Ashley
Everything for Recovery

2025 ANNUAL OUTCOMES REPORT

FROM MEASUREMENT TO PRECISION MEDICINE: OUR GROWTH

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I. Our approach: Research as the Vehicle of Better Care

Recovery is deeply personal — but it should also be measurable, understandable, and continuously improving.

At Ashley Addiction Treatment, we have helped more than 75,000 individuals reclaim their lives from substance use disorder since our founding in 1983. We approach recovery as both a personal experience and a measurable clinical process. By systematically collecting patient-reported outcomes, biometric data, and treatment indicators, we can assess progress in real time and apply those insights to care delivery.

This approach is grounded in a simple principle: measurement informs understanding and understanding drives better treatment.

Historically, substance use disorder (SUD) treatment has lacked consistent, real-time outcome measurement. As a result, care has often been guided more by philosophy than by science or data. Our model is designed to address this gap by embedding research directly into the patient experience — allowing us to evaluate what works, for whom, and under what conditions.

> “Research is the vehicle, not the destination — it’s how we deliver better outcomes for more people.”

Alex Denstman, MBA
Co-CEO, Ashley Addiction Treatment

THIS WORK MATTERS ON EVERY LEVEL:

For patients, it means receiving care that adapts to their needs in real time — addressing not just substance use, but the emotional, physical, and social challenges that shape recovery.

For our clinical teams, it ensures that every intervention — whether a group session, medication, or therapeutic activity — serves a clear and measurable purpose.

For the field, it contributes to a growing evidence base that advances SUD treatment far beyond our own campus.

Over the past seven years, our research program has evolved in both scope and impact:

Build measurement infrastructure

We established the systems to consistently collect patient-reported outcomes, biometrics, and treatment data — creating a foundation for understanding recovery in real time.

Validate outcomes

We demonstrated that our approach works. Across key areas like anxiety, depression, stress, and resilience, patients showed meaningful and sustained improvement during treatment.

Use data to drive decisions and personalize care

Today, we are using this data not just to observe recovery — but to actively shape it. Real-time insights now inform how we match patients to groups, adjust interventions, and deliver more precise, individualized care.

THIS PROGRESSION REFLECTS A FUNDAMENTAL SHIFT:

In 2024, we showed that recovery can be measured.
In 2025, we demonstrated that it improves.
In 2026, we show how data actively shapes care in real time.

Our research efforts span three interconnected areas — internal quality improvement, clinical trials, and treatment outcomes studies — all working together in a continuous cycle:

WE MEASURE → WE TEST → WE LEARN → WE REFINE.

Through this process, data becomes more than information — it becomes action. It helps us identify what patients need, design targeted interventions, evaluate their impact, and continuously improve the care we provide.

> “We are driven by purpose and grounded by evidence. The result of our research is a treatment model that is not static, but adaptive — one that evolves with every patient we serve.”

Jami Mayo Barney, MBA
Research Manager, Ashley Addiction Treatment

And ultimately, that is why research matters: **because better understanding leads to better care — and better care saves lives.**

II. Who We Serve (demographics)

In 2025, our clinical reach expanded to serve 1,781 unique patients across 2,054 treatment episodes. Notably, 15.3% of these individuals utilized multiple levels of care, demonstrating the strength of our integrated care continuum. To date, we have collected over 26,000 distinct clinical observations, further enriching the robust database we leverage for real-time outcomes tracking and program optimization.

Data are drawn from the complete inpatient sample (N= 1299)

9.7% are US Veterans

43 is the average age of our patients

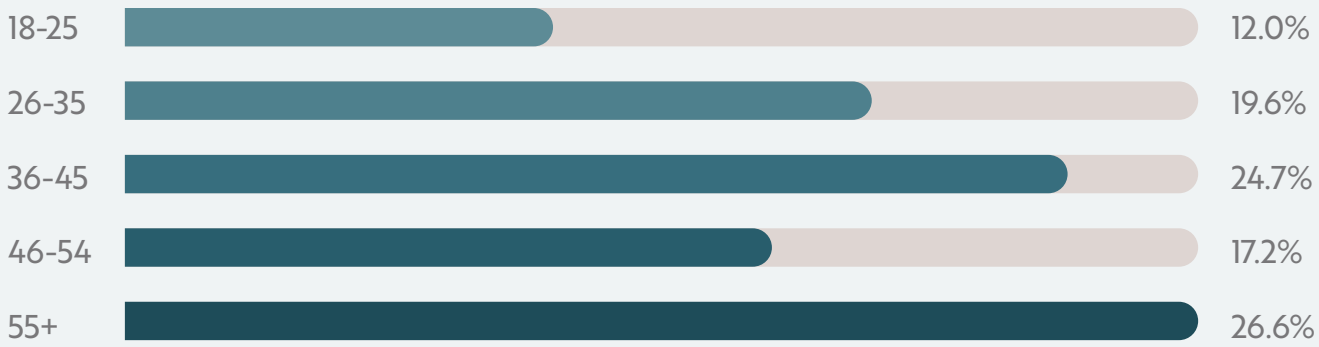
RACE / ETHNICITY

White	84.3%
African American	8.9%
Other	4.6%
Asian	1.8%
Native American	0.4%

DISCHARGE STATUS

Standard	74.7%
Against Clinical Advice	14.8%
Transfer Facility	8.1%
Administrative Discharge	2.1%
Other	0.3%

AGE DISTRIBUTION



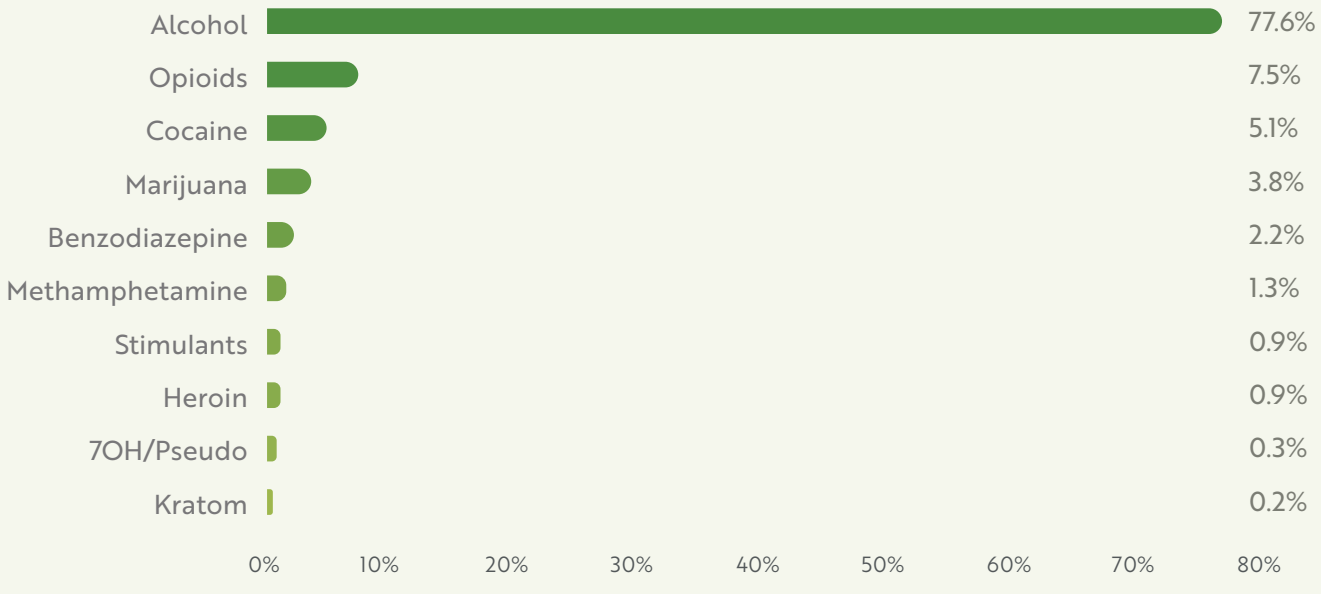
62.4% are employed at time of admission

74.4% report a family history of substance use

83.5% report physical health impacts from substance use

53.4% report use of nicotine products

PRIMARY DRUG OF CHOICE



III. What We Measure

At Ashley, we measure the aspects of recovery that matter most for sustained outcomes. Our approach integrates patient-reported experiences with objective health data to provide a comprehensive view of each individual's progress.

All assessment tools used in our framework are standardized, validated instruments (see Appendix), ensuring that every insight we generate is both clinically meaningful and scientifically grounded.

Importantly, we do not measure recovery as a single outcome. Instead, we assess a set of interconnected domains that reflect the full patient experience. This allows us to do more than observe progress — we can identify emerging needs, intervene earlier, and continuously refine care.

Together, these measures form the foundation of our precision medicine model:

WE MEASURE → WE UNDERSTAND → WE ACT.

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1. EARLY RECOVERY NEEDS

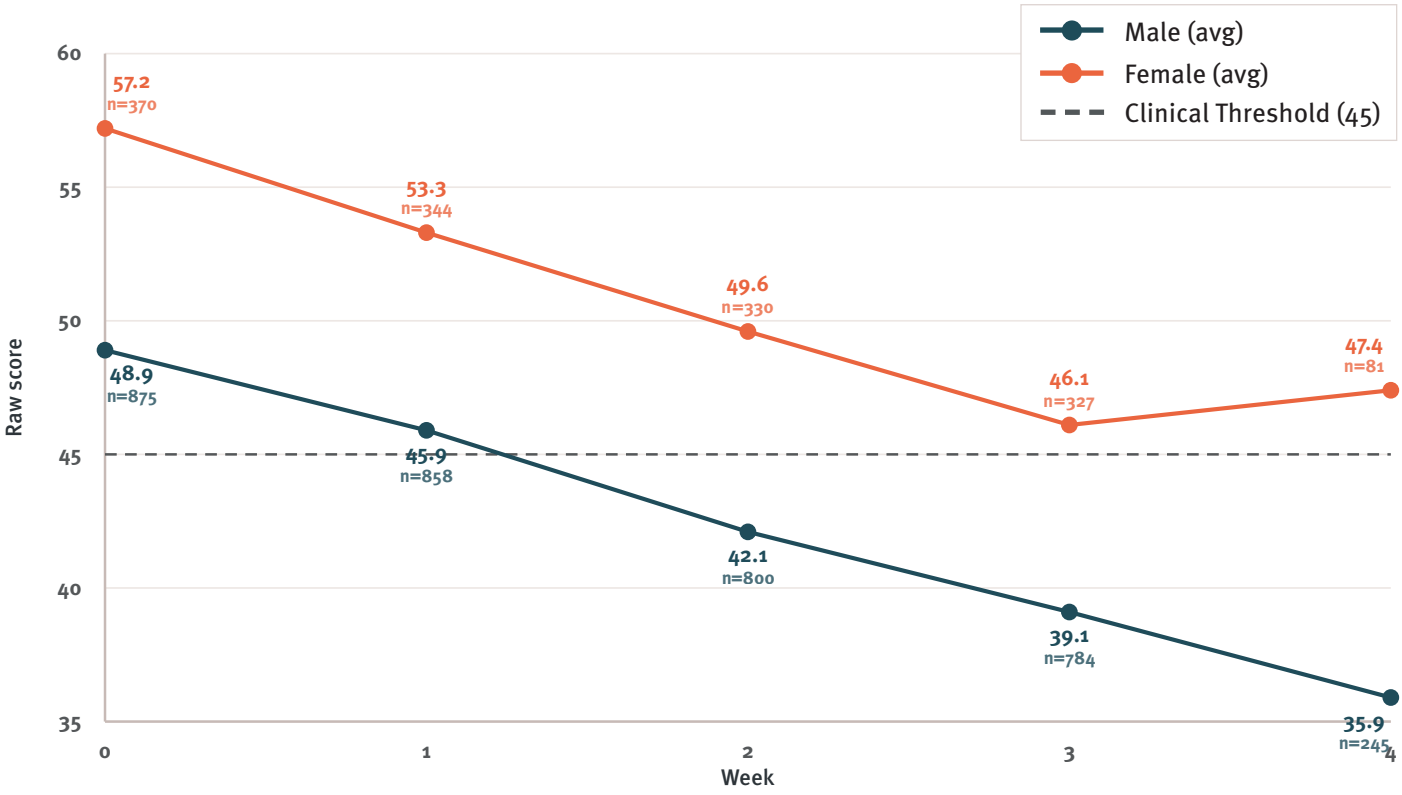
Early recovery is often marked by significant emotional and psychological distress. To ensure patients receive the right level of support at the right time, we track core symptoms that commonly interfere with engagement and recovery early in treatment, including:

