OUTCOMES REPORT

ASHLEY ADDICTION TREATMENT

WHO WE ARE

Ashley Addiction Treatment, founded in 1983, has treated over 65,000 patients for substance use disorder (SUD). As modeled by our co-founders, we continue to be at the forefront of SUD treatment; serving our patients and the industry. Our vision is accomplished through our robust research program, including academic collaborations with faculty from Johns Hopkins, that shape our future practice with true evidence-based care that is inclusive, effective, and personalized. This report showcases the unwavering efforts of the Ashley Addiction Treatment research team over the past 4 years in measuring and enhancing treatment outcomes for individuals with substance use disorders.

We transform and save lives by integrating the science of medicine, the art of therapy and the compassion of spirituality.

WHAT WE TREAT

RISK AND RESILIENCE FACTORS

RISK

Definition: Patterns of thoughts and emotions that cause distress or impair functioning

Why it's important: Identifying patients reporting known risk factors of relapse and treatment attrition can help clinicians respond in real-time

Metrics: Anxiety, depression, stress, craving (list of scales in appendix)

RESILIENCE

Definition: Mental and behavioral flexibility that enhances the ability to adapt and bounce back from adversity and challenges

Why it's important: Measuring factors known to be protective for recovery can help us capitalize on patient strengths

Metrics: Optimism, commitment to sobriety, quality of life, spirituality (list of scales in appendix)

What it is: Trac9 is a data driven tool for assessing and monitoring patient outcomes in addiction treatment. This approach uses a battery of standardized assessments that collect patient reported mental health progress with a focus on risk and resilience factors.

The system has two primary uses:

1) empowering clinicians with real-time, visual charts of patient progress, allowing them to tailor treatments and intervene promptly, and

2) allowing the research department to gather more granular data to identify factors linked to long-term success, guiding our service optimization.

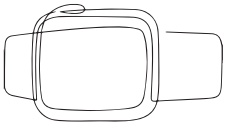
How it works: Since July of 2021, patients at all Ashley locations partake in a series of surveys.

BIOMETRICS

What it is: We utilize daily activity wearables to measure momentary health metrics related to sleep and cardiovascular health so that we can better understand how factors of physiological health are related to treatment outcomes.

How it works: In 2022, patients enrolled in residential and extended care treatment were offered activity wearables worn for the duration of their stay.

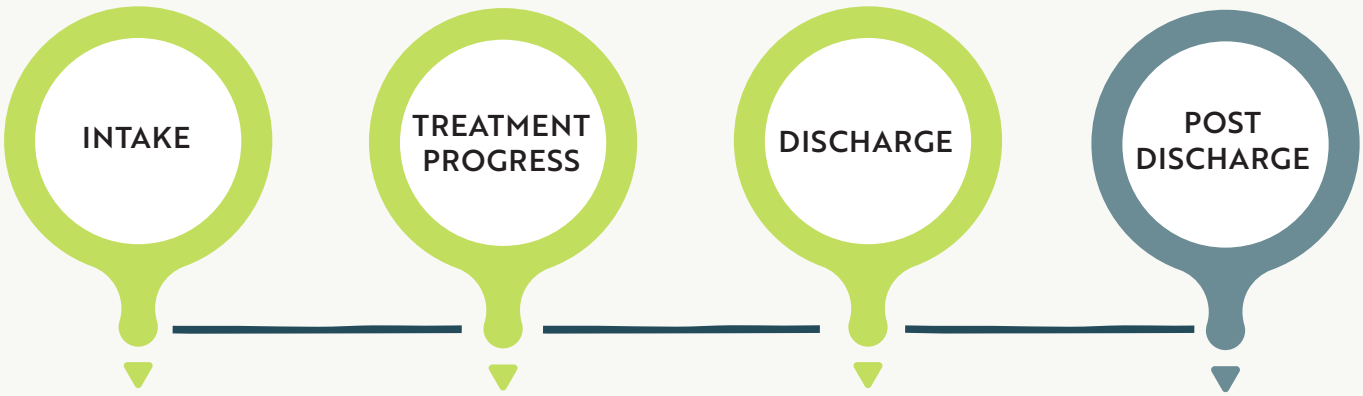
Why its important: Addiction treatment often lacks objective measures to track a patient's recovery progress. However, our program uniquely combines self-reported data with physiological monitoring, offering a comprehensive picture of a patient's health and well-being throughout their treatment journey.



What is a wearable?

A Smartwatch that monitors sleep and cardiovascular health.

Wearable worn throughout residential treatment and extended care



Collects foundational information

Assesses risk and resilience factors

Measures patient satisfaction

Tracks relapse, mood, and recovery resources

Weekly Survey's (Admission + 1x/ week)

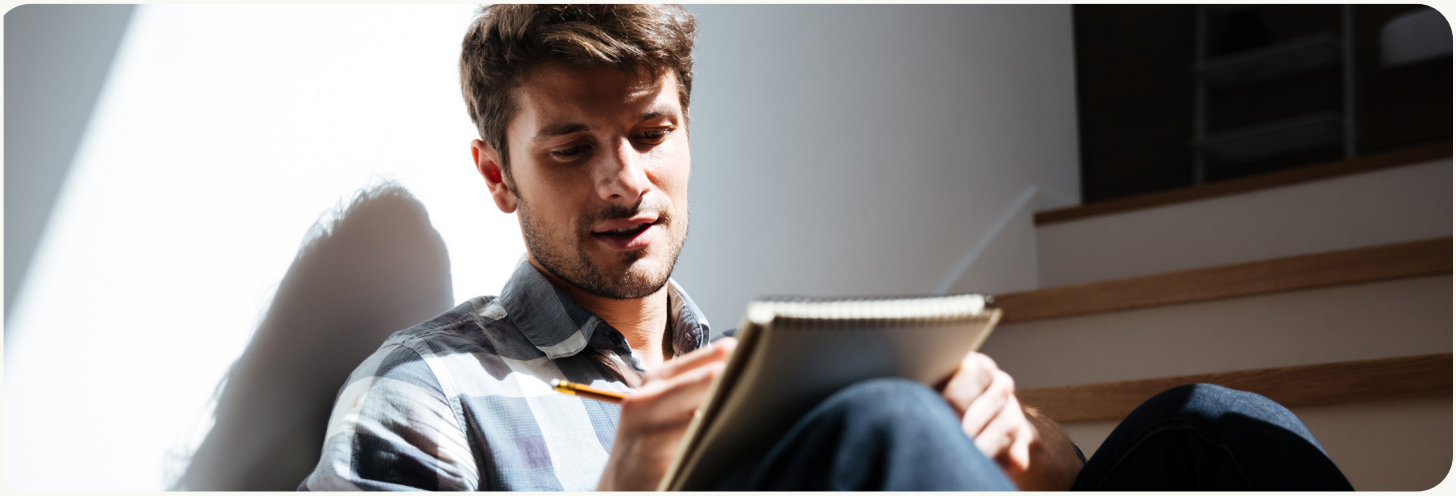
Monthly Survey's (12 surveys - 1x/ month for 12 months)

