30 days. Only 4 clients reported they went to the emergency room in the past 30 days, all for physical health reasons. The average number of days that clients experienced physical medical problems decreased from 9 at intake to 5 at the follow up. Forty-four percent (n=36) reported that they were less troubled or bothered by medical problems at the follow up, and 30% (n=24) reported they were not at all bothered by medical problems.



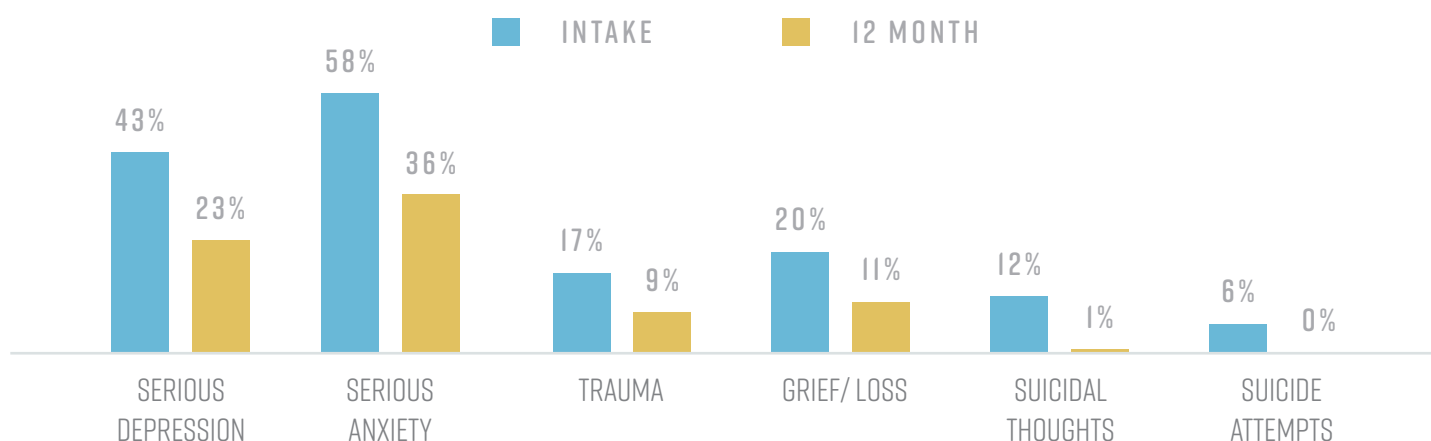
MEDICAL PROBLEM DAYS REDUCED FROM 9 TO 5, A 44% DECREASE

MENTAL AND EMOTIONAL HEALTH AT 12 MONTHS

AAC provides treatment for co-occurring substance use and mental health disorders. At intake, 31% of the sample (n=25) reported that they had been treated in an inpatient or hospital setting for psychiatric needs at least one time in their lives. A slightly higher proportion of clients reported that they had received outpatient treatment for psychiatric needs at least one time in their lives (43%, n=35). All clients regardless of psychiatric history were asked at intake and the twelve month follow up if they had experienced any of a series of mental health symptoms in the previous 30 days. The most commonly reported symptoms were serious anxiety and serious depression. At the 12 month follow up, the proportions of clients experiencing each mental health symptoms dropped.

Clients were then asked how many days in the past 30 they experienced any of the mental health symptoms they reported. The average number of days decreased from 16 days at intake to 7 days at the follow up. Nearly three-quarters (72%, n=58) of the clients reported that they were less troubled or bothered by these problems at the follow up. Only 11% (n=9) of clients reported they were not at all bothered by mental health symptoms at intake and at the follow up. Only one client reported a hospitalization due to emotional or mental health reasons at the 12 month follow up.

PERCENTAGE OF CLIENTS REPORTING MENTAL HEALTH SYMPTOMS IN THE PAST 30 DAYS



PSYCHIATRIC PROBLEM DAYS REDUCED FROM 16 TO 7, A 56% DECREASE

FAMILY AND SOCIAL

Family members have a critical role to play in clients' recovery. As part of AAC's program, family members are contacted as early on and invited to participate in family therapy with the client, in addition to the client's individual therapy which often addresses family dynamics.



FAMILY CONFLICT DAYS REDUCED FROM 8 TO .5, A 94% DECREASE

Clients were asked about their relationships with family members as well as friends, co-workers, and other social connections. Clients reported improvement in both their relationships with family members and other social relationships from intake to follow up. Specifically, the average number of days of serious conflict with family members decreased from 7.8 days at intake to .5 days at the follow up, and the number of days of serious conflicts with others outside of the family decreased from 3.4 days to 1 day. Over half reported that they were less troubled or bothered by problems related to their family relationships (74%, n=60), and just under half reported this reduction for other social relationships (47%, n=38). A small proportion of clients reported that they were not at all bothered by family problems at either intake or follow up (20%, n=16), and a much larger proportion were not at all bothered by social relationships at either intake or follow up (44%, n=36).



FAMILY CONFLICT DAYS

REDUCED FROM 8 TO 0.5,

A 94% DECREASE.



PSYCHIATRIC PROBLEM

DAYS REDUCED FROM 16 TO 7,

A 56% DECREASE.



MEDICAL PROBLEM DAYS

REDUCED FROM 9 TO 5,

A 44% DECREASE.





SUMMARY

American Addiction Centers facilities are accredited by either the Joint Commission (TJC) or the Commission on Accreditation of Rehabilitation Facilities (CARF), and their techniques and intervention strategies are rooted in scientific research.

The company believes that recovery is possible for anyone, that hope is key, and that providing individuals with tools to help them remain clean and sober for life is a primary aim of American Addiction Centers treatment.

This strong belief in the philosophy and approach to treatment lead AAC to hire a third-party independent evaluation team in 2015. Evaluators were asked to measure outcomes among clients entering AAC for residential treatment, at discharge from treatment, and at 2, 6 and 12 month post-discharge intervals. The evaluation was specifically designed to measure critical health and social functioning outcomes that are typically the major reasons for relapse to substance use following treatment (e.g., alcohol use, drug use, mental health symptomatology, lack of family/community recovery support, etc). Valid and reliable instruments were selected to measure each of these areas of functioning and were collected as a routine part of intake and discharge information gathering. The evaluation team established a call center solely dedicated to tracking and interviewing clients after discharge from treatment so that these same outcomes could be measured over time.

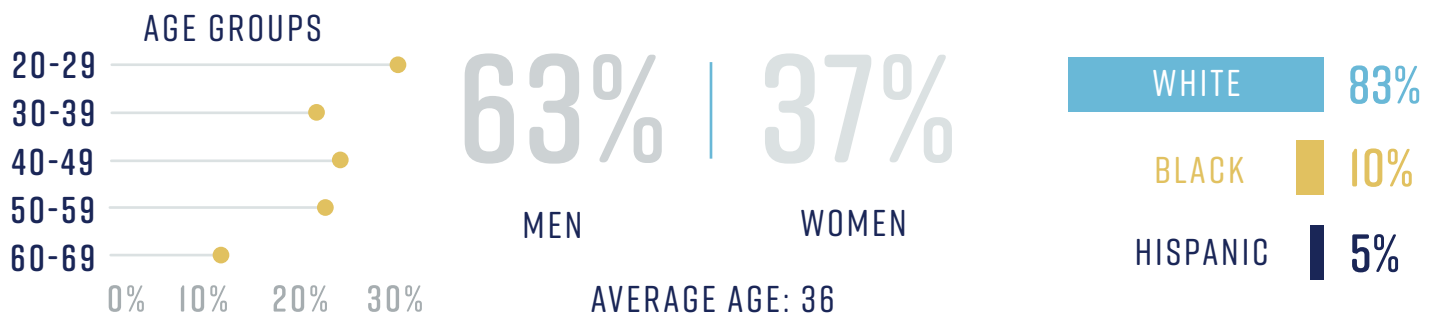
White Paper #3 represents a sub-study of a larger 3-year evaluation. The results demonstrate that randomly selected clients who completed AAC treatment experience positive outcomes in all of the key functional domains assessed and that these improvements are maintained twelve months post discharge. There were significant reductions in alcohol and drug use, and over half of the clients had not used any substances in the 30 days prior to the follow up interview. Among those who were using, the average number of days reduced, as well as the extent to which the client was impacted by alcohol or drug problems as compared to intake. Additionally, clients reported a reduction in mental health symptoms, including depression, anxiety, and trauma. There was a large reduction in suicidal thoughts and suicide attempts from intake to follow up as well. While relatively few clients reported physical medical issues at intake, there were very few hospitalizations, emergency room visits, and a low average number of physical health problem days at follow up.

DATA

AAC ONE YEAR POST-TREATMENT FOLLOW UP STUDY

American Addiction Centers (AAC) approaches treatment and recovery from a holistic perspective. AAC partnered with Centerstone Research Institute (CRI), an independent non-profit research organization, to implement a post-discharge outcome evaluation to understand how clients are doing up to one year after treatment. Findings from the project showed reductions in drug and alcohol use, improvements in mental and physical health, decreased suicidal ideation, and overall better family functioning.

12 MONTH FOLLOW UP SAMPLE



SUBSTANCE USE

ALCOHOL



75% CLIENTS REPORTING ANY
ALCOHOL USE AT **INTAKE**

CLIENTS REPORTING ANY
ALCOHOL USE AT **12 MONTH** **26%**

HEROIN

23% CLIENTS REPORTING ANY
HEROIN USE AT **INTAKE**

CLIENTS REPORTING ANY
HEROIN USE AT **12 MONTH** **6%**



DRUGS



74% CLIENTS REPORTING ANY
ILLEGAL DRUG USE AT **INTAKE**

CLIENTS REPORTING ANY
ILLEGAL DRUG USE AT **12 MONTH** **26%**

OTHER OPIATES

39% CLIENTS REPORTING ANY
OTHER OPIATE USE AT **INTAKE**

CLIENTS REPORTING ANY
OTHER OPIATE USE AT **12 MONTH** **4%**



PSYCHIATRIC SEVERITY
DECREASED 59%

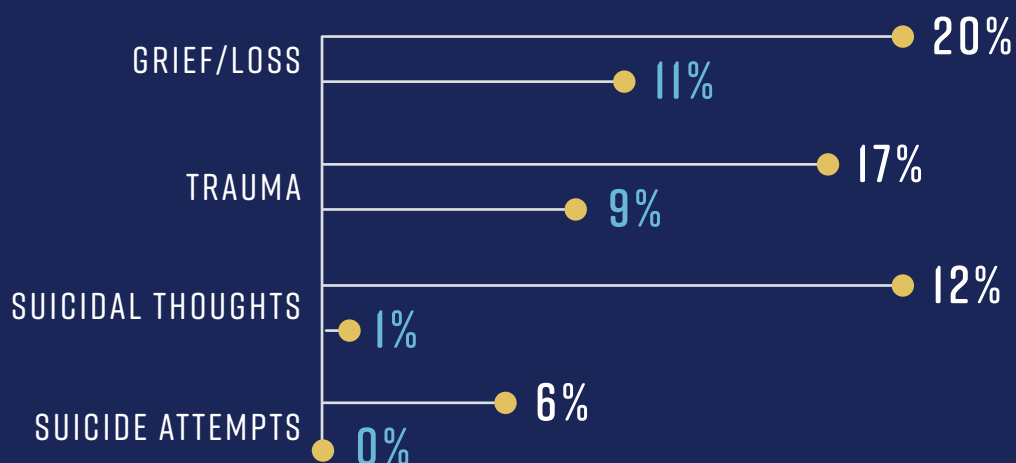

43%
AT INTAKE
SERIOUS
DEPRESSION

→ 23%
AT 12 MONTH


58%
AT INTAKE
SERIOUS
ANXIETY

→ 36%
AT 12 MONTH

THE PERCENT OF CLIENTS REPORTING EACH MENTAL HEALTH
SYMPTOM DECREASED FROM **INTAKE** TO **12 MONTH**



MEDICAL SEVERITY
DECREASED 58%


9 DAYS
AT INTAKE
PHYSICAL HEALTH
HOSPITALIZATIONS

→ 3 DAYS
AT 12 MONTH


9 DAYS
AT INTAKE
MEDICAL
PROBLEMS

→ 5 DAYS
AT 12 MONTH

FAMILY SEVERITY
DECREASED 94%


8 DAYS
AT INTAKE
CONFLICT WITH
FAMILY

→ 5 DAYS
AT 12 MONTH


3 DAYS
AT INTAKE
CONFLICT WITH
OTHERS

→ 1 DAY
AT 12 MONTH

RESEARCH OUTCOMES SUMMARY

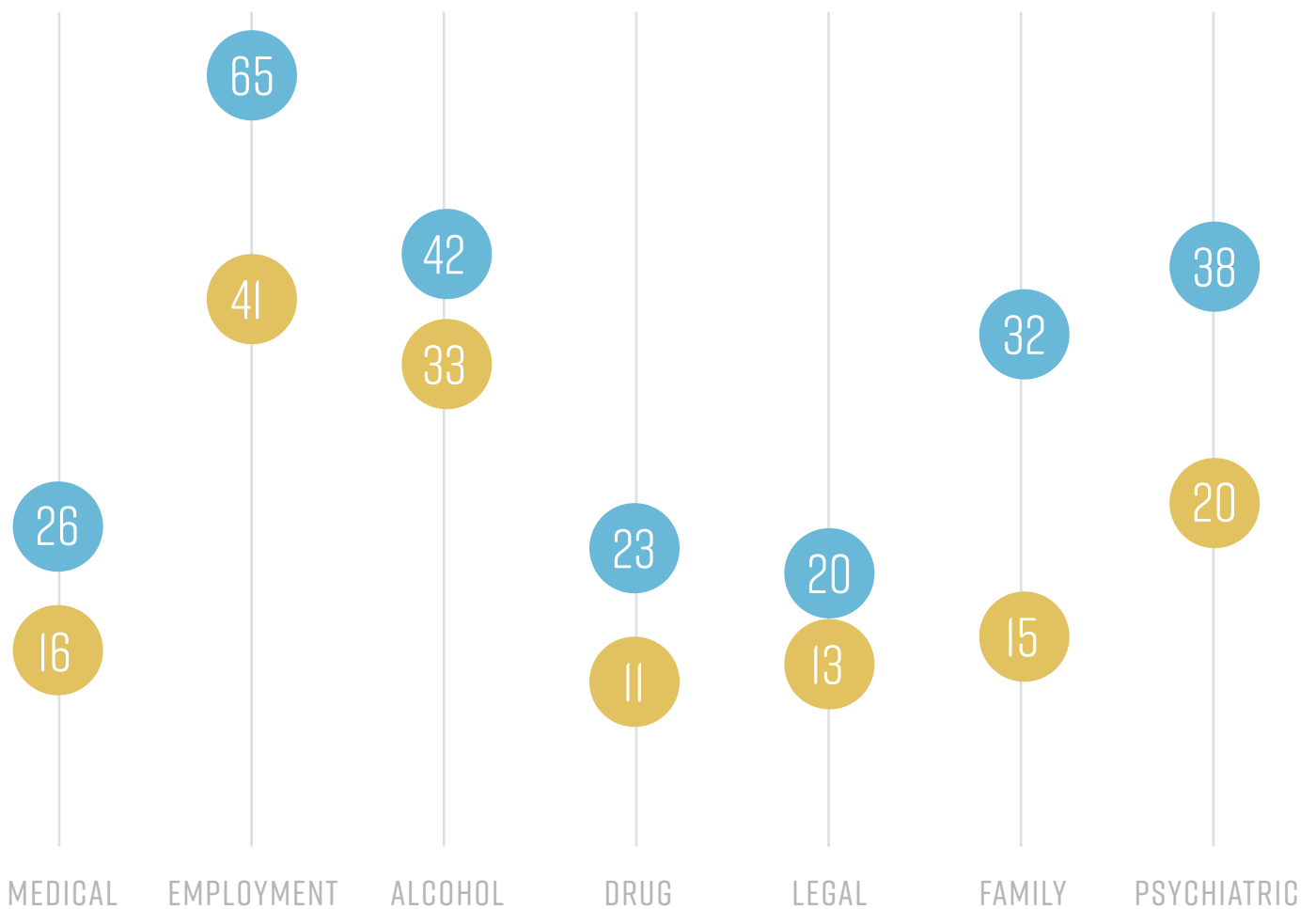


OUTCOMES STUDY- BASELINE CHARACTERISTICS

BASELINE ASI COMPOSITE SCORES

NATIONAL TREATMENT NORMS VERSUS AAC SCORES.

● NATIONAL NORMS ● AAC



SEVERITY SCORES

OUTCOMES STUDY- INTAKE TO DISCHARGE



ALCOHOL PROBLEM DAYS REDUCED FROM 11 TO 3, A 78% DECREASE



DRUG PROBLEM DAYS REDUCED FROM 16 TO 3, AN 81% DECREASE



PSYCHIATRIC PROBLEM DAYS REDUCED FROM 16 TO 7, A 53% DECREASE



FAMILY CONFLICT DAYS REDUCED FROM 6 TO 2, A 74% DECREASE

NOTE: "Problem Days" while in treatment can include days experiencing significant cravings, withdrawal, or other symptoms

PHQ-9 INTAKE TO DISCHARGE



CLIENTS SHOWED A **9.16 POINT DECREASE** IN DEPRESSION SYMPTOMOLOGY. THIS INDICATES THAT CLIENTS ENTERED AAC WITH MODERATE TO MODERATELY HIGH LEVELS OF DEPRESSION SYMPTOMS, AND LEFT **AAC WITH VERY LOW SYMPTOMS**.