- Anxiety
- Depression
- Perceived stress
- Substance-specific cravings

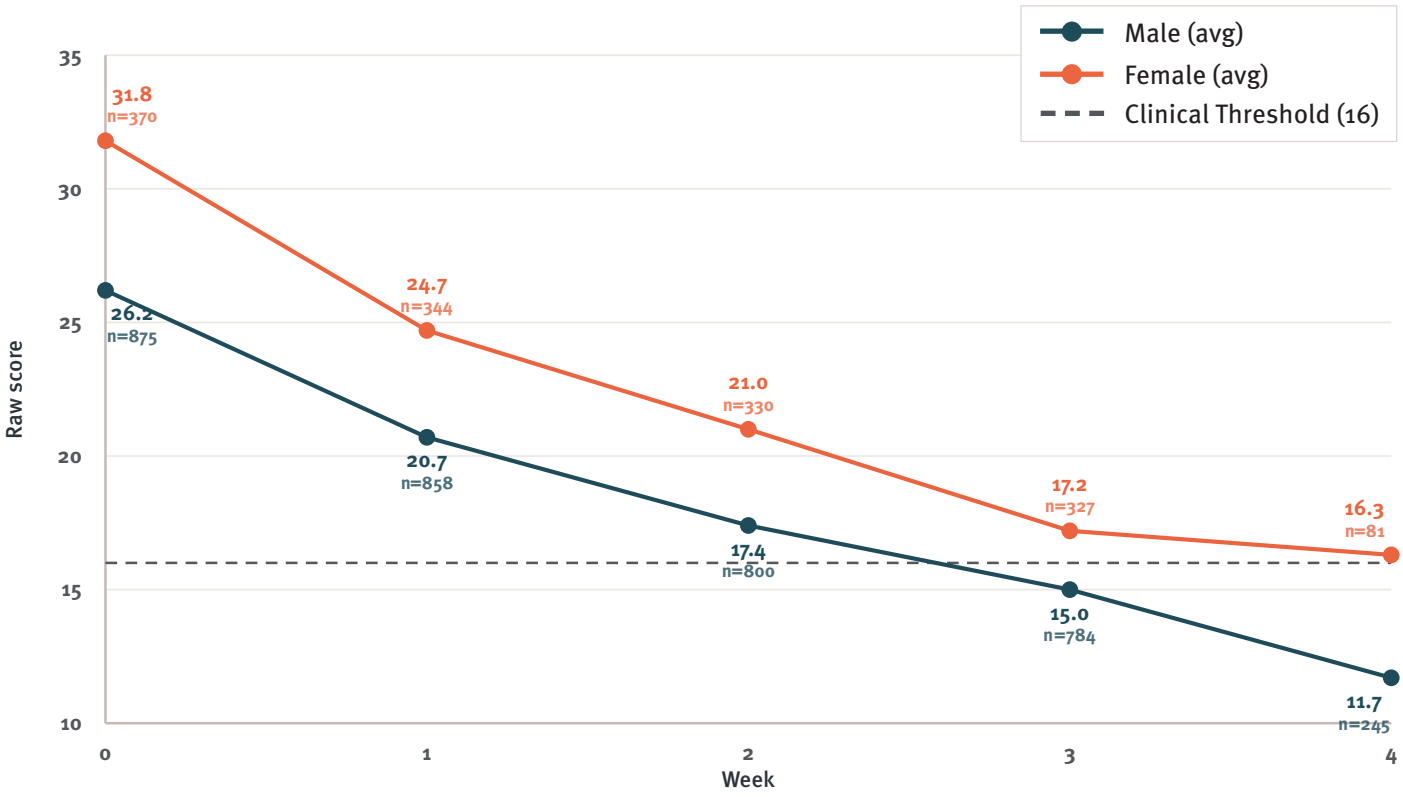
These data are collected routinely from residential patients during treatment, creating a detailed picture of symptom change over time.

How to read the visuals:
The figures in this section display average symptom scores across treatment weeks for residential patients. Clinical threshold lines indicate the level at which symptoms are typically considered clinically significant. Scores above these lines suggest a greater likelihood of impairment or distress; scores below indicate symptom relief into a healthier range.

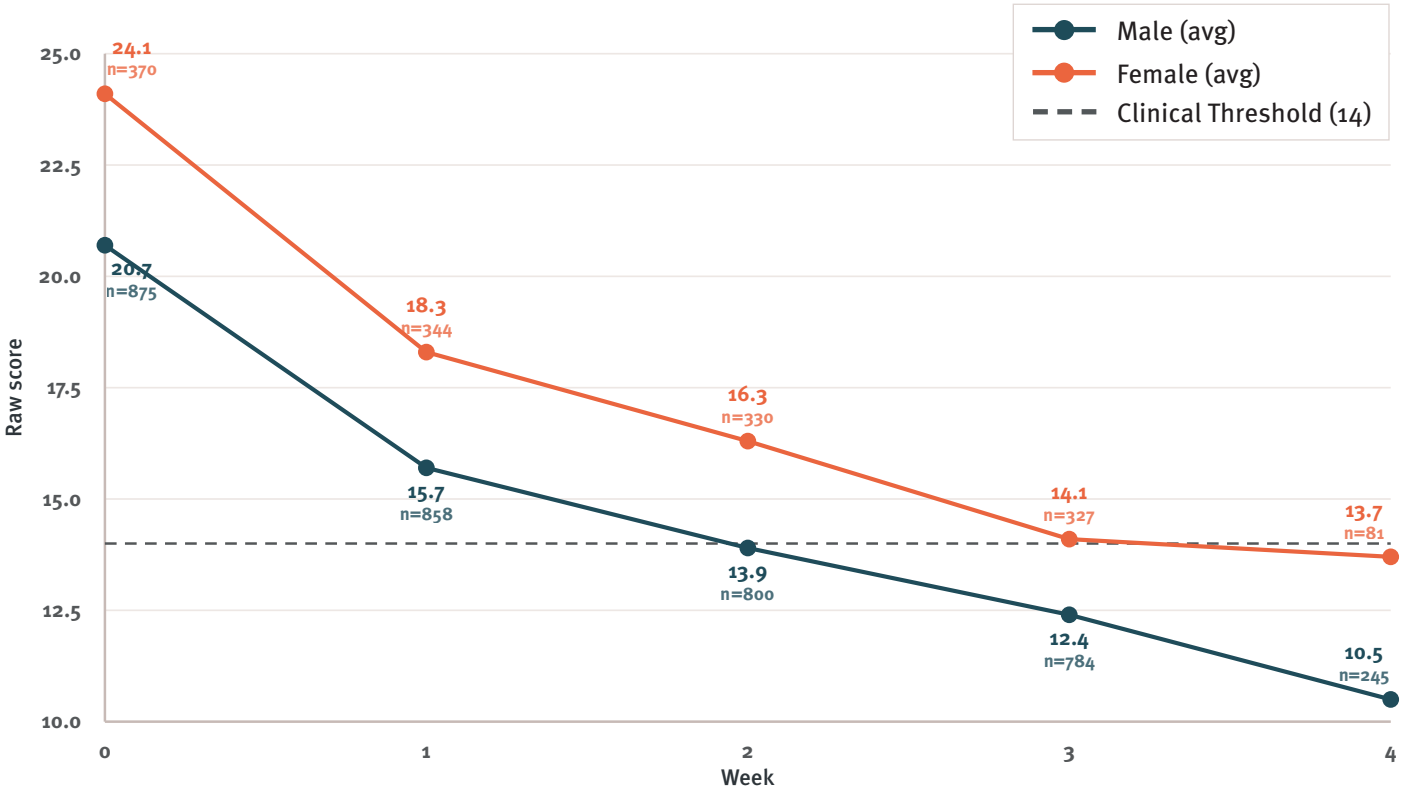
Average Anxiety (PSWQ) Scores by Gender (Weeks 0-4)



Average Depression (CES-D) Scores by Gender (Weeks 0-4)



Average Stress (PSS-10) Scores by Gender (Weeks 0-4)



WHAT THE DATA SHOW:

Across symptoms, patients demonstrate meaningful and measurable improvement during treatment. While all groups show progress, trajectories differ — particularly between men and women early in treatment. Women often enter treatment with greater symptom severity and may take longer to fall below clinical thresholds, even though improvement rates are similar.

WHY THIS MATTERS:

Recognizing these differences led directly to action. In response, we established a Gender Disparities Committee to better understand and address sex-specific patterns in early recovery. Insights from this work are already informing more tailored interventions, including programming that accounts for hormonal changes, caregiving roles, trauma exposure, and gender-specific stressors.

This is a clear example of our approach in action: **measurement identifies variation, variation drives targeted solutions, and targeted solutions improve care.**

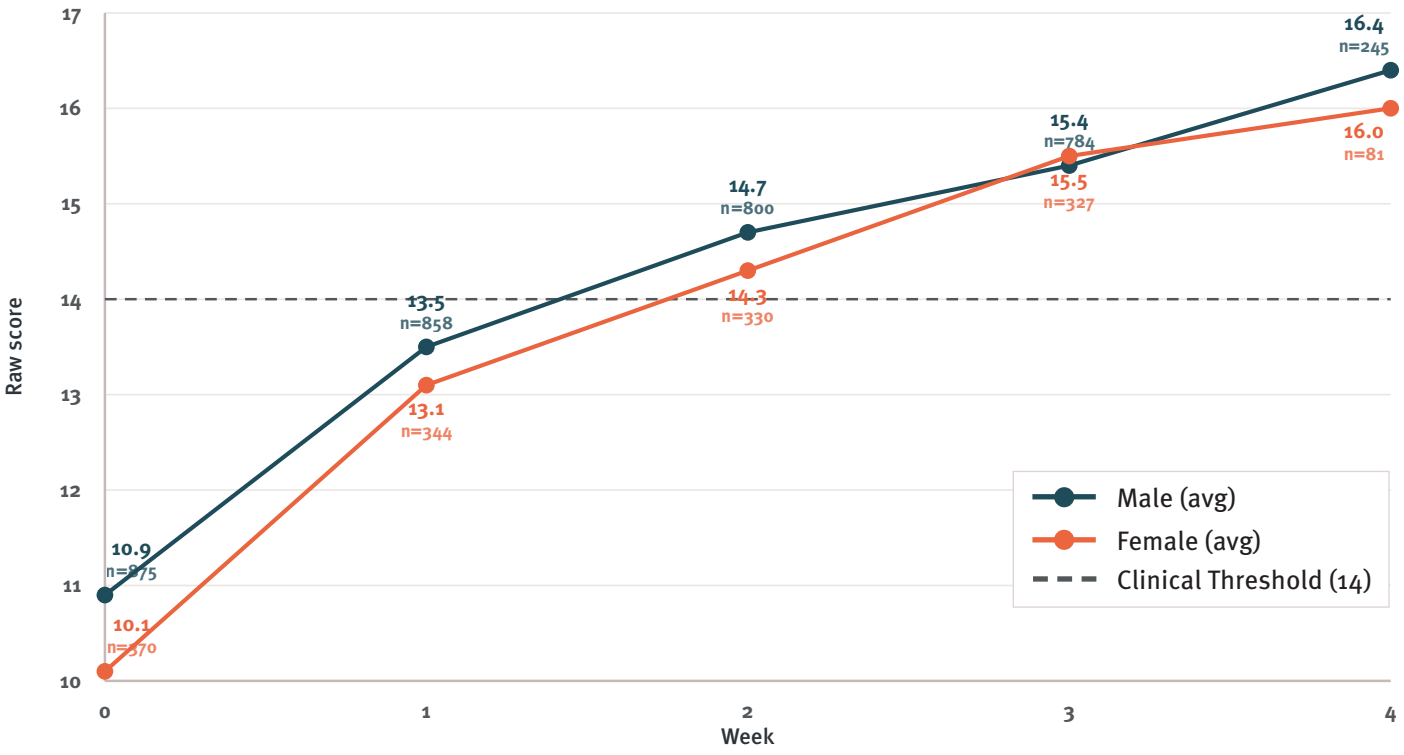
2. RESILIENCE AND WELL-BEING

While symptom reduction is critical, recovery is sustained by the ability to build strength, meaning, and stability. To capture this broader picture, we measure resilience-related indicators such as:

