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Horizons' Outcomes Performance Evaluation: Residential Substance Use Disorder Treatment Outcomes for Pregnant and Parenting Women

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Abstract

Objectives: Pregnant and parenting patients with substance use disorders (SUDs) face increasing clinical complexity, while access to long-term residential treatment has declined. This study examined whether American Society of Addiction Medicine (ASAM) 3.5 residential treatment [1] combined with wraparound services was associated with improved outcomes during treatment and up to 24 months following enrollment, and whether treatment duration influenced these outcomes.

Methods: Participants were pregnant and/or parenting women receiving residential SUD treatment at University of North Carolina (UNC) Horizons between December 2019 and February 2022. Assessments were conducted at intake and at 3, 6, 12, 18, and 24 months post-enrollment. Measures included the Addiction Severity Index (ASI) and the Housing Instability Index (HII). Linear mixed models evaluated changes over time and compared outcomes for participants who completed ≥180 days versus <180 days of residential treatment across housing stability and six ASI domains.

Results: N=74 women in residential care were included in this analysis. Most (96.1%) completed the study with minimal missing visits. Significant main effects of time were observed for ASI drug, employment, medical, and psychiatric composite scores, and for housing instability. Post-hoc analyses demonstrated sustained improvements from baseline through multiple follow-up points. Participants who remained in residential treatment for at least six months reported significantly lower substance use across the entire 24-month follow-up period compared to those with shorter stays.

Conclusions: Comprehensive residential treatment with sufficient duration yields durable improvements across life domains for pregnant and parenting women with SUDs. Findings highlight the importance of longer residential stays and have critical implications for treatment and insurance coverage decisions.

Introduction

Data from the 2024 National Survey on Drug Use and Health indicate that 48.2% of women ages 12 or older report illicit drug use in their lifetimes, and 13.7% of women ages 12 and older had a substance use disorder (SUD) diagnosis within the past year [2]. However, the same data set reports that only 12.5% of women who had a SUD in the past year received any treatment [2]. Barriers to SUD treatment, including some women-specific barriers, include lack of coordinated treatment planning among medical, addiction, and mental health treatment providers; providers being unaware of co-occurring psychiatric disorders; custody concerns; child care; lack of health insurance or funds to pay for treatment; lack of transportation; and the stigma, discrimination and prejudice women experience around admitting to having a SUD and seeking treatment for their SUD [3]. Women who enroll in SUD treatment are more likely than men to appear with complex presentations, including poly-substance use, medical and psychiatric comorbidities, and parenting/childcare needs [4-7].

Pregnancy is a unique time in life when improving health-related behaviors can become more urgent. For women with SUD, there can be great motivation to reduce or stop substance use to improve the chances of health outcomes for themselves and their infants [8]. However, when women seek SUD treatment help while pregnant, they face a myriad of barriers to access and engagement in care [9]. Examples of such barriers beyond those noted above for non-pregnant women include the interaction of pregnancy, substance use disorders, and psychiatric co-occurring disorders that are ignored or unrecognized by treatment providers and specific stigma that pregnant women with SUDs encounter. Clinical issues of concern for this population include adequate prenatal care, use of SUD treatment medications or other psychiatric medications while pregnant and/or nursing, maternal bonding, and coordinated treatment planning among medical and behavioral health disciplines [3].

Women with SUDs, including women who are pregnant and/or parenting, have unique needs that are best served in women-centered programs. In fact, women-centered programs to treat women with substance use disorders were developed following the widespread recognition of the unique problems and issues associated with women's health that occurred in the 1970-80s [10]. A plethora of treatment components that are related to treatment success have been identified [11,12], and there is agreement that treatment should address survival needs, general and obstetrical health, psychological functioning, family and parenting responsibilities, trauma history, co-occurring disorders, financial independence, appropriate treatment

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medications, and support services for mother and child [10]. A review of women-centered treatment programs found that they are more likely than mixed-gender programs to offer childcare, housing assistance, transportation, job training, prenatal and postpartum care, and other skills training [13].