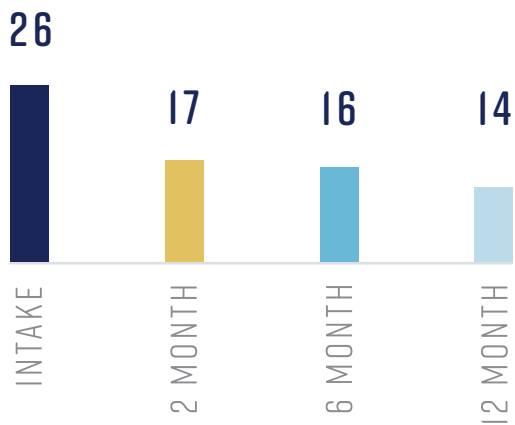
All recovery capital dimensions on the RCS improved from intake to discharge.



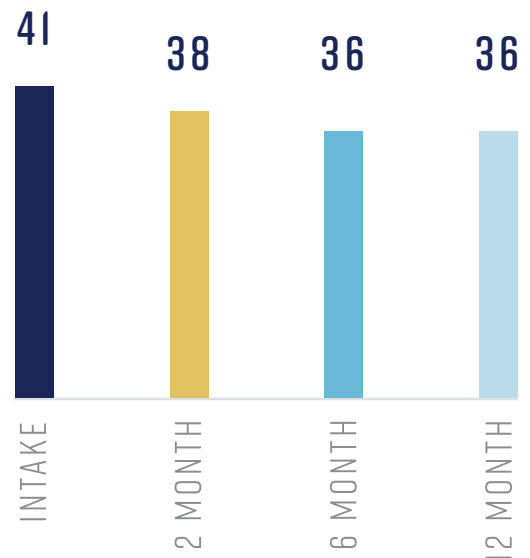
OUTCOMES STUDY- ONE YEAR LATER

ASI SEVERITY SCORES CHANGE OVER TIME

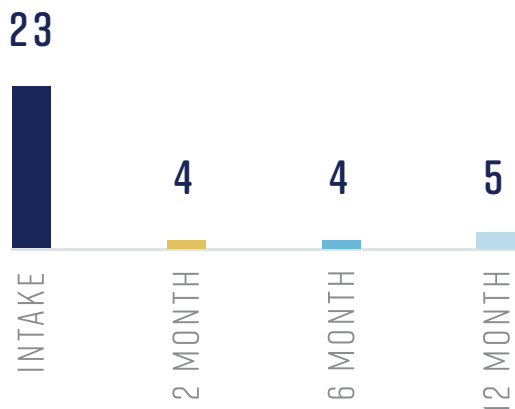
MEDICAL SEVERITY SCORE



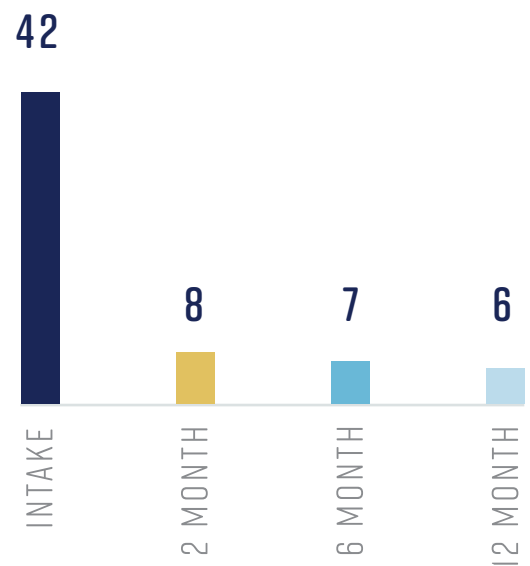
EMPLOYMENT SEVERITY SCORE



DRUG SEVERITY SCORE

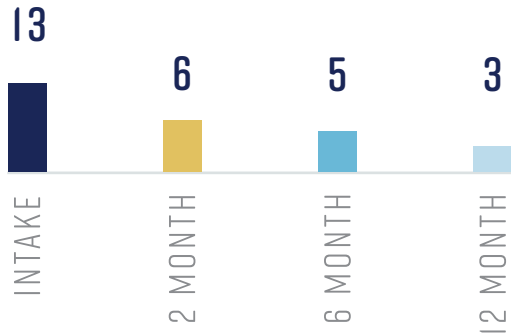


ALCOHOL SEVERITY SCORE

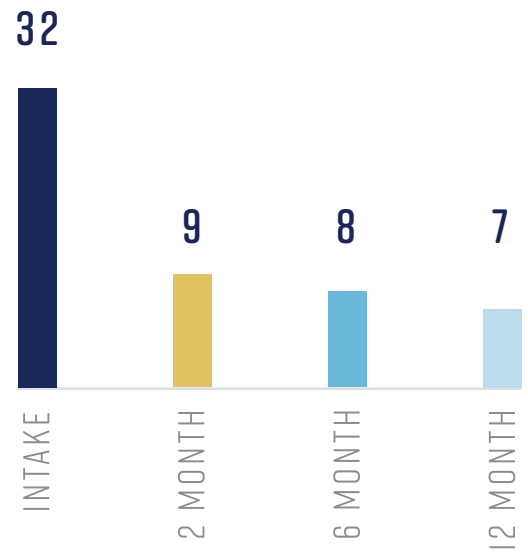


OUTCOMES STUDY- ONE YEAR LATER

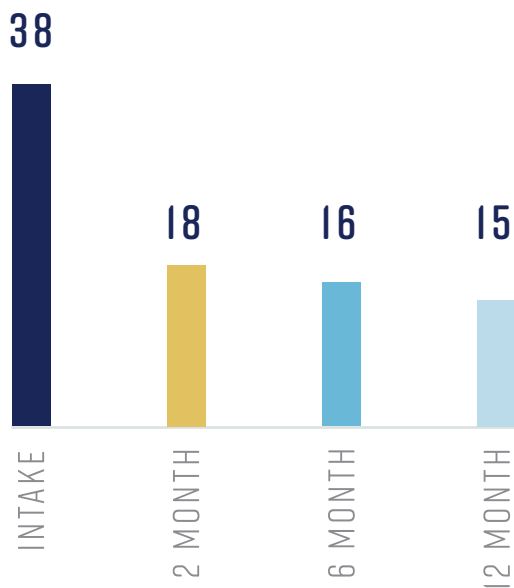
LEGAL SEVERITY SCORE



FAMILY SEVERITY SCORE

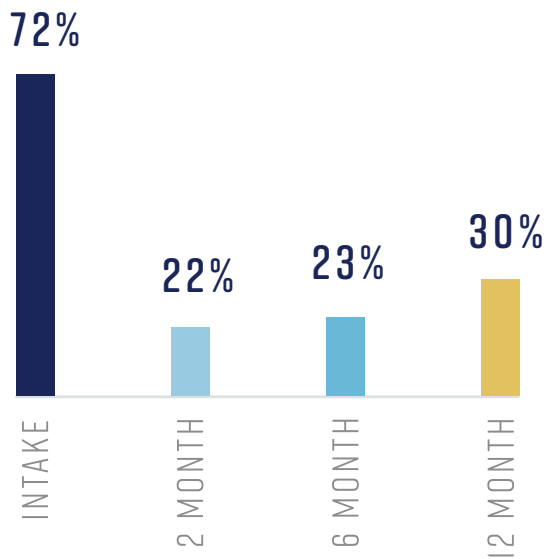


PSYCHIATRIC SEVERITY SCORE

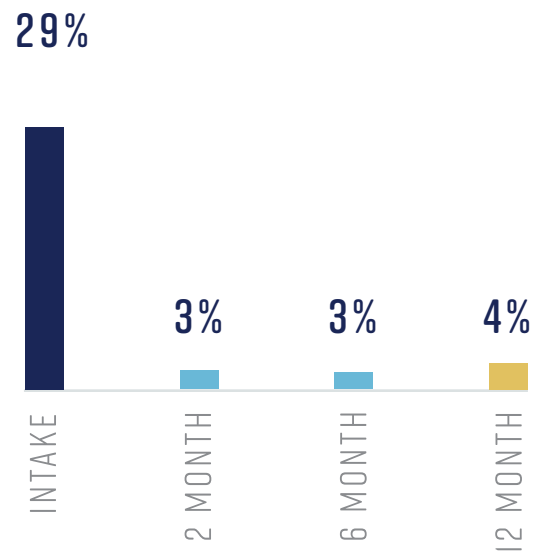


OUTCOMES STUDY- ONE YEAR LATER

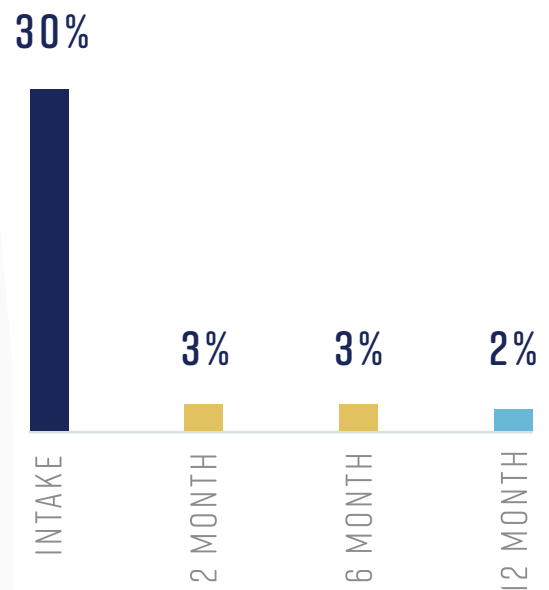
PERCENT OF CLIENTS WHO REPORTED ANY
ALCOHOL USE IN THE PRIOR 30 DAYS



PERCENT OF CLIENTS WHO REPORTED ANY
HEROIN USE IN THE PRIOR 30 DAYS

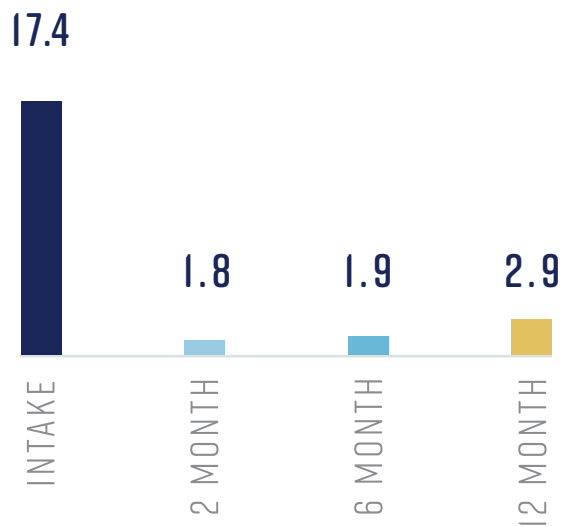


PERCENT OF CLIENTS WHO REPORTED ANY
OTHER OPIATE USE IN THE PRIOR 30 DAYS

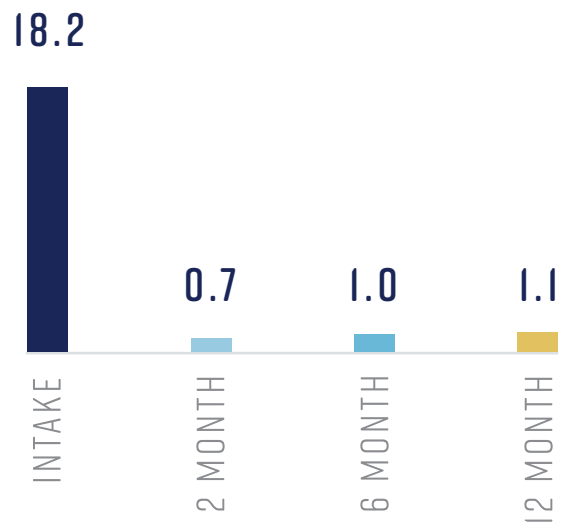


OUTCOMES STUDY- ONE YEAR LATER

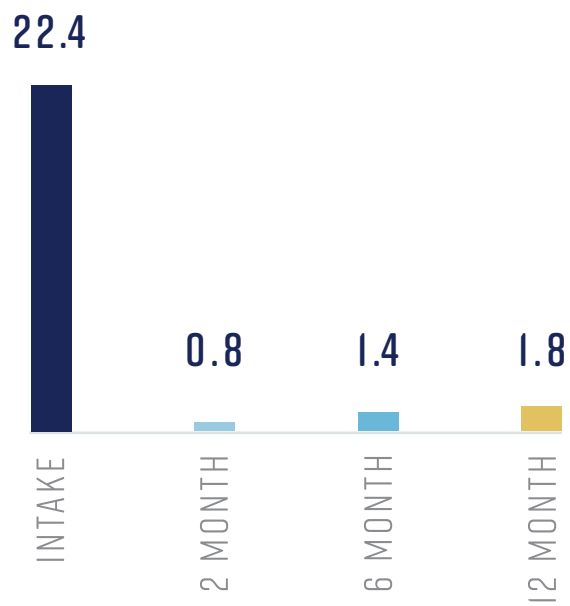
AVERAGE **ALCOHOL** USE DAYS IN THE PAST 30
AMONG THOSE USING AT INTAKE



AVERAGE **OPIATE** USE DAYS IN THE PAST 30
AMONG THOSE USING AT INTAKE



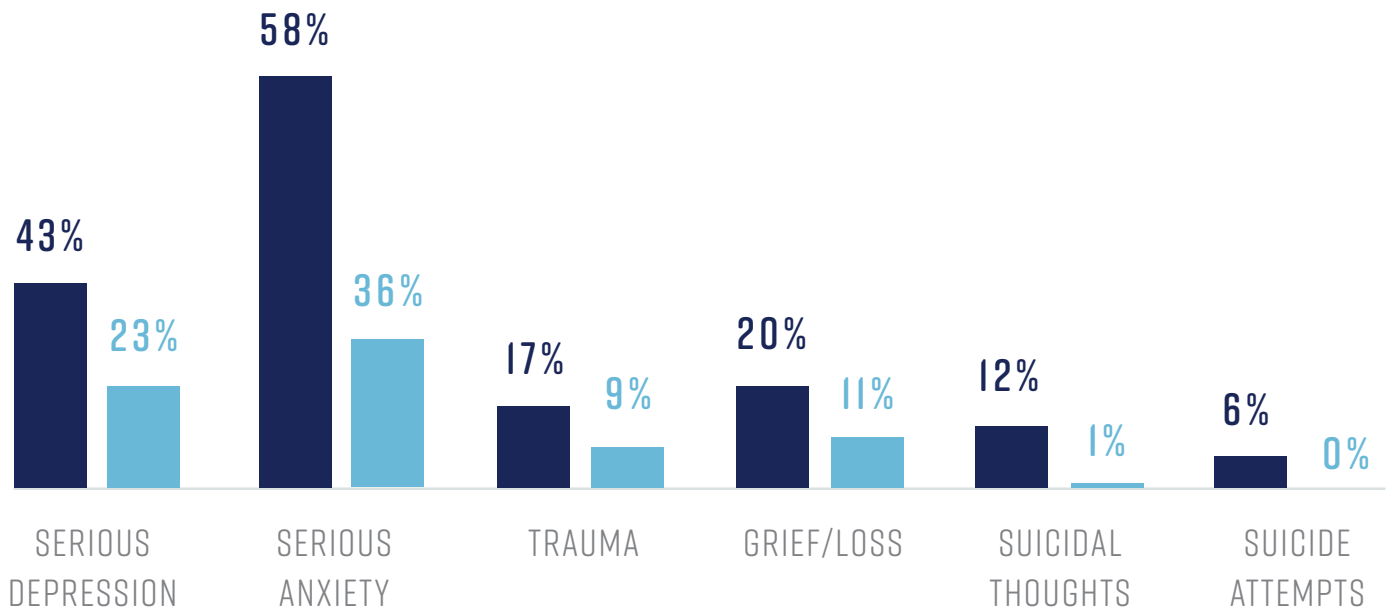
AVERAGE **HEROIN** USE DAYS IN THE PAST 30
AMONG THOSE USING AT INTAKE



OUTCOMES STUDY- ONE YEAR LATER

PERCENTAGE OF CLIENTS REPORTING MENTAL HEALTH SYMPTOMS IN THE PAST 30 DAYS.

● INTAKE ● 12 MONTH



OUTCOMES STUDY- ONE YEAR LATER

OF THOSE WHO REPORTED USING THESE SUBSTANCES AT INTAKE, THE AVERAGE NUMBER OF DAYS **DECREASED SIGNIFICANTLY**. MANY OF THESE CLIENTS REPORTED THAT THEY WERE **NOT USING THESE SUBSTANCES AT ALL** AT 12 MONTHS.



*Comparative national benchmark for
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PSYCHIATRIC PROBLEM DAYS

REDUCED FROM 16 TO 7,

A 56% DECREASE.



MEDICAL PROBLEM DAYS

REDUCED FROM 9 TO 5,

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INTAKE TO DISCHARGE OUTCOMES

PURPOSE OF THIS PAPER

Addiction and addiction treatment is multi-faceted, and impacts many areas of a person's life, including performance at work, relationships with loved ones, and mental and emotional well-being. Understanding people on the journey to recovery is similarly complex, and cannot be reduced to whether a person is abstinent or not abstinent. 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.