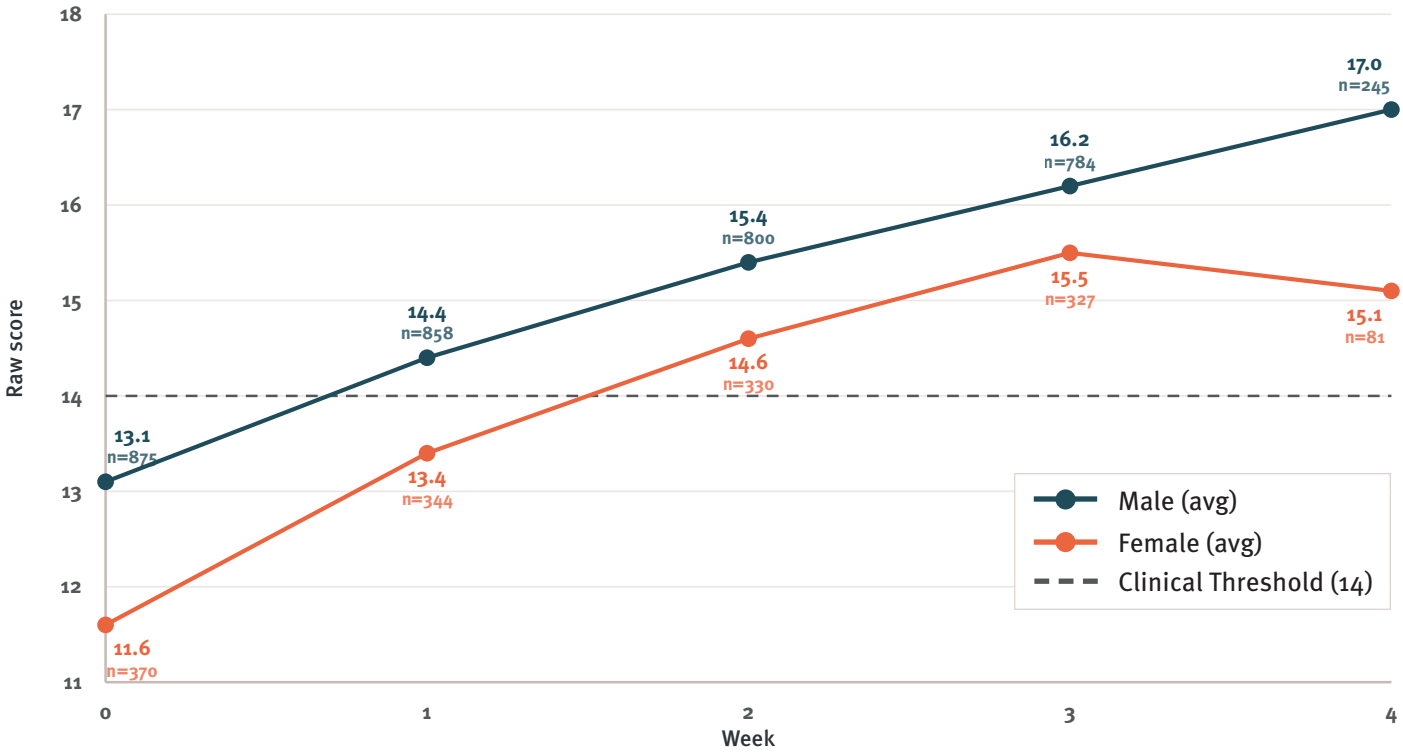
- Optimism and outlook for the future
- Quality of life
- Sense of meaning or spirituality
- Commitment to sobriety

How to read the visuals:
Figures in this section reflect changes in average resilience scores among residential patients over the course of treatment. Higher scores represent stronger protective factors that support long-term recovery. Clinical threshold lines provide a reference point for interpretation- scores above the line indicate healthy levels of resilience associated with sustained recovery, while scores below the line suggest areas where additional support may be helpful.

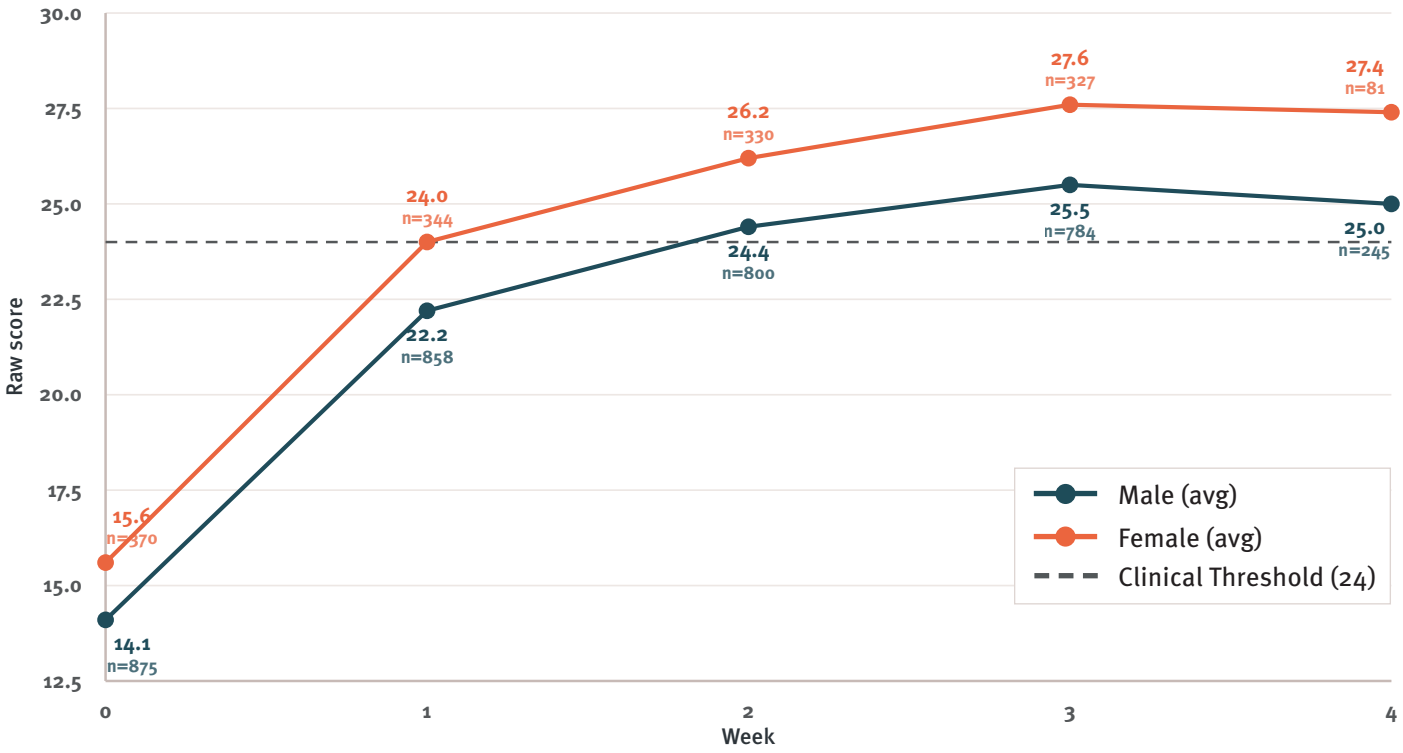
Average Quality of Life Scores by Gender (Weeks 0-4)



Average Optimism (LOT-R) Scores by Gender (Weeks 0-4)



Average Spirituality (RBB) Scores by Gender (Weeks 0-4)



WHAT THE DATA SHOW:

Patients demonstrate significant gains in multiple areas of resilience during residential treatment, particularly in optimism, spirituality, and quality of life. These improvements reflect more than symptom relief — they signal growing confidence, connection, and stability.

WHY THIS MATTERS:

Patients who leave treatment with stronger resilience are better equipped to manage stress, tolerate discomfort, and remain engaged in recovery support after discharge. These measures help us evaluate whether treatment is preparing patients not just to stop using substances, but to build fulfilling, sustainable lives.

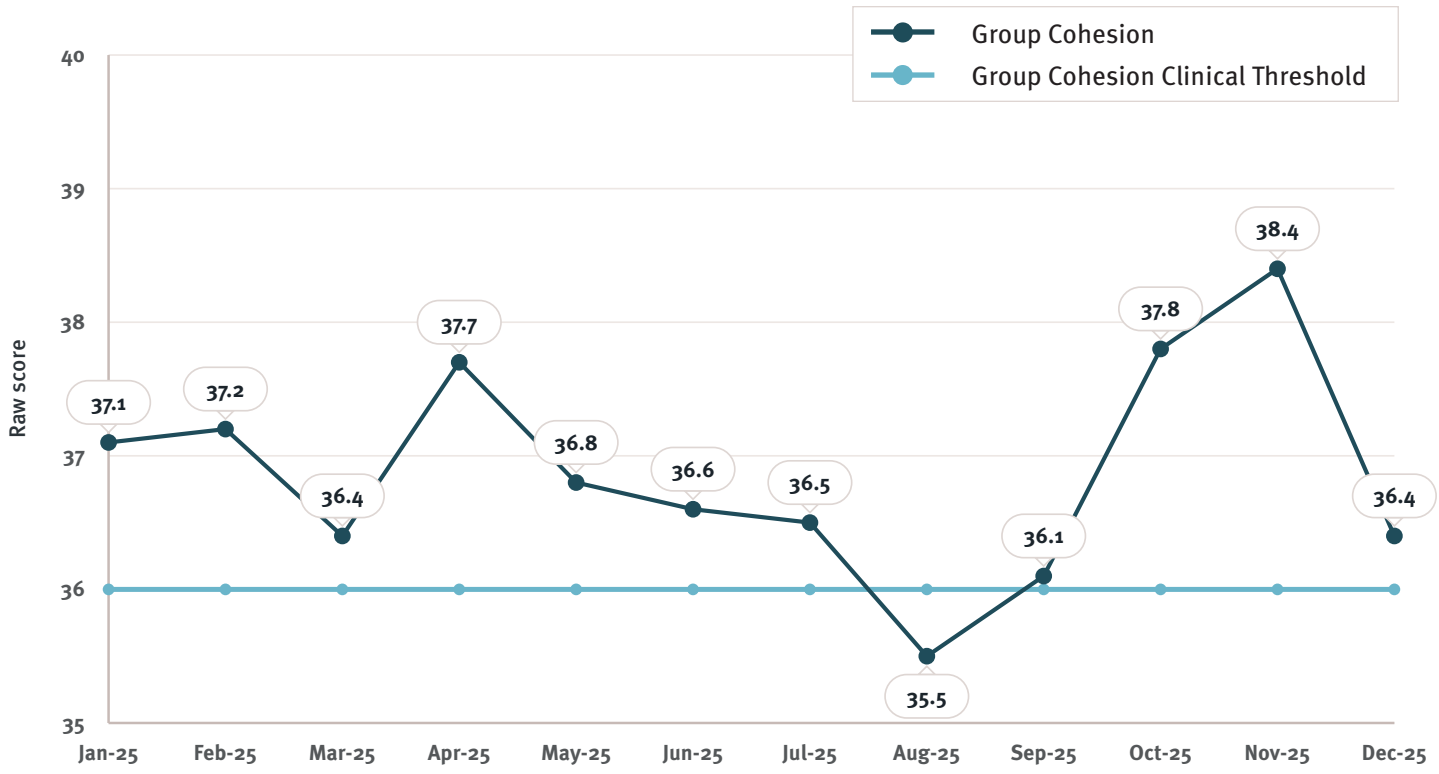
3. THERAPEUTIC RELATIONSHIPS

We evaluate the strength of group cohesion and therapeutic alliance between patients and clinicians using validated tools (GSRS and ARM-5). These measures provide insight into engagement, trust, and the overall effectiveness of the therapeutic environment.

