Ashley
Everything for Recovery

HEALING, MEASURED & MEANINGFUL

OUTCOMES REPORT BY ASHLEY ADDICTION TREATMENT

TABLE OF CONTENTS

Research drives innovation—and innovation saves lives. At Ashley Addiction Treatment, we invest in data, outcomes, and evidence-based practices because we believe recovery should be both effective and deeply personal.

This report pairs proven results from those we serve—
scribbled notes of progress, moments of clarity,
and hope backed by science.

HEALING, MEASURED & MEANINGFUL

WHO WE ARE

Ashley Addiction Treatment has helped more than 70,000 individuals reclaim their lives from substance use disorder since our founding in 1983. We combine evidence-based clinical care with deep compassion and spiritual grounding. Through our growing research department and academic partnerships—including faculty collaborations with Johns Hopkins—we are shaping a future of recovery that is personalized, measurable, and effective

RESEARCH MISSION

To conduct rigorous and consequential research, to widely disseminate the outcomes, and to use the findings to deliver exceptional care that saves and transforms lives.

WHY RESEARCH MATTERS

At Ashley, research is not an add-on—it's central to everything we do.

We believe that effective care begins with listening and learning. Measurement is how we listen; research is how we learn—so we can provide better care. It's how we help people get well sooner—and stay well longer.

Unfortunately, addiction treatment research has long been underfunded and underdeveloped. Too often, treatment has been guided by philosophy rather than science—like treating hypertension without ever checking blood pressure. We're changing that.

FOR PATIENTS

We use real-time data and patient feedback to personalize treatment—addressing not just addiction, but the emotional, physical, and social challenges that can stand in the way of recovery.

FOR ASHLEY

Research helps us refine and strengthen our programs—so every group session, medication, or therapeutic activity serves a clear, evidence-based purpose.

FOR THE FIELD

By collaborating with world-class researchers from **Johns Hopkins** and other institutions, we help shape the future of addiction care, ensuring our findings benefit patients everywhere, not just those here at Ashley.

IN SHORT: WE RESEARCH BECAUSE IT MAKES OUR CARE BETTER—AND BECAUSE BETTER CARE SAVES LIVES.

CORE RESEARCH AREAS

Our research program advances our mission through three key areas:

Independent Research

We conduct independent quality improvement studies using data from our care systems to continually enhance programs and patient care.
Example: Tracking outcomes from new medication-assisted therapies or studying how cravings change during treatment.

Academic Partnerships

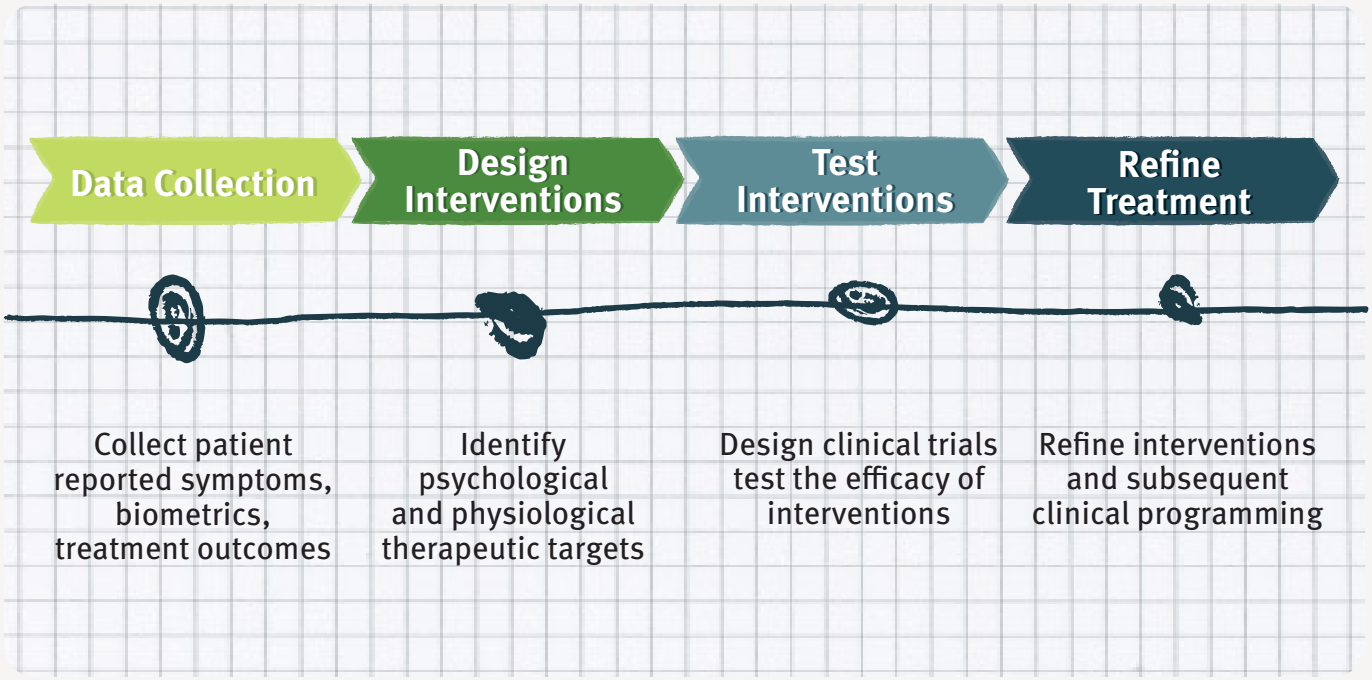
We collaborate with leading faculty from Johns Hopkins University, who design clinical and observational studies aimed at improving addiction treatment. Ashley serves as the study site, and these experts provide scientific guidance, regulatory oversight (including IRB access), and support publication in peer-reviewed journals.
Example: Testing sleep interventions to improve recovery outcomes.

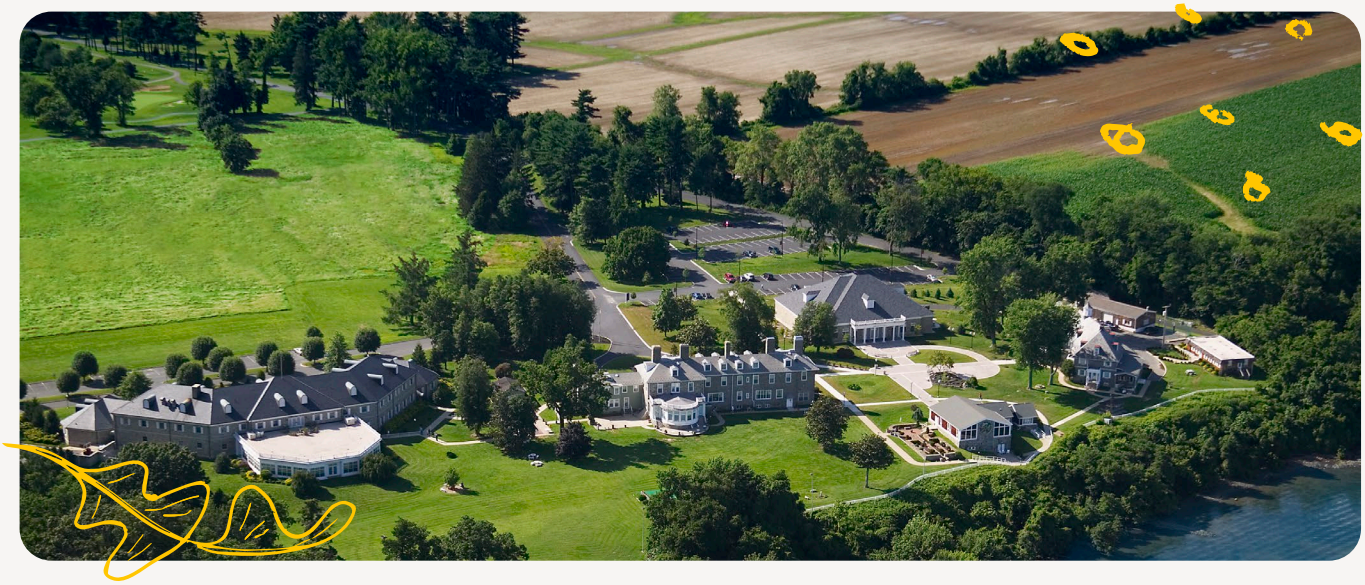
Research Collaborations

We work with academic institutions and industry partners on projects that align with Ashley's mission, contributing to advancements in addiction science on a national and global scale.