ACADEMIC STUDIES

What it is: We deploy observational studies and clinical trials that delve into key factors contributing to recovery – sleep, chronic pain, withdrawal, craving, and emotion. These investigations illuminate the intricacies and effectiveness of various treatment modalities, both established and novel, while uncovering potential subgroup patterns during the recovery journey.

How it works: Through established collaborations with faculty from Johns Hopkins and academic investigators under IRB regulations, Ashley becomes a research site where project coordinators screen and enroll eligible and willing patients.

Why its important: From these studies, Ashley receives valuable firsthand insights into novel evidence-based interventions which improve overall treatment programming.



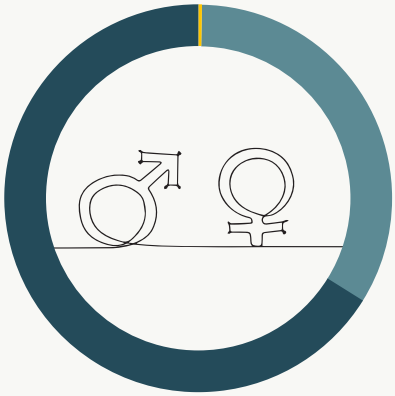
WHY WE MEASURE OUTCOMES

Addiction treatment should prioritize personalized care, informed decision-making, and quality of life. We utilize a unique combination of patient-reported outcomes, objective biometric data and academic research to unlock personalized treatment pathways and identify new therapeutic avenues to ensure the best possible outcomes.

WHO WE MEASURE

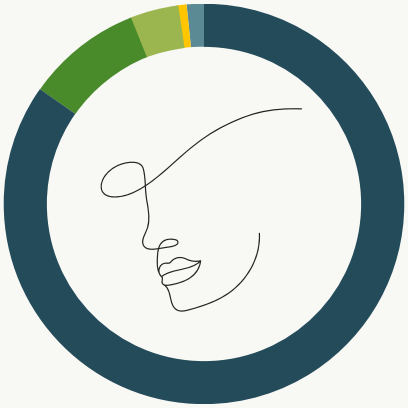
DEMOGRAPHICS

The current report examines data from a diverse group of 3,105 patients residing in over 31 states and 2 countries who participated in our residential and intensive outpatient treatment programs between 2021 and 2023. The average patient was 42 years old, with 62% employed and 8% veterans.



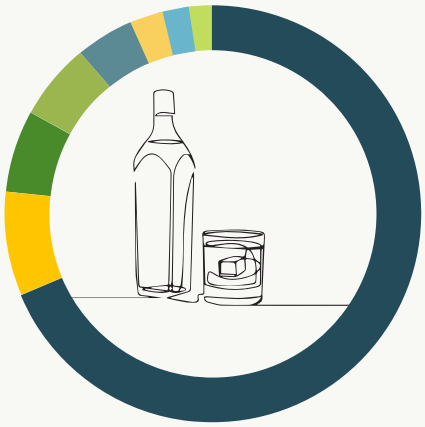
Gender*

- Male (65.99%)
- Female (33.72%)
- Non-Binary (0.29%)



Race

- White (84.91%)
- African American (9.06%)
- Other (3.97%)
- Asian (1.45%)
- Native American/ Pacific Islander (0.55%)



Drug of Choice

- Alcohol (68.72%)
- Opioids (7.98%)
- Cocaine (6.35%)
- Marijuana (6.35%)
- Heroin (4.33%)
- Benzodiazepines (2.61%)
- Methamphetamine (2.02%)
- Stimulants (1.63%)

Via the perceived stress scale (PSS) we found that 33.97% of female inpatients reported high levels of perceived stress at intake as compared to male percentage of 23.03%.

Via the Center for Epidemiological Studies Depression (CES-D) Data indicated that 88.08% of female inpatients were at risk for clinical depression vs 80.96% at intake for male patients.

* While we did have a small group of patients who identified outside the male/female binary (N=9), this subgroup wasn't large enough to provide statistically robust results within the current analysis framework. Future research will be designed to allow for meaningful analysis of the unique experiences of non-binary individuals.