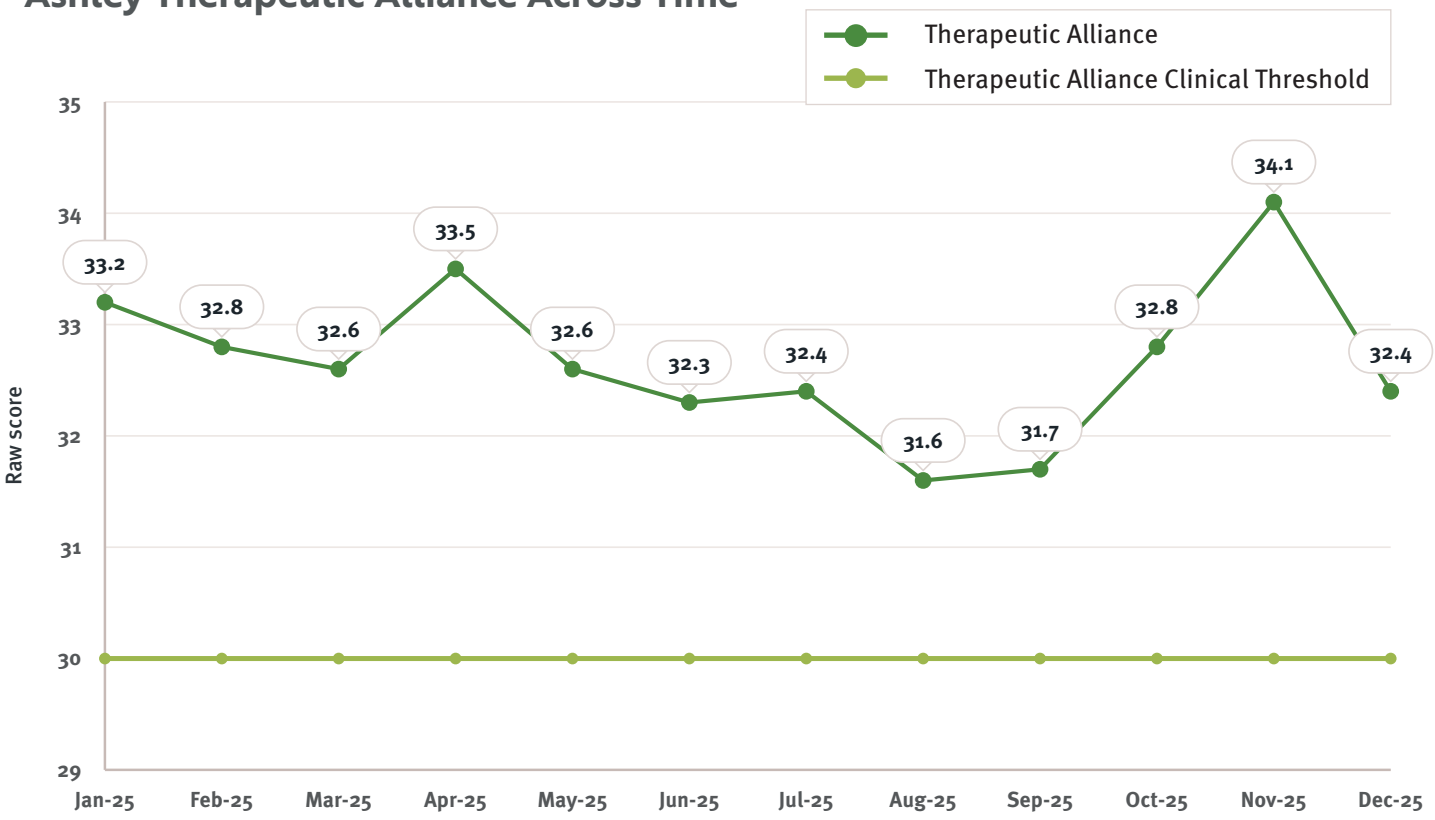
How to read the visuals:

Charts display average scores over time for residential patients, with clinical threshold lines representing scores associated with healthy group dynamics and effective therapeutic alliance.

Ashley Group Cohesion Across Time



Ashley Therapeutic Alliance Across Time



WHAT THE DATA SHOW:

Since routine measurement began, both group cohesion and therapeutic alliance scores have consistently met or exceeded clinical thresholds — and have steadily strengthened over time.

WHY THIS MATTERS:

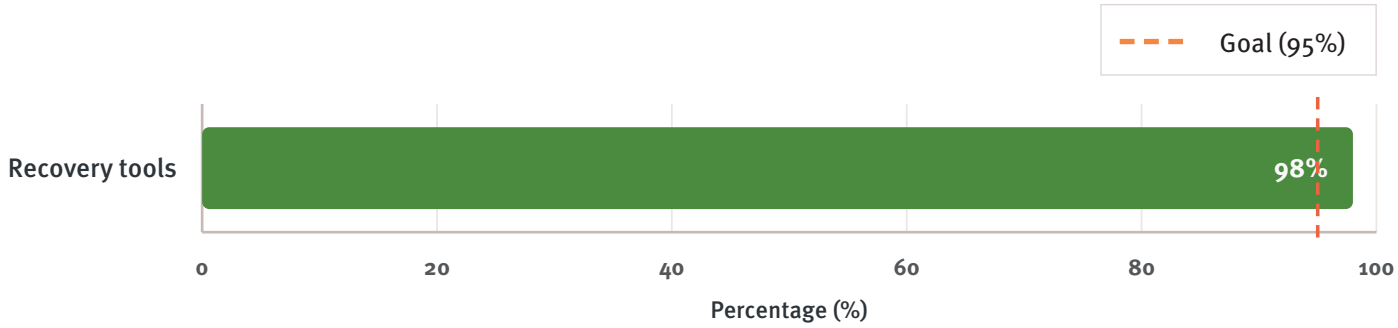
These findings validate our emphasis on intentional patient matching and counselor alignment. By using data to design groups thoughtfully and support strong alliances, we foster environments where patients feel safe, understood, and engaged — critical ingredients for meaningful recovery.

4. PATIENT EXPERIENCE

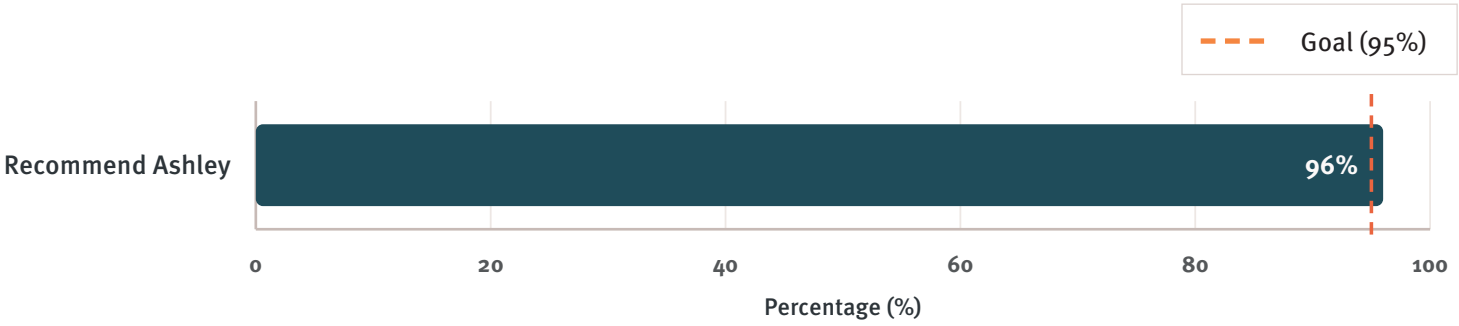
Patient experience data provides essential insight into how care is received across different populations. We measure satisfaction to ensure that treatment is effective, respectful, and responsive.

Our organizational goal is to maintain average satisfaction scores above 95% across key experience indicators.

Did the program provide you with the tools to assist with your recovery?



Would you recommend Ashley to a friend/family member if they had a problem with drugs/alcohol?



WHAT THE DATA SHOW:

An overwhelming majority of patients report that they received the tools needed to support their recovery and would recommend Ashley to a friend or family member.

WHY THIS MATTERS:

Research consistently shows that patient satisfaction is linked to treatment engagement, retention, and outcomes (Kelly et al., 2018). These data help us continuously refine programming to ensure care aligns with patient needs and expectations.

5. POST-DISCHARGE OUTCOMES

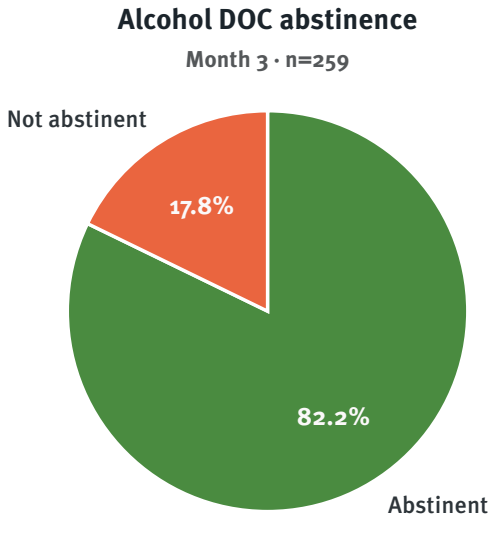
We follow patients after treatment to assess ongoing recovery, including quality of life, engagement in support systems, and abstinence. This allows us to evaluate the durability of treatment effects beyond discharge.

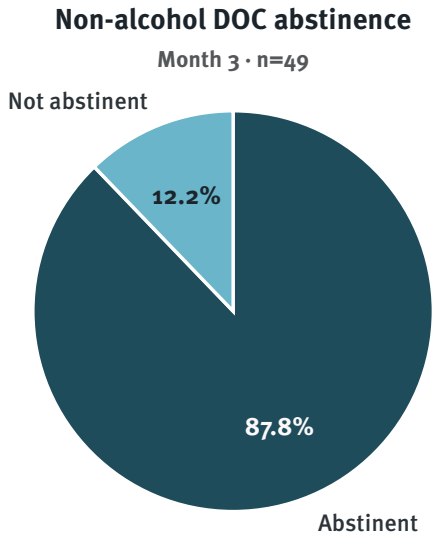
The following summarizes results from patient self-reported follow-up surveys collected in 2025. During this period, we collected 2,080 unique assessments from 563 unique patients.

The following outcomes summarize overall patterns among respondents, showing how outcomes are related rather than proving cause-and-effect relationships. Analyses used a pair-wise approach, meaning patients were included whenever data were available for a given outcome.