WHY IT MATTERS: Our research efforts directly drive better care. They make recovery safer, more supportive, and more sustainable—for every patient we serve.

These efforts all work together as a process to move treatment forward:





WHAT WE MEASURE

At Ashley, we care for adults with substance use disorders, many of whom also face mental health challenges like anxiety, depression, and trauma. Every person's recovery needs are unique, so our approach is never one-size-fits-all.

In 2024, we focused on tracking priority areas that matter most for sustainable recovery. We measure these using validated clinical assessments (see appendix for full list of scales) and wearable health technology:

1. Early Recovery Needs

We've reframed "risk factors" into essential needs for early recovery:

- Relief from anxiety and depression
- Reduction in stress
- Support to reduce cravings
- Restoration of trust, safety, and belonging

WHY IT MATTERS: Focusing on needs—not deficits—helps us deliver affirming, effective care that feels relevant to each patient's journey.

2. Building Resilience

Recovery isn't just about symptom reduction—it's about building strength. We help patients cultivate:

- Optimism about the future
- Meaning and purpose through spiritual engagement
- Improved quality of life and well-being
- Sustained commitment to sobriety

WHY IT MATTERS: Patients who build resilience leave treatment with tools for long-term success in recovery.

3. Personalized Care Through Data

Real-time analysis of patient-reported outcomes helps us deliver the right care at the right time. Examples include:

- Matching patients to groups for stronger group cohesion and therapeutic alliance
- Offering specialized groups for anxiety, depression, trauma, and grief
- Providing targeted support for patients with physical pain or other health conditions

WHY IT MATTERS: No two patients have the same journey. Our data-driven approach helps us customize care for each individual.

4. Group Cohesion & Therapeutic Alliance

We track how connected patients feel in group therapy using validated scales (GSRS & ARM-5).

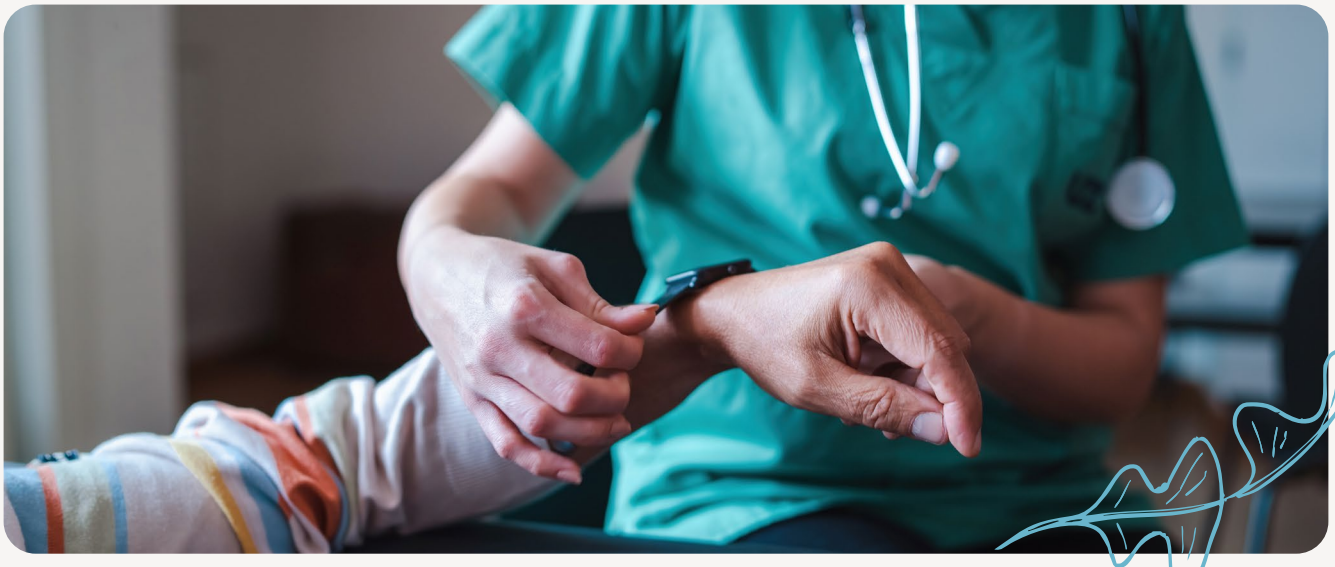
WHY IT MATTERS: Feeling safe, supported, and heard in group therapy improves personal growth, accountability, and healing.

5. Digital Biometrics

With the help of wearable technology, consenting patients track their sleep, physical activity, and cardiovascular health throughout treatment.

Since 2022, 282 patients have taken part in this initiative.

WHY IT MATTERS: Sleep disturbances are common—and often disruptive—in early recovery. By combining objective biometric data with patient-reported symptoms, we're building a powerful dataset to design, test, and implement targeted physical health interventions. These efforts help us personalize treatment to improve sleep, boost energy, and support overall well-being.



ACADEMIC STUDIES IN PROGRESS

- **Cognitive decline in older adults with alcohol use disorder**
- **Insomnia medication for patients on medication-assisted therapy for opioid use disorder**
- **Safety and efficacy of GLP-1s and Naltrexone in early recovery**

WHY IT MATTERS: These cutting-edge studies directly lead to new, improved treatment strategies for the patients we serve today—and those we will serve tomorrow.

"AT OUR CORE, WE ARE IN THE KNOWLEDGE BUSINESS — WE STRIVE TO LEARN, TREAT, AND TEACH."

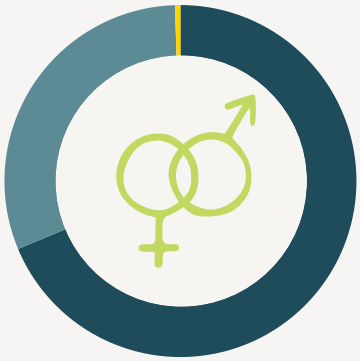
- Dr. Eric C. Strain, M.D., Board Member

WHO WE SERVE

INTERNAL RESEARCH HIGHLIGHTS 2024

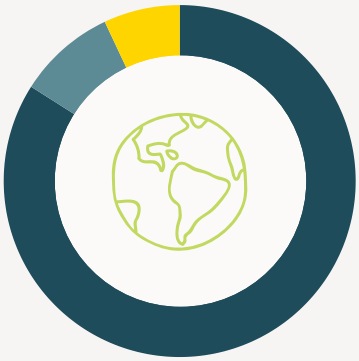
In 2024, we collected data from 1,726 unique patients and 1,965 treatment episodes. To date, we have collected over 16,000 unique patient report outcomes assessments. This data acts as a pool of information that we can use to ask questions and retrieve real-time answers.

Findings are drawn from the complete inpatient sample (N = 1,236)



GENDER

- Male (68.69%)
- Female (30.81%)
- Non-binary (0.49%)



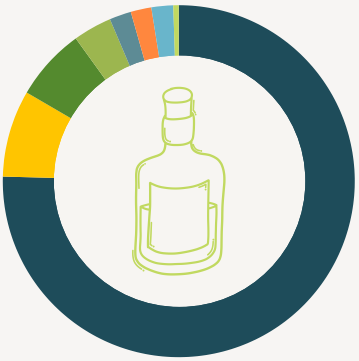
RACE

- White (84%)
- African American (9%)
- Other (7%)

7%
of our patients are US Veterans.

43
is the average age of our patients.

56%
of our patients report the use of nicotine products.