INTERNAL KEY FINDINGS

WHAT WE'VE FOUND

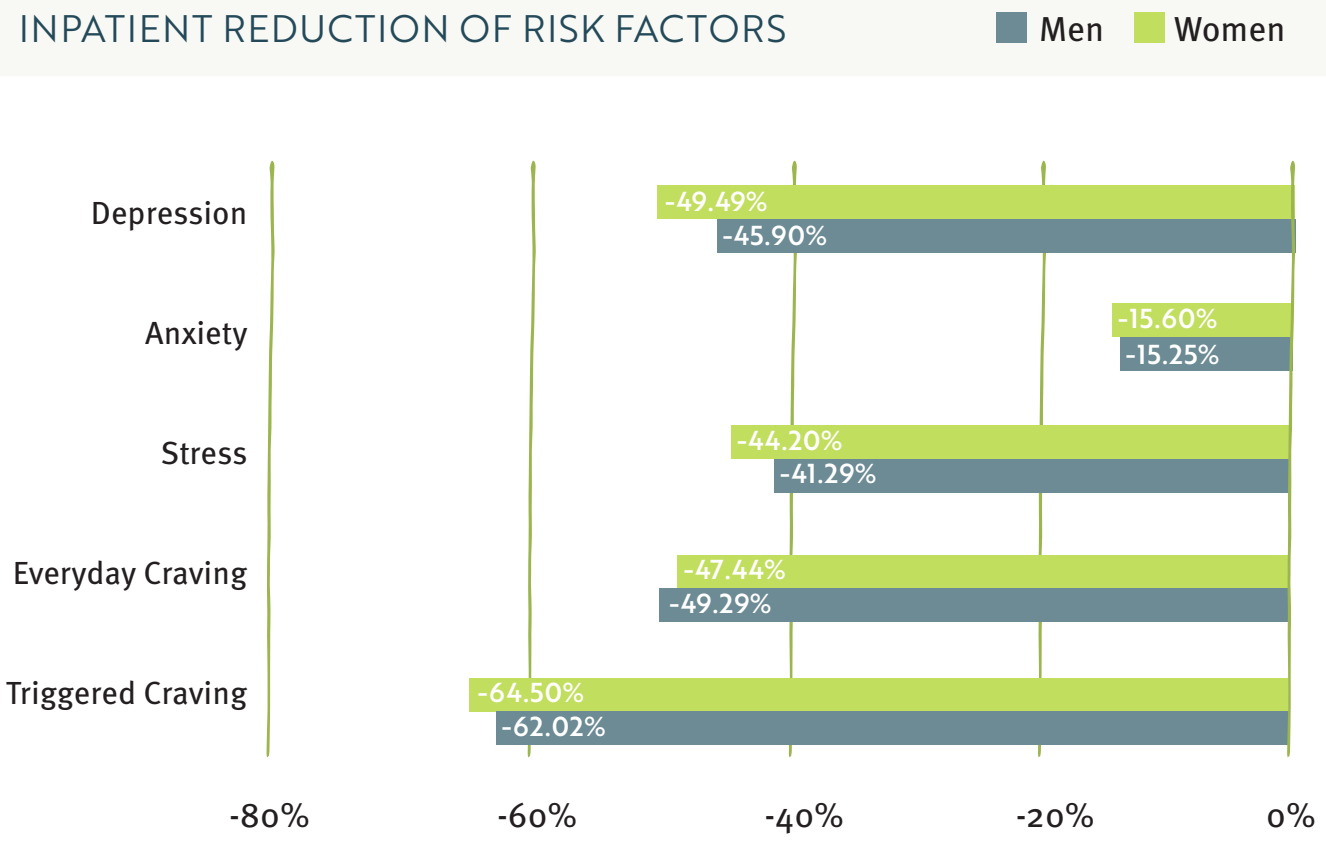
From 2021-2023, as a routine part of treatment, we surveyed 3,105 patients enrolled in our treatment programs at regular intervals during treatment and post-discharge to better understand the effectiveness of our treatment model and become more intentional about services we provide. We collected 18,762 unique observations through a series of surveys administered weekly during treatment and monthly after discharge to track patient progress.

REDUCTION IN RISK FACTORS

Our inpatient treatment program demonstrates a significant positive effect on known risk factors for recovery in patients with substance use disorders. Notably, depression and craving showed the greatest improvement. However, the changes in anxiety symptoms were relatively modest, averaging around 15%.

Anxiety symptoms may improve more slowly than other factors, and these results highlight the importance of monitoring these symptoms longer-term [1,2] and the need for therapeutic tactics which target symptoms of anxiety within our existing treatment model.