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 discharge. Specifically, recovery capital, relapse risk, mental health symptomology and family functioning. Findings from the post-discharge follow ups are presented in a subsequent paper.

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 offered services and client base. To prepare AAC staff for the adoption of the evaluation system, CRI delivered intensive in-person outcomes monitoring training for staff at each facility to ensure fidelity in the administration and data entry of each of the evaluation tools. Upon arrival at an AAC facility, clients completed a battery of intake assessments with a trained staff member within three calendar days of admission. Clients completed the discharge battery of assessments with a trained AAC staff member within seven days prior to leaving the facility. All tools were embedded into the electronic health record and data collection was integrated into routine clinical workflows. Once a trained staff member completed an assessment, the EHR would automatically score it, which allowed scores to be viewed and integrated into treatment and case management planning by the appropriate staff.

MEASURES

All clients who entered treatment at the six participating facilities completed a battery of validated assessments that measure key treatment outcomes at intake and discharge. AAC's Clinical Oversight Team, in conjunction with the clinical leadership at each facility and CRI, selected assessment tools that met two criteria: 1) instruments must be validated, reliable tools for measuring change over time in target outcomes, and 2) instruments must provide information to pragmatically support clinical treatment and the development of post-discharge plans. Therefore, each assessment included in the outcome monitoring system is a valid measure of change over time for individual clients, as well as aggregated sample groups. A total of five assessments were selected, summarized in the table on the following page.



ASSESSMENT	JUSTIFICATION FOR USE
<i>Addiction Severity Index (ASI), 5th edition</i>	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 a targeted treatment plan. It is used as AAC's Biopsychosocial assessment tool and measures change over time. Composite scores are calculated for each of the 7 domains with a range of 0 to 1. The composite score is a reflection of severity of the client's problems in each domain; the higher the score, the more severe the problems.
<i>The Advance Warning Signs of Relapse (AWARE)</i>	The AWARE is a validated, reliable tool that is used to predict a client's risk of relapse to heavy drinking in the next two months. AAC chose to utilize the AWARE for all clients for an additional study to examine the predictive ability of the AWARE for substances beyond alcohol. It is a 28-item scale with a score range of 28 to 196; the higher the score, the higher the probability of heavy drug or alcohol use (not just a slip) by the client in the next two months.
<i>The Recovery Capital Scale (RCS)</i>	The RCS is a validated, reliable tool that identifies a client's internal and external assets that support recovery. It provides treatment and case management staff information on individualized and specific areas on which to focus in order to improve recovery supports for each client. It is a 35-item assessment with a score range of 35-175. The higher the score, the higher the clients' recovery capital; the lower the score, the lower the client's recovery capital.
<i>The Family Assessment Device (FAD)</i>	The FAD is a validated, reliable tool that assesses level of dysfunction within a client's family system. It contains a 12 item scale with a range of scores from 1, which is healthy functioning, to 4 which is unhealthy functioning. A score of 2 or above is clinically significant, indicating that family issues should be addressed in treatment.
<i>The Personal Health Questionnaire-9 (PHQ-9)</i>	The PHQ-9 is a validated, reliable tool that assesses a client's level of likelihood of a diagnosis of depression, and therefore a need for further depression diagnostics. It is designed for repeated administration, and provides a snapshot score that indicates if depressive symptomology improves or becomes more severe. It is a 9-item scale with a score range of 0 to 20+; higher scores reflect greater severity of depression symptoms.

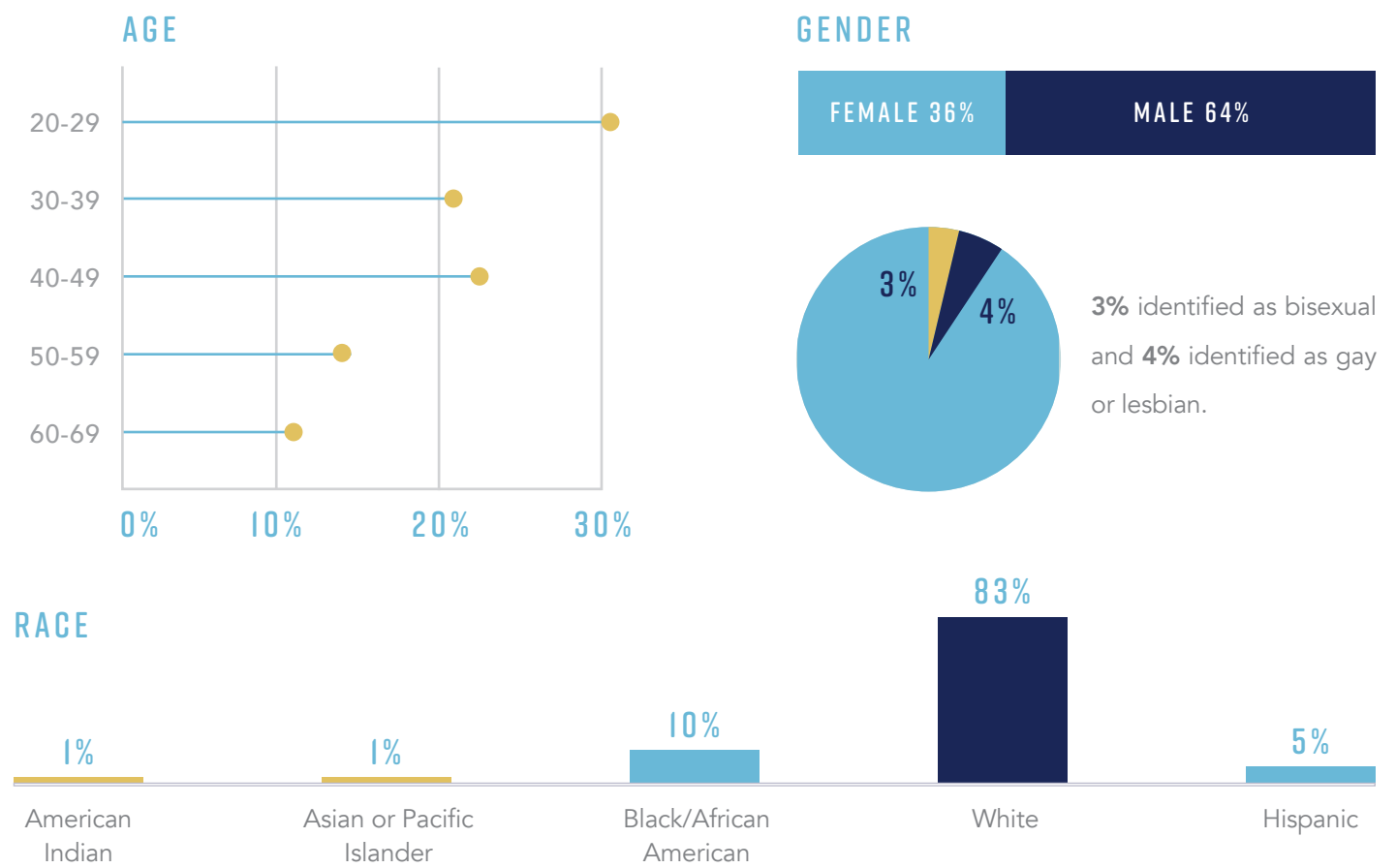
DATA ANALYSIS

The primary goal of this study was to explore client progress in a variety of functional areas related to recovery from intake to discharge. Therefore, CRI conducted paired t tests to assess whether clients’ average ASI, PHQ-9, RCS, FAD, and AWARE scores collected at both time points were different to a statistically significant degree. Power analysis for a dependent sample t-test was conducted in G*Power to determine a sufficient sample size using an alpha of 0.05, a power of 0.80, a small effect size ($d_z = 0.2$), and two tails (Faul et al., 2013). Based on the aforementioned assumptions, the desired sample size is 199 for each analysis. Therefore, all analyses within this study were sufficiently powered. In order to account for any outliers, reported significance results were confirmed using nonparametric tests. Data analysts set significance levels for all statistical tests at $p < 0.05$ as a conservative means of detecting differences. In other words, the results from CRI’s analyses are very unlikely to be due to chance, but rather due to the treatment provided by AAC.

RESULTS

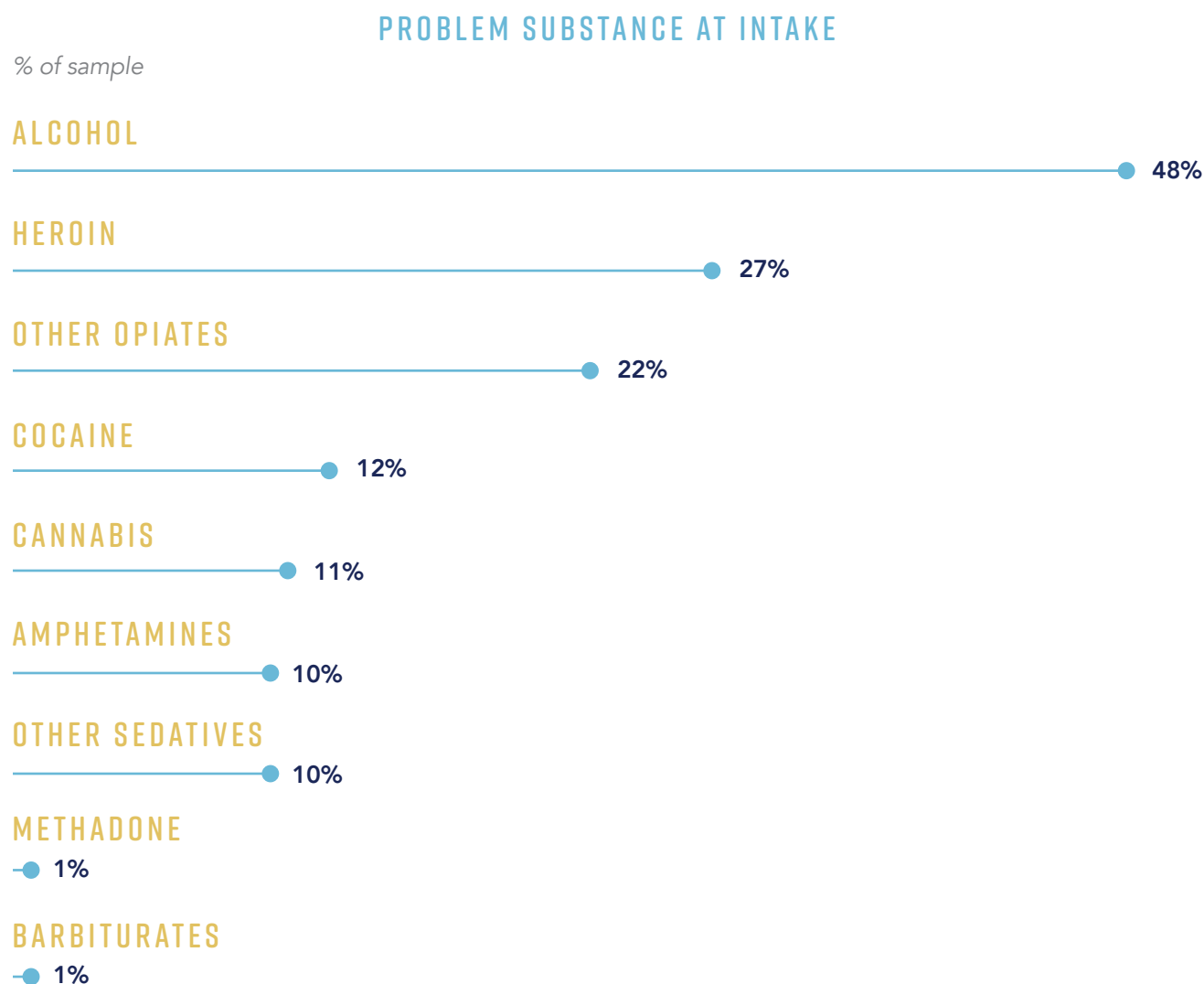
CHARACTERISTICS OF AAC CLIENTS

Data from a total of $n = 4,225$ clients were included in this analysis. The majority of clients included in this study identified as male (64%), white (83%) and heterosexual (93%). Most clients also reported ages of 20 to 29, with an average age of $M = 35.5$, $SD = 12.5$ for the total sample.



Clients were also asked to disclose their problem substance during the intake process, and could report more than one substance as their problem substance. Nearly half (48%, $n = 2020$) reported that alcohol was a problem substance. For comparison, according to the 2015 National Survey on Drug Use and Health, 15.1 million adults ages 18 and older (6.2 percent of this age group) were diagnosed with Alcohol Use Disorder. This includes 9.8 million men (8.4 percent of men in this age group) and 5.3 million women (4.2 percent of women in this age group). The second most common problem substances were heroin (27%, $n = 1127$) and other opiates or analgesics (22%, $n = 924$). Of the 20.5 million Americans 12 or older that had a substance use disorder in 2015, 2 million (9.75%) had a substance use disorder involving prescription pain relievers and 591,000 (2.8%) had a substance use disorder involving heroin (American Society of Addiction Medicine, 2016). Most clients (67%, $n = 2,756$) also reported using more than one substance in the month prior to admission at AAC. Further, a wide majority (78%, $n = 3,122$) of clients indicated heavy substance use within the month prior to intake, while only 6% ($n = 226$) were abstinent or reported light use in the month prior to intake.

Average length of stay in days in the sample was $M = 30.91$, $SD = 9.66$.



Source: AAC Outcomes Monitoring Study

INTAKE TO DISCHARGE OUTCOMES

SUBSTANCE USE

Substance use and recovery were not heavily investigated in this analysis because all clients included in this study were receiving services in an inpatient residential facility where access and resources to substances is forbidden and unavailable at the time of data collection. Theoretically, all participants would show marked levels of abstinence because of lack of access. For information regarding abstinence and substance use 12-months after discharge, please refer to [White Paper #3].

However, AAC did explore the extent to which clients reported having problems related directly to alcohol or drugs as a treatment outcome. To assess this, items from the ASI regarding the number of days clients reported having problems related to alcohol or drugs, as well as the extent to which they reported being bothered by these problems were compared at intake and discharge. For example, clients were asked:

- to report the number of days within the previous 30 in which they experienced problems including craving for alcohol or drugs, withdrawal symptoms, disturbing effects of drug or alcohol intoxication, or wanting to stop and not being able to do so; and
- to rate the extent to which they were bothered by alcohol and drug related problems on a scale of 1 (*not at all*) to 5 (*extremely*).

On average, clients experienced a statistically significant decrease in problem days related to alcohol from intake (M = 11.35, SD = 13.29) to discharge (M = 2.53, SD = 7.58), as well as for drugs from intake (M = 16.37, SD = 13.81) to discharge (M = 3.17, SD = 8.13).

ASI REPORTED PROBLEM DAYS (PAST 30 DAYS)								
	Intake		Discharge					
	M	SD	M	SD	t	P value	n	d
Alcohol Problem Days	11.35	13.29	2.53	7.58	38.763	.000***	3,600	0.82
Drug Problem Days	16.37	13.81	3.17	8.13	56.697	.000***	3,604	1.16

Note. Nonparametric tests were also conducted to account for skew and confirmed the P value; M = Mean SD = Standard Deviation t = Paired t test d = Cohen’s d; *p ≤ .05, ***p ≤ .001



ALCOHOL PROBLEM DAYS REDUCED FROM 11 TO 3, A 78% DECREASE



DRUG PROBLEM DAYS REDUCED FROM 16 TO 3, AN 81% DECREASE

The extent to which clients were bothered by these problems also decreased significantly from intake to discharge for both drugs and alcohol. For problems related to alcohol, these data suggest that clients were “considerably” bothered at intake ($M = 4.04$, $SD = 1.27$), and “slightly” bothered at discharge ($M = 2.25$, $SD = 1.36$). A similar pattern was observed for drugs, with clients reporting being “considerably to severely” bothered at intake ($M = 4.32$, $SD = 1.04$) and “slightly” bothered at discharge ($M = 2.34$, $SD = 1.37$).

RECOVERY CAPITAL

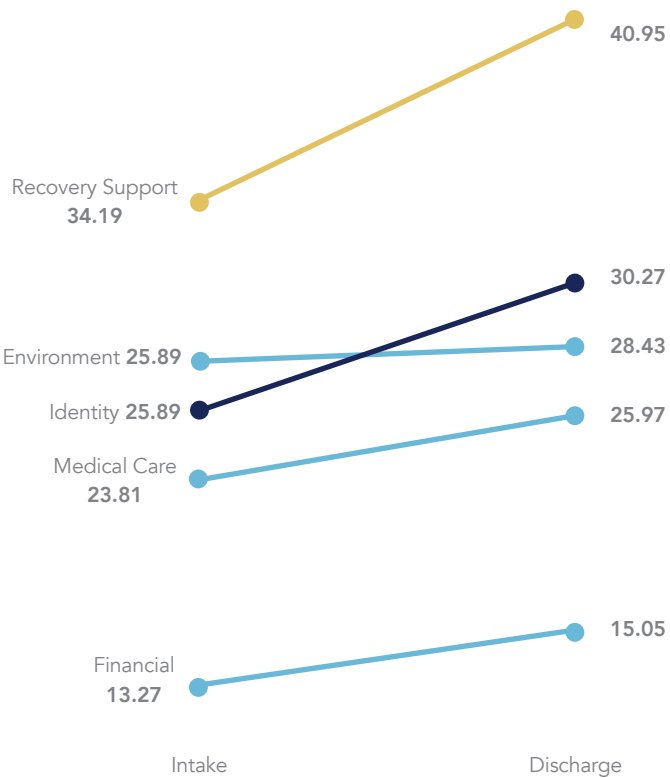
Recovery Capital is a concept defined as “the breadth and depth of internal and external resources that can be drawn upon to initiate and sustain recovery from severe alcohol or drug problems” (White & Cloud, 2008).