While the critical components of women's treatment are generally agreed upon, they have not been well studied in terms of greater utilization yielding improved maternal and child outcomes, or of the resiliency of a variety of health and well-being improvements over time post-treatment. The HOPE project was a prospective cohort design that enrolled women seeking treatment for substance use disorders at UNC Horizons, an established OB/GYN clinic and residential treatment program for women and their children in the southeastern US [14]. The project followed participants for 24 months from enrollment and included adult and child measures to examine the relationship between utilization of treatment services and adult and child outcomes over an extended period of time post-treatment. The overall aim was to provide treatment providers and policy makers and implementers with information to use to improve services and/or better tailor programming for patients. A secondary aim was to examine the extent to which the services provided yielded outcomes that support the need for sustained and/or increased funding for services to treat these vulnerable families. This report focuses on the adult outcomes for the women who were residential patients at Horizons and participated in the HOPE project.

The Horizons' Outcomes Performance Evaluation (HOPE) project builds on prior work [14,15] by following both women and their children for up to 24 months from residential treatment admission and includes an array of outcome measures. This project also aims to fill the gap in contemporary longitudinal outcome data for pregnant/parenting women with substance use disorders [16,17]. Thus, this project looks at length of stay in the residential program as one measure of utilization of services and the association of service utilization to long-term outcomes in the domains of alcohol and substance use, housing stability, employment, medical, and mental health.

Methods

Project Sites

Recruitment for the HOPE project took place at the UNC Horizons treatment sites. Intake visits and subsequent in-person project visits took place at mutually agreed upon safe locations that offered adequate privacy and space, primarily offices at one of the Horizons sites, Horizons' residential apartments, or participant homes for women no longer living in one of the Horizons' residential programs.

Participants

Patients receiving SUD treatment services at UNC Horizons during the recruitment period who met the inclusion criteria were eligible to participate. Patients needed to be at least 18 years of age (also the minimum age for receiving services at Horizons), able to communicate effectively in English, have begun services at Horizons no more than 90 days prior to intake into the project (for this current episode of care for women who were returning patients to Horizons), and to have a diagnosed substance use disorder based on DSM-5 criteria at the intake visit. Exclusion criteria were having an acute severe psychiatric condition in need of immediate treatment or a determination of being of imminent risk to themselves or others during intake; any pending legal circumstances prohibiting them from participating (e.g. they were scheduled to start a jail/prison sentence during the project period); or confirmed plans to move out of North Carolina during the project period.

Procedures

Following IRB exemption, study recruitment began in December 2019 and ended in February 2022. The project team obtained informed consent from the interested woman and for any of her children who she wanted included in the project. The project team recruited eligible patients within the first 4 weeks after their initial service at Horizons (for this episode of care for women who have received services from Horizons in the past) but not later than 90 days from initial service at Horizons. All recruited women were informed that their decision to participate or not participate would in no way affect their or their children's services at Horizons.

Project participants completed six in-person (see (Table 1) COVID 19 note) project visits: intake, and 3, 6, 12, 18, and 24-month follow-up assessments. Baseline assessments occurred when participants were admitted into treatment at Horizons, and follow-up assessments were conducted throughout their residential treatment and following treatment discharge. At three time points, between the in-person visits (at 9, 15 and 21 months), a member of the project team communicated by phone or text message with the participant to complete a brief survey, update contact information, and provide reminders of future visits. For each in-person project visit participants received a gift card for a big box retailer for the following amounts: $30 for intake, 3 and 6 months, $40 for 12 and 18 months, and $50 for 24 months. At the intake visit participants also selected a welcome gift ($10 in value), and for each completed check-in telephone call (at 9, 15, and 21 months) the participant selected a small gift from a gift basket at the next in-person visit ($5 in value). Each participating child also selected an age-appropriate gift at each in-person visit ($5 in value, assortment of small toys and books).

Table 1: The timing of the measurements.

Hope Assessment Schedule*	Intake	3 months	6 months	9 months	12 months	15 months	18 months	21 months	24 months
ADULT MEASURES									
HOPE Demographic Data Questionnaire	X								
Addiction Severity Index (ASI)	X		X		X		X		X
Housing Instability Index (HII)	X		X		X		X		X

COVID 19 Note
Study recruitment began on 12/17/2019. To ensure the safety of project staff and participants, UNC IRB, the University and UNC Healthcare issued guidelines and restrictions on participant interactions pertaining to COVID 19 beginning on 3/18/2020 which ceased new study recruitment. Recruitment restarted in June 2020 for residential patients after a quarantine period for new arrivals. Recruitment of outpatient participants restarted in March 2021. Project visits were conducted onsite at Horizons or via telephone until fall of 2021.