INPATIENT REDUCTION OF RISK FACTORS

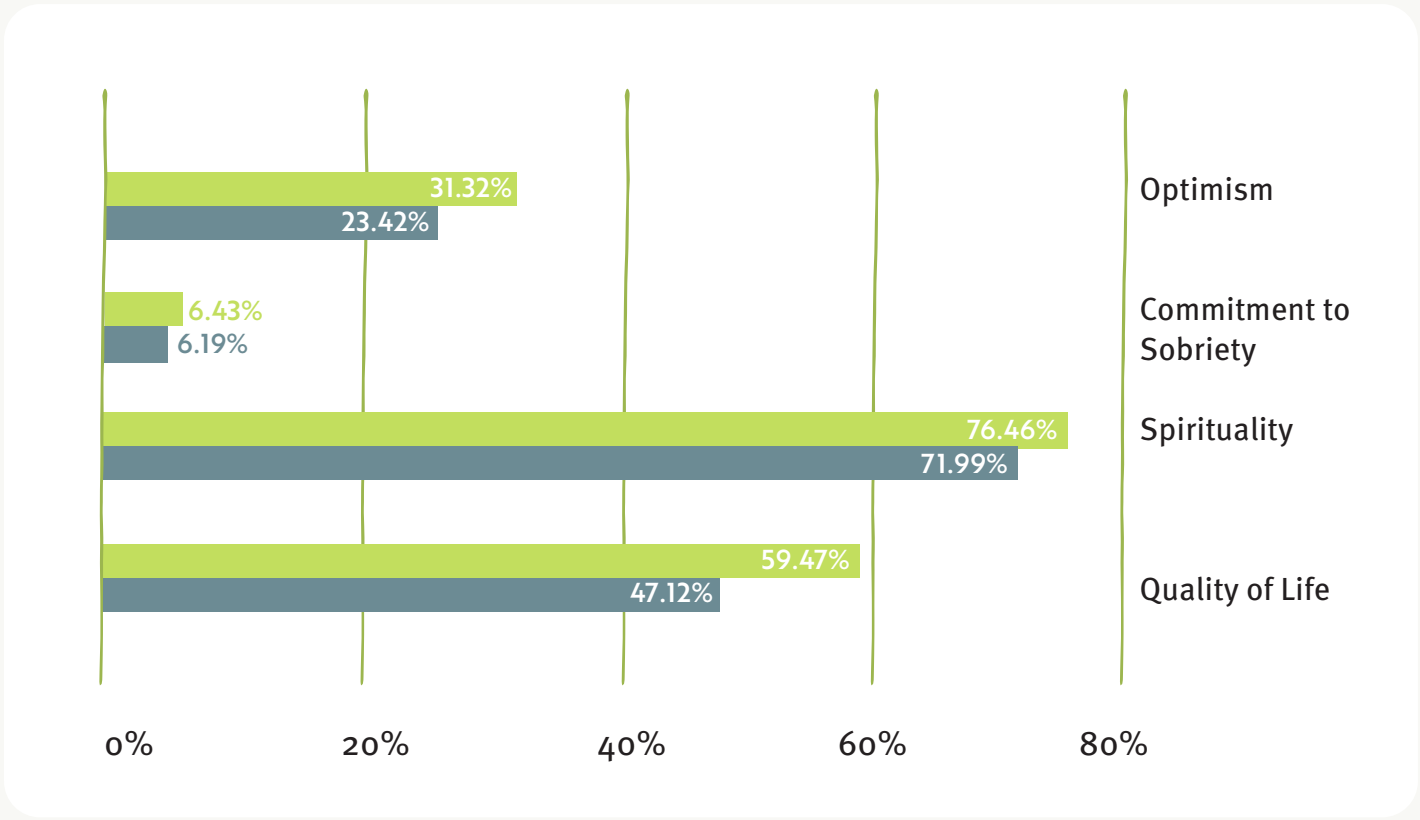


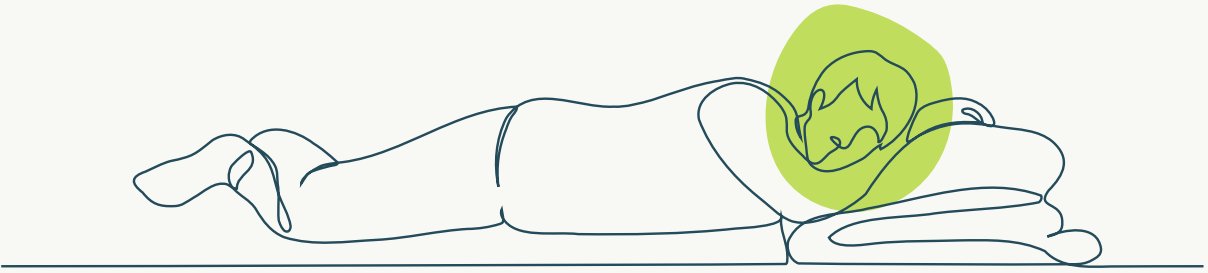
On average,
female inpatients experienced a 49.49% decrease in depressive symptoms throughout the course of residential treatment.

IMPROVEMENTS IN RESILIENCE

The table shows significant improvements in resilience factors for patients enrolled in our inpatient program, except commitment to sobriety. Commitment to sobriety, defined as the extent to which an individual is motivated to change in the context of recovery [3]. This lack of improvement suggests the need to further evaluate the factors that drive motivation and prioritize implementing therapeutic tactics which address commitment to sobriety.

INPATIENT INCREASE IN RESILIENCE



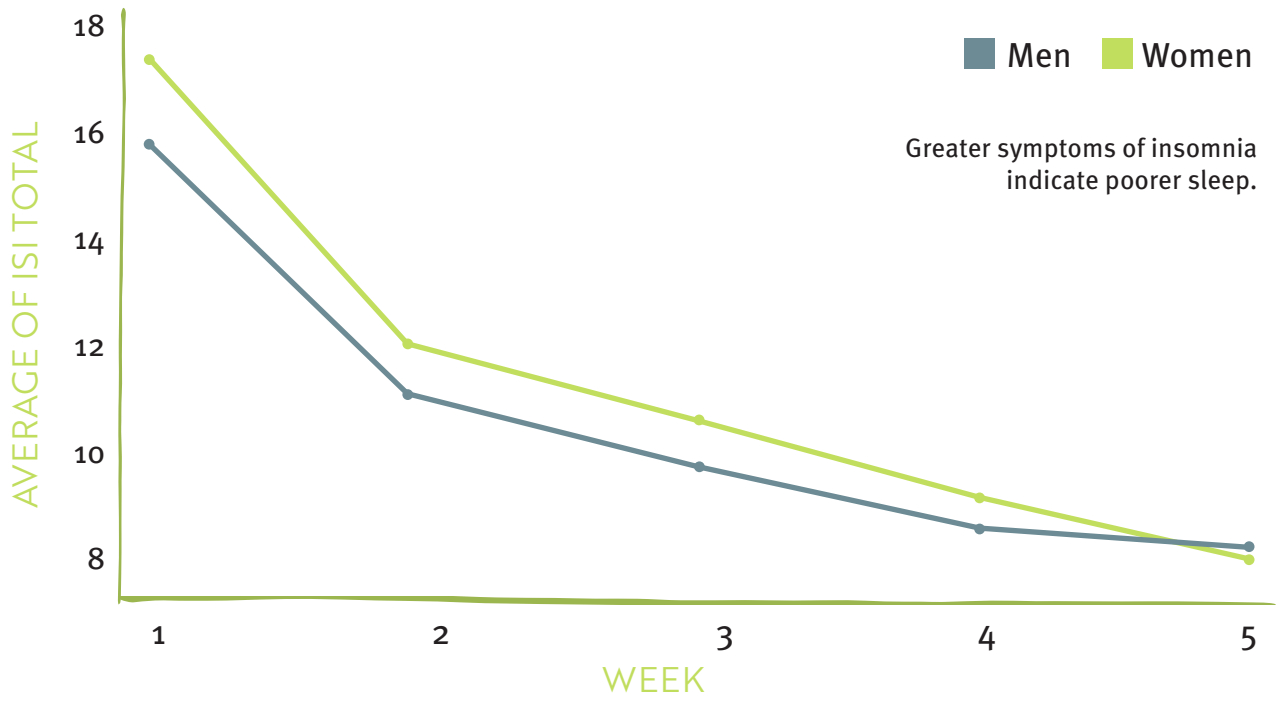


SLEEP CHANGES

Poor sleep in early recovery from Substance Use Disorders (SUDs) is a persistent and widespread challenge, significantly increasing the risk of relapse and overdose [4, 5]. To address this critical issue, our research program prioritizes understanding the complexities affecting sleep quality. We have begun by analyzing biometric data from smartwatches worn by consenting participants (n=169) in residential and extended care treatment. Our future plans aim to use this data to develop and inform sleep-focused therapeutic interventions.