DRUG OF CHOICE

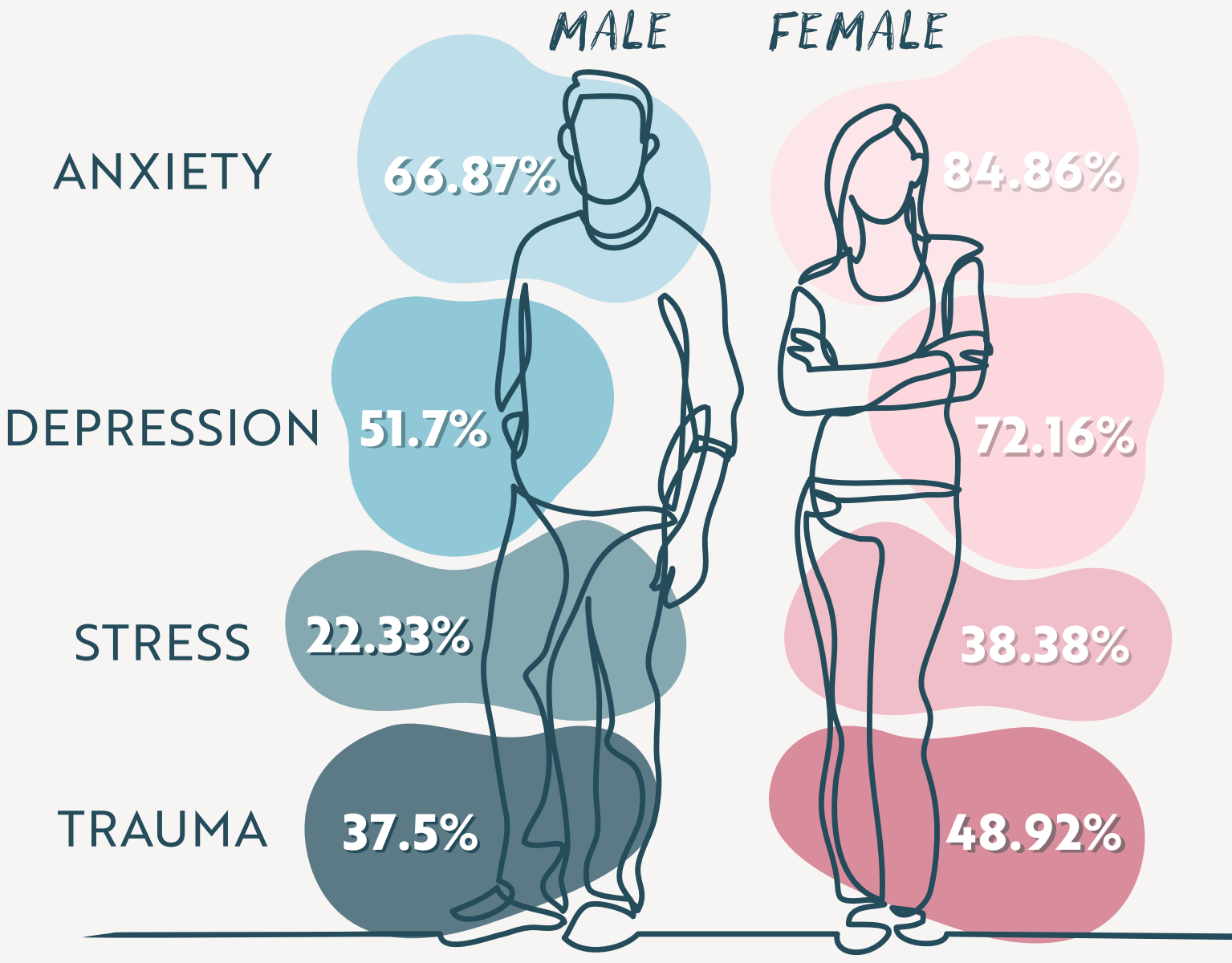
- Alcohol
- Opioids
- Cocaine
- Marijuana
- Heroin
- Benzodiazepines
- Methamphetamine
- Stimulants

DISCHARGE STATUS

- Standard Discharge
- Against Clinical Advice (ACA) Discharge
- Transfer Facility
- Administrative Discharge

78% of patients successfully complete their recommended treatment, demonstrating high levels of patient engagement and program effectiveness—key predictors of sustained recovery and improved long-term outcomes.

Upon intake, we have consistently found that females report experiencing more severe symptoms in each of the following areas, but that these symptoms decrease at a rate slightly faster than that rate of their male counter parts.



Additionally, 36.5% of females and 25.7% of males reported having been diagnosed with an eating disorder at some point in their lives.

INTERNAL RESEARCH HIGHLIGHTS

ADDRESSING EARLY RECOVERY NEEDS

Anxiety

WHAT THIS MEANS FOR YOU

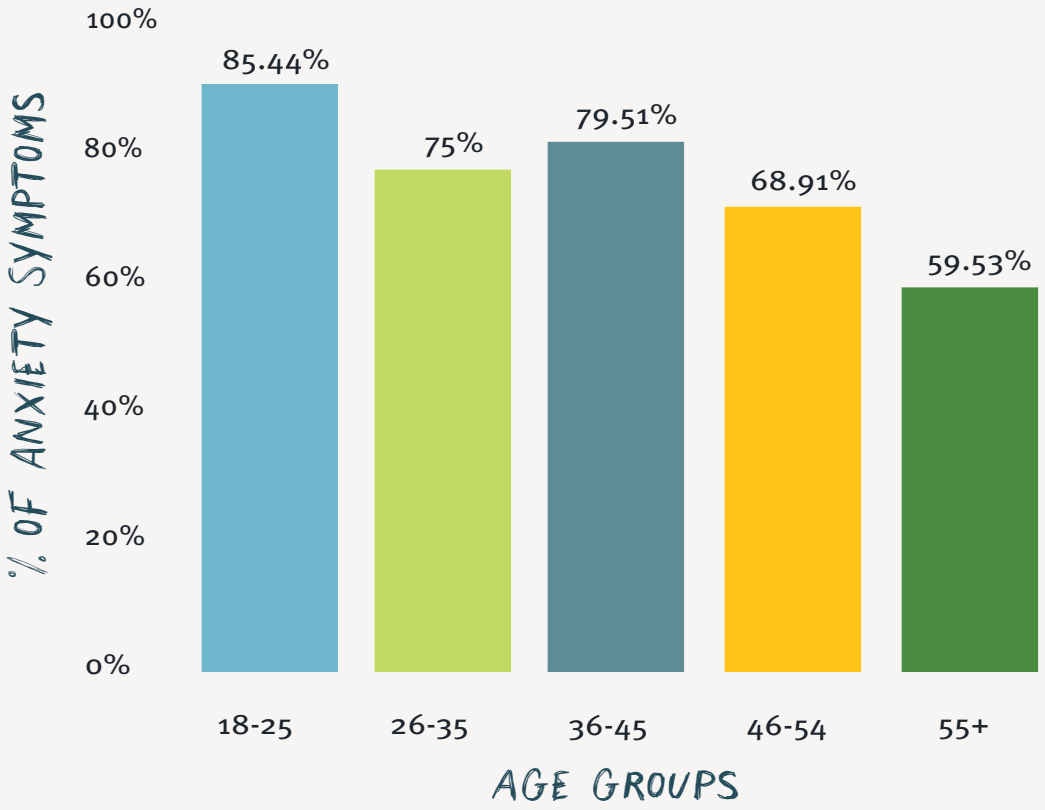
Anxiety is a common companion for many individuals beginning addiction treatment, particularly for younger adults. For example:

- If you're between 18 and 25, nearly 9 out of 10 people your age (85.44%) enter treatment with clinically significant anxiety.

- By the time they leave Ashley, that number drops significantly to approximately 2 out of 10 (23.00%).

Anxiety can feel overwhelming in early recovery, but **our data demonstrates that it profoundly improves with treatment.** Our comprehensive care model directly addresses anxiety, helping patients manage these symptoms effectively so they can fully engage in building a healthy, lasting recovery.

