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Expansion and evaluation of level II and III recovery residences for people taking medications for an opioid use disorder: project HOMES (Housing for MAR Expanded Services) study protocol

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ABSTRACT

Introduction As the US continues to battle the opioid epidemic, recovery residences remain valuable services for people in recovery. While there is a growing body of literature describing positive outcomes experienced by people who live in recovery residences, little is known about the experience of people who live in these residences while taking medications for an opioid use disorder (MOUD) as part of their recovery. Thus, this study has three aims: (1) expand the availability of recovery residences that meet the National Alliance for Recovery Residences standards in Texas and serve individuals taking medications for an opioid use disorder as part of their recovery; (2) evaluate recovery residences for people taking MOUD as part of their recovery; and (3) compare the cost-effectiveness of recovery residences to treatment-as-usual.

Methods and analysis In collaboration with community partners, we opened 15 recovery residences in the State of Texas to house people taking MOUD as part of their recovery. We are collecting quantitative and qualitative data to evaluate outcomes at the intrapersonal, interpersonal, organisational and community levels. At the intrapersonal level, we are assessing changes in behavioural and psychosocial constructs using a longitudinal survey, objectively measuring current substance use with a point-of-interview breathalyser and urinalysis, and examining changes in healthcare utilisation using data obtained from a healthcare information exchange. We are collecting interpersonal data using in-depth individual interviews with residents and staff. We are collecting organisational data using field observation and a cost-effectiveness study, and we are collecting community data using neighbourhood mapping.

Ethics and dissemination The UTHealth institutional review board approved all protocols. We will disseminate study findings via conference presentations, peer-reviewed publications and brief community reports.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This is one of the first multisite studies to examine the effectiveness of recovery residences for people taking medications for an opioid use disorder as part of their recovery.
⇒ Data are collected at the intrapersonal, interpersonal, organisational and community levels using qualitative and quantitative methods.
⇒ The prospective cohort design relies on a convenience sample.
⇒ Data are being collected only in Texas, although some findings are likely to be generalisable to other locations.

INTRODUCTION

Curbing opioid misuse is a public health priority. In 2021, approximately 9.2 million Americans misused opioids,[1] and 80 411 died of an opioid-involved overdose.[2] Unfortunately, 94% of Americans who might benefit from treatment and recovery support services did not receive treatment or recovery support services in 2021.[1]

Recovery support services are frequently operated by businesses and nonprofit organisations and include a variety of programmes to help people access programmes that support long-term recovery maintenance.[3 4] Recovery residences and recovery coaching are two of these programmes. The Substance Abuse and Mental Health Services Administration (SAMHSA) defines recovery residences as, 'safe, healthy, family-like substance free living environments that support individuals in recovery from addiction'. While recovery residences vary widely in structure, all are centred on peer support connection

to services that promote long-term recovery.[5] Recovery coaches are peer workers who offer and receive help, 'based on shared understanding, respect, and mutual empowerment between people in similar situations.' [6 7] The National Alliance of Recovery Residences (NARR), a national professional association that developed standards for operating recovery residences,[8] has categorised recovery residences into four levels based on staffing credentials and availability of in-house services. Recovery residences are based on the social model of recovery, which emphasises the importance of peer support in the recovery process.[9 10] Level IV residences include clinical staff and levels II and III include paid peer staff. Level I residences are self-governed by the residents and studies surrounding these homes compose most of the published literature on recovery residence effectiveness.[11] The exact number of recovery residences in the USA is difficult to quantify as homes regularly open and close and not all recovery residences are catalogued by national organisations as certification is optional in many states. Mericle *et al* estimated that there were 10 358 recovery residences nationally, 583 in Texas.[3 12]