I. Abstinence rates 3 Months Post-discharge

Chart type: % Infographic/Pie Chart

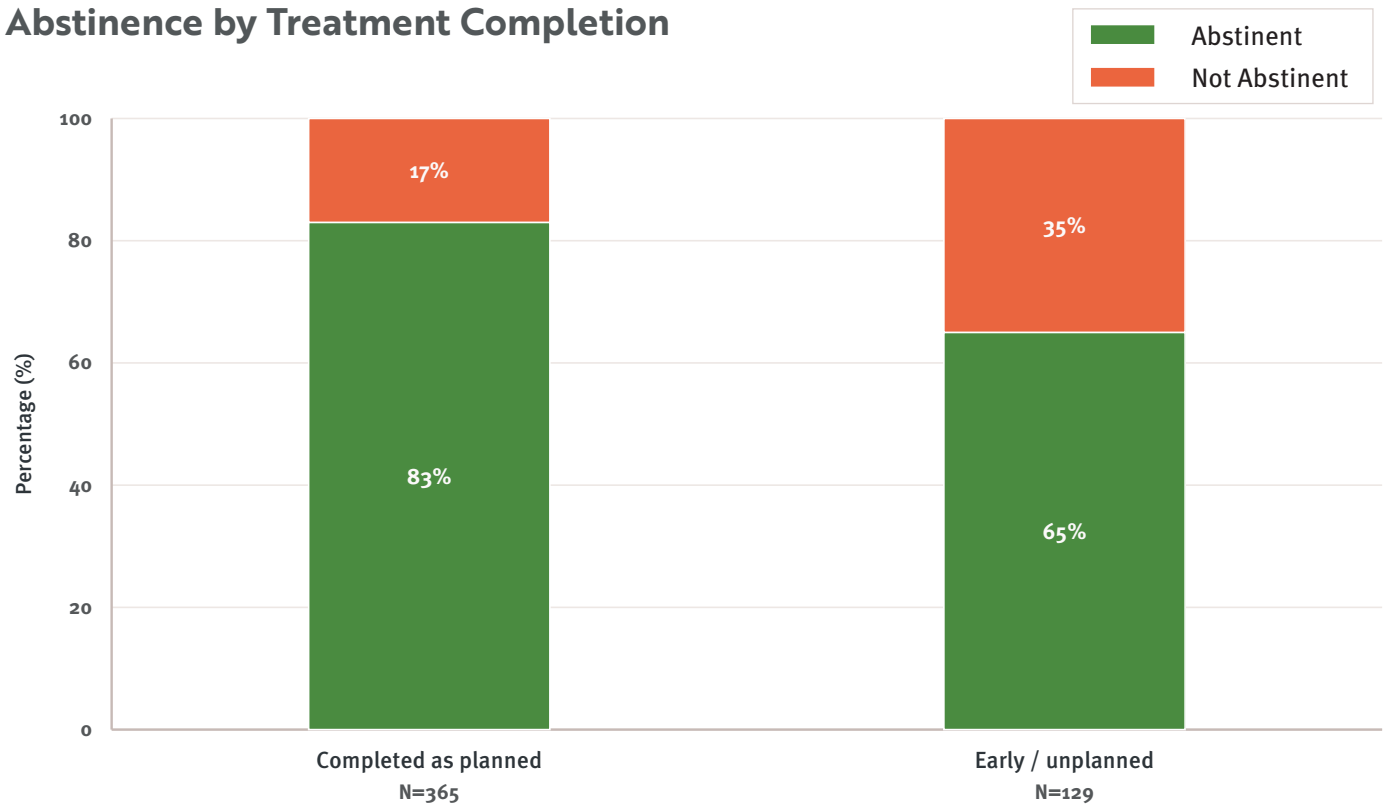




Key Findings at a Glance

- Patients reporting abstinence consistently showed:
  - Higher ratings of life since completing treatment
  - Greater engagement in continuing care
- Patients who completed treatment as planned demonstrated stronger post-discharge outcomes than those discharged early or unexpectedly.

II. Patients who completed treatment as planned demonstrated higher abstinence rates.

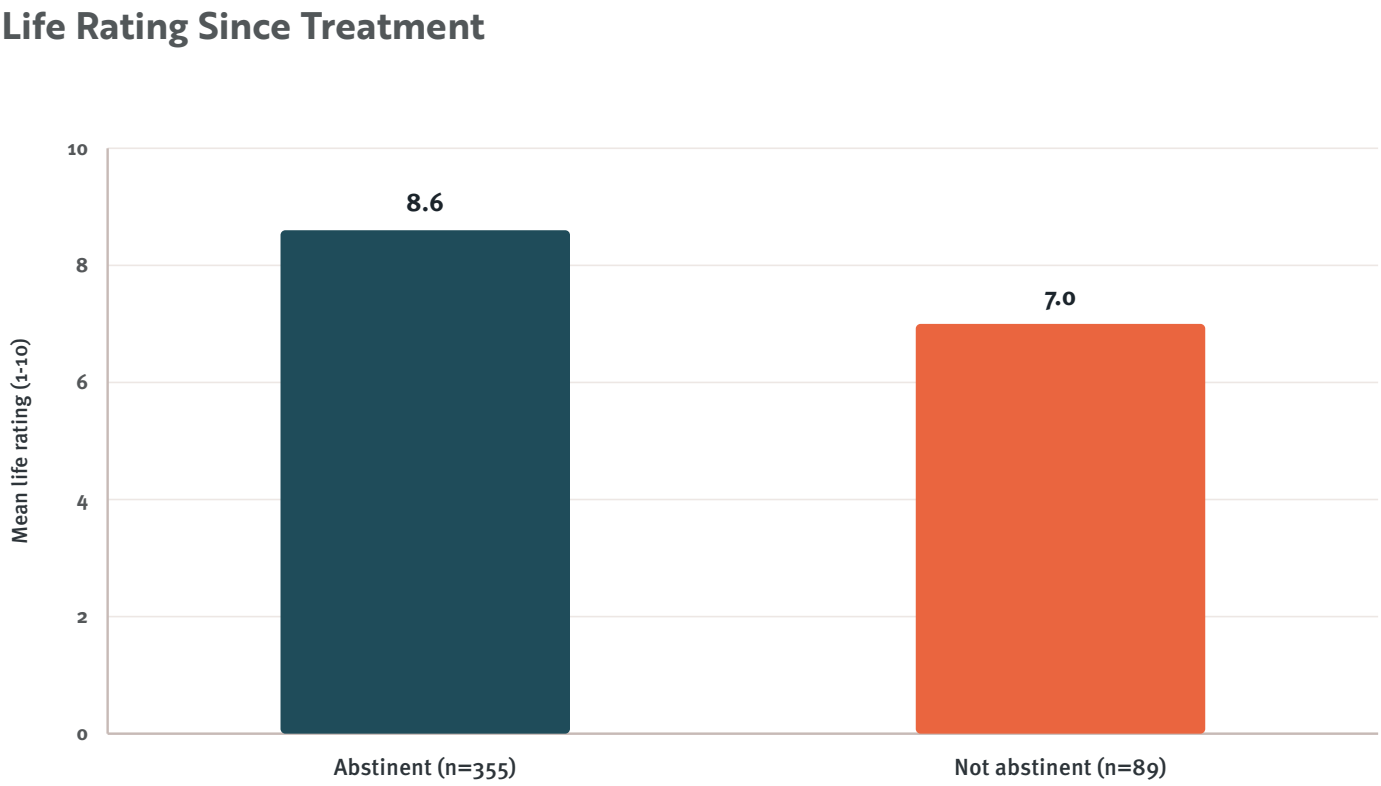


Patients who completed treatment as planned demonstrated higher abstinence rates at follow-up than those discharged early or unexpectedly.

ANALYSIS PERFORMED

Abstinence rates were summarized descriptively by discharge status. These data reflect all respondents with both discharge status and alcohol use data.

III. Patients reporting abstinence rated their lives since treatment more positively.



Patients reporting abstinence rated their lives since treatment more positively than patients reporting continued substance use.

ANALYSIS PERFORMED

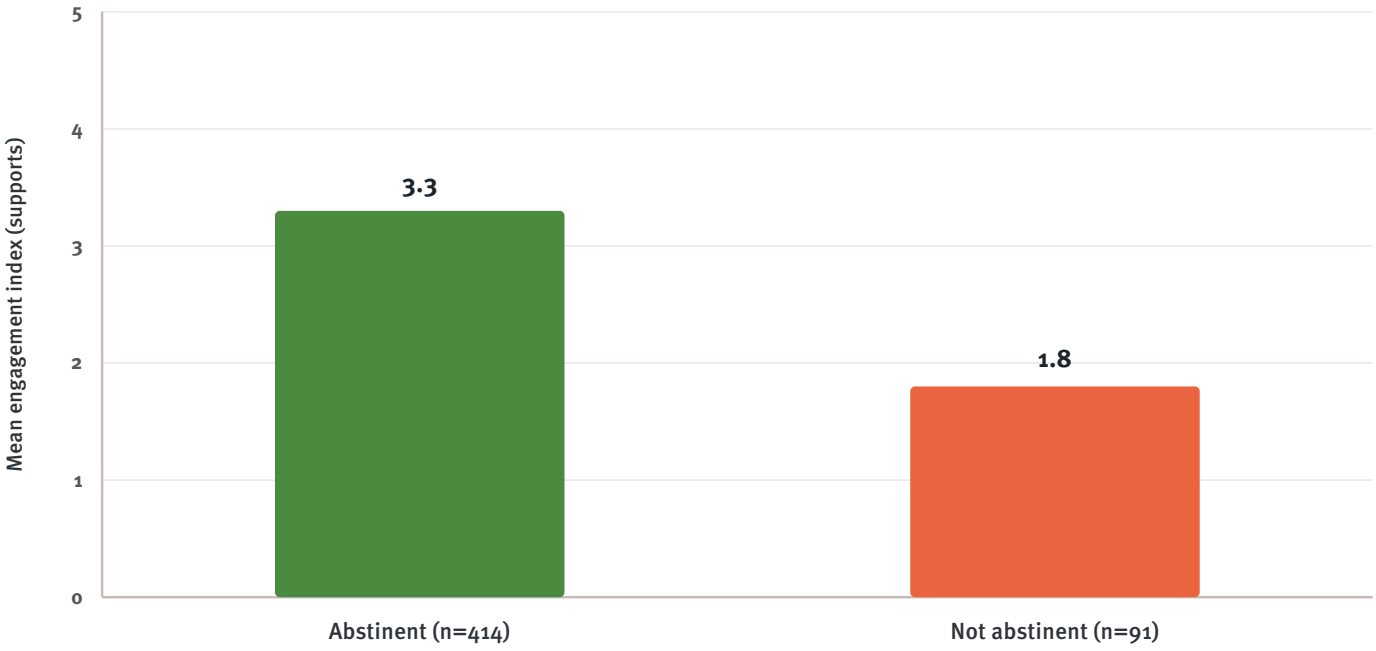
Life rating since treatment was measured using a self-reported follow-up survey item. Results summarize descriptive comparisons of mean life ratings among patients who reported abstinence and those who reported substance use. Analyses included respondents with available data for both variables.

IV. Patients reporting abstinence showed greater engagement in continuing care.

The engagement index reflects the number of post-discharge supports the patient reported, including:

- Ongoing treatment involvement
- Individual therapy
- Recovery meetings / 12-step participation
- Staying in touch with a sponsor

Aftercare Engagement



Patients reporting abstinence also reported higher average engagement in aftercare support following discharge.

ANALYSIS PERFORMED

Aftercare engagement was assessed using multiple independent survey items reflecting participation in post-discharge supports (e.g., therapy, recovery meetings, staying connected with providers). Patients were included for each engagement indicator they completed. Missing responses to individual aftercare items did not exclude patients from engagement analyses or count as non-engagement.

WHY THIS MATTERS:

These findings reinforce the importance of treatment completion and ongoing engagement in recovery supports. They also highlight where we can intervene earlier — by strengthening care transitions and expanding post-discharge support.

VI. Physiological Health

Through wearable technology, we track sleep, physical activity, and cardiovascular indicators throughout treatment. These objective measures provide an additional layer of insight into recovery, helping us identify patterns that may not be captured through self-report alone.

Since 2023, 384 patients have voluntarily participated in our wearable program as part of their treatment experience. This growing dataset enhances our understanding of how physiological health interacts with recovery.

As we continue to learn, these insights will help us determine how best to integrate physiological data into care — informing more precise, personalized interventions. Our first publication stemming from this project is featured in the Academic Highlights section.

IV. Academic Studies in Progress

Our academic collaborations help advance innovative, evidence-based approaches to SUD treatment. Through these relationships, we conduct clinical trials and rigorous treatment outcomes research to address critical gaps in the field and translate research findings into meaningful improvements in patient care.

> “Traditionally, academic research has remained somewhat removed from the realities of patient care, often driven by broader industry trends. Our collaboration with Ashley reflects a more patient-centered model – one where research is intentionally designed around patient needs. In this approach, treatment and research are continuously informing one another in real time.”