BASELINE PROPORTION OF EACH AGE GROUP WITH HIGH SYMPTOMS OF ANXIETY



KEY FINDINGS ON ANXIETY REDUCTION

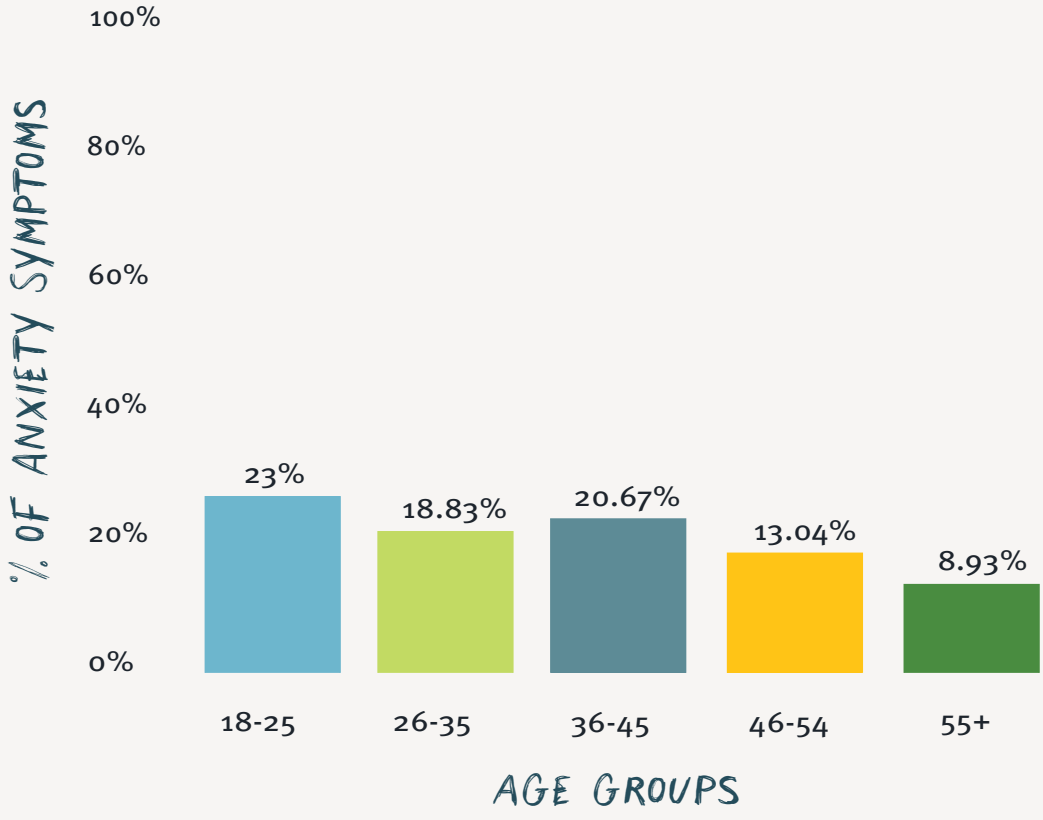
High Prevalence at Intake: Most patients reported clinically significant anxiety at admission, with the highest levels among young adults (18-25: **85.44%**).

Consistent Treatment Effect Across Ages: By Week 4, anxiety prevalence fell to **~9-23%** across all age groups, representing **74-85% relative reductions.**

Older Adults Show Greatest Proportional Relief: Patients 55+ dropped from **59.53% to 8.93%** (an **85% reduction**), demonstrating particularly strong gains in this age group.

WHY IT MATTERS: Anxiety can significantly interfere with the healing process in recovery. Our findings confirm that at Ashley, anxiety gets demonstrably better. We use this real-time information to tailor care, helping each individual find relief, stay actively engaged in treatment, and develop the emotional resilience vital for long-term recovery.

WEEK 4 PROPORTION OF EACH AGE GROUP WITH HIGH SYMPTOMS OF ANXIETY



Depression

WHAT THIS MEANS FOR YOU

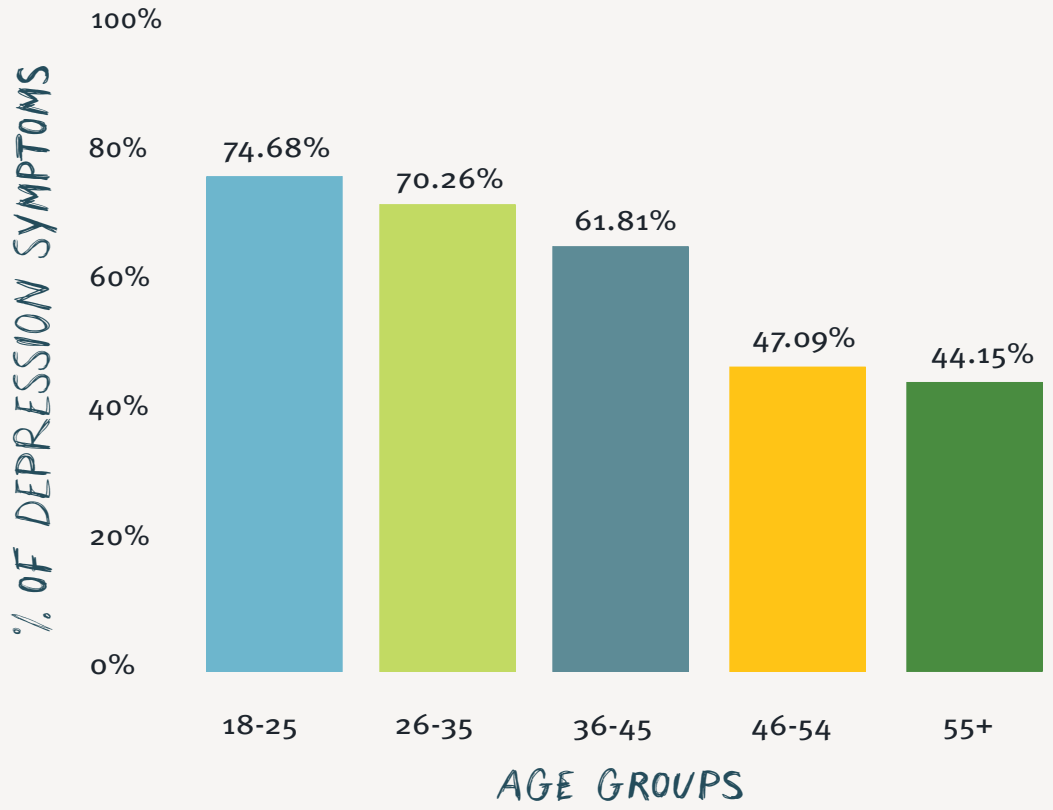
Depression is a significant hurdle for many entering addiction treatment, affecting individuals across all age groups. For example:

- If you're between 18 and 25, nearly 7.5 out of 10 people your age (74.68%) begin treatment with clinically significant depression.

- By the time they leave Ashley, that number drops to approximately 3 out of 10 (33.00%).

While feeling depressed in early recovery can be isolating, our data proves it is a common and highly treatable aspect of the healing journey. Our comprehensive care model at Ashley is specifically designed to help patients manage depression, fostering emotional well-being and supporting a focused path to lasting recovery.