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Measures

The measures that were included in this study were (see (Table 1) for timing):

1. **HOPE Demographic Data Questionnaire:** Included items on age, race, ethnicity, past treatment for SUD, years of education, marital status, pregnancy status, faith tradition, living children (ages, custody), medication for opioid use disorder (MOUD) history, tobacco use history, felony history (intake only).

2. **DSM-V Substance Use Disorder Criteria:** Assessed diagnostic substance use disorder criteria across multiple substances at intake [18].

3. **Adverse Childhood Experiences:** assessed traumatic childhood events, such as abuse, neglect, and family dysfunction that often results future psychological distress and externalizing behavior [19].

4. **Addiction Severity Index (ASI):** composite scores, asking about last 30 days in the following domains: drug, alcohol, employment/support, psychiatric, and medical. Intake, 6, 12, 18 and 24 months [20]. Family and social domains were not included as this was outside the scope of the clinical programming impact on sustained health gains and housing security assessed in the study. The legal domain of the ASI was not included due to too little variation in legal item responses.

5. **Housing Instability Index (HII):** 10 items, most yes/no answers except for number of moves in last 30 days and how likely is it that you will be able to pay for housing this month with 4 answer choices. Intake, 6, 12, 18 and 24 months [21].

Data Analyses

Descriptive characteristics of the sample were collected and examined at baseline. Longitudinal analyses were performed with linear mixed models to examine differences in treatment outcomes between those who completed more than 180 days of residential treatment and those who completed less than 180 days of treatment. We compared these two groups and examined the impact of this binary split on outcomes across multiple areas, including housing

Table 2: Demographic and Psychosocial Characteristics of Residential Women Enrolled in HOPE.

	Total sample (n=74) f (%) or *mean (SD)*	Range
Age	*31.2 years (5.10)*	19 to 43 years
Race White Black Other/more than one race	 54 (73%) 15 (20.3%) 5 (6.8%)	
Ethnicity: Hispanic/Latino	3 (4.1%)	
Education* Less than high school High School graduate/GED More than high school	 45 (60.8%) 24 (32.4%) 5 (6.8%)	8th grade to some graduate coursework completed
Married+	9 (12.2%)	
Pregnant at treatment entry	27 (36.5%)	
Gestation age at project entry	*24.6 weeks*	12 weeks to 40 weeks
History of felony conviction	36 (48.6%)	
Mandated to treatment By criminal justice system By child protective services	 11 (14.9%) 4 (5.4%)	
Current tobacco smoker	64 (86.5%)	
Age at first substance use other than tobacco	*14.7 years (4.0)*	8 years to 41 years
Years of reported substance use	*16.4 (5.6)*	2 years to 28 years
History of intravenous drug use+	42 (56.8%)	
Primary problematic substance* Opioids Stimulants Alcohol Other	 39 (52.7%) 26 (35.1%) 5 (6.8%) 4 (5.4%)	
Meet diagnostic criteria for DSM SUD diagnosis** Opioids Alcohol Sedatives Cannabis Hallucinogens Amphetamines	 44 (57.9%) 15 (19.7%) 11 (14.8%) 28 (36.8%) 1 (1.3%) 56 (73.7%)	
Reported receiving Medication to treat Opioid Use Disorder (MOUD) at baseline	48 (63.2%)	
Adverse Childhood Experiences Score^	*5.7 (4.1)*	0-10

+Data missing for one woman; *Data missing for two women; ^Data missing for three women
**Numbers will add up to more than 100% due to multiple participants meeting criteria for more than one SUD diagnosis

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(as assessed by the HII) and 6 domains of the ASI (drug, alcohol, employment/support, psychiatric, legal, and medical), over a 2-year period. Total scores were calculated for the HII and for the individual composite scores of each domain for the ASI. Reported baseline total scores were compared to each following time point (3-, 6-, 9-, 12-, 15-, 18-, 21-, and 24-month time points). Age, race, highest level of education completed, pregnancy status, and history of intravenous drug use were included as covariates in all models. Models included an interaction term of time and days in treatment. Data were analyzed using IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp, Armonk, NY).