Andrew Huhn, PhD, MBA
Associate Professor, Johns Hopkins University School of Medicine

CURRENT STUDIES INCLUDE:

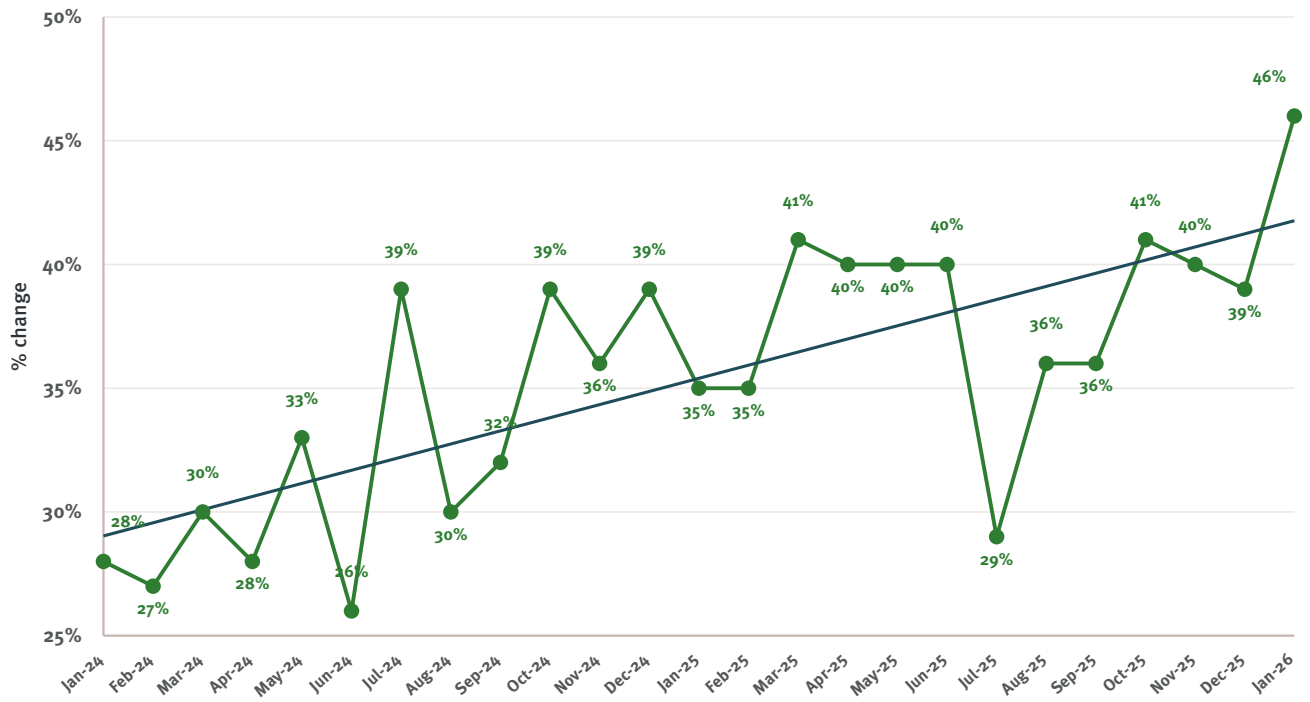
- Cognitive Decline in Older Adults with Alcohol Use Disorder
- Safety and Efficacy of GLP-1 Agonists and Naltrexone in Early Recovery
- Gut Microbiome Health and Early Recovery Outcomes
- Treating Co-occurring Insomnia and Alcohol Use Disorder in Early Recovery

V. Our Progress

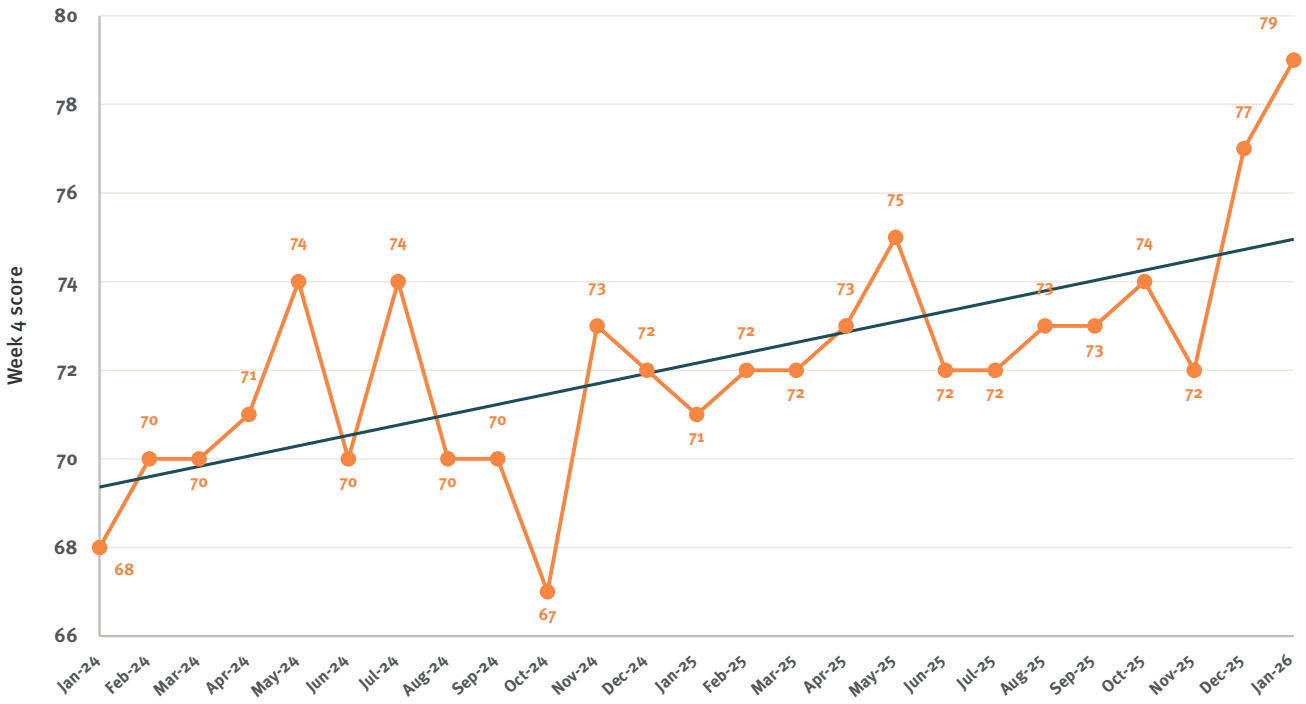
The primary indicator of our clinical efficacy is the Global Recovery Score (GRS). This metric, powered by the Trac9 platform, moves beyond simple abstinence by aggregating nine essential dimensions of health — including emotional regulation, spiritual connection, and resilience — into a single, high-fidelity measure of recovery.

Over the past 24 months, we have observed a consistent upward trend in GRS outcomes across our continuum of care. This growth is not a matter of chance; it is the direct result of our transition toward a Precision Medicine model. By embedding research into the patient experience, we have moved away from static treatment protocols toward a system where real-time data informs every clinical pivot.

Ashley Clinical Outcomes - Global Recovery Score % Change



Ashley Clinical Outcomes - Average Global Recovery Score at Week 4



TURNING DATA INTO DISCOVERY

The rising recovery scores reflected in our data represent more than just improved statistics; they reflect an intentional evolution in how we deliver care. To improve global recovery, we use our data to identify and address specific clinical challenges as they emerge.

Our progress is rooted in strategic, data-driven shifts including:

- Strengthening Therapeutic Relationships Through Intentional Patient Matching
- Targeted Craving Interventions & Enhanced Medication Protocols

The following sections detail how these specific interventions — informed by the very data we collect- have fundamentally strengthened the patient journey at Ashley.

1. Strengthening Therapeutic Relationships Through Intentional Patient Matching

At Ashley, our Model of Care is guided by five core principles — competence, effectiveness, empowerment, innovation, and spirituality. A key part of living out these principles is our commitment to continuously evaluate and improve the care we provide.

One way we do this is through Intentional Patient Matching, a structured and research-informed process used to assign patients to counseling groups where they are most likely to feel supported, engaged, and understood.

WHAT IS INTENTIONAL PATIENT MATCHING?

In simple terms, Intentional Patient Matching is the science of placing patients into counseling groups where they can connect meaningfully with both their peers and their counselor. Research shows that when patients feel a sense of connection and belonging, they are more engaged in treatment and more likely to achieve positive outcomes.

This process takes into account shared experiences, identities, and individual preferences to create groups that foster trust, openness, and collaboration.

HOW DOES THE PROCESS WORK?

We consider three key factors when matching patients to groups:

Clinical Focus
Each patient is first matched to a group based on their primary clinical needs, ensuring the content and goals of the group are relevant to their recovery.

Group Composition
We thoughtfully group patients with others who share similar characteristics, such as substance use history, age, race, gender identity, or life experiences, to promote connection and mutual support.

Counselor Match
We align patients with counselors based on patient preferences, counselor strengths, and the demonstrated outcomes of each group to ensure the best possible therapeutic fit.

By integrating these elements, we aim to place every patient in a group that maximizes their opportunity for growth and recovery.

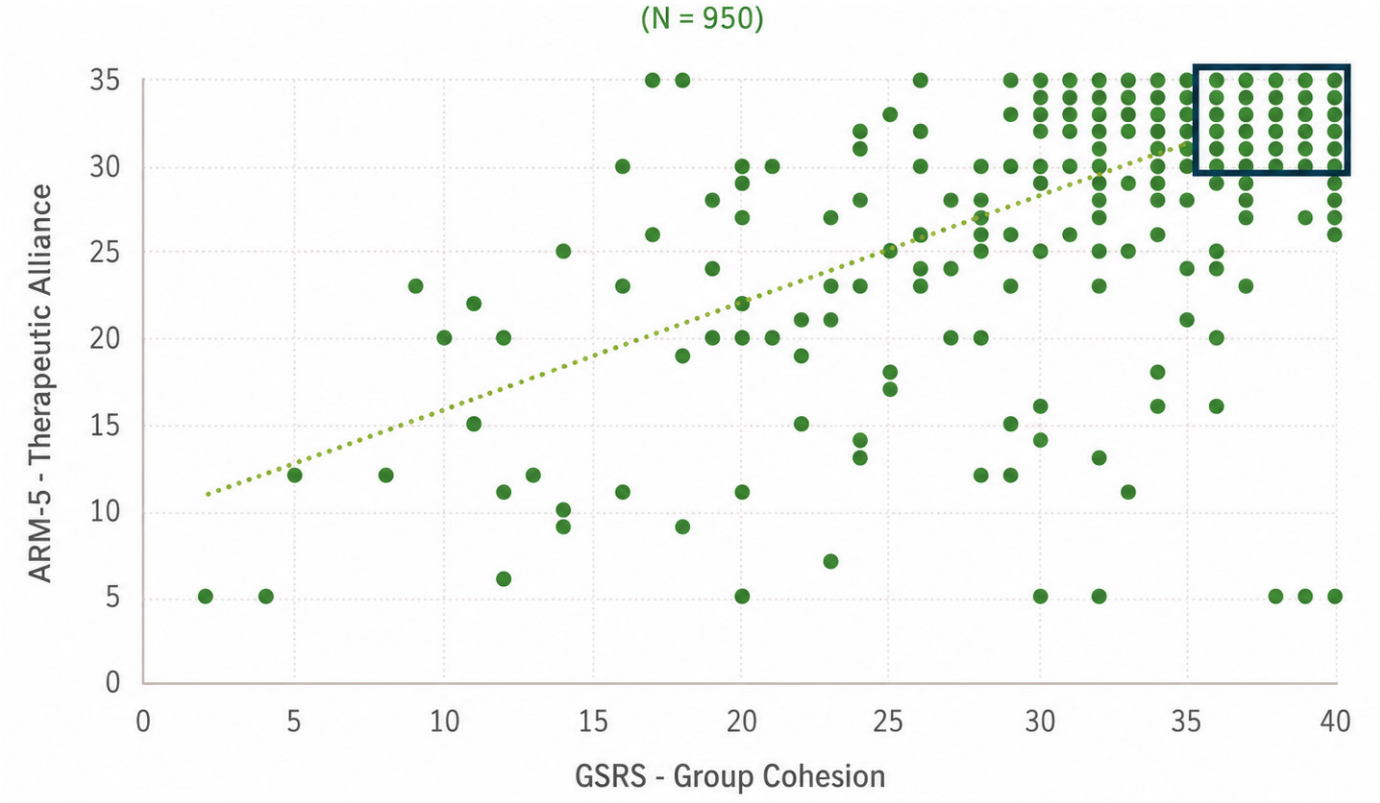
HOW WE MEASURE SUCCESS

To ensure our approach is effective, we routinely measure therapeutic relationships using two well-established tools:

Group Session Rating Scale (GSRS) measures group cohesion
This brief patient survey assesses how well the group is functioning, including the sense of connection and overall group climate. Higher scores indicate stronger group cohesion. Research shows that early scores on this measure are strongly linked to treatment progress.