As expected, initial findings reveal a concerning trend. The average sleep duration (Total Sleep Time, TST) is low, at approximately 6.35 hours per night, with high variability (standard deviation of 1.45 hours). Additionally, TST showed significant fluctuations of around 3.3 hours during the first week of treatment. We are actively analyzing this data to uncover the factors influencing these sleep changes and look forward to sharing further insights as we advance our understanding in this crucial area.

In conjunction with objective sleep data, our patient population completed surveys at regular intervals assessing insomnia symptoms and their impact on daily functioning via the Insomnia Severity Index (ISI). The data (n=574) focused on patients with clinically significant insomnia symptoms (ISI score ≥ 15) at admission. During the first 4 weeks of treatment, the average patient experienced a 47% reduction in insomnia symptoms, suggesting notable improvement in perceived sleep quality during treatment.



POST DISCHARGE OUTCOMES

Following discharge, patients (N=1178) were surveyed once per month for one year. The average patient was age 45, 35.06% of patients were female and 80.98% were standard discharges. These surveys assessed patient mental health progress, support group engagement and recovery outcomes.

AT 6 MONTHS POST-DISCHARGE

• The data shows consistently low craving for both drugs and alcohol (averaging below 3 and 2 per month respectively) across the follow-up period. This suggests patients are managing their craving effectively and not feeling overpowered by urges to use.

• Patients reported sustained high levels of life satisfaction (7.52) and quality of life (8.43) (VAS 0-10), indicating continued contentment with their sober lifestyle.

• **83.23%** report that they have found a sponsor.

• **61.35%** report active involvement in the 12-steps which enhances accountability and personal growth.

• **49.4%** report participating in routine individual therapy which offers personalized support.

At both 3 and 6 months following discharge, a substantial number of patients with alcohol and other substance use disorders report maintaining complete abstinence.

COMPLETE ABSTINENCE

3 MONTHS

Primary Alcohol **77.72%**

Primary Drug **79.35%**

6 MONTHS

Primary Alcohol **71.83%**

Primary Drug **71.05%**

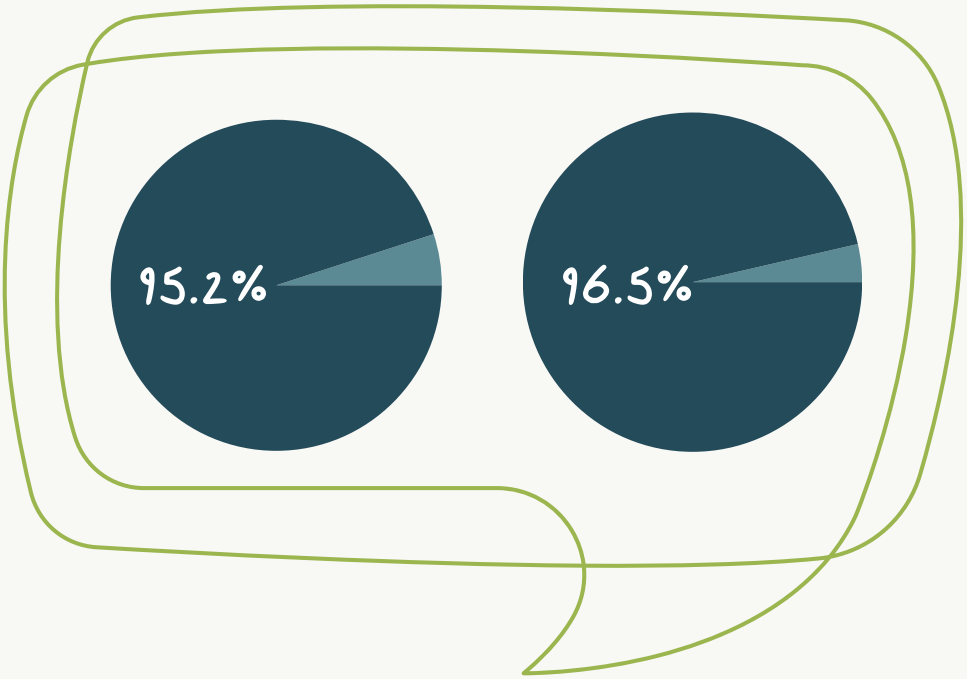
PATIENT SATISFACTION

In addition to clinical outcomes, standardized measurement of patient satisfaction is crucial for optimizing our treatment environment, as research suggests significant positive relationship between satisfaction, treatment retention and outcomes [6].

95.2% patients would recommend Ashley to a friend or family member suffering from substance use disorder

and

96.5% patients felt that they had received tools necessary for recovery goals



ACADEMIC KEY FINDINGS

(see appendix for full list of publications)

SEX DIFFERENCES IN DEPRESSIVE SYMPTOMS

We conducted a secondary analysis (N=16) that examined the effects of sex and depressive symptoms on daily withdrawal and craving among persons in medically managed treatment for opioid use disorder. This subset included patients that completed medically managed withdrawal at Ashley (vs. elsewhere) and had a sufficient number of assessments within the period of observation (i.e., >2).

WHAT WE'VE FOUND

• Both self-reported symptoms of withdrawal and craving declined throughout the course of residential treatment.

• Self-reported withdrawal was higher among women than men. Depressive symptoms were associated with withdrawal severity among women, but not men.

WHY IT MATTERS

• Depressive symptoms during withdrawal may increase desire to use opioids during opioid withdrawal, among men and women.

• Depressive symptoms that emerge during opioid withdrawal should be measured, monitored and treated.

PROTRACTED FENTANYL CLEARANCE IN OUD PATIENTS

This study was one of the first (n=12) examinations of how long fentanyl persists in the body of people with opioid use disorder enrolled in residential treatment.

WHAT WE'VE FOUND

• Fentanyl clearance in individuals with opioid use disorder (OUD) who regularly use fentanyl takes significantly longer than the typical 2-4 day clearance of other short-acting opioids.

• The median time for fentanyl and norfentanyl clearance was 7.3 and 13.3 days, respectively, with one participant testing positive for up to 19 days for fentanyl and 26 days for norfentanyl.

WHY IT MATTERS

• This protracted clearance can contribute to difficulties with buprenorphine inductions for patients using fentanyl, potentially causing precipitated withdrawal.

• It may also extend opioid withdrawal and post-withdrawal symptoms, impacting the course of treatment.