BASELINE PROPORTION OF EACH AGE GROUP WITH HIGH SYMPTOMS OF DEPRESSION



KEY FINDINGS ON DEPRESSION REDUCTION

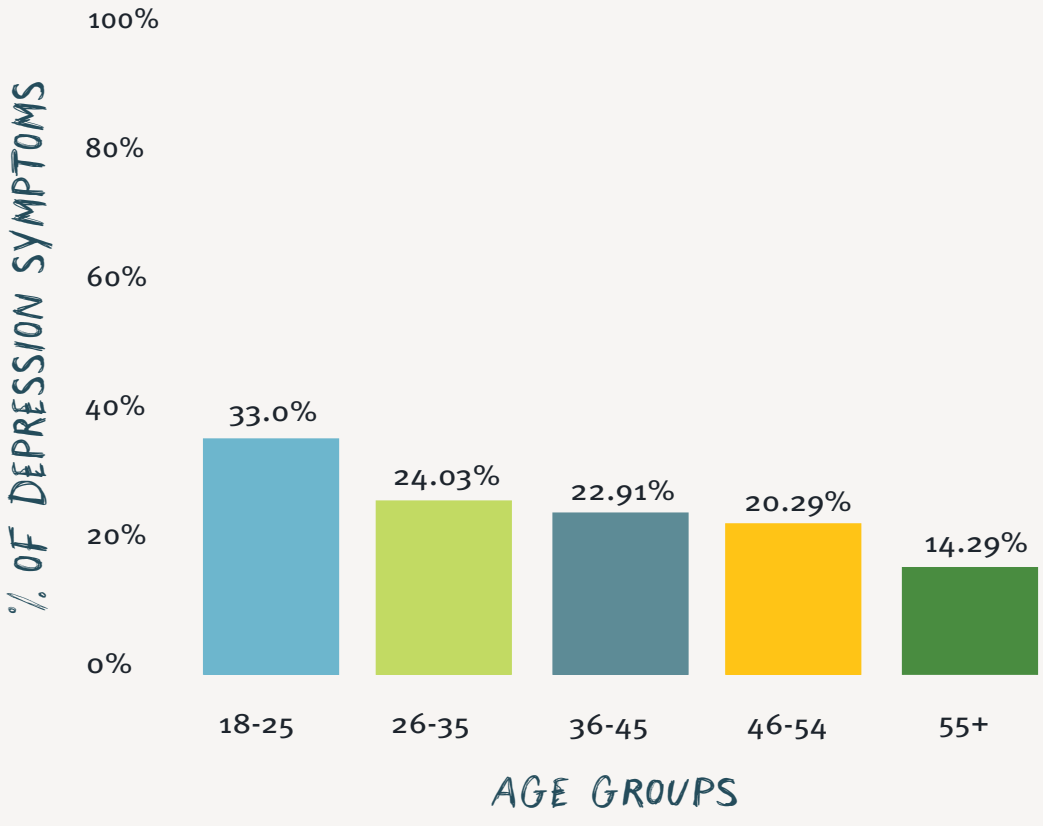
Common Across All Ages at Admission: Depression affected most patients, with the highest rates in young adults (18-25: **74.68%**).

Marked Improvement During Treatment: By Week 4, prevalence dropped to **~14-33%**, representing **56-68% reductions** across age groups.

Largest Proportional Gains in Older Adults: Patients 55+ improved from **44.15% to 14.29%** (a **67.6% reduction**), showing the most progress relative to baseline.

WHY IT MATTERS: Depression can severely impede the recovery process, making it difficult to engage in treatment and build a new life. At Ashley, we recognize and actively work to alleviate depressive symptoms. We leverage these insights to provide individualized support, helping each patient find relief, remain engaged in their care, and cultivate the long-term emotional resilience crucial for sustained sobriety.

WEEK 4 PROPORTION OF EACH AGE GROUP WITH HIGH SYMPTOMS OF DEPRESSION



Stress

WHAT THIS MEANS FOR YOU

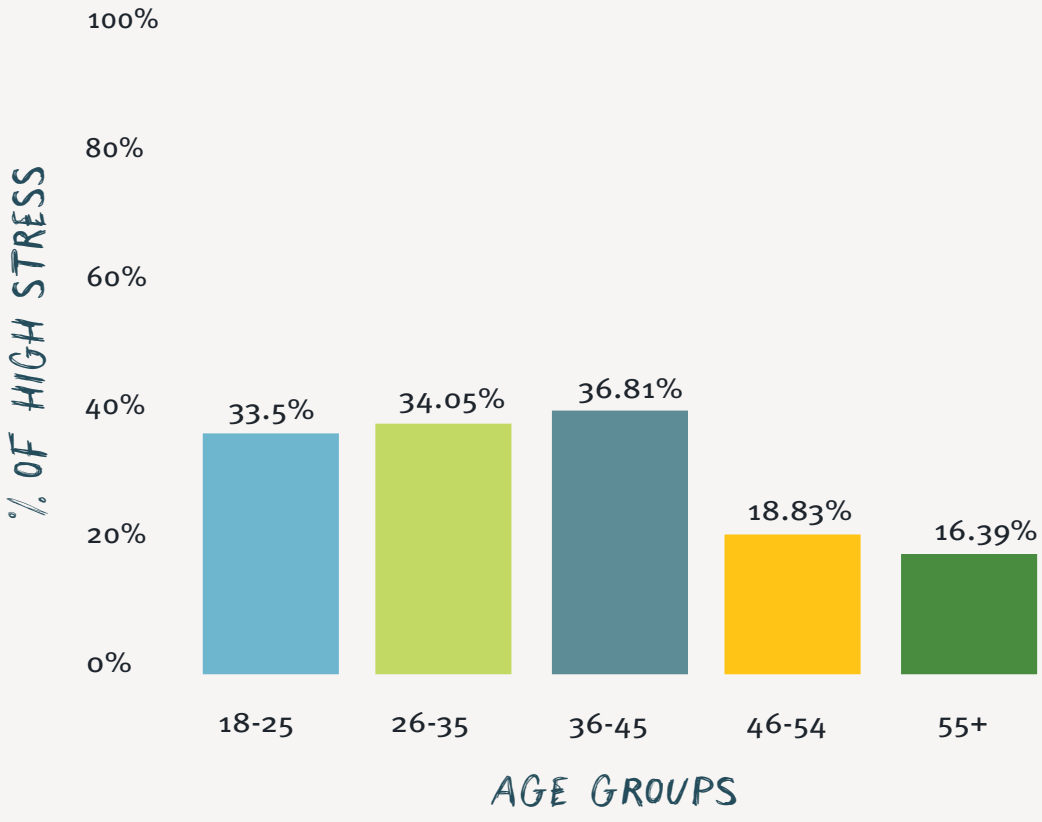
Stress is an undeniable part of life, and for those entering addiction treatment, it can be particularly overwhelming. For example:

- If you're between 18 and 25, about 3 out of 10 people your age (33.54%) report high stress levels when starting treatment.

- By the time they leave Ashley, that number drops dramatically to less than 1 out of 10 (4.30%).

Effectively managing stress is vital for successful recovery. Our evidence-based approach helps patients develop robust coping mechanisms and significantly reduce stress, allowing them to better focus on their healing and build a strong foundation for a healthier, more balanced future.