Agnew Relationship Measure–5 (ARM-5) measures therapeutic alliance
This survey evaluates the strength of the relationship between a patient and their individual counselor. It looks at key elements such as trust (bond), collaboration (partnership), and confidence in the treatment process. Higher scores reflect a stronger therapeutic alliance, optimal for treatment success.

Therapeutic Relationships at Ashley



Together, these measures allow us to track the quality of therapeutic relationships and provide key insights to strengthen our patients' treatment experiences.

2. Targeted Craving Interventions

One of the most important advantages of our measurement model is the ability to see how our outcomes compare — not just internally, but against national benchmarks.

Using data collected through Trac9, we routinely compare our performance to a national dataset representing approximately 250 treatment facilities. Through this benchmarking process, we identified a clear opportunity: while our patients were improving, our craving reduction outcomes were not as strong as we expected relative to national peers.

In response, we implemented a series of targeted, evidence-based interventions designed to more effectively reduce cravings during early recovery. These efforts focused on both clinical practice and care delivery systems, ensuring that improvements could be sustained over time.

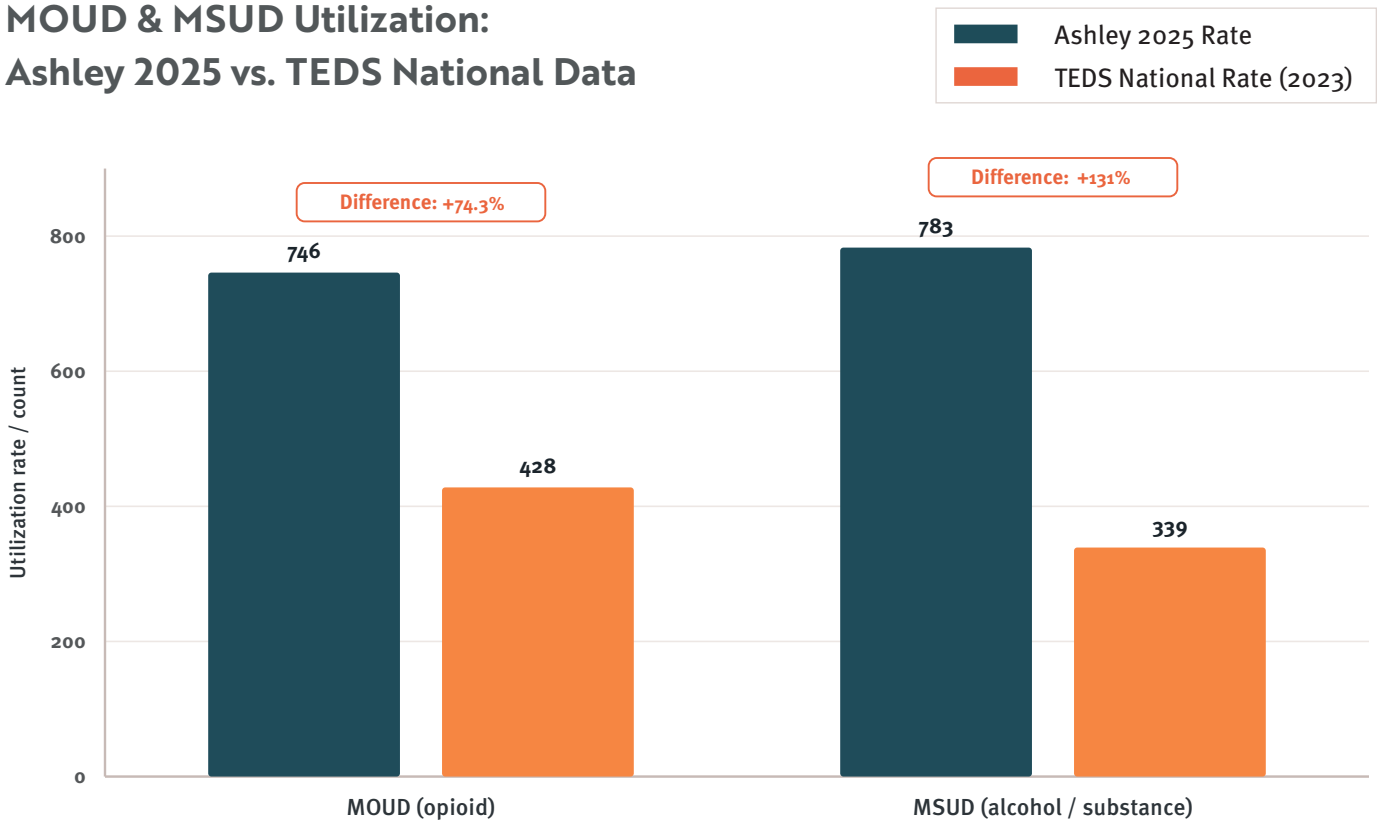
Key initiatives included:

- Earlier initiation of medication-assisted treatment (MAT), including starting acamprosate (Campral) sooner in the treatment process
- Expanded clinician education on buprenorphine and other MAT options, strengthening confidence and consistency in prescribing practices
- Integration of nursing staff into clinical rounds, providing real-time education and support around medication strategies for substance use disorders
- Development of a suite of clinical resources to support counselors' work with patients experiencing elevated cravings
- Quarterly outcomes review sessions to share data with counselors and supervisors, reinforcing accountability and equipping teams with strategies to improve outcomes

Together, these changes reflect a shift from reactive care to proactive, data-informed intervention — addressing cravings earlier, more consistently, and more effectively.

I. Benchmarking Medication Rates

An essential part of this improvement was fine-tuning how we use medications to support recovery. We closely follow national standards — specifically the Treatment Episode Data Set (TEDS) — which helps us benchmark our care against federal standards (SAMHSA, 2024). By treating cravings as a medical priority, we provide the physical stability patients need so they can focus fully on their therapeutic work.



As shown in the figure below, our utilization rates significantly exceed national benchmarks. For MOUD, our rate is approximately 74% higher than the national average. For MSUD, our rate is approximately 131% higher, meaning patients are more than twice as likely to receive these medications compared to national residential treatment averages. By treating cravings as a medical priority, we provide the physical stability patients need so they can focus fully on their therapeutic work.

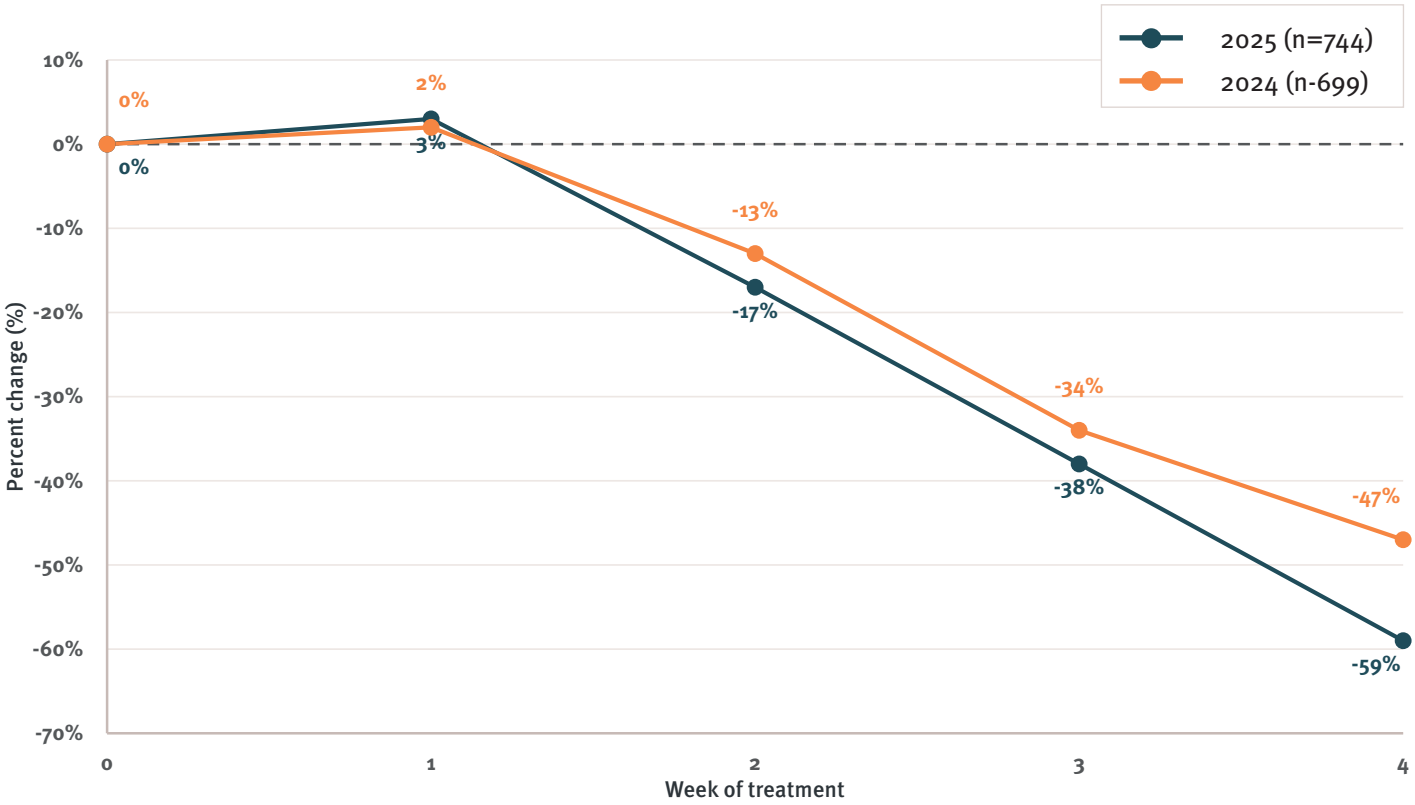
II. Craving relief for our patients

As a direct result of these efforts, we have observed meaningful improvements in how effectively we help patients manage cravings during treatment.

From 2024 to 2025, the average reduction in craving symptoms increased by 12%, representing a significant clinical gain over a relatively short period of time.

This improvement demonstrates the power of closing the loop between measurement and care: identifying a gap, implementing targeted interventions, and achieving measurable progress.

Percent Change in Craving Through Course of Treatment (2024 vs. 2025)



Comparison of percentage reduction in craving symptoms before and after targeted clinical interventions. Greater reduction in 2025 reflects improved treatment effectiveness.

VI. Academic highlights

1. Physiological and Mental Health Tracking in Substance Use Disorder Treatment

A study conducted at Ashley Addiction Treatment involving 59 individuals in residential treatment examined how physiological signals (like heart rate) and mental health symptoms (stress, anxiety, and depression) change together over the first month of recovery. Participants wore a WHOOP® device to track their heart metrics while completing weekly clinical assessments.

WHAT WE FOUND

Most participants showed improvement in either their physical regulation or their mental health, but these improvements didn't always happen at the same time. While treatment generally helped, the way people recovered was highly individualized.

- About 64–69% of participants saw their anxiety, depression, and stress levels drop, while a similar majority saw improvements in their resting heart rate and heart rate variability (HRV).
- Improving physically didn't always mean the person felt better mentally in that same week. Only about one-third of the group saw their heart metrics and mental health scores improve simultaneously.
- The table below shows the percentage of participants who experienced "dual improvement" (both their body and mind showing positive trends) during the first month:

CONCURRENT IMPROVEMENT METRIC	PARTICIPANTS SHOWING IMPROVEMENT (N=59)	PERCENTAGE
Lower heart rate + lower anxiety	**25**	**42%**
Higher HRV + lower depression	**24**	**41%**
Lower heart rate + lower stress	**23**	**39%**
Higher HRV + lower anxiety	**23**	**39%**

WHY IT MATTERS

These results highlight that:

- Physiological stabilization and mental health recovery do not always move in tandem. A patient may show "healthy" heart rate metrics while still experiencing significant anxiety, or conversely, feel mentally stronger even while their body is still physically recalibrating.