APPENDIX

RESOURCES

[1] Craske, M. G., & Stein, M. B. (2016). Anxiety disorders and substance use disorders: Co-occurrence, mechanisms, and treatment approaches. Dialogues in clinical neuroscience, 18(3), 251-263. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4355945/

[2] Boyd, K. A., Compton, M. T., Grant, B. F., & Blanco, C. (2014). Psychotherapy for anxiety disorders complicated by substance use disorders. Evidence-based practice in psychiatry, 7(1), 1-27. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3753025/

[3] Kelly, J. F., & Greene, M. C. (2014). Beyond motivation: Initial validation of the commitment to sobriety scale. Journal of Substance Abuse Treatment, 46(2), 257-263. https://doi.org/10.1016/j.jsat.2013.06.010

[4] Brower, K. J., & Perron, B. E. (2010). Sleep disturbance as a universal risk factor for relapse in addictions to psychoactive substances. Medical Hypotheses, 74(5), 928-933. https://doi.org/10.1016/j.mehy.2009.10.020

[5] Huhn, A. S., & Finan, P. H. (2022). Sleep disturbance as a therapeutic target to improve opioid use disorder treatment. Experimental and Clinical Psychopharmacology, 30(6), 1024-1035. https://doi.org/10.1037/pha0000477

[6] Bjertnaes, O., Haugland, A. K., & Lintdal, H. (2017). Reliability and validity of the Patient Experiences Questionnaire for Interdisciplinary Treatment for Substance Dependence – Continuous Electronic Measurement (PEQ-ITSD – CEM). BMC Health Services Research, 17(1), 73. https://bmchealthservres. biomedcentral.com/articles/10.1186/s12913-023-10506-7

FULL LIST OF STANDARD ASSESSMENTS COLLECTED VIA TRAC9

- **Anxiety – Penn State Worry Questionnaire**
  - *Meyer TJ, Miller ML, Metzger RL, Borkovec TD: Development and Validation of the Penn State Worry Questionnaire. Behaviour Research and Therapy 28:487-495,1990.*
- **Commitment – Commitment to Sobriety**
  - *Kelly, J. F., & Greene, M. C. (2014). Beyond motivation: Initial validation of the Commitment to Sobriety Scale. Journal of Substance Abuse Treatment, 46(2), 257-263. doi:10.1016/j.jsat.2013.06.010*
- **Depression – Center for Epidemiological Studies Depression**
  - *Radloff, L. (1977). "The CES-D Scale: A Self Report Depression Scale for Research in the General." Applied psychological measurement 1(3): 385-401.*
- **Optimism – Life Orientation Test Revised**
  - *Carver, C. S., Scheier, M. F., & Segerstrom, S. C. (2010). Optimism. Clinical Psychology Review, 30, 879-889.*
- **Spirituality – Religious Background and Behavior Questionnaire**
  - *Adapted from the Religious Background and Behavior Questionnaire. Connors, G. J.,*

Tonigan, J. S., & Miller, W. R. (1996). A measure of religious background and behavior for use in behavior change research. Psychology of Addictive Behaviors, 10(2), 90-96. doi: 10.1037/0893-164X.10.2.90

- **Stress – Perceived Stress Scale**
  - *S. Cohen and G.M. Williamson, Perceived stress in a probability sample of the United States. In: S. Spacapan and S. Oskamp, Editors, The Social Psychology of Health, Sage, Newbury Park, CA (1988), pp. 31–67.*
- **Quality of Life – Quality of Life in Addiction Recovery**
  - Adapted from Laudet, A. L. (2009). Don't Wanna Go Through That Madness No More: Quality of Life Satisfaction as Predictor of Sustained Remission from Illicit Drug Misuse. Substance Use & Misuse, 44(2), 227-252.
- **Verbal Craving – Various by DOC**
- **Alcohol - Alcohol Urge Questionnaire**
  - Bohn, M. J., Krahn, D. D., & Staehler, B. A. (1995). Development and initial validation of a measure of drinking urges in abstinent alcoholics. Alcoholism: Clinical and Experimental Research,19(3), 600–606.
- **Benzodiazepine - Alcohol Urge Questionnaire Adapted***
- **Cocaine - Cocaine Craving Questionnaire**
  - Heinz, A. J., Schroeder, J. R., Epstein, D. H., Singleton, E. G., Heishman, S. J., & Preston, K. L. (2006). Heroin and cocaine craving and use during treatment: Measurement validation and potential relationships. Journal of Substance Abuse Treatment, 31(4), 355–364.
- **Heroin - Heroin Craving Questionnaire**
  - Heinz, A. J., Schroeder, J. R., Epstein, D. H., Singleton, E. G., Heishman, S. J., & Preston, K. L. (2006). Heroin and cocaine craving and use during treatment: Measurement validation and potential relationships. Journal of Substance Abuse Treatment, 31(4), 355–364.
- **Marijuana – Marijuana Craving Questionnaire**
  - Heishman, S. J., Evans, R. J., Singleton, E. G., Levin, K. H., Copersino, M. L., & Gorelick, D. A. (2009). Reliability and validity of a short form of the Marijuana Craving Questionnaire. Drug and Alcohol Dependence, 102(1-3), 35–40.
- **Methamphetamine - Alcohol Urge Questionnaire Adapted***
- **Opioids – Heroin Craving Questionnaire****
- **Visual Craving – Images rated by scale**

LIST OF CURRENT PUBLICATIONS FOR RESEARCH CONDUCTED AT ASHLEY

Ellis, J. D., Han, D., Mayo, J. L., Huhn, A. S. (2024). The association of pain impact and sleep disruption with opioid withdrawal during opioid-use disorder treatment. British Journal of Clinical Pharmacology, DOI: 10.1111/bcp.16022.

The study investigates the relationship between pain impact, sleep disturbance, opioid withdrawal, and craving in 24 individuals undergoing residential opioid use disorder (OUD) treatment. Results show that higher pain impact correlates with increased withdrawal severity throughout treatment, particularly in its early stages, while sleep disturbances are linked to both withdrawal and craving, with stronger effects observed early on. The findings highlight the importance of addressing pain impact and sleep disturbances as potential targets for improving OUD treatment outcomes through novel pharmacotherapies and adjunctive interventions.