BASELINE PROPORTION OF EACH AGE GROUP WITH HIGH SYMPTOMS OF STRESS



KEY FINDINGS ON STRESS REDUCTION

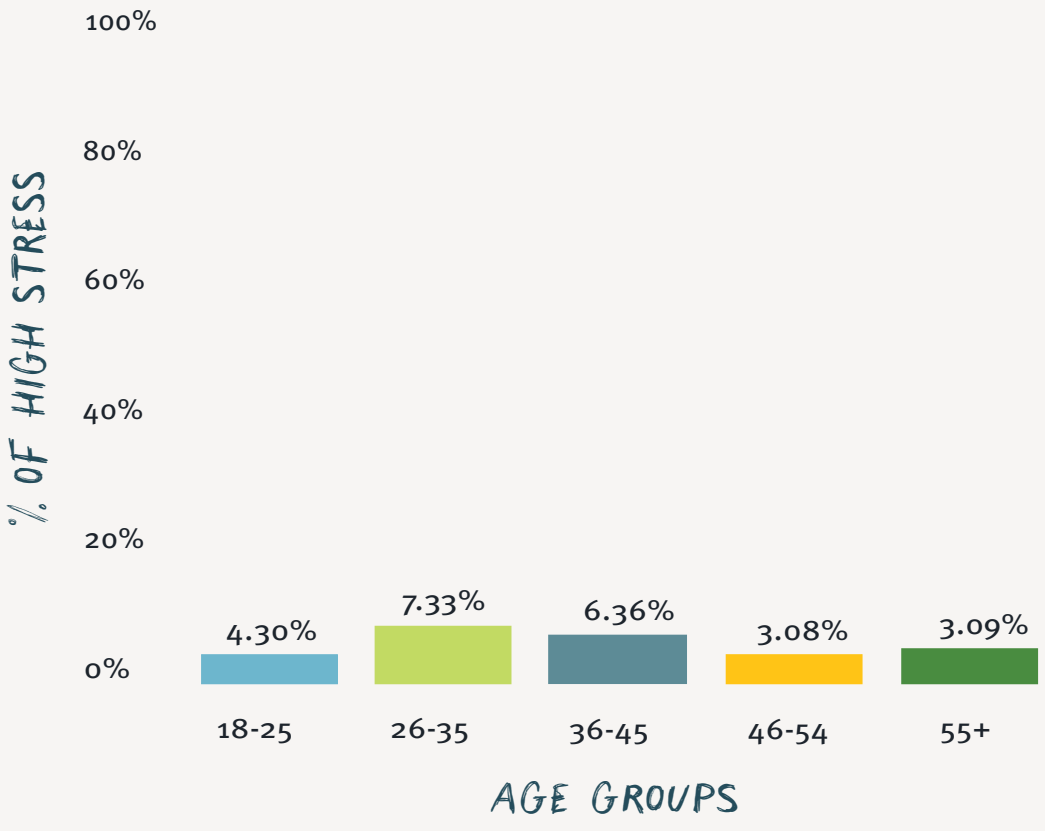
Moderate Prevalence at Admission: Stress was less common than anxiety or depression but still affected a sizable minority, peaking in ages 36-35 (**36.81%**).

Steepest Relative Improvement of all Symptoms: By Week 4, stress prevalence dropped to **~3-7%**, with **relative reductions of ~79-87%**.

Largest Proportional Gains in Older Adults: Patients 18-25 declined from 33.54% to 4.30% (an 87.2% reduction), the largest proportional drop among all age groups.

WHY IT MATTERS: Unmanaged stress is a significant trigger for relapse and can hinder a patient's ability to engage fully in treatment. At Ashley, we equip patients with effective strategies to mitigate stress, recognizing its critical role in sustained recovery. By addressing stress in real-time, we empower individuals to gain control over their emotional landscape, fostering deeper engagement in treatment and building the resilience needed for long-term well-being.

WEEK 4 PROPORTION OF EACH AGE GROUP WITH HIGH SYMPTOMS OF STRESS



BUILDING RESILIENCE

A Study by: Mark Hushen, M.Div., M.A., VP of Spiritual Care & Wellness

At Ashley, recovery encompasses more than symptom reduction; it's about cultivating a holistic sense of well-being, with spirituality as a cornerstone. We define spirituality as the various activities, practices, routines, and principles that foster peace of mind, meaning, purpose, and connection.

Our comprehensive approach offers diverse opportunities for spiritual growth, from access to our campus's natural beauty, exercise, yoga, and mindfulness meditation, to chapel services, spiritual counseling, and a variety of recovery support groups like Twelve-Step Facilitation, Recovery Dharma, and SMART Recovery.

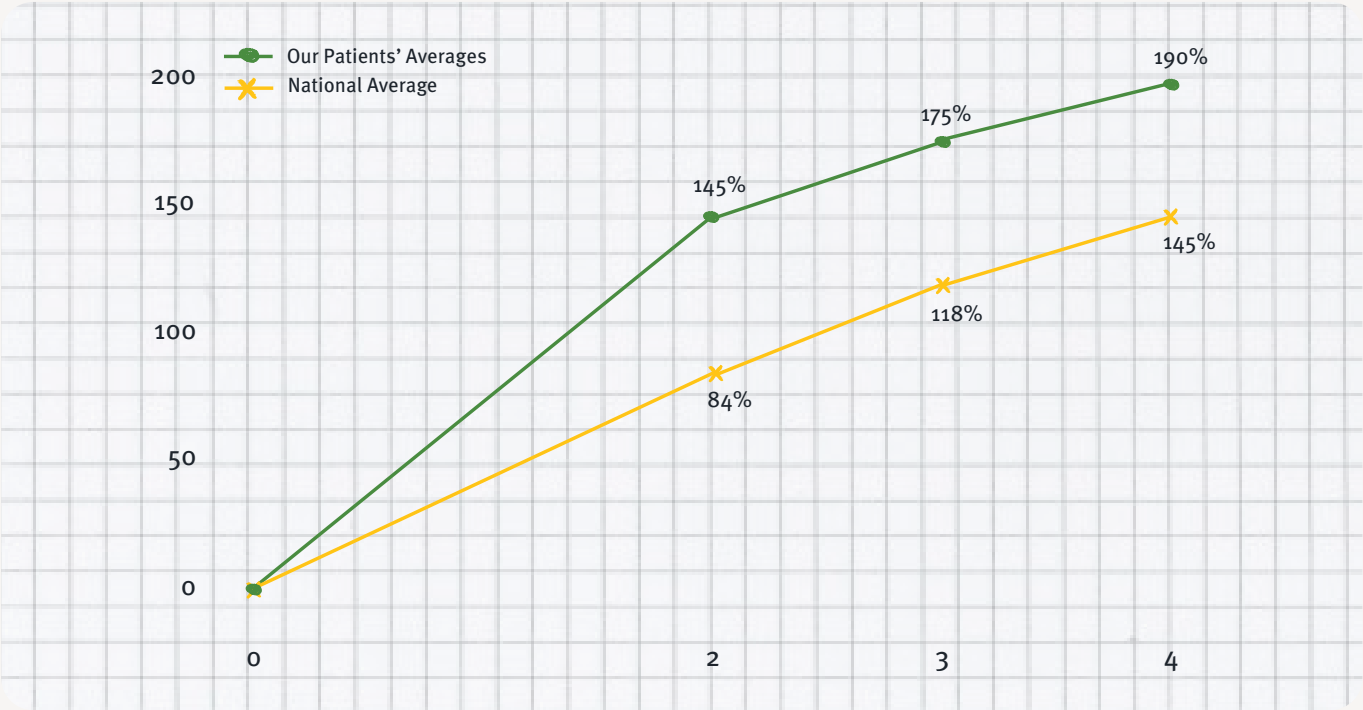
As Hushen emphasizes, spirituality is vital for sustained, healthy recovery, acting as a powerful catalyst for:

- **Decreased suffering:** reducing depression, anxiety, stress, and cravings.
- **Brain & Mind Health:** promoting neuroplastic changes and training the mind to be present, addressing feelings of powerlessness.
- **Connection & Happiness:** fostering positive social networks and authentic happiness rooted in lived values.
- **Resilience:** increasing optimism, motivation, cognitive coping skills, and physiological balance (e.g., increased oxytocin, balanced dopamine/serotonin).

WHAT THIS MEANS FOR YOU

Our integrated approach yields exceptional results in fostering spiritual well-being. Patients at Ashley experience significantly accelerated progress in spiritual practices compared to national benchmarks.

PERCENTAGE INCREASE IN SPIRITUAL PRACTICES BY WEEK (%)



(Please note: All patients begin at 0% for "percentage increase" at baseline, as this represents the starting point from which all changes are measured.)

KEY FINDINGS ON SPIRITUAL GROWTH

The impact of our spiritual program is clear in our patient outcomes. Compared to the national average, which is based on data from approximately 250 other treatment providers, Ashley patients show dramatically greater engagement in spiritual practices during treatment.