To measure this construct, AAC chose to use the Recovery Capital Scale (RCS). Data related to the multidimensional nature of recovery capital were also assessed with the employment and legal subscales within the Addiction Severity Index to supplement outcomes monitoring in this area.

Scores on the Recovery Capital Scale range from 35 to 175. The average intake score of the RCS was $M = 121.24$, $SD = 19.17$ ($n = 1802$), and the average discharge score of the RCS was $M = 138.27$, $SD = 16.22$ ($n = 1802$). This indicates a 17.03 point increase in overall recovery capital from intake to discharge. This change was statistically significant, ($t = 37.85$, $p = .000$, $d = .96$).

The RCS also assesses recovery capital in several unique dimensions (e.g., recovery support, identity, medical care, environment, financial). These subscales were established via a psychometric analysis of the RCS using data also collected in the AAC outcomes recovery system (Holder, Suiter, Berney, & Mathes, unpublished manuscript). All recovery capital areas showed statistically significant improvement from intake to discharge (see table below), with identity and recovery support scores indicating the greatest improvement.

ALL RECOVERY CAPITAL DIMENSIONS ON THE RCS IMPROVED FROM INTAKE TO DISCHARGE.



Note: RCS Domain Score Ranges: Intake and Discharge, Respectively
Recovery Support: 11 - 55
Identity: 7 - 35
Medical Care: 6 - 30
Environment: 7 - 35
Financial: 4 - 20

RCS SCORES BY DOMAIN INTAKE TO DISCHARGE								
	Intake		Discharge					
	M	SD	M	SD	t	P value	n	d
Total Score	121.24	19.17	138.27	16.22	37.85	.000***	1,802	0.96
Recovery Support	34.19	7.72	40.95	6.25	24.77	.000***	954	0.96
Identity	25.89	5.73	30.27	3.93	31.58	.000***	1,731	0.89
Medical Care	23.81	3.90	25.97	3.19	22.70	.000***	1,695	0.61
Environment	26.52	4.97	28.43	4.25	16.07	.000***	1,558	0.41
Financial	13.27	3.91	15.05	3.58	20.19	.000***	1,510	0.48

Note. M = Mean SD = Standard Deviation t = Paired t test d = Cohen's d * $p \leq .05$, *** $p \leq .001$

AAC also utilized the Employment and Legal domains of the ASI to further assess client recovery capital. The average ASI-Employment intake score was M = .42, SD = .28, and average discharge score M = .58, SD = .23. The average ASI Legal intake score was M = .12, SD = .21, and average discharge score was M = .07, SD = .16. Client composite scores on the Employment domain indicated a statistically significant increase from intake to discharge (see Table 2), indicating a decrease in employment activity. This outcome is reasonable given clients do not work during their residential stay. However, the Legal dimension on the ASI indicated a statistically significant decrease in recovery capital, which indicates improvement on this measure. This outcome most likely is due to AAC's specific attention to addressing legal issues.

ASI DOMAIN SCORES INTAKE TO DISCHARGE								
	Intake		Discharge					
	M	SD	M	SD	t	P value	n	d
Employment	0.42	0.28	0.58	0.23	-40.53	.000***	3,573	0.62
Legal	0.12	0.21	0.07	0.16	18.60	.000***	3,301	0.27

Note. Nonparametric tests were also conducted to account for skew and confirmed the P value; M = Mean SD = Standard Deviation t = Paired t test d = Cohen's d, * $p \leq .05$, *** $p \leq .001$

RISK OF RELAPSE

Identifying risk of relapse for clients in drug and alcohol treatment is an integral step in effective treatment planning and delivery, as well as strategizing ways to meet clients' needs after discharge. Therefore, AAC also incorporated the Assessment of Warning Signs for Relapse (AWARE) into the outcomes monitoring system in order to systematically and intentionally build risk reduction into its treatment model.

At intake, clients' average score on the AWARE was $M = 103.59$, $SD = 27.46$. At discharge, clients' average score was $M = 78.21$, $SD = 12.82$, a 24% decrease in the risk of relapse. The AWARE currently is validated to predict relapse in alcohol use. This change was statistically significant.

AWARE SCORES INTAKE TO DISCHARGE								
	Intake		Discharge					
	M	SD	M	SD	t	P value	n	d
TOTAL SCORE	103.59	27.46	78.21	12.82	47.88	.000***	2,486	1.18

Note. Nonparametric tests were also conducted to account for skew and confirmed the P value; M = Mean SD = Standard Deviation t = Paired t test d = Cohen's d, $*p \leq .05$, $***p \leq .001$

MENTAL AND EMOTIONAL HEALTH

AAC facilities are recognized as either Joint Commission or CARF accredited and provide evidence-based mental health services to clients diagnosed with co-occurring disorders. The ability to provide mental health services to this population is essential in effective drug and alcohol treatment programs. According to SAMHSA's 2014 National Survey on Drug Use and Health (NSDUH) approximately 7.9 million adults in the United States had co-occurring disorders. Because of this high prevalence of mental health issues among individuals with addiction disorders, AAC collected outcomes monitoring data on mental health symptomology with the PHQ-9 and the ASI Psychiatric Domain.

The average intake score of the PHQ-9 was $M = 11.53$, $SD = 6.72$ ($n = 1973$), and the average discharge score of the PHQ-9 was $M = 2.43$, $SD = 3.31$ ($n = 1973$). This change was statistically significant, ($t = 56.97$, $p = .000$, $d = 1.92$).

PHQ-9 INTAKE TO DISCHARGE



CLIENTS SHOWED A **9.16 POINT DECREASE** IN DEPRESSION SYMPTOMOLOGY. THIS INDICATES THAT CLIENTS ENTERED AAC WITH MODERATE TO MODERATELY HIGH LEVELS OF DEPRESSION SYMPTOMS, AND LEFT **AAC WITH VERY LOW SYMPTOMS**.

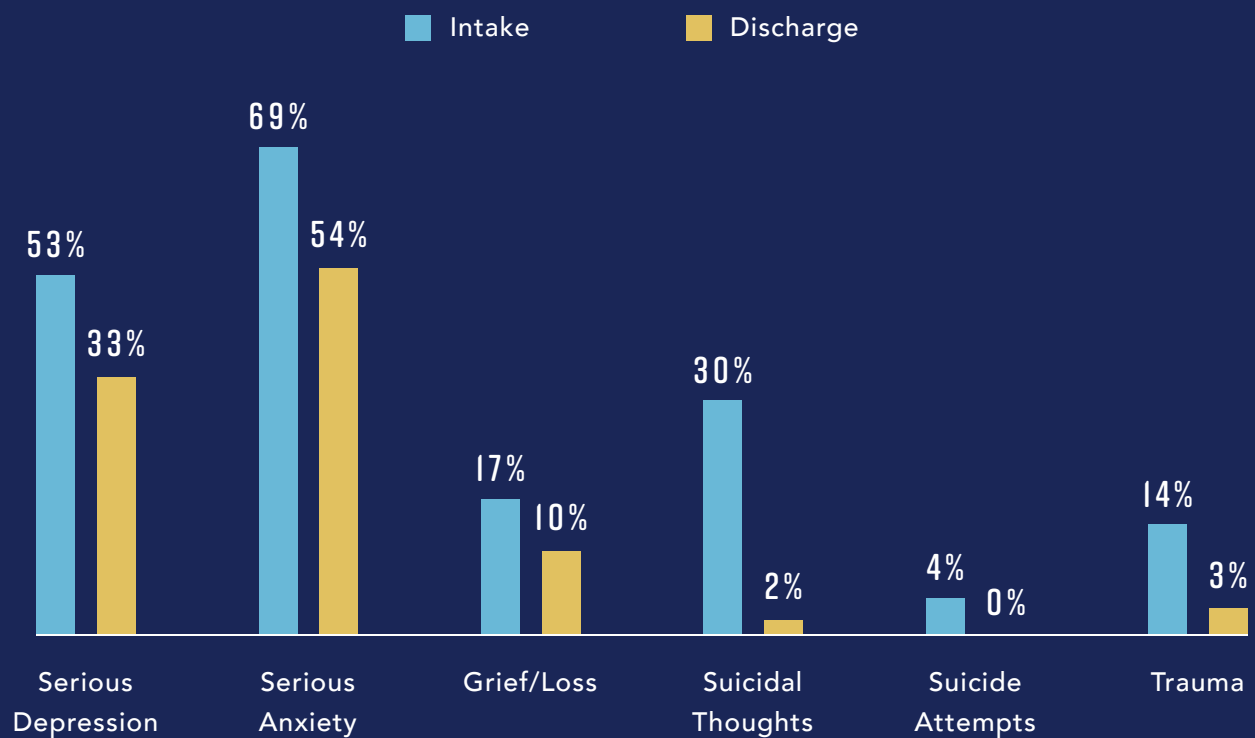
The ASI Psychiatric domain was also used as an indicator to evaluate treatment impact on client mental health. Client scores showed statistically significant improvement from intake to discharge, from $M = .38$, $SD = .22$ at intake to $M = .24$, $SD = .2$ at discharge ($n=3,273$). In addition, AAC collected data related to client anxiety, depression, grief and loss, suicidality (i.e., thoughts, attempts), and trauma. Clients experienced statistically significant improvement in all of these symptoms from intake to discharge. The percentage of clients reporting suicidal thoughts dropped by 93%, and zero clients reported suicide attempts during their treatment.

ASI DOMAIN SOCRES INTAKE TO DISCHARGE

	Intake		Discharge					
	M	SD	M	SD	t	P value	n	d
PSYCHIATRIC	0.38	0.22	0.24	0.20	37.67	.000***	3,273	0.67

Note. Nonparametric tests were also conducted to account for skew and confirmed the P value; M = Mean SD = Standard Deviation t = Paired t test d = Cohen's d, * $p \leq .05$, *** $p \leq .001$

PERCENTAGE OF CLIENTS REPORTING MENTAL HEALTH SYMPTOMS IN PAST 30 DAYS



Clients were then asked how many days in the past 30 they experienced any of the mental health symptoms they reported. The average number of days significantly decreased from 17 days at intake to 8 days at discharge, a 53% reduction. The amount that clients were troubled or bothered by these problems reduced by 48% from intake to discharge. These data suggest that clients were "moderately" bothered at intake ($M = 3.70$, $SD = 1.25$), and "slightly" bothered at discharge ($M = 2.50$, $SD = 1.25$).



PSYCHIATRIC PROBLEM DAYS REDUCED FROM 17 TO 8, A 53% DECREASE

FAMILY FUNCTIONING

Family members often play a critical role in clients' recovery. As part of AAC's programs, family members are invited to actively engage in treatment by participating in family therapy as well as clients' individual therapy, which often focuses heavily on family dynamics. Family functioning was included as a key construct in the outcomes monitoring system, and was assessed with the Family Assessment Device (FAD) and the ASI Family domain.

At intake, clients average scores on the FAD were $M = 2.24$, $SD = .56$ ($n = 2853$). At discharge, average scores decreased to $M = 2.02$, $SD = .54$. Family functioning showed a statistically significant improvement from intake to discharge. This outcomes suggests that the family focused treatment clients received at AAC improved family dynamics, and continued family counseling and support after completing AAC treatment would further support client recovery.

FAD SCORE INTAKE TO DISCHARGE								
	Intake		Discharge					
	M	SD	M	SD	t	P value	n	d
TOTAL SCORE	2.24	0.56	2.02	0.54	21.64	.000***	2,853	0.40

Note. Nonparametric tests were also conducted to account for skew and confirmed the P value; M = Mean SD = Standard Deviation t = Paired t test d = Cohen's d, $*p \leq .05$, $***p \leq .001$

Clients' scores on the Family domain of the ASI were also compared as a supplemental measure of change in family functioning. These scores also indicated a statistically significant improvement from intake to discharge, with a decrease in the average score at intake of $M = .31$, $SD = .22$, to the average at discharge of $M = .16$, $SD = .17$.

ASI DOMAIN1 SCORES INTAKE TO DISCHARGE								
	Intake		Discharge					
	M	SD	M	SD	t	P value	n	d
FAMILY	0.31	0.22	0.16	0.17	38.74	.000***	3,107	0.76

Note. Nonparametric tests were also conducted to account for skew and confirmed the P value; M = Mean SD = Standard Deviation t = Paired t test d = Cohen's d, $*p \leq .05$, $***p \leq .001$

Clients were asked about their relationships with family and incidents of conflict. Clients reported significant improvement in their relationships with family from intake to discharge. Specifically, the average number of days of serious conflict with family members decreased from 6 days at intake to 2 days at discharge. The amount that clients were troubled or bothered by these family related problems reduced by 33% by discharge. These data suggest that clients were "moderately" bothered at intake ($M = 3.57$, $SD = 1.29$), and then only "slightly" bothered at discharge ($M = 2.24$, $SD = 1.29$).



FAMILY CONFLICT DAYS REDUCED FROM 6 TO 2, A 74% DECREASE

SUMMARY

American Addiction Centers facilities are accredited by either The Joint Commission (TJC) or the Commission on Accreditation of Rehabilitation Facilities (CARF), and their techniques and intervention strategies are rooted in scientific research. The company believes that recovery is possible for anyone, that hope is key, and that providing individuals with tools to help them remain clean and sober for life are primary aims of American Addiction Centers treatment.

This strong belief in the philosophy and approach to treatment lead AAC to hire a third-party independent evaluation team in 2015. Evaluators were asked to measure outcomes among clients entering AAC for residential treatment, at discharge from treatment, and at two, six, and twelve months post-discharge intervals. The evaluation was specifically designed to measure critical health and social functioning outcomes that are typically the major reasons for relapse to substance use following treatment (e.g., alcohol use, drug use, mental health symptomatology, lack of family/community recovery support, etc.) . Valid and reliable instruments were selected to measure each of these areas of functioning and were collected as a routine part of intake and discharge information gathering. The evaluation team established a call center solely dedicated to tracking and interviewing clients after discharge from treatment so that these same outcomes could be measured over time.

This White Paper represents a sub-study of a larger 3-year evaluation with a specific focus on the immediate impact of AAC treatment client outcomes from intake to discharge. Results from this study suggest AAC's treatment is beneficial for clients on multiple areas of functioning that have been evidenced to be significantly related to relapse prevention, risk reduction, and recovery. Clients' average scores on measures used in this study indicated statistically significant improvement in recovery capital, risk of relapse, mental health, and family functioning. Subsequent White Papers in this series will reflect the findings of the comprehensive 3-year evaluation, and will build upon the current findings by exploring the impact of these holistic health domains on long-term recovery.



1 McLellan AT, Alterman AI, Metzger DS, et al. (1994). Similarity of outcome predictors across opiate, cocaine, and alcohol treatments: role of treatment services. *Journal of Consulting Clinical Psychology*, (62), 1141-1158.

12 MONTH OUTCOMES FULL SAMPLE

LONG-TERM OUTCOMES | AAC THREE-YEAR OUTCOME STUDIES

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.**

● INTAKE ● 12 MONTH						
ALCOHOL	EMPLOYMENT	PSYCHIATRIC	FAMILY	MEDICAL	DRUG	LEGAL
42	41	38	32	26	23	13
6	36	15	7	14	5	3

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), 5th 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 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

Timepoint	Eligible	Completed	Follow Up Rate
2 Month	4,399	1,133	26%
6 Month	1,852	515	28%
12 Month	221	80	36%

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.

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.

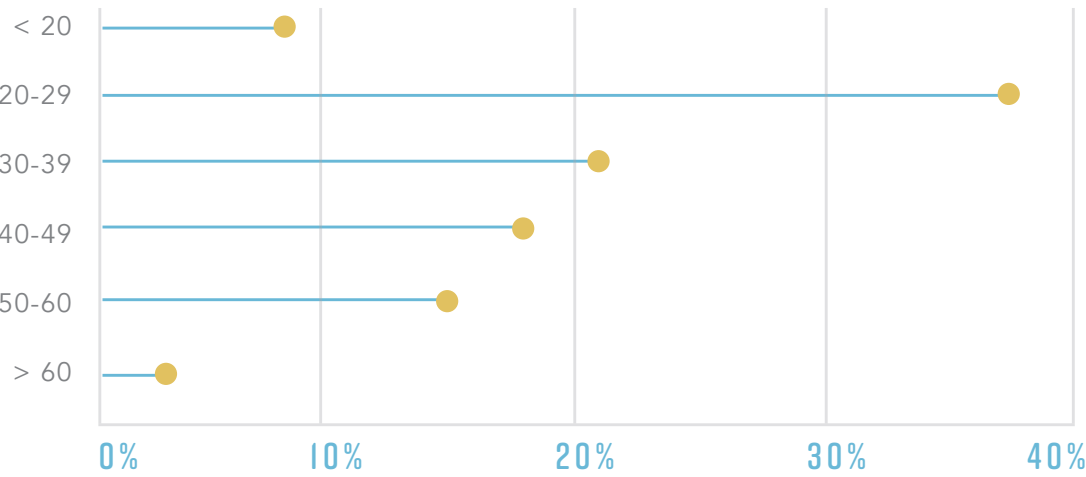
CHARACTERISTICS OF AAC CLIENTS AT INTAKE

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%).