Hochheimer, M., **Strickland, J. C**., Rabinowitz, J. A., **Ellis, J. D.**, Bergeria, C. L., **Hobelmann, J. G**., & **Huhn, A. S.** (2023). The impact of opioid-stimulant co-use on tonic and cue-induced craving. Journal of Psychiatric Research, 164, 15-22.

This study investigates the craving dynamics among 1,974 individuals in 55 residential substance use treatment centers in the United States in 2021, focusing on those primarily using opioids, methamphetamine, or cocaine. Results indicate that individuals with primary methamphetamine or cocaine use exhibit lower tonic craving compared to those primarily using opioids, while primary cocaine use also correlates with lower cue-induced cravings. However, opioid-methamphetamine polysubstance users experience heightened tonic and cue-induced cravings, suggesting the need for tailored interventions targeting craving to mitigate relapse risks and improve treatment outcomes for this population.

Ellis, J. D., Rabinowitz, J. A., **Strickland, J. C**., Skandan, N., **Hobelmann, J. G.**, Finan, P. H., & **Huhn, A. S.** (2023). Latent patterns of sleep disturbance, pain impact, and depressive symptoms in residential substance use treatment. Drug and alcohol dependence, 248, 109903.

The study aimed to uncover distinct subgroups among 8,621 individuals in residential substance use treatment in 2020 and 2021 in the United States based on their patterns of pain, sleep disturbance, and depressive symptoms. Through longitudinal analysis, four classes were identified, with individuals experiencing high levels of pain, depressive symptoms, and sleep disturbance more likely to be older, use opioids as their primary substance, exhibit high distress intolerance, and have a higher likelihood of treatment discontinuation. These findings underscore the importance of addressing physical health conditions comprehensively, especially among older adults, and suggest distress intolerance as a potential target for intervention to alleviate co-occurring symptoms in substance use disorder treatment

Rabinowitz JA, **Ellis JD**, Wells J, **Strickland JC**, Maher BS, **Hobelmann JG**, **Huhn AS**. Correlates and Consequences of Anxiety and Depressive Symptom Trajectories During Early Treatment for Alcohol Use. Alcohol, https://doi.org/10.1016/j.alcohol.2022.11.005.

The study examined the association between latent trajectories of anxiety and depressive symptoms and treatment attrition among 6,197 individuals seeking treatment for alcohol use. Through analysis of data from 78 addiction treatment centers, distinct trajectories of anxiety and depressive symptoms were identified during the first month of treatment. Those experiencing persistently high levels of anxiety and depressive symptoms were more likely to drop out of treatment, emphasizing the importance of addressing these symptoms early on to improve treatment outcomes. Additionally, demographic and clinical factors such as gender, age, benzodiazepine use, and past heroin use were found to influence the trajectory of symptoms, suggesting the need for tailored interventions based on individual characteristics.

Ware OD, **Ellis JD**, Dunn KE, **Hobelmann JG**, Finan P, **Huhn AS**. The association of chronic pain and opioid withdrawal in men and women with opioid use disorder. Drug and Alcohol Dependence 2022; 240 https://doi.org/10.1016/j.drugalcdep.2022.109631.

The study aimed to investigate the impact of chronic pain and gender on opioid withdrawal severity among individuals with opioid use disorder (OUD). Using data from 1,252 individuals entering residential addiction treatment facilities, it was found that at intake, withdrawal was higher in women and those with chronic pain, and this trend persisted across subsequent timepoints. These findings suggest the need for earlier engagement in treatment and potentially more intensive strategies to manage opioid withdrawal, particularly for women and individuals with chronic pain.

Strickland JC, Marks KR, Smith KE, **Ellis JD**, **Hobelmann JG**, **Huhn AS**. Patient perceptions of higher dose naloxone nasal spray for opioid overdose. International Journal of Drug Policy 2022; 106: https://doi.org/10.1016/j.drugpo.2022.103751.

This study examined patient perceptions of higher-dose naloxone formulations for opioid overdose reversal, addressing concerns about patient acceptance and precipitated withdrawal risks. Among 1,152 patients entering treatment for opioid use disorder at one of 49 addiction treatment facilities located across the United States, a majority expressed no preference or favored higher-dose formulations, particularly in scenarios involving personal overdose experiences. These findings provide crucial insights for policymakers and healthcare providers, emphasizing the importance of patient perspectives in decision-making regarding naloxone distribution and utilization amidst evolving opioid overdose landscapes.

Bergeria CL, Tan H, Antoine D, Weerts EM, **Huhn AS**, **Hobelmann JG**, Dunn, KE. A double-blind, randomized, placebo-controlled, pilot clinical trial examining buspirone as an adjunctive medication during buprenorphine-assisted supervised opioid withdrawal. Exp Clin Psychopharmacol 2022; doi: 10.1037/pha0000550.

This study investigated the efficacy of buspirone as an adjunctive medication to buprenorphine-assisted opioid withdrawal in individuals with opioid use disorder (OUD). Conducted as a double-blind randomized clinical trial with 15 participants, results showed that buspirone significantly decreased opioid withdrawal symptoms, particularly during the first and second weeks of stable buspirone use. Additionally, participants reported improvements in sleep duration and latency to sleep onset, suggesting that buspirone may offer unique benefits during protracted withdrawal periods, thus aiding in the successful management of opioid withdrawal and potentially improving long-term treatment outcomes for individuals with OUD.

Ellis JD, Rabinowitz JA, Wells J, Liu F, Finan PH, li DGA, **Hobelmann JG**, **Huhn AS**. Latent trajectories of anxiery and depressive symptoms among adults in early treatment for nonmedical use. J Affect Disord 2022; 299:223-232.

This study analyzed anxiety and depressive symptom trajectories during the initial month of treatment for opioid use disorder (OUD) among individuals who screened positive for depression (N = 3,016) and/or anxiety (N = 2,779) at intake from 86 addiction treatment facilities. Three distinct trajectories were identified for both anxiety and depression symptoms, ranging from persistent moderate-to-severe symptoms to remitting severe symptoms and persistent minimal-to-mild symptoms. Persistent moderate-to-severe symptoms were associated with female gender and heavy past-month benzodiazepine co-use, suggesting targeted interventions may improve mental health outcomes in early OUD treatment, particularly for high-risk individuals.