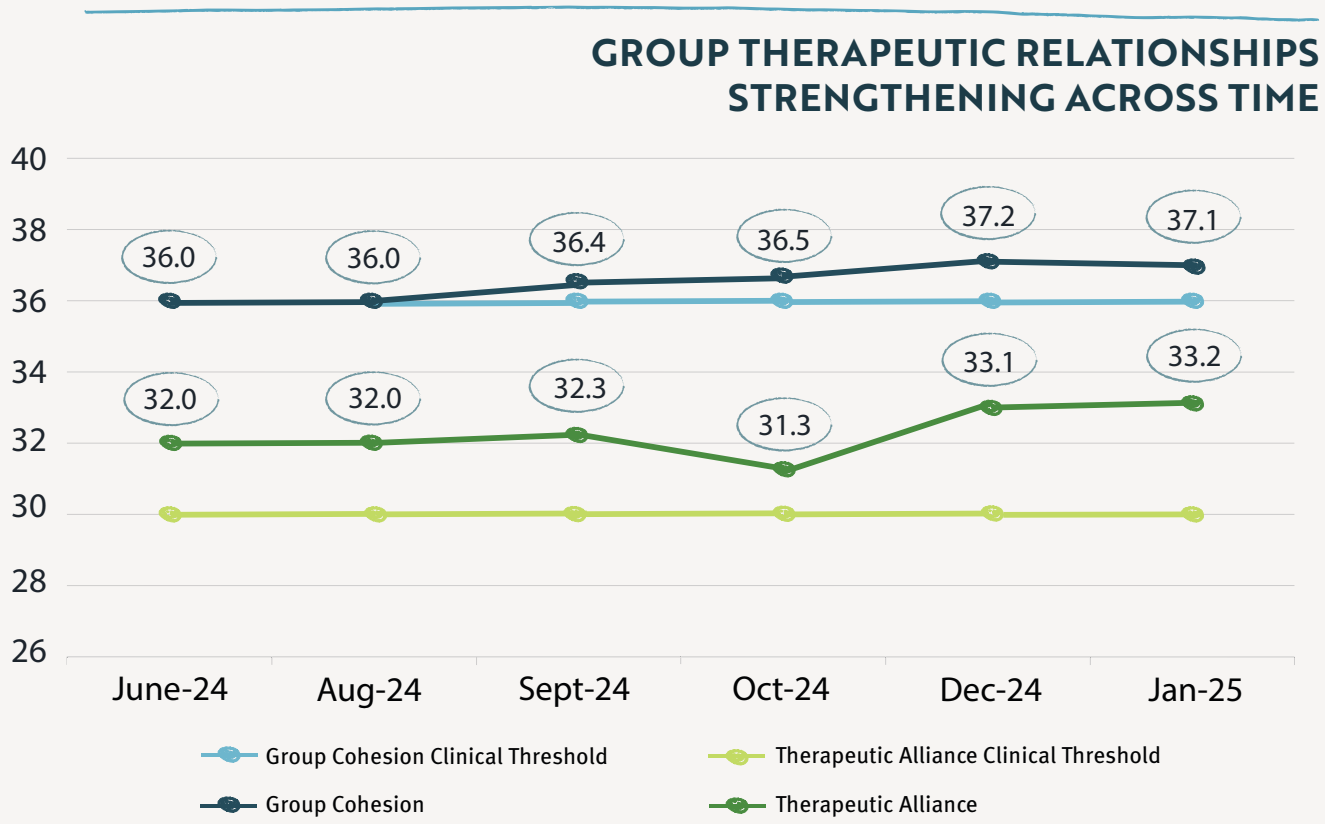
- **Exceptional Growth:** Our patients achieve a remarkable 198% increase by Week 4, demonstrating rapid and profound engagement.
- **Outperforming National Benchmarks:** This significantly surpasses the national average's- by the end of Week 4, Ashley patients show a 53% greater increase in spiritual practices, highlighting the unique effectiveness of our spiritual programming.

WHY IT MATTERS: This significant growth in spiritual practices underscores Ashley's commitment to holistic recovery. It provides patients with essential tools for lasting peace, resilience, and connection, acting as a powerful buffer against relapse and a foundation for a truly fulfilling life in sobriety.

GROUP COHESION AND THERAPEUTIC ALLIANCE

A Study by: Wendy Insalaco, PhD, LCADC, LCPC, Director of Quality Outcomes and Model of Care

Effective group therapy and strong therapeutic relationships are foundational to successful treatment. Our ongoing internal research rigorously tracks these vital components of our care model.



KEY FINDINGS ON GROUP THERAPEUTIC RELATIONSHIPS

- Since routine measurement began last spring, **group therapeutic relationships have consistently strengthened over time.**
- Both the **GSRS (Group Cohesion) and ARM-5 (Therapeutic Alliance)** scales have remained at or above established cutoff scores, indicating healthy group dynamics and patient-therapist bonds.
- Importantly, **both group cohesion and therapeutic alliance outcomes have steadily increased throughout the year**, reflecting continuous improvement in these critical areas of our program.

WHY IT MATTERS: The sustained strengthening of group cohesion and therapeutic alliance highlights the effectiveness of our group therapy modalities and the skill of our clinical staff. These strong relationships foster an environment of trust and support, which is essential for personal growth, accountability, and healing in recovery.

UNDERSTANDING PATIENT EXPERIENCE

A Study by: Wendy Insalaco, PhD, LCADC, LCPC, Director of Quality Outcomes and Model of Care

Directly analyzing patient satisfaction data, such as our Senior and Female Patient Satisfaction reports, offers crucial benefits that directly enhance the patient experience and their recovery journey. By understanding the specific needs and preferences of different patient groups, Ashley can fine-tune its services, ensuring care is optimally delivered for all demographics. This targeted insight allows for continuous, evidence-based refinement of programs, fostering enhanced patient engagement, greater comfort, and ultimately, improved therapeutic outcomes leading to sustained recovery.

Senior Patient Satisfaction (Age 55+)

Our analysis indicates that senior patient satisfaction overall matched or exceeded that of younger patients. Specifically, senior patients reported higher satisfaction with Nursing care, Counseling, group therapeutic relationships, and their understanding of continuing care recommendations. They also expressed greater satisfaction with transportation services, environmental comfort and cleanliness, food quality, and a heightened sense of safety and security. These positive experiences were closely linked to educational opportunities, supportive interactions with staff, and strong social connections. These findings affirm that Ashley effectively meets the specific needs and preferences of our senior patient population.

Female Patient Satisfaction

Our analysis reveals important distinctions in satisfaction for female patients. They showed significantly higher engagement in spiritual counseling and physical wellness therapies (93% participation), and higher satisfaction with Mental Wellness and Social Wellness programs. Overall, female patient satisfaction was most closely linked to the quality of the care environment (housekeeping, comfort, and culinary offerings), supportive interactions with staff (nursing and medical teams), and access to spiritual care. This data provides actionable insights for enhancing the female patient experience and ensuring consistently high-quality care.

TRACKING RECOVERY POST DISCHARGE

Understanding long-term recovery outcomes is crucial for evaluating treatment effectiveness. To this end, patients were surveyed monthly for one year following discharge (N=795 patients; average age 45, 38.62% female, 78.24% completed standard discharge). These post-discharge surveys, which rely on patient self-report, assessed mental health progress, support group engagement, and recovery outcomes.

KEY FINDINGS AT 3 MONTHS POST DISCHARGE

Data from three months post-discharge indicates sustained positive outcomes:

- **Sustained Well-being:** Patients reported consistently high levels of **life satisfaction (78%)** and **quality of life (82%)** (scores above 7 on a VAS 0-10), suggesting continued adaptation to their sober lifestyle.
- **Engagement in Recovery Support:** A substantial number of patients maintained active involvement in recovery support: **80% reported having a sponsor, 61% participated in 12-step programs,** and **50% engaged in routine individual therapy.**
- **Abstinence Rates:** A significant proportion of patients reported maintaining complete abstinence from their primary substance: **81.44% for primary alcohol** and **85.92% for primary drug use disorders.**

WHY IT MATTERS: The data indicates that patients are equipped with the tools and connections necessary for continued well-being and abstinence after leaving treatment. This information is vital for continually refining our programs to foster lasting recovery.

ACADEMIC RESEARCH HIGHLIGHTS

The Association of Pain Impact and Sleep Disruption with Opioid Withdrawal During Opioid-Use Disorder Treatment

A study conducted at Ashley in 24 volunteers examined whether opioid withdrawal and opioid craving were stronger after nights of worse sleep. We also examined whether opioid withdrawal and opioid craving were higher when people were more impacted by pain. Finally, we tested the stability of these relationships across the course of treatment.