GENDER



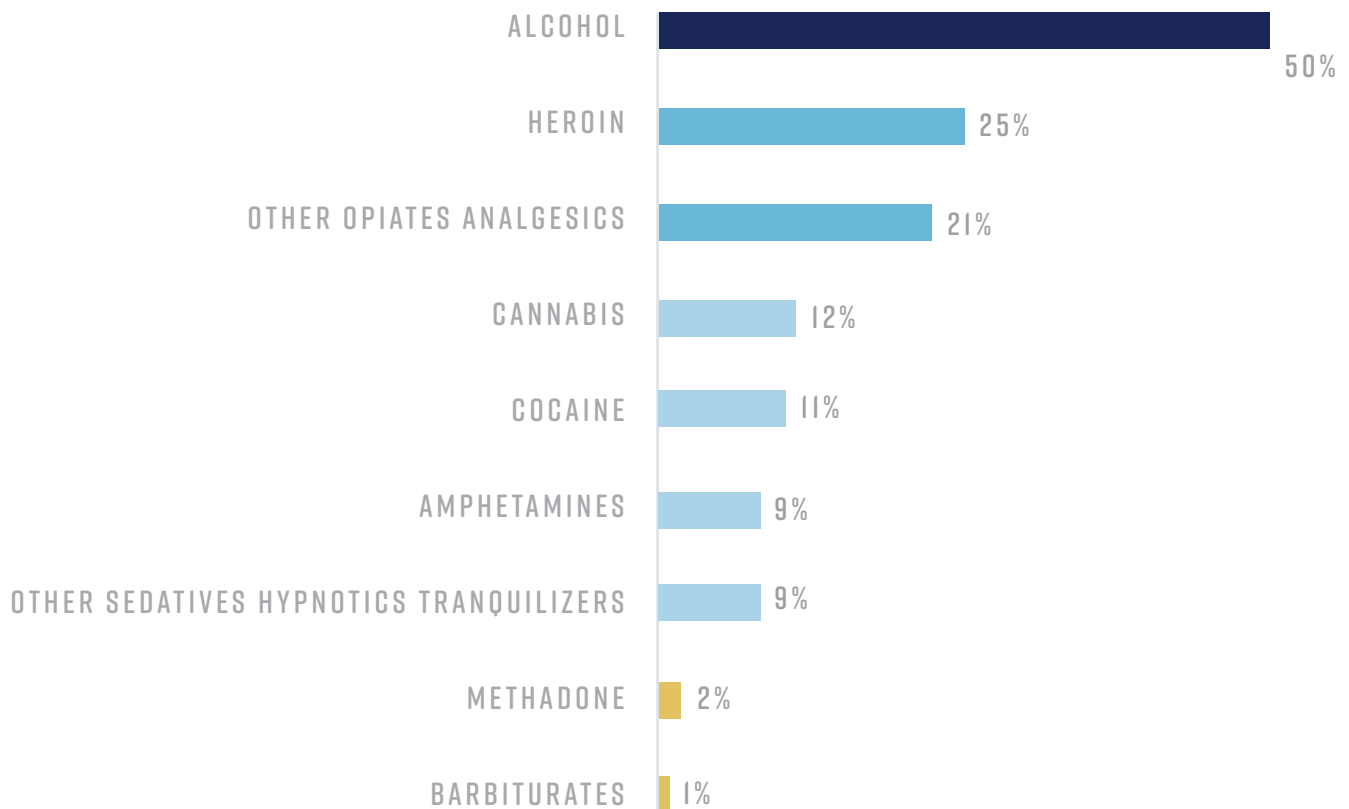
AGE



RACE



PROBLEM SUBSTANCES AT INTAKE % OF SAMPLE



INTAKE TO FOLLOW-UP OUTCOMES

CHANGE OVER TIME IN ASI COMPOSITE SCORES

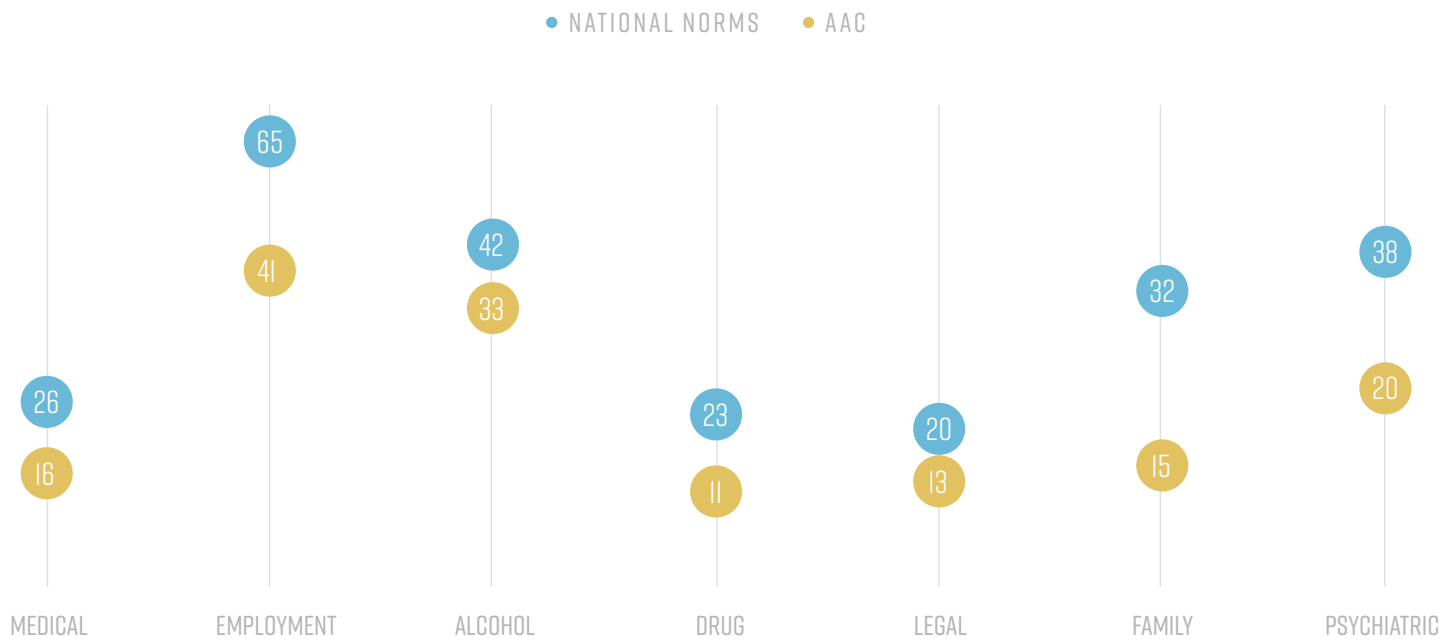
The ASI measures the severity of client's unmet needs in each domain based on a scale of 0 to 100¹, where a higher score indicates higher severity in that domain. These scores are referred to as Composite Scores and have been validated as measures for change in severity over time. Compared to national norms published for the ASI Composite Scores from a nationally representative sample of inpatient treatment facilities², AAC's population is generally more impaired at intake, with higher intake composite scores in every domain except employment and legal.

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%.

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

² 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



SEVERITY SCORES

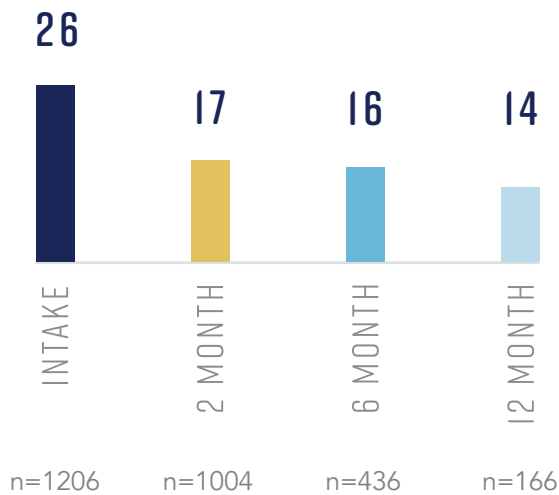
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OVERALL CHANGE-OVER-TIME MODELS IN HLM ANALYSIS FOR EACH COMPOSITE DOMAIN

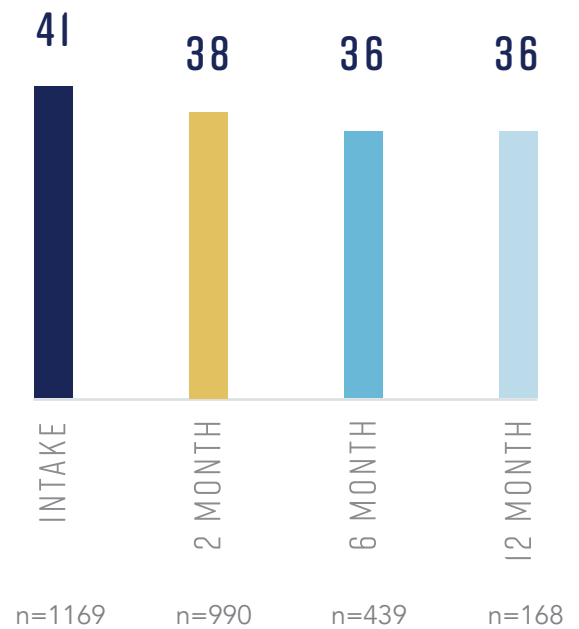
DOMAIN	F	P
MEDICAL SEVERITY SCORE	449.23	<.001
EMPLOYMENT SEVERITY SCORE	2548.40	<.001
ALCOHOL SEVERITY SCORE	1251.65	<.001
DRUG SEVERITY SCORE	1575.47	<.001
LEGAL SEVERITY SCORE	364.47	<.001
FAMILY SEVERITY SCORE	1301.77	<.001
PSYCHIATRIC SEVERITY SCORE	1789.59	<.001

ASI SEVERITY SCORES CHANGE OVER TIME

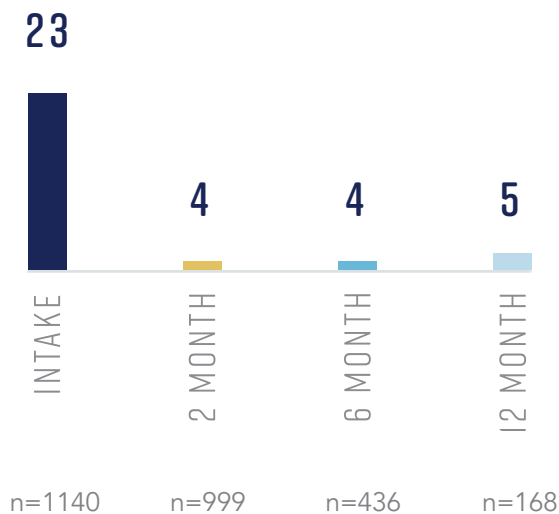
MEDICAL SEVERITY SCORE



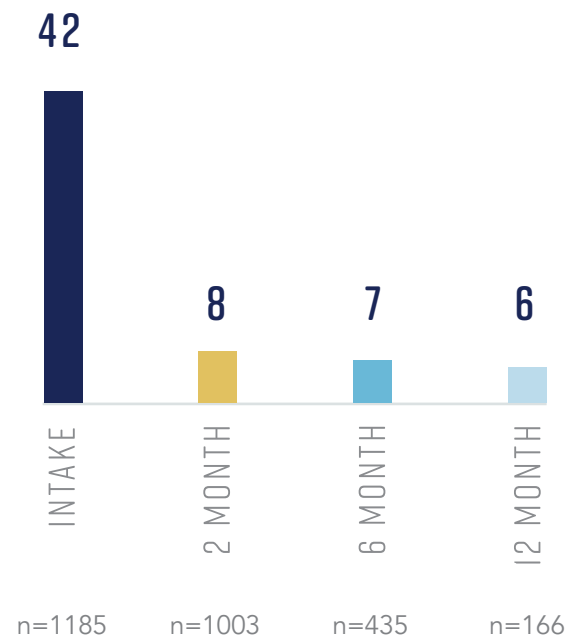
EMPLOYMENT SEVERITY SCORE



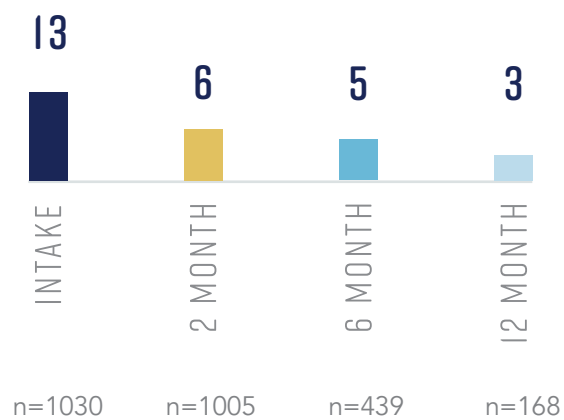
DRUG SEVERITY SCORE



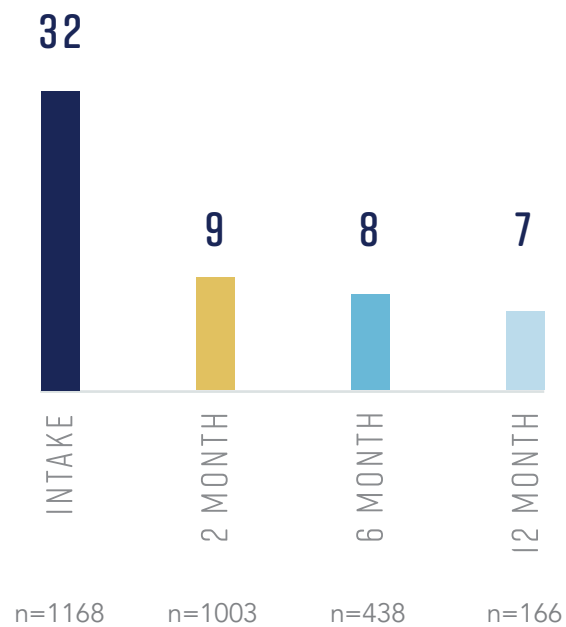
ALCOHOL SEVERITY SCORE



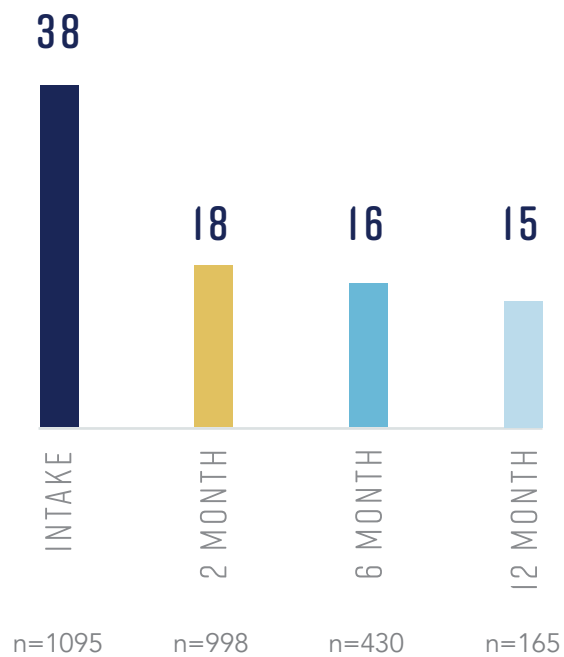
LEGAL SEVERITY SCORE



FAMILY SEVERITY SCORE



PSYCHIATRIC SEVERITY SCORE



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.