Results

Participants

A total of 304 women were screened and consented to participate into the study. 117 participants were enrolled, of those two refused to participate. 78 were women in the residential program and the sample of focus for this study. Of those women 74 completed the project (96.1%), meaning they missed no more than 2 of the project visits. Of those who did not complete the project, three women (two in a car accident and the other due to unknown causes), and one woman was incarcerated, resulting in a final analytical sample of 74. (Table 2) summarizes the demographic data for the analytical sample. The mean age of our sample was 31.2 years old (ranging from 19 to 43 years of age), 73% were white, and 60.8% had less than a high school education. 12.2% of the sample was married, and 36.5% were pregnant at baseline, with an average of 24.6 weeks gestation at program entry. On average, women in the sample reported they began using substances at 14 years old and had been using for an average of 16 years, with opioids (52.7%) and amphetamines (35.1%) being the primary substances used. Among residential participants, the average number of days in the residential program was 208.6 (SD = 93.6). For participants who stayed in the program less than 180 days, the average was 100 days (SD = 53.9), and the average for those who stayed for more than 180 days was 266.1 (SD = 47.3).

Addiction Severity Index (ASI) Composite Scores and Housing Security

(Figure 1) provides means for ASI composite scores across the 24-month follow-up period. We observed significant main effects of time for specific ASI Composite Scores, including drug use (F = 10.65, p < .001), employment (F = 22.73, p < .001), medical (F = 2.83, p = .026), and psychiatry (F = 3.79, p = .01). Post-hoc analyses for the Drug Composite Scores indicated significant pairwise differences between baseline scores and 6- (t = 6.72, p < .0001), 12- (t = 5.74, p < .0001), 18- (t = 6.27, p < .0001), and 24-month follow-up (t = 3.72, p = .0002). For Medical Composite Scores, we observed similar significant pairwise comparisons between baseline and 6- (t = 3.08, p = .0023), 12- (t = 3.00, p = .0030), 18- (t = 3.01, p = .0029), and 24-month follow-up (t = 4.47, p < .0001). Additional post-hoc analyses for the Employment Composite Score indicated significant pairwise differences between 6-month scores and all follow-up scores at 12- (t = 4.76, p < .0001), 18- (t = 5.53, p < .0001), 24-month follow-up (t = 5.74, p < .0001). It is important to note that for most residential patients at Horizons, they cannot seek employment until transitioning into step-down services, typically after 4 months of treatment. For Psychiatric Composite Scores, we observed significant differences between baseline and 6- (t = 2.81, p = .0054), 15- (t = 3.40, p = .0008), and 24-months follow-up (t = 2.60, p = .0099) but not 12-month follow-up (t = 1.50, p = .1355). We also found significant effects of time on the Housing Instability Index (HII), with post-hoc analysis indicating significant differences between baseline and all follow-up assessments at 6- (t = 3.82, p = .0002), 12- (t = 4.27, p < .0001), 18- (t = 4.24, p < .0001), and 24-months (t = 3.25, p = .0013).

Additionally, we observed significant interactions between the days in residential treatment and time in the Drug Use Composite Score (F = 2.18, p = .028) and the Alcohol Use Composite Score (F = 2.14, p = .031), indicating that individuals who were in residential treatment reported less drug and alcohol use over time. More specifically, individuals who had at least 6 months of residential treatment reported lower use of substances across the 24-month assessment period. Pairwise comparisons indicated significant differences between baseline and final follow-up time points (t = 2.14, p = .031).

Discussion

Women who qualify for residential SUD treatment, with an ASAM level of care at 3.5 or higher [22], often present with co-occurring disorders, many years of substance use, significant trauma histories, legal system involvement, and limited educational and employment histories. The women in this study are typical of Horizons' patients in many ways, including prevalent nicotine use (87%), past felony convictions (48%), early age of first use (under 15 years), years of continuous use (16 years on average), many adverse childhood experiences (mean of 5.6) and limited educational attainment (60% having less than a high school diploma). These complex circumstances require tailored, intensive treatment. UNC Horizons offers comprehensive, integrated programming that focuses on addiction education, return to use prevention, parenting, healthy relationships, health and safety, trauma recovery, and job readiness. The residential program is designed to last for an average of nine months, during which women receive intensive group treatment, attending Substance Abuse Comprehensive Outpatient Treatment (SACOT) group programming five days each week for approximately 4 months and then attending Substance Abuse Intensive Outpatient Program (SAIOP) groups 3 days per week for approximately 3 months, and also meeting with an individual therapist and a case manager about once each week. Women often begin part or full-time jobs towards the end of their residential stays.