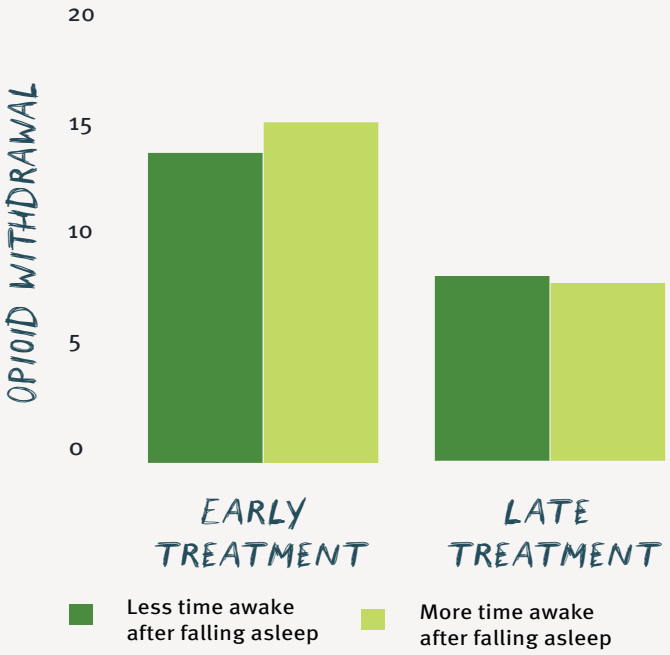
WHAT WE FOUND:

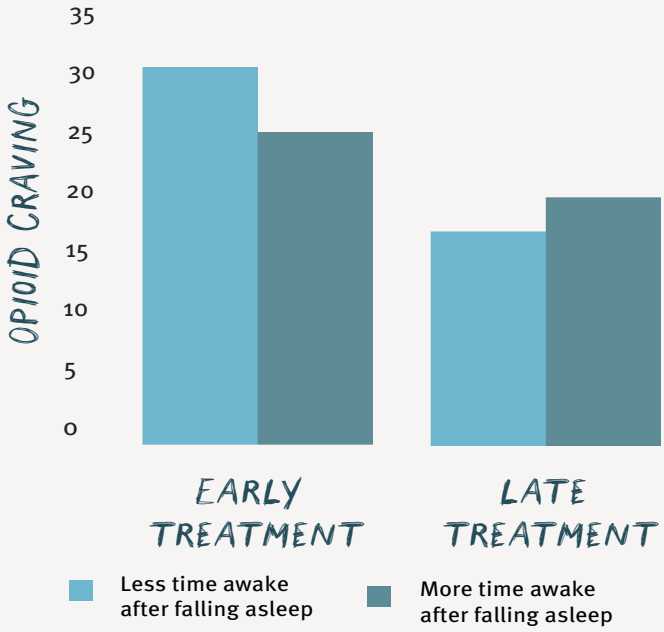
- After nights of more time awake and more frequent awakenings, people had worse withdrawal symptoms and stronger craving the next day.
- On days when people had worse pain, they also had stronger opioid withdrawal.
- These relationships were strongest during the earliest parts of treatment.

WHY IT MATTERS:

These results highlight that:

- Sleep continuity is highly impactful in treatment.
- Sleep and pain should be considered in treatment planning.
- That managing sleep disruption and pain may be particularly relevant in early treatment.





Ecological Momentary Assessment of Craving, Mood, and Treatment Engagement in Patients With Opioid and Alcohol Use Disorders

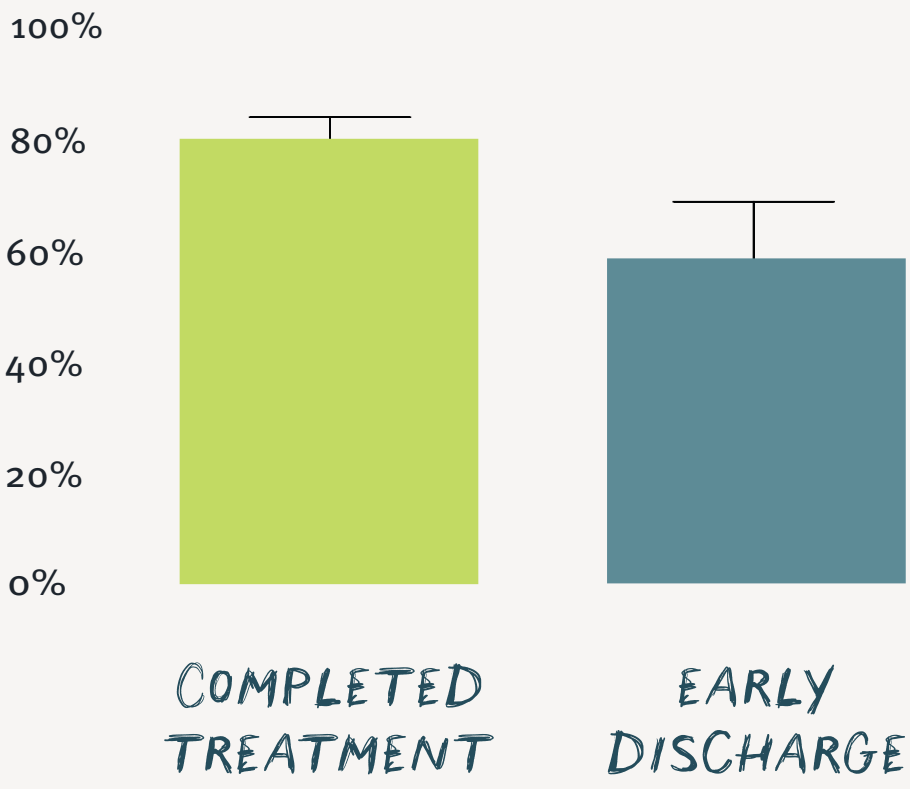
We conducted an innovative momentary assessment study to predict outcomes among patients enrolled at Ashley with opioid or alcohol use disorder (N=63). Patients were asked to complete momentary assessments (e.g., answer frequent daily prompts for ratings using a cell-phone based app) of their mood, craving, and decision-making throughout their residential treatment stay.

WHAT WE FOUND:

- Patients with opioid use disorder reported higher overall craving levels but demonstrated a greater reduction over time compared to participants with alcohol use disorder.
- Engagement in activities like positive social experiences while in treatment at Ashley predicted lower craving and greater treatment engagement.

WHY IT MATTERS:

- Understanding how craving and affect dynamically change over time in patients with opioid versus alcohol use disorder can inform precision addiction medicine and optimize tailored treatment approaches.
- These data provide evidence for a tool that can be implemented to aid clinical decision-making



APPENDIX

LIST OF CURRENT PUBLICATIONS FOR RESEARCH CONDUCTED AT ASHLEY

Ellis JD, Han D, **Mayo JL**, **Huhn AS.** The association of pain impact and sleep disruption with opioid withdrawal during opioid-use disorder treatment. British Journal of Clinical Pharmacology. 2024;90(6):1408-1417. https://doi.org/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 JC**, Rabinowitz JA, **Ellis JD**, Bergeria CL, **Hobelmann JG**, & **Huhn AS.** The impact of opioid-stimulant co-use on tonic and cue-induced craving. Journal of Psychiatric Research. 2023;164:15-22. https://doi.org/10.1016/j.jpsychires.2023.06.021

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 JD, Rabinowitz JA, **Strickland JC**, Skandan N, **Hobelmann JG**, Finan PH, & **Huhn AS.** Latent patterns of sleep disturbance, pain impact, and depressive symptoms in residential substance use treatment. Drug and Alcohol Dependence. 2023;248:109903. https://doi.org/10.1016/j.drugalcdep.2023.109903

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.

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.

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.

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, CM, **Huhn AS**, **Hobelmann JG**, Finnerty J, Solounias B, & Dunn KE. 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.

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**

ACCESS OUR RESEARCH FINDINGS HERE:

Ashley
Everything for Recovery