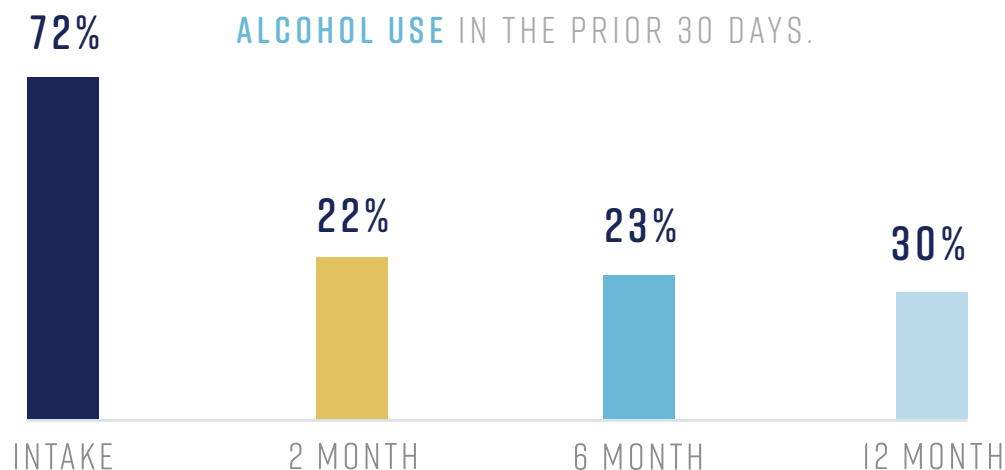
ABSTINENCE IN THE PAST 30 DAYS AT EACH TIME POINT



Reduction in Percent of Sample Using

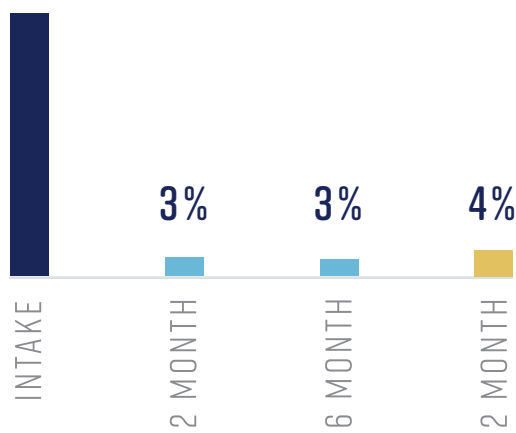
The percentage of clients reporting use of alcohol, heroin, and other opiates in the prior 30 days decreased from intake to each follow up time point. The largest drop was in the percent of clients reporting **other opiate use in the prior 30 days, which decreased by 93%**. There was an **86% drop in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



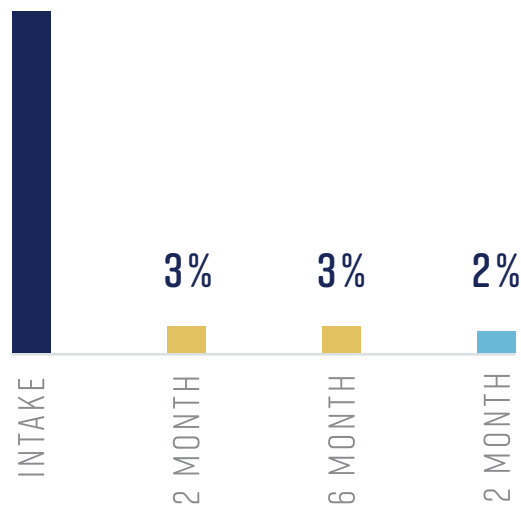
PERCENT OF CLIENTS WHO REPORTED ANY
HEROIN USE IN THE PRIOR 30 DAYS

29%



PERCENT OF CLIENTS WHO REPORTED ANY
OTHER OPIATE USE IN THE PRIOR 30 DAYS

30%



Days of Use

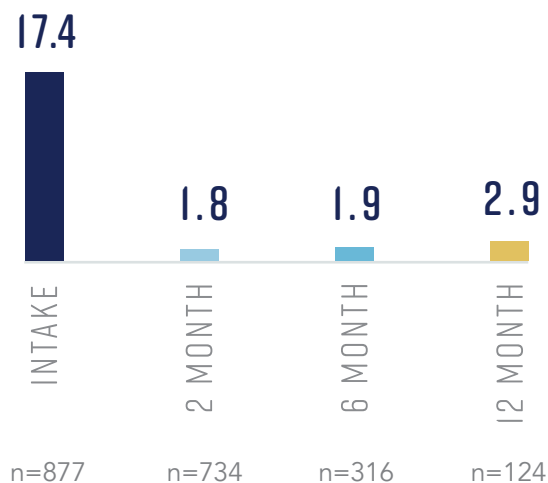
The average number of days clients used each substance decreased from intake to each of the follow-up timepoints. Results of the mixed model analysis indicated statistical significance of the overall model for all substances ($F = 1490.46$, $p = <.001$), which suggests that AAC clients experienced a 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

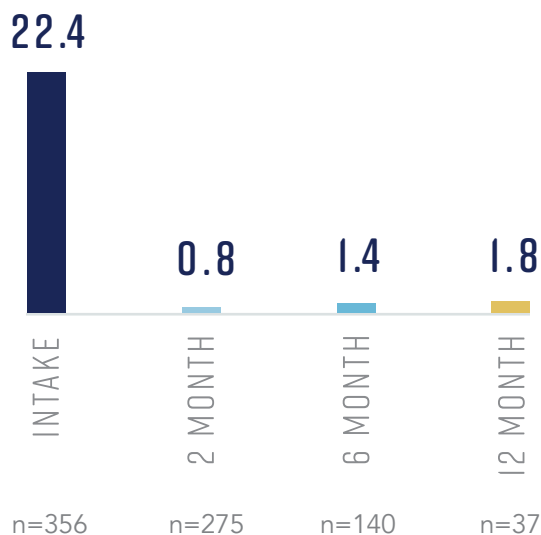
ITEM	F	P
DAYS OF ALCOHOL USE IN PAST 30	776.84	<.001
DAYS OF ALCOHOL USE IN PAST 30	304.161	<.001
DAYS OF OTHER OPIATE USE IN PAST 30	227.31	<.001

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.

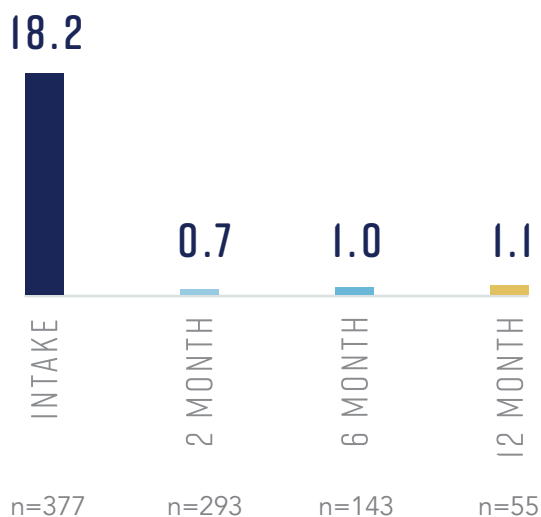
AVERAGE **ALCOHOL** USE DAYS IN THE PAST 30
AMONG THOSE USING AT INTAKE



AVERAGE **HEROIN** USE DAYS IN THE PAST 30
AMONG THOSE USING AT INTAKE



AVERAGE **OPIATE** USE DAYS IN THE PAST 30
AMONG THOSE USING AT INTAKE

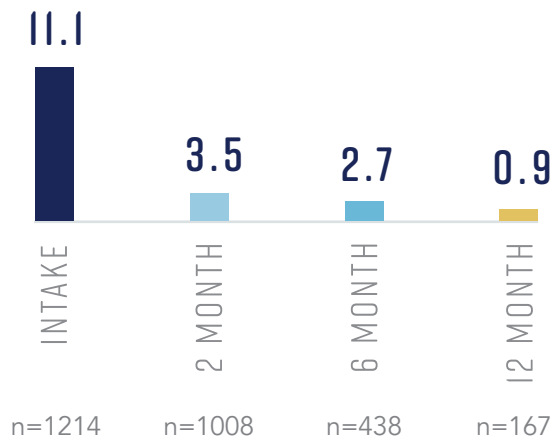


Alcohol and Drug Problem Days

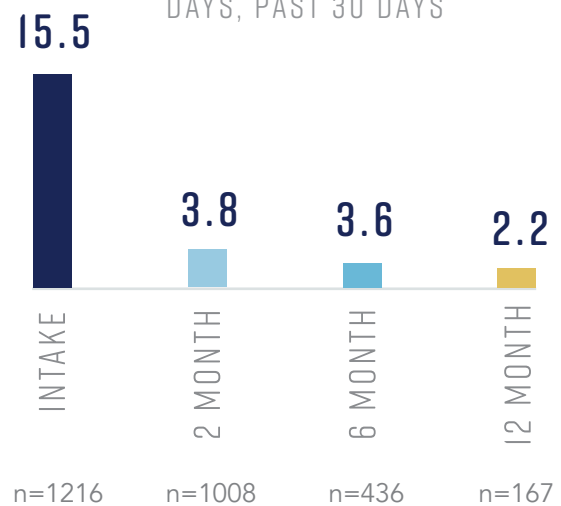
In addition to reporting number of days using each substance, clients were asked to report the number of days within the past 30 in which they experienced problems due to their alcohol use, and separately the number of days within the past 30 that they experienced problems due to their drug use. Problem 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%.

“SIGNIFICANT REDUCTION IN TOTAL NUMBER OF PROBLEM DAYS FOR BOTH ALCOHOL AND DRUGS AFTER DISCHARGE WAS SUSTAINED TWELVE MONTHS POST-DISCHARGE.”

AVERAGE NUMBER OF **ALCOHOL** PROBLEM
DAYS, PAST 30 DAYS



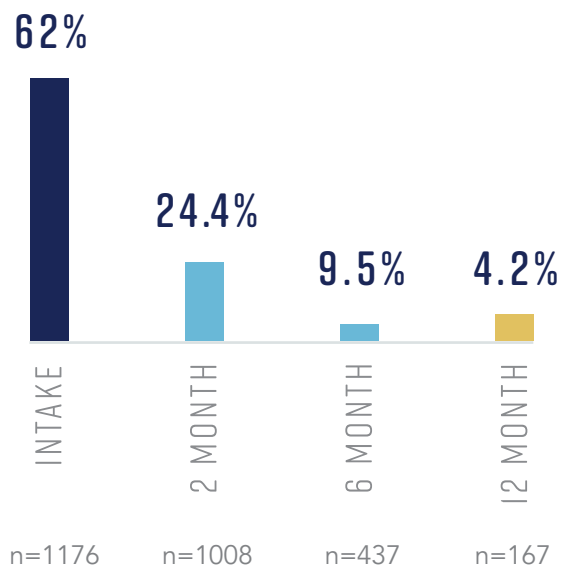
AVERAGE NUMBER OF **DRUG** PROBLEM
DAYS, PAST 30 DAYS



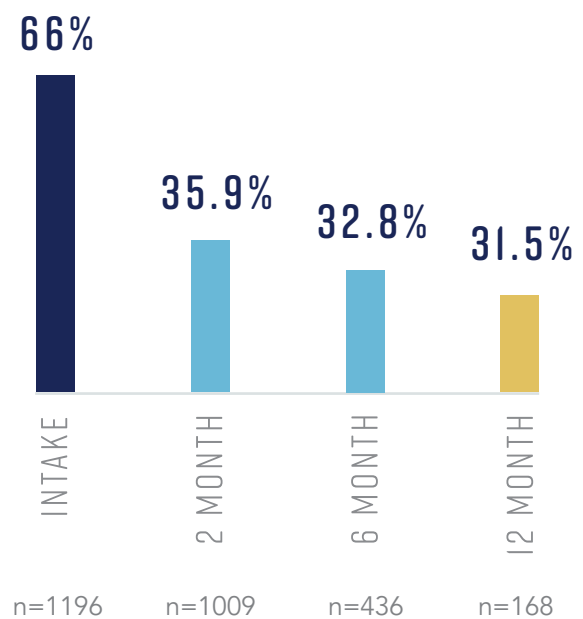
Emotional and Mental Wellness

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.

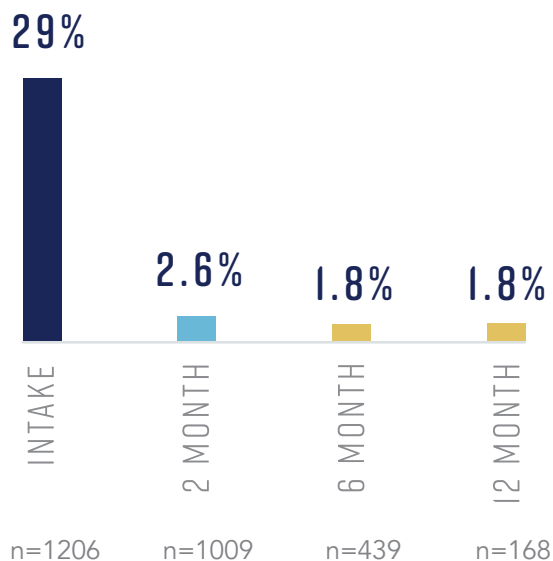
PERCENT OF CLIENTS REPORTING
SERIOUS DEPRESSION, PAST 30 DAYS



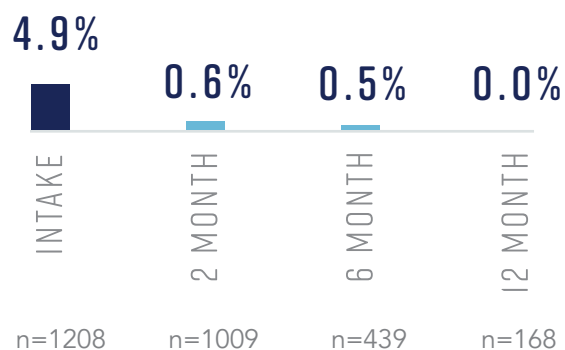
PERCENT OF CLIENTS REPORTING
SERIOUS ANXIETY, PAST 30 DAYS



PERCENT OF CLIENTS REPORTING
SUICIDAL THOUGHTS, PAST 30 DAYS

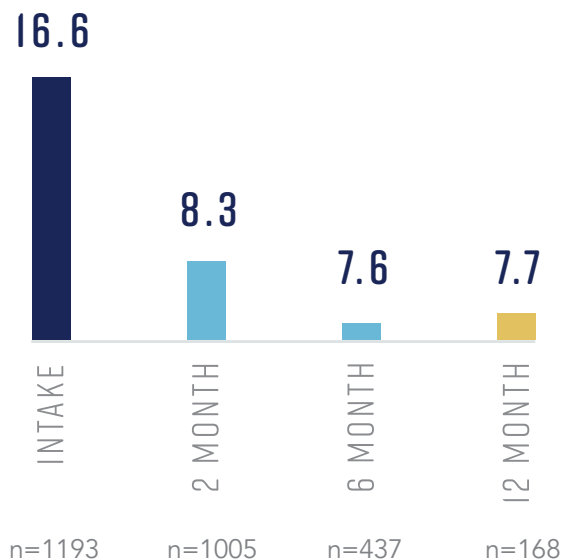


PERCENT OF CLIENTS REPORTING
SUICIDE ATTEMPTS, PAST 30 DAYS



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**.

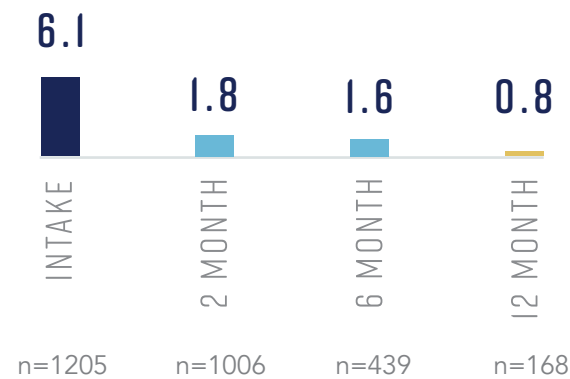
AVERAGE NUMBER OF **PSYCHOLOGICAL**
PROBLEM DAYS PAST 30 DAYS



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.**

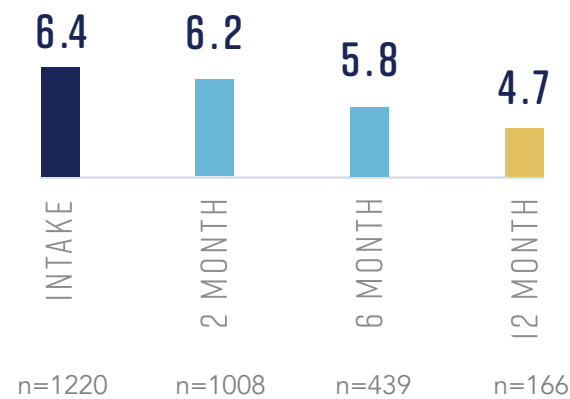
AVERAGE NUMBER OF **FAMILY CONFLICT**
PROBLEM DAYS PAST 30 DAYS



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.**

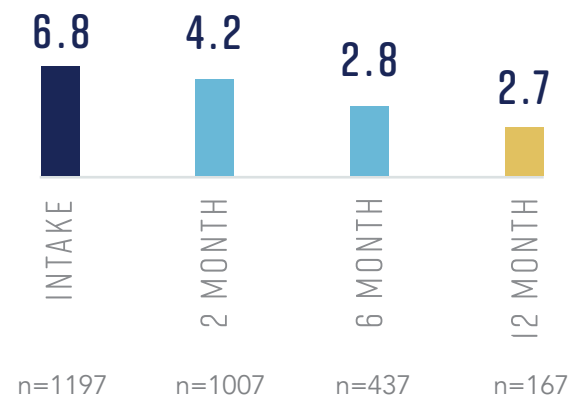
AVERAGE NUMBER OF **MEDICAL**
PROBLEM DAYS PAST 30 DAYS



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 . 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.

12 MONTH OUTCOMES RANDOM SAMPLE

12 MONTH POST DISCHARGE | AAC THREE-YEAR OUTCOME STUDIES

PURPOSE OF THIS PAPER

Addiction and addiction treatment is multi-faceted, and impacts many areas of a person's life, including performance at work, relationships with loved ones, and mental and emotional well-being. Understanding people on the journey to recovery is similarly complex, and cannot be reduced to whether a person is abstinent or not abstinent. 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.

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.

EVALUATION DATA SHOW **STATISTICALLY SIGNIFICANT IMPROVEMENT IN DEPRESSION SYMPTOMOLOGY. IN KEY AREAS OF FUNCTIONING FROM INTAKE TO DISCHARGE AND FROM INTAKE TO 12 MONTHS POST DISCHARGE.**

The ongoing outcome monitoring system provided a framework to collect outcome data across all clients at the participating facilities. Data were collected as part of the intake and discharge interviews already conducted with each client. All clients were asked if CRI could contact them after they left AAC services to complete follow-up surveys 2 months post-discharge, 6 months post-discharge, and 12 months post discharge. Data collected through these follow ups showed statistically significant improvements in depression symptoms, family functioning, relapse risk, and recovery capital from intake to discharge. Additionally, clients experienced improvements in six out of the seven functional domains assessed by the Addiction Severity Index (ASI), a standardized assessment validated for outcomes measurement. The data from this monitoring system provided AAC leadership and operations staff with actionable information about what happens during and after treatment, and attempted to follow up with every client post-discharge.