Hobelmann JG, **Huhn AS**. Comprehensive pain management as a frontline treatment to address the opioid crisis. Brain Behav 2021; e2369. Htpps://doi.org/10.1002/brb3.2369

The literature review underscores the ongoing severity of the opioid crisis and the limited impact of current strategies aimed at reducing prescription opioid-related deaths. It highlights the effectiveness of comprehensive pain recovery programs, which integrate various therapeutic approaches to address individual needs and specific pain diagnoses, potentially reducing reliance on opioids and preventing opioid use disorder. Despite their historical prominence, financial challenges have hindered the sustainability of these programs, suggesting a need for renewed focus on their expansion and revitalization as a frontline strategy in combating chronic pain within the context of the opioid crisis.

Varshneya NB, Thakrar AP, **Hobelmann JG**, Dunn KE, **Huhn AS**. Evidence of buprenorphine-precipitated withdrawal in persons who use fentanyl. Journal of Addiction Medicine 2021. doi: 10.1097/ADM.0000000000000922

This study investigates the incidence of buprenorphine-precipitated withdrawal in 1,679 individuals who use fentanyl, a phenomenon not yet clinically established. Findings reveal significantly increased odds of severe withdrawal symptoms when individuals use buprenorphine within 24 hours or 24 to 48 hours after fentanyl use, underscoring the specificity of this effect to buprenorphine. This highlights the necessity for further research to enhance buprenorphine induction strategies and better understand the pharmacokinetics of non-medical fentanyl use.

Yi, C.M., **Huhn, A.S.**, **Hobelmann, J.G.**, Finnerty, J., Solounias, B., & Dunn K.E. Integration of Patient-reported Outcomes Assessment into Routine Care for Patients Receiving Residential Treatment for Alcohol and/or Substance Use Disorder. Journal of Addiction Medicine 2021; doi: 10.1097/ADM.0000000000000927.

This study introduced patient-reported outcome measures into a residential treatment program, assessing demographics, drug use history, and physical and mental health. The results assessed from 961 participants revealed correlations between alcohol/opioid use and poorer health outcomes, with improvements observed over time, suggesting the feasibility of integrating outcome monitoring into clinical operations to personalize treatment plans.

Huhn AS, **Hobelmann JG**, Strain E, **Oyler GA**. Protracted Renal Clearance of Fentanyl in Persons with Opioid Use Disorder. Drug and Alcohol Dependence 2020; 214:e108147, https://doi.org/10.1016/j.drugalcdep.2020.108147

The study investigated fentanyl clearance in 12 individuals with opioid use disorder (OUD) admitted to residential treatment, finding that the clearance time for fentanyl and its metabolite, norfentanyl, averaged 7.3 and 13.3 days respectively, notably longer than other short-acting opioids. These findings shed light on challenges in buprenorphine induction for fentanyl users and emphasize the necessity for deeper understanding of fentanyl's pharmacokinetics during opioid withdrawal.

Huhn AS, **Hobelmann JG**, Strickland JC, **Oyler GA**, Bergeria CL, Umbricht A, Dunn KE. Differences is availability and use of medications for opioid use disorder in residential treatment settings in the United States. JAMA Network Open. 2020;3(2):e1920843.doi:10.1001/jamanetworkopen.2019.20943.

This study examined the availability and utilization of medications for opioid use disorder (MOUDs) in 2,863 residential treatment facilities and 232,414 admissions in the United States in 2017, finding that MOUDs were underutilized, particularly in states that did not expand Medicaid. Facilities not offering MOUDs were less likely to provide other psychiatric medications, have proper licensing or accreditation, and more likely to accept only cash payments, indicating potential barriers to accessing comprehensive treatment for individuals with opioid use disorder. Efforts to improve MOUD availability and use in residential facilities could significantly enhance treatment outcomes for those initiating recovery from opioid use disorder.

Huhn, AS, **Hobelmann JG**, **Ramirez A**, Strain EC, **Oyler GA**. Trends in first-time treatment admissions for older adults with Alcohol Use Disorder: Availability of medical and specialty clinical services in hospital, residential, and outpatient facilities. Drug and Alcohol Dependence. 2019 Oct 205: https://doi.org/10.1016/j.drugalcdep.2019.107694.

This study analyzed trends in 3,606,948 individuals seeking first-time treatment for AUD with alcohol as their primary drug of choice in the U.S. from 2004 to 2017, finding a significant increase in the proportion of older adults seeking treatment during this period. The majority of older adults sought treatment in outpatient and residential facilities, which were less likely to offer specialized clinical services such as supervised detoxification and psychiatric medications compared to hospital-based facilities. These findings indicate a gap in providing comprehensive and tailored care for older adults with AUD in substance abuse treatment facilities.

Ellis JD, Mayo JL, **Finan PH**, Gamaldo CE, **Huhn AS**. Clinical correlates of drug-related dreams in opioid use disorder. American Journal on Addictions 2021; 31: doi:10.1111/ajad.13219.

This study investigated drug-related dreams among 154 individuals with opioid use disorder (OUD), finding that those who recalled such dreams were more likely to experience sleep disturbances, including poorer sleep quality and insomnia symptoms. Additionally, post-dream craving and distress were associated with insomnia symptoms, poor sleep hygiene behaviors, and higher levels of anxiety. These findings suggest that addressing co-occurring issues such as OUD, pain, sleep disturbances, and anxiety could enhance overall well-being in this population.

Ellis JD, Mayo JL, **Gamaldo CE**, Finan PH, **Huhn AS**. Worsening sleep quality across the lifespan and persistent sleep disturbances in persons with opioid use disorder. J Clin Sleep Med. 2022 Feb 1;18(2):587-595. doi: 10.5664/jcsm.9676. PMID: 34569924; PMCID: PMC8805005.

This study examined sleep patterns in 154 individuals with opioid use disorder (OUD), finding that participants reported a decline in sleep quality over their lifespan. Factors such as female sex, multiple treatment episodes, and positive screens for chronic pain and insomnia were associated with persistent sleep disturbance. The findings highlight the importance of routine screening for sleep disturbances and chronic pain in OUD treatment, emphasizing the need for interventions targeting these co-occurring conditions.