This project found that comprehensive residential treatment leads to significant improvements in mental health, reductions in drug use, increased employment, and housing stability compared to treatment entry. Importantly, women were able to maintain and even continue these positive trends for over a year after leaving the residential treatment program. Given the level of severity of their substance use disorders, and their many co-occurring factors, the improvements that the women were able to make and sustain in key areas of their lives are notable. Return to use after SUD is a common phenomenon, with estimates for return to use within one year of treatment ranging from 40-70% [23-25]. Our findings indicate that intensive, comprehensive treatment, including case management transition services to help patients build connections to local recovery support groups and to providers who can continue to prescribe medications, can lead to long-term recovery. The small but significant increase in ASI medical composite scores observed in our data from 18 to 24 months post treatment entry is unsurprising given clinical observations that once SUD symptoms stabilize or subside during recovery patients are able

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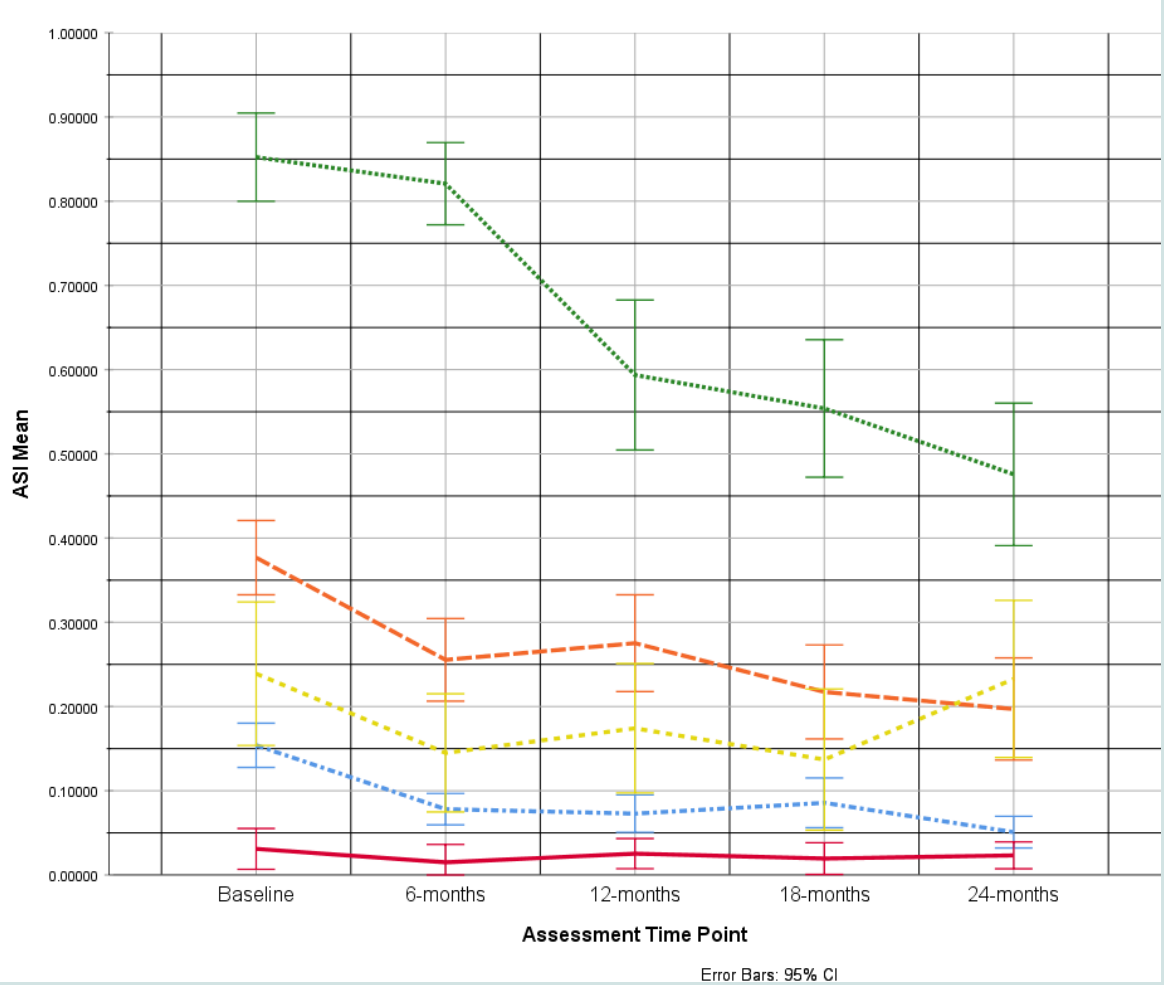