As of March 3, 2017, the follow-up rate for the ongoing outcome monitoring system was 30%. While the follow up rate was relatively low, the number of follow ups was large due to the practice of reaching out to every client that discharged from a participating facility. To ensure that the follow up data collected through the ongoing outcome monitoring system was representative of the overall population, a sub-study with a stratified random sample was designed with a goal of achieving a higher follow-up rate. The sub-study included four facilities and focused on outcomes from intake to 12 month post-discharge.

The sub-study was conducted using a randomly selected sample of 168 clients who were eligible for their 12 month follow-up. Of the 168 randomly selected, 93 clients completed the 12 month follow-up survey, for a follow-up rate of 55%. The sample included clients of all discharge types and included a large variation in length of stay (insert range). In order to examine the impact of program completion on outcomes 12 months post discharge, only the 81 clients whose discharge type was “complete” were included in these analyses. This paper summarizes key outcomes from this sample of 81 randomly-selected clients twelve months after they completed residential treatment with AAC.

TREATMENT AT AAC

AAC provides a variety of evidence-based treatments for those with substance use disorders, as well as co-occurring mental health disorders. The ASI serves as the biopsychosocial assessment for all AAC facilities. Treatment includes individual therapy, group sessions, and family therapy, utilizing a variety of therapeutic approaches such as motivational interviewing, cognitive behavioral therapy, and trauma counseling. Clients come to AAC from across the United States, and are matched to one of 19 AAC facilities based on their specific needs. All facilities use AAC’s holistic curriculum “Embracing Change: Recovery for Life.” The average length of stay in residential care is 30 days. Once a client completes treatment and discharges from services, they are connected with AAC’s alumni program which provides after-care support.

METHODS

AAC utilizes the Addiction Severity Index (ASI), 5th edition with all clients who enter care at the participating facilities. AAC selected this assessment because it is a validated, reliable tool that assesses clients’ needs in seven key domains critical to overall quality of life and functioning. The ASI is well aligned with the primary treatment goals of improving client’s overall functioning, and serves as the foundation for developing a targeted treatment plan. Additionally, the ASI is a valid measure of change over time and treatment outcomes. The ASI includes seven domains: Medical, Education/Employment, Alcohol, Drug, Legal, Family/Social, and Psychiatric. Each domain returns a score allowing identification of the areas with greatest need and risk. The ASI can be administered several times to a client while maintaining validity.

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 the administration and data entry of the ASI. All items included in the ASI were embedded into the electronic medical record and data collection was integrated into routine clinical workflows. Once a client arrived at a facility, their primary therapist completed the intake ASI with them within 48 hours. The evaluation study was explained to clients and they were given the opportunity to consent or decline to participate. While the intake and discharge ASI were part of the

provision of care at AAC, participation in the follow up interviews was completely optional and declining to participate in no way impacted the care provided to clients. The discharge ASI was administered to clients by their primary therapist within one to two days of their discharge date.

All clients who consented to participate in the follow up evaluation were contacted two months, six months, and twelve months post discharge and asked to complete the follow up ASI. In order to collect the highest quality information despite the geographic footprint of AAC clients, all follow ups were collected via phone interviews with CRI's trained data collectors. The follow up interview took between 20-30 minutes to complete and also provided validated scores for each of the domains. Clients were compensated for their time and participation with a gift card that was electronically sent to them within three days of completing the follow-up survey.

For this focused sub-study, clients who were discharged from Desert Hope, Greenhouse, and Recovery First and whose twelve month follow up window opened between February 6, 2017 and March 3, 2017 were included in the sampling frame. A total of 168 clients were randomly selected. In order to ensure that the distribution of facilities within the sample matched the overall population at AAC, the sample was stratified by facility. Eighty-three clients were selected from Desert Hope, 61 were selected from Greenhouse, and the remaining 24 were selected from Recovery First. CRI attempted to reach these 168 randomly selected clients for one month. Of the 168 selected, 93 clients completed the interview, for a follow up rate of 55%. Out of the 93 randomly selected clients who completed the 12 month interview, only the 81 clients who completed the AAC treatment program were included in the analysis presented in this paper.

TRACKING AND FOLLOW UP METHODS

In order to ensure a high follow up rate among these randomly selected clients, intensive tracking strategies were used. At intake, clients were given an information flyer explaining the project and a detailed locator form was completed by intake staff that included contact information for collateral contacts. At discharge, clients were again given a flyer to remind them of the project and the follow up time points, and the locator form was updated with any new or additional contact information. Reminder emails were sent to clients who consented to participate in the evaluation within a week of each data collection opening, and emails were sent after phone calls were made to clients with no answer. A personal letter was mailed to each of the 168 clients who were selected into the sample as well. For this sub-study, clients were called at every available phone number multiple times each week. Because the contact information provided at discharge was a year old, callers also used directories available online to locate updated phone numbers and email addresses for clients (Google, social media profiles, Spokeo, BeenVerified, PIPL). As a last resort, if viable contact information could still not be obtained, CRI worked with AAC's billing department to determine if there was any additional contacts.

An average of 10 phone calls, 4 emails, and 6 text messages, in addition to one mailed letter, were placed to each client in the sample over the course of the month, for an average of 20 total contact attempts. The range of total contact attempts was 1 attempt to 69 attempts.

CHARACTERISTICS OF THE 12 MONTH RANDOM SAMPLE

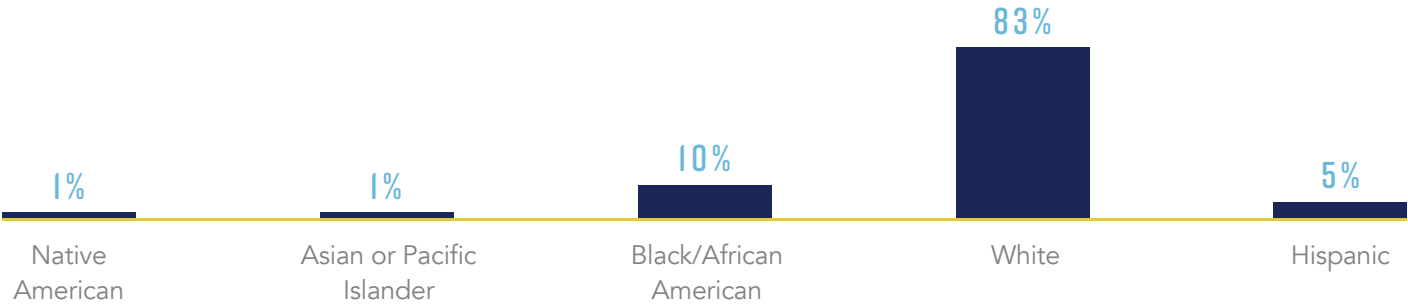
The demographics of the sample closely mirrored the demographics of the overall AAC population. Due to the stratified sampling strategy, the majority of the clients received treatment from Desert Hope, in line with the relative proportion of the overall AAC population that receive care at each facility annually. Although the sample was predominately male (63%), a slightly higher proportion of females completed the interview, as compared to the overall AAC population.

GENDER

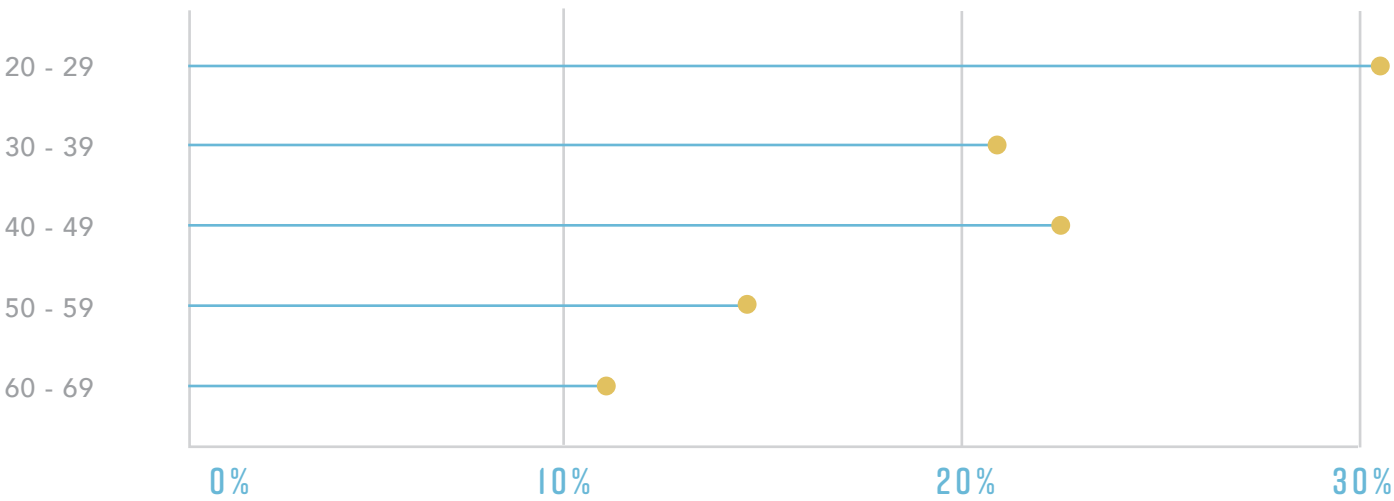


The vast majority of clients in the sample were white (83%), and identified as straight (91%). The largest age group was 20 to 29 years old.

RACE



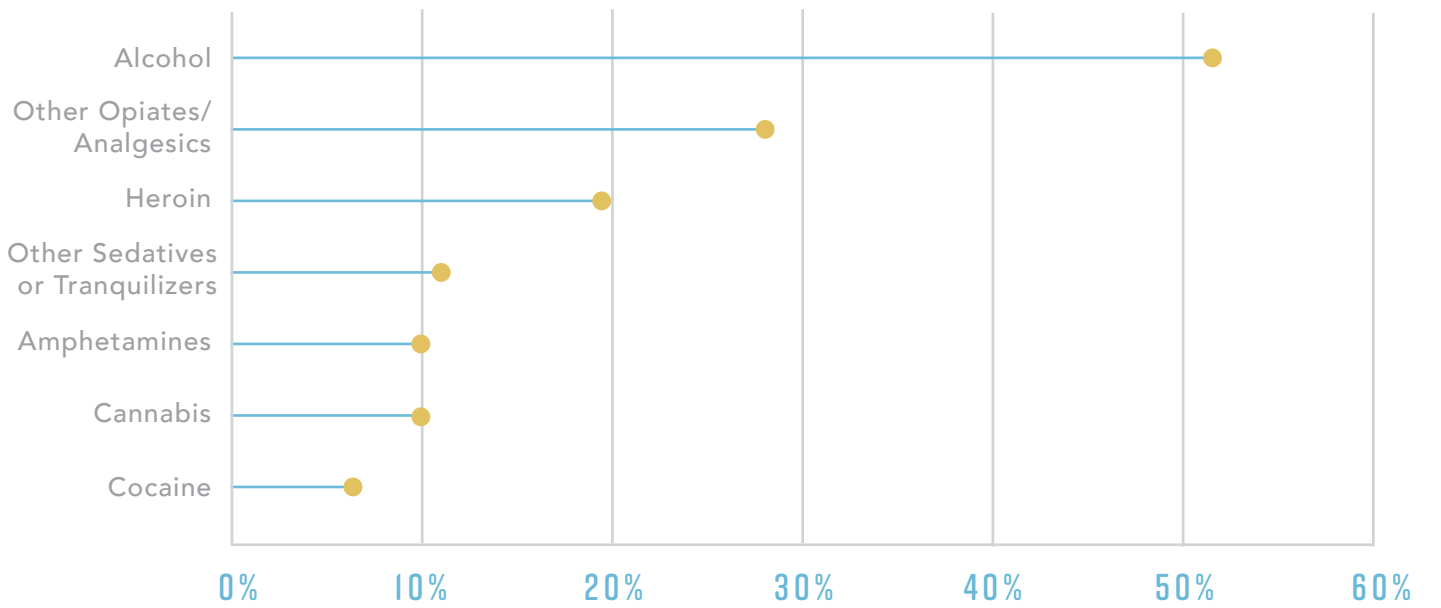
AGE



Clients could report more than one substance as their problem substance. Just over half (n=41, 51%) of the clients in the sample reported that alcohol was a problem substance at intake. The next most common substances were other opiates (n=23, 28%) and heroin (n=16, 20%).

*Average length of stay in the sample was 32 days, with a range of 27 to 56 days.

PROBLEM SUBSTANCES AT INTAKE



12 MONTH POST DISCHARGE OUTCOMES

CHANGE OVER TIME IN COMPOSITE SCORES

The Addiction Severity Index (ASI) measures the severity of client’s unmet needs in each domain, on a scale of 0 to 100*. These scores are referred to as Composite Scores and have been validated as measures for change in severity over time. The average Composite Scores decreased from intake to 12 month follow up in all domains, reflecting improvement in that status of client’s lives in each domain. The most dramatic decreases in severity were in the Alcohol domain, dropping from 43 to 5, followed by the Family domain, dropping from 39 to 5. The smallest decrease was in Employment. These decreases were statistically significant.

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

ALL SCORES ON THE ASI DECREASED FROM INTAKE TO 12 MONTHS POST DISCHARGE

ALCOHOL



EMPLOYMENT



FAMILY



PSYCHIATRIC



MEDICAL



DRUG



LEGAL



intake

12 months

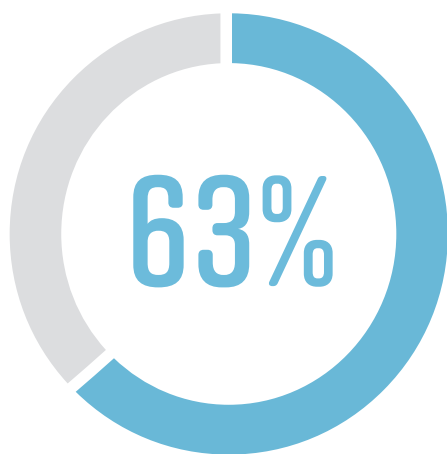
TABLE 1. ASI COMPOSITE SCORES

RANDOM SAMPLE INTAKE AND 12-MONTH FOLLOW-UP DIFFERENCES								
ITEMS	Intake		12 Month Follow-Up					
	M	SD	M	SD	t	P value	n	d
Medical ASI Score	0.36	0.35	0.15	0.25	4.49	<.001***	77	0.58
Employment ASI Score	0.41	0.27	0.34	0.25	2.25	<.027*	75	0.45
Alcohol ASI Score	0.44	0.36	0.05	0.12	9.26	<.001***	75	0.52
Drug ASI Score	0.25	0.19	0.05	0.08	9.17	<.001***	76	0.41
Legal ASI Score	0.16	0.23	0.02	0.07	4.40	<.001***	58	2.55
Family ASI Score	0.39	0.24	0.04	0.98	12.82	<.001***	77	1.01
Psychiatric ASI Score	0.37	0.20	0.13	0.16	8.41	<.001***	69	0.53

Notes. Items have been rephrased for reporting purposes; see ASI for original item wordings. M = mean, SD = standard deviation, t = paired t-test, n = sample size, d = Cohen's d effect size. * $p \leq .05$. *** $p \leq .001$. †Items range on scale of 1-5.

SUBSTANCE USE AT 12 MONTHS

At the 12 month follow up, 48% (n=39) of clients reported that they had not abused any substances since leaving treatment, meaning that they had no slips or relapses since leaving AAC. Sixty-three percent (n=51) of clients had not used any substances in the past 30 days. Of the clients who reported that they had been using in the past 30 days, the majority reduced their use as compared to their patterns at intake as compared to their patterns at intake.



**63% OF CLIENTS WERE ABSTINENT
FROM ALL SUBSTANCES AT 12 MONTHS.**

National benchmark: 30%.

Specifically, clients were asked how many days in the past 30 they used each substance. Among those who reported use in the 30 days prior to intake, the average number of days using each substance decreased from intake to 12 month. For those reporting any alcohol use at intake, the average number of days decreased from 15 to 3 days at the 12 month follow up. For those reporting any heroin or other opiate use at intake, the average number of days reduced from 24 days to 3 days and from 21 days to 1 day respectively.

Clients who reported they had used a substance in the 30 days prior to the twelve month follow up also saw a significant decrease in the average number of days of use, indicating harm reduction.

Additionally, clients were asked at intake and again at the 12 month follow up to rate their use in the past 30 days on a scale from heavy use (significantly hindering daily functioning), moderate use, light use, or no use. Eighty one percent shifted from a higher to a lower amount of use. Only two clients reported that they were admitted to a hospital for alcohol or drug related reasons in the 30 days prior to the 12 month follow up. No clients reported that they went to the emergency room for alcohol or drug related reasons.



OVERALL USE FROM INTAKE TO FOLLOW UP

OF THOSE WHO REPORTED **USING THESE SUBSTANCES AT INTAKE**, THE AVERAGE NUMBER OF DAYS DECREASED SIGNIFICANTLY. MANY OF THESE CLIENTS REPORTED THEY WERE NOT USING THESE SUBSTANCES AT ALL AT 12 MONTHS.