- Passive monitoring via devices like the WHOOP® provides a valuable objective layer to clinical care. However, because physical and emotional states can diverge, these tools should complement traditional patient self-reporting and clinical dialogue.

- Recovery trajectories are highly individualized. By monitoring both physiological and psychological markers, clinicians can better identify "at-risk" patterns, such as a patient whose physical metrics are improving while their mental health remains stagnant — allowing for more precise and timely interventions.

Insalaco W, Clapham C, Gelino B, Mayo Barney J, Billings B, Ellis JD, Hobelmann JG, Huhn AS, Zipunnikov V, Rabinowitz JA. Tracking the longitudinal course of physiologic and mental health functioning among individuals in substance use disorder treatment. Frontiers in Psychiatry. 2026;17:1755153. https://www.frontiersin.org/journals/psychiatry/articles/10.3389/fpsyt.2026.1755153/full

2. Affective Modulation of Pain in Opioid Treatment

A study conducted at Ashley in 24 volunteers seeking treatment for opioid use examined whether their positive and negative emotions were related to opioid withdrawal and craving during treatment. We also examined if different types of pain experiences during treatment changed how positive or negative emotions influenced opioid withdrawal and craving.

WHAT WE FOUND

Daily pain changed how positive emotions were related to opioid withdrawal: when daily pain was higher, more positive emotions were linked to less opioid withdrawal. When daily pain was low, positive emotions were not related to opioid withdrawal.

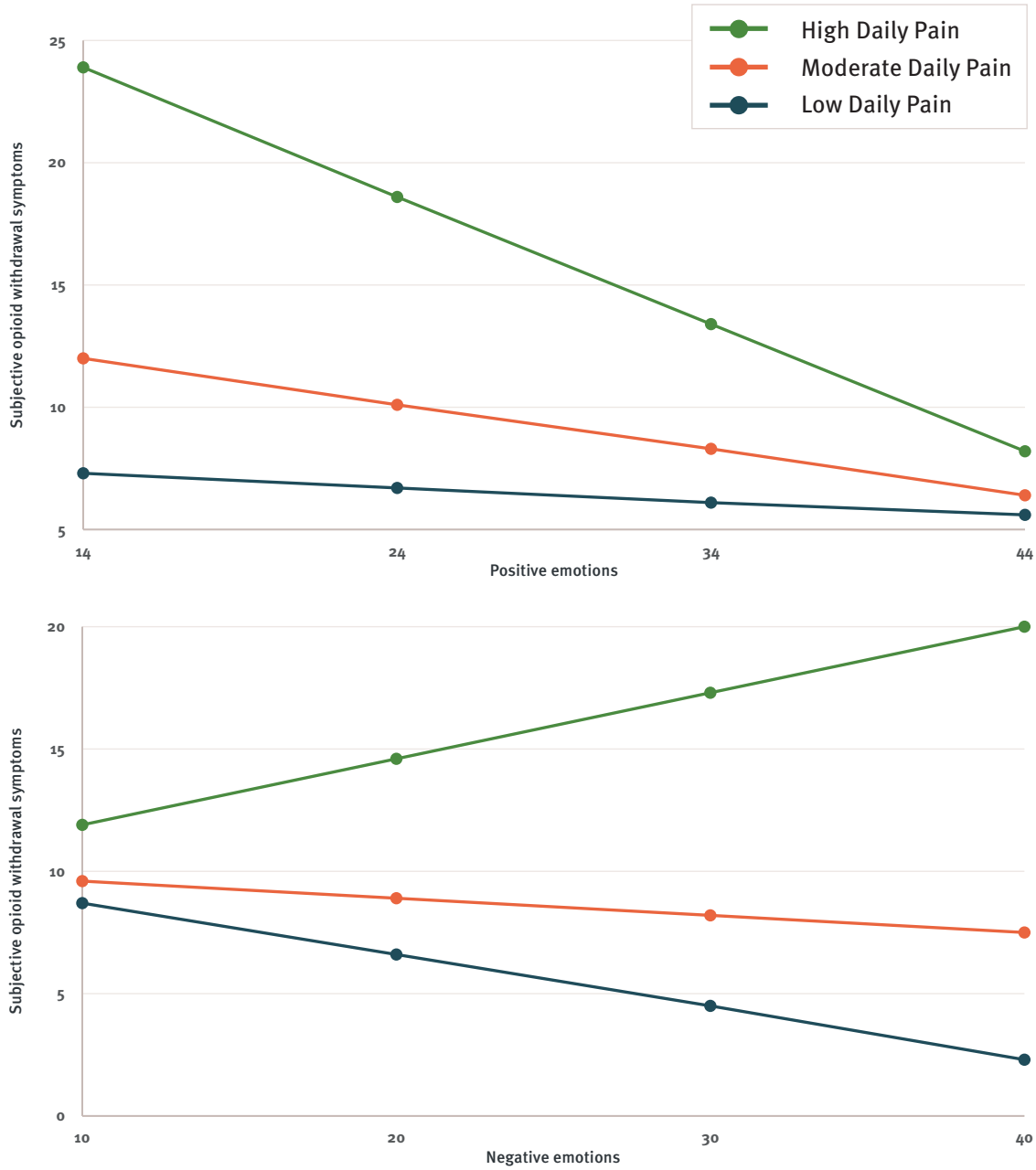
Chronic pain changed how negative emotions were related to opioid withdrawal: negative emotions were more strongly related to worse withdrawal for people with chronic pain. The same was true when daily pain, pain that interferes with life, and pain severity were higher.

Worrying a lot about pain changed how positive emotions were related to opioid craving: among people who worried more about pain, positive emotions were most protective against craving.

WHY IT MATTERS

These results highlight that:

- Pain may make opioid withdrawal worse.
- Pain and emotions/mood interact during treatment: Positive and negative emotions affect opioid withdrawal differently depending on someone's pain.
- Managing pain and building coping skills during treatment may reduce opioid withdrawal severity.



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, 90(6), 1408–1417. https://doi.org/10.1111/bcp.16022

3. Professional Quality of Life and Compassion Ability in Clinicians Who Work in Substance Use Disorder Treatment

A doctoral dissertation examined the relationships between aspects of professional quality of life and compassion ability in a national sample of 266 clinicians, including SUD counselors, licensed professional counselors, social workers, marriage and family therapists, and psychologists who provide substance use disorder treatment.

WHAT WE FOUND

- Professional quality of life was both related to and predictive of clinicians' compassion ability in substance use disorder treatment work environments.
- Clinicians with greater compassion satisfaction tend to have more compassion ability.
- Clinicians with greater burnout tend to have less compassion ability.
- Clinicians experiencing more secondary traumatic stress tend to have lower compassion ability.
- The combination of compassion satisfaction, burnout, and secondary traumatic stress predicted clinicians' compassion ability.
- More than 1/5 of the clinicians' compassion ability is explained by the level of pleasure they derive from helping their patients.

WHY IT MATTERS

This is the first study to measure clinicians' compassion ability in substance use disorder treatment and examine how professional quality of life influences this capacity. Compassion is an essential clinical competency and standard of care in many healthcare settings, contributing to clinicians' commitment to their organization, patients' experiences, and the outcomes that are achieved. However, the demands of substance use disorder treatment place clinicians at elevated risk for burnout and secondary traumatic stress, which can undermine compassionate care. In the context of burnout and secondary traumatic stress, the level of pleasure clinicians derive from helping their patients has a clinically significant effect on clinicians' compassion ability. These findings suggest that organizational strategies to strengthen compassion ability should prioritize enhancing compassion satisfaction, mitigating burnout and secondary traumatic stress, and supporting alignment between clinicians' values and their professional responsibilities.

Insalaco, W. (2025). Professional quality of life and compassion ability in clinicians who work in substance use disorder treatment (Order No. 31848149). [Doctoral dissertation, National University]. ProQuest Dissertations & Theses Global. (3216762675).

4. Mindfulness in Recovery® (MIR): Initial Efficacy of a Novel Mindfulness-based Intervention for Substance Use Disorder Treatment

A study evaluated changes across seven mindful living skills among patients in a residential substance use disorder treatment program that integrated Mindfulness in Recovery® (MIR) with 12-step facilitation therapy. We also examined whether participation in this combined approach was associated with improvements in recovery-oriented behaviors and indicators of sustained abstinence and well-being.

WHAT WE FOUND

- Participants demonstrated a significant increase in all seven MIR skills: attention, values, wisdom, equanimity, compassion, loving-kindness, and action.
- Participants significantly increased their daily mindful responding.
- Participants experienced significant increases in thriving.
- Participants reported significant reductions in craving and compulsive thoughts about substances

WHY IT MATTERS

These findings suggest that MIR may be an effective adjunct to traditional substance use disorder treatment, particularly for patients seeking a mindfulness-based complement to 12-step facilitation. The results position MIR as a promising new approach for reducing addictive cognitions and strengthening behaviors that support long-term recovery.

Kettering, V. L., & Insalaco, W. (2026). Mindfulness in Recovery® (MIR): Initial efficacy of a novel mindfulness-based intervention for substance use disorder treatment. Alcoholism Treatment Quarterly, 1–9. https://doi.org/10.1080/07347324.2026.2617241

VII. Appendix

I. References

Kelly, P. J., Deane, F. P., & Baker, A. L. (2018). The relationship between patient satisfaction and treatment outcomes in substance use disorder treatment. Journal of Substance Abuse Treatment, 88, 56–61. https://doi.org/10.1016/j.jsat.2018.02.007

Substance Abuse and Mental Health Services Administration. (2024). Treatment Episode Data Set (TEDS): 2022. Admissions to and discharges from publicly funded substance use treatment. U.S. Department of Health and Human Services. https://www.samhsa.gov/data/data-we-collect/teds-treatment-episode-data-set

Volkow, N. D., Frieden, T. R., Hyde, P. S., & Cha, S. S. (2014). Medication-assisted therapies—tackling the opioid overdose epidemic. New England Journal of Medicine, 370(22), 2063–2066. https://doi.org/10.1056/NEJMp1402780

II. Full List of Standardized Assessments

- 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 29

- 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.

- Everyday 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.

- 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

- Group Cohesion – Group Session Rating Scale (GSRS)
  Quirk, K., Miller, S. D., Duncan, B. L., & Owen, J. (2013). Group Session Rating Scale: Reliability and validity of a post-group session outcome measure. Journal of Counseling Psychology, 60(3), 358–367. https://doi.org/10.1037/a0032517

- Theraputic Alliance – Agnew Relationship Measure–5 (ARM-5)
  Cahill, J., Barkham, M., Hardy, G., Gilbody, S., Richards, D., Miles, J., & Evans, C. (2012). A Review and Critical Appraisal of Measures of Therapeutic Alliance in Mental Health Care Settings. Health Technology Assessment, 16(10). https://doi.org/10.3310/hta16100

III. List of current publications for research conducted at Ashley

Insalaco W, Clapham C, Gelino B, **Mayo Barney J**, **Billings B**, **Ellis JD**, **Hobelmann JG**, **Huhn AS**, Zipunnikov V, Rabinowitz JA. Tracking the longitudinal course of physiologic and mental health functioning among individuals in substance use disorder treatment. Frontiers in Psychiatry. 2026;17:1755153.

This study examined changes in physiological functioning and self-reported mental health during the first month of residential substance use disorder treatment using wearable WHOOP® devices and repeated assessments from 59 participants. Although many individuals showed improvements in both physiological and mental health measures, these changes did not consistently occur together, highlighting the value of combining objective wearable data with patient-reported outcomes to support personalized recovery monitoring.

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.

E**llis 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 anxiety 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

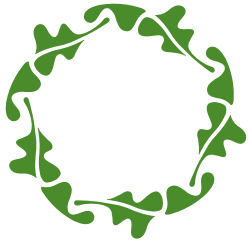
The study investigated fentanyl clearance in 12 individuals with opioid use disorder (OUD) admitted to residential treatment, finding that the clearance time for fentanyl and its metabolite, norfentanyl, averaged 7.3 and 13.3 days respectively, notably longer than other short-acting opioids. These findings 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.



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To every patient, family, alum, clinician, and supporter who made this year of outcomes possible — thank you. Your trust is the reason these numbers became lives changed.

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