Figure 1: Clinical presentation. Erythematous serpiginous larva tracks associated with hyper-pigmented macules and crusts. (A) Posterior surface of right calf. (B) Right anterior thigh.

to focus on other significant issues in their lives, including medical issues that may have been ignored during or masked by substance use [26].

One of the important findings from this project is that women who remained in the residential program for at least six months had significantly lower levels of substance use over the 24-month follow-up period than women who stayed less than six months. This finding is consistent with neuroscience studies that show brain recovery over time, including frontal white matter pathways implicated in emotional regulation and top-down executive control [27-29]. For example, consistent months without substance use shows continuous improvement in brain fiber tract integrity which may be a neural mechanism explaining recovery [30]. This finding has important ramifications for policy makers and insurers as they weigh the cost of comprehensive residential treatment and the temptation to limit the length of residential stays. The complexity of the lives of the women who present to SUD treatment at a 3.5 ASAM level, especially when pregnant and/or with at least one minor child in their custody, requires treatment that addresses all of the major life domains in order to achieve stability. Our finding adds to the literature indicating that length of stay is an important determinant in longer-term outcomes for patients [24]. Specifically for pregnant and parenting women, three national studies (including RWC/PPW Cross-Site Study) showed that women who spent ≥6 months in residential treatment had significantly higher drug free rates (68–71%) at 6–12-month follow-up than those with shorter stays [31].

The possible economic impact of providing residential treatment for women with substance use disorders is substantial. For example, operating at approximately $3 million annual budget to serve 56 women and their children, the program is estimated to prevent roughly $4.1 million in direct public expenditures per year. Savings accrue across multiple domains, including neonatal intensive care unit (NICU) admissions, extended maternal hospital stays, foster care placements, incarceration, and domestic violence or child abuse-related hospitalizations. Under these assumptions, the net benefit of the program is over $1 million annually, yielding a return of $1.36 for every dollar invested. Such estimates do not include the numerous potential long-term benefits such as reduced recurrence of maternal SUD, decreased emergency healthcare utilization by mother and child, improved child developmental outcomes, or increased workforce participation and tax contributions among women in recovery. By accounting for both immediate and downstream societal

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costs, such estimates highlight that residential treatment programs are both clinically effective and economically advantageous, representing a sound investment of federal and state resources in maternal and child health.

The main limitations of this project include the absence of a control or comparison group, and the self-reported nature of substance use variables without biological specimen testing confirmation. However, this is a minor limitation as a meta-analysis of over 200 studies found overall high agreement between self-reported illicit drug use and biological measures such as urine, with agreement levels generally >0.79 [32]. In fact, self-report can be especially reliable in studies when participants know urine drug testing will occur, sometimes showing lower false discovery rates than urine drug tests depending on recall period and setting [32]. The COVID pandemic also reduced our overall sample size and led to a greater number of telephone study visits and fewer in-person study visits than planned. However, the prospective nature of the project, the use of validated measures (including the ASI, which is a well-accepted standard including for substance use reporting), the relatively long follow-up period, and the separation between the research team members who conducted the study visits and the clinical team members at Horizons who delivered treatment services (to ensure study participants were not giving answers to please their clinicians) all lend credibility to the findings. This study provides important information for the treatment field and policymakers regarding the effectiveness of comprehensive residential SUD treatment, and the importance of a longer residential stay- at least 6 months- to address severe and complex use disorders.

Conflict of Interest Statement

The authors report no conflict of interest.

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