HEROIN USE DECREASED BY AN AVERAGE OF **88%**
OTHER OPIATE USE DECREASED BY AN AVERAGE OF **95%**
ALCOHOL USE DECREASED BY AN AVERAGE OF **80%**

OVERALL USE FROM INTAKE TO FOLLOW UP

THE AVERAGE NUMBER OF DAYS OF USE ALSO DECREASED SIGNIFICANTLY FOR THOSE WHO REPORTED **THEY WERE STILL USING** THESE SUBSTANCES AT 12 MONTHS, INDICATING **HARM REDUCTION**



HEROIN USE DECREASED BY AN AVERAGE OF **18%**
OTHER OPIATE USE DECREASED BY AN AVERAGE OF **20%**
ALCOHOL USE DECREASED BY AN AVERAGE OF **38%**

ALCOHOL USE

Three-quarters of the sample (75%, n=61) reported alcohol use in the 30 days prior to intake. At the 12 month follow up, only 26% (n=21) of the sample reported any alcohol use in the prior 30 days, representing a decrease of more than half. The average number of problem days decreased by 91%, from 12 days at intake to 1 day at the twelve month follow up. Clients were asked to rate how troubled or bothered they were by the alcohol problems they experienced in the previous 30 days, and over half of the sample (54%, n=44) reported that they were less troubled or bothered at the follow up as compared to their response at intake. An additional 40% (n=33) of clients reported that they were not at all bothered by alcohol problems at either the intake or follow up time point. Finally, the average amount of money clients spent on alcohol in the past 30 days decreased by 84% from intake to the follow up, from \$140 to \$22.



ALCOHOL PROBLEM DAYS REDUCED FROM **12** TO **1**, A **92%** DECREASE

DRUG USE

Similar to the reduction in alcohol use, the proportion of clients who reported any drug use in the prior 30 days decreased from 74% (n=60) at intake to 26% (n=21) at the twelve month follow up. The average number of days clients' experienced drug related problems dropped 86%, from 14 days to 2 days. Fifty seven percent (n=46) of the clients reported a reduction in how troubled or bothered they were by drug related problems at the 12 month follow up, and an additional 35% (n=29) reported they were not at all bothered by any drug related problems at either intake or the follow up. The average amount of money spent on drugs in the prior 30 days decreased by 87%, from \$700 at intake to \$91 at the follow up.

 **DRUG** PROBLEM DAYS REDUCED FROM **14** TO **2**, AN **82%** DECREASE

TABLE 2. DAYS OF SUBSTANCE USE IN THE PAST 30

RANDOM SAMPLE INTAKE AND 12-MONTH FOLLOW-UP DIFFERENCES								
	Intake		12 Month Follow-Up					
ITEMS	M	SD	M	SD	t	P value	n	d
Days With Substance Use in Past 30 Days	3.58	0.70	1.66	0.80	16.36	<.001***	79	2.55
Days Using Alcohol in Past 30 Days	11.46	11.63	2.13	5.86	7.12	<.001***	79	1.01
Days Using Heroin in Past 30 Days	5.23	11.01	0.88	3.74	3.98	.001***	80	0.53
Days Using Other Opiates in Past 30 Days	8.20	12.40	0.60	3.83	5.86	<.001***	80	0.83
Days Using Sedatives in Past 30 Days	5.05	9.87	0.78	3.07	4.08	<.001***	80	0.58
Days Using Cocaine in Past 30 Days	1.84	5.37	0.10	0.89	2.95	<.005*	80	0.45
Days Using Amphetamines in Past 30 Days	5.04	10.86	0.86	2.99	4.44	<.001***	80	0.52
Days Using Cannabis in Past 30 Days	6.75	11.69	2.66	7.67	2.85	.005*	79	0.41
Total Substance Use in Past 30 Days	45.78	31.63	8.24	16.21	10.17	<.001***	80	2.55
Days of Alcohol Problems in Past 30 Days	11.94	13.57	0.78	3.42	7.15	<.001***	77	1.01
Days of Drug Problems in Past 30 Days	13.71	13.95	2.20	7.10	7.41	<.001***	79	0.53

Notes. Items have been rephrased for reporting purposes; see ASI for original item wordings. M = mean, SD = standard deviation, t = paired t-test, n = sample size, d = Cohen's d effect size. * $p \leq .05$. *** $p \leq .001$. †Items range on scale of 1-5.

PHYSICAL HEALTH AT 12 MONTHS

Very few clients reported hospitalizations for physical health reasons. Nine clients (11%) reported one hospitalization for physical health reasons in the 30 days prior to admission, and only 3 clients (5%) reported one hospitalization in the 30 days prior to the twelve month interview.

HOSPITALIZATIONS FOR PHYSICAL HEALTH REASONS WERE UNCOMMON, AND REDUCED BY HALF FROM INTAKE TO 12 MONTH.



At the 12 month follow up, clients were asked if they had gone to the emergency room for any reason in the previous 30 days. Only 4 clients reported they went to the emergency room in the past 30 days, all for physical health reasons.

MEDICAL PROBLEM DAYS REDUCED FROM 9 TO 5, A 44% DECREASE

The average number of days that clients experienced physical medical problems decreased from 9 at intake to 5 at the follow up. Forty-four percent (n=36) reported that they were less troubled or bothered by medical problems at the follow up, and 30% (n=24) reported they were not at all bothered by medical problems.

PERCENTAGE OF CLIENTS REPORTING MENTAL HEALTH SYMPTOMS IN PAST 30 DAYS

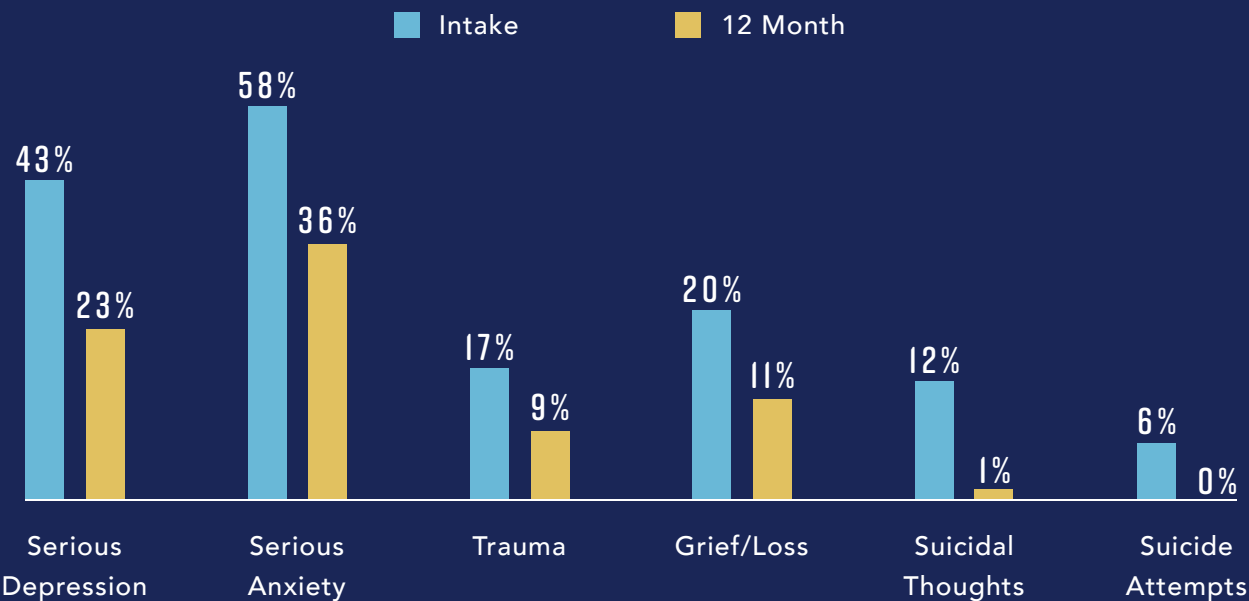


TABLE 3. PHYSICAL HEALTH OUTCOMES

RANDOM SAMPLE INTAKE AND 12-MONTH FOLLOW-UP DIFFERENCES									
ITEMS	Intake		12 Month Follow-Up						
	M	SD	M	SD	t	P value	n	d	
Days Experienced Medical Problems in Past 30 Days	8.92	12.45	4.68	2.65	1.85	.010*	78	0.47	
Degree Troubled By Medical Problems in Past 30 Days†	2.48	1.31	1.78	1.26	3.21	.004*	80	0.54	

Notes. Items have been rephrased for reporting purposes; see ASI for original item wordings. M = mean, SD = standard deviation, t = paired t-test, n = sample size, d = Cohen’s d effect size. *p ≤ .05. *** p ≤ .001. †Items range on scale of 1-5.

MENTAL AND EMOTIONAL HEALTH AT 12 MONTHS

AAC provides treatment for co-occurring substance use and mental health disorders. At intake, 31% of the sample (n=25) reported that they had been treated in an inpatient or hospital setting for psychiatric needs at least one time in their lives. A slightly higher proportion of clients reported that they had received outpatient treatment for psychiatric needs at least one time in their lives (43%, n=35).

All clients regardless of psychiatric history were asked at intake and the twelve month follow up if they had experienced any of a series of mental health symptoms in the previous 30 days. The most commonly reported symptoms were serious anxiety and serious depression. At the 12 month follow up, the proportions of clients experiencing each mental health symptoms dropped.

Clients were then asked how many days in the past 30 they experienced any of the mental health symptoms they reported. The average number of days decreased from 16 days at intake to 7 days at the follow up. Nearly three-quarters (72%, n=58) of the clients reported that they were less troubled or bothered by these problems at the follow up. Only 11% (n=9) of clients reported they were not at all bothered by mental health symptoms at intake and at the follow up. Only one client reported a hospitalization due to emotional or mental health reasons at the 12 month follow up.

 **PSYCHIATRIC** PROBLEM DAYS REDUCED FROM 16 TO 7, A 56% DECREASE

TABLE 4. PSYCHIATRIC OUTCOMES

RANDOM SAMPLE INTAKE AND 12-MONTH FOLLOW-UP DIFFERENCES						
ITEMS	Intake		12 Month Follow-Up			
	No	Yes	No	Yes	n	Significance
Serious Depression in Past 30 Days	53.9%	46.1%	76.3%	23.7%	76	.005*
Serious Anxiety in Past 30 Days	39.0%	61.0%	63.7%	36.3%	77	.001***
Trauma in Past 30 Days	82.1%	17.9%	88.8%	11.2%	78	.275
Grief or Loss in Past 30 Days	79.5%	20.5%	82.5%	17.5%	78	.683
Suicidal Thoughts in Past 30 Days	77.6%	22.4%	98.8%	1.2%	76	<.001***
Suicide Attempts in Past 30 Days	93.3%	6.7%	100.0%	0.0%	75	.025*

Note. * ≤ .05. *** ≤ .001

FAMILY AND SOCIAL

Family members have a critical role to play in clients’ recovery. As part of AAC’s program, family members are contacted as early on and invited to participate in family therapy with the client, in addition to the client’s individual therapy which often addresses family dynamics.

Clients were asked about their relationships with family members as well as friends, co-workers, and other social connections. Clients reported improvement in both their relationships with family members and other social relationships from intake to follow up. Specifically, the average number of days of serious conflict with family members decreased from 7.8 days at intake to .5 days at the follow up, and the number of days of serious conflicts with others outside of the family decreased from 3.4 days to 1 day. Over half reported that they were less troubled or bothered by problems related to their family relationships (74%, n=60), and just under half reported this reduction for other social relationships (47%, n=38). A small proportion of clients reported that they were not at all bothered by family problems at either intake or follow up (20%, n=16), and a much larger proportion were not at all bothered by social relationships at either intake or follow up (44%, n=36).

 **FAMILY CONFLICT** DAYS REDUCED FROM 8 TO .5, A 94% DECREASE

TABLE 5. FAMILY OUTCOMES

RANDOM SAMPLE INTAKE AND 12-MONTH FOLLOW-UP DIFFERENCES								
ITEMS	Intake		12 Month Follow-Up					
	M	SD	M	SD	t	P value	n	d
Serious Family Conflicts in Past 30 Days	7.86	10.37	1.24	4.30	5.07	<.001***	78	0.83

Notes. Items have been rephrased for reporting purposes; see ASI for original item wordings. M = mean, SD = standard deviation, t = paired t-test, n = sample size, d = Cohen’s d effect size. *p ≤ .05. *** p ≤ .001. †Items range on scale of 1-5.

SUMMARY

American Addiction Centers facilities are accredited by either the Joint Commission (TJC) or the Commission on Accreditation of Rehabilitation Facilities (CARF), and their techniques and intervention strategies are rooted in scientific research. The company believes that recovery is possible for anyone, that hope is key, and that providing individuals with tools to help them remain clean and sober for life is a primary aim of American Addiction Centers treatment.

This strong belief in the philosophy and approach to treatment lead AAC to hire a third-party independent evaluation team in 2015. Evaluators were asked to measure outcomes among clients entering AAC for residential treatment, at discharge from treatment, and at 2, 6 and 12 month post-discharge intervals. The evaluation was specifically designed to measure critical health and social functioning outcomes that are typically the major reasons for relapse to substance use following treatment (e.g., alcohol use, drug use, mental health symptomatology, lack of family/community recovery support, etc.) . Valid and reliable instruments were selected to measure each of these areas of functioning and were collected as a routine part of intake and discharge information gathering. The evaluation team established a call center solely dedicated to tracking and interviewing clients after discharge from treatment so that these same outcomes could be measured over time.

This White Paper represents a sub-study of a larger 3-year evaluation. The results demonstrate that randomly selected clients who completed AAC treatment experience positive outcomes in all of the key functional domains assessed and that these improvements are maintained twelve months post discharge. There were significant reductions in alcohol and drug use, and over half of the clients had not used any substances in the 30 days prior to the follow up interview. Among those who were using, the average number of days reduced, as well as the extent to which the client was impacted by alcohol or drug problems as compared to intake. Additionally, clients reported a reduction in mental health symptoms, including depression, anxiety, and trauma. There was a large reduction in suicidal thoughts and suicide attempts from intake to follow up as well. While relatively few clients reported physical medical issues at intake, there were very few hospitalizations, emergency room visits, and a low average number of physical health problem days at follow up.

*McLellan AT, Alterman AI, Metzger DS, et al. (1994). Similarity of outcome predictors across opiate, cocaine, and alcohol treatments: role of treatment services. Journal of Consulting Clinical Psychology, (62), 1141-1158.

MEDIA

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American Addiction Centers Releases Findings from its First Patient Outcome Studies

Nashville, Tenn. (February 20, 2018) - American Addiction Centers (AAC) is breaking new ground in addiction treatment with the release of its first patient outcome studies. AAC is joining the ranks of only a handful of national treatment centers to measure outcomes and publicly share the findings. Utilizing three years of tracking and research, with the assistance of Centerstone Research Institute (CRI), the studies analyzed how treatment at AAC facilities impacted the lives of patients. Results indicate that 63 percent of AAC patients maintain abstinence one year after treatment, as compared to [national benchmarks](#) of 30 percent.

"The treatment industry hasn't done a good job of proving that treatment really works," says Michael Cartwright, CEO, American Addiction Centers. "That's why we felt it was critical for American Addiction Centers, as a leader in the industry, to invest in patient outcome studies. Our findings show our treatment model is making a difference in the lives of our patients, even months after treatment ends. We are also using this new data to improve our services as part of our ongoing commitment to clinical excellence."

CRI enrolled more than 4,000 patients as part of the main study. They were tracked from intake to discharge and then at two, six, and 12 months. The researchers looked at several outcome measures, including substance use, co-occurring medical problems, mental health challenges, family problems, and employment and legal issues.

"Addiction is a chronic disease that affects every aspect of a person's life, from family functioning to mental and physical health," says Dr. Tom Doub, AAC's Chief Clinical and Compliance Officer. "We wanted to analyze those aspects as well in determining the effectiveness of our treatment model. It turns out our comprehensive approach made a significant difference in patients' overall quality of life."

Some key findings from the 12-month follow up substudy include:

- At 12 months, 63% of patients were abstinent from all substances.
- Days of alcohol use, which was the most reported issue, decreased by 80% 12 months after completing treatment
- Days of heroin use decreased by 88%
- Total days with significant family conflict decreased by 87%
- Days experiencing physical health problems decreased by 44%
- Days with mental health problems, like depression or anxiety, decreased 56%

"At AAC, our mission is to transform lives," says Doub. "One of the major barriers to families seeking help is lack of confidence in treatment outcomes. These studies clearly demonstrate that treatment works. Not only does it work to reduce substance use, but it also has significant benefits across many important areas of life."

AAC already has plans for phase two of the study. The goal is to expand on the initial study and to also analyze the impact that treatment makes on reducing other healthcare costs such as emergency room visits and hospitalizations.

“Our ultimate goal is to revolutionize the treatment of addiction so we can save more lives,” says Cartwright. “We won’t stop until we get there. This is one giant step towards helping us achieve our vision.”

To learn more about the studies, visit americanaddictioncenters.org/outcomes-study/

About American Addiction Centers

American Addiction Centers (NYSE: AAC) is a leading provider of inpatient and outpatient substance abuse treatment services. We treat clients who are struggling with drug addiction, alcohol addiction, and co-occurring mental/behavioral health issues. We currently operate substance abuse treatment facilities located throughout the United States. These facilities are focused on delivering effective clinical care and treatment solutions. For more information, please find us at AmericanAddictionCenters.org or follow us on Twitter @AAC_Tweet.