In a 2017 review of the scientific literature on recovery residences, Kelly described the rigour of research conducted as moderate and called for additional research.[13] Researchers studying the effectiveness of recovery residences have found that the longer someone lives in a residence, the more likely they maintain recovery, obtain stable employment and reduce criminal justice involvement.[11 14–17] Residents' report improved self-regulation, less-aggressive behaviour and more optimism about their future.[14 18–20] In addition to looking at individual-level recovery-related outcomes, researchers have examined how differences in organisational structure and characteristics of staff affect residents' recovery outcomes. This includes an examination of how the house policies and culture impact recovery outcomes for men versus women, racial and ethnic minorities, or sexual minorities.[11 21–28] Researchers have also begun examining differences between residents who do or do not take medications for an opioid use disorder (MOUD)[29 30] or residents who do or do not have access to a recovery coach.[31] Unfortunately, for people taking MOUD and wanting to live in a recovery residence, barriers exist including MOUD-related stigma, concerns about medication cost and diversion, and a lack of technical assistance for house managers and operators.[32 33] Providers' MOUD preferences in different geographical locations across Texas also determine the types of MOUD available to residents.

While there is a growing body of research on the effectiveness of recovery residences, there is much to learn about the effectiveness of level II and III recovery residences or how outcomes differ between residents taking or not taking MOUD. There is less known about whether outcomes reported in the literature are similar for levels II and III recovery residences developed for people taking MOUD or whether the residences are cost-effective relative to treatment as usual (TAU; ie, persons taking MOUD and living in the community). Thus, the purpose of project HOMES is to evaluate the effectiveness of level II and III recovery residences for people taking MOUD as part of their recovery journey.

Study aims

Aim 1. Expand the availability of recovery residences that meet the NARR standards in Texas and serve people taking MOUD as part of their recovery.

Aim 2. Evaluate recovery residences for people taking MOUD as part of their recovery.

Aim 3. Compare the cost-effectiveness of recovery residences to treatment-as-usual.

METHODS

Patient and public involvement

Project Housing for MAR Expanded Services (HOMES; https://go.uth.edu/homes) is a three-arm quasi-experimental, mixed methods evaluation study. Project HOMES was conceptualised through informal conversations with our community partners to provide and evaluate level II and III MOUD services within the scope of the funders' allowable expenses. While community partners were regularly queried, the research team made all final decisions about study design. We provide four examples of decisions informed by conversations with community partners. First, we decided to provide residence operators with stable funding based on average capacity rather than a monthly point-in-time census or voucher programme. Second, we distinguished the roles of the residence operators, technical assistance and certification provider, and evaluation team. Residence operators requested the freedom to set their own operation policies as long as they maintained certification and collaborated with the evaluation team to provide necessary data. The technical assistance and certification provider requested independence when assisting residence operators with modifying existing or creating new policies to better serve residents taking MOUD and maintaining certification. To ensure all our community partners had the freedom to operate, our team chose to function as observers, collecting, analysing and disseminating data with as little intrusion as possible. Third, the decision to employ a quasi-experimental observational study design rather than a randomised study design resulted from a shared desire by our community partners and the research team not to withhold services from people in need of recovery housing. Finally, prior to disseminating findings in academic journals, we often conduct member checks with community partners, incorporating their comments into manuscripts, primarily in the discussion section. When feasible, we invite community partners to copresent at conferences and coauthor manuscripts.

Setting

The study is being conducted in Texas-based recovery residences serving individuals in recovery from opioid

Figure 1 Project Housing for MAR Expanded Services level II and III National Alliance of Recovery Residences-certified recovery residence locations.

use disorder taking MOUD as part of their recovery (intervention arms) and in community settings serving individuals in recovery from opioid use disorder also taking MOUD as part of their recovery and not living in a recovery residence (control arm). Recovery residences are located in Austin, El Paso, Houston, Midland and San Angelo, Texas. Community arm participants are recruited statewide (figure 1).

Intervention design

Expanded availability of recovery residences

In 2020, our team collaborated with community partners across Texas to expand the availability of level II and III NARR-certified recovery residences for people taking MOUD for an opioid use disorder (NARR, 2019). In collaboration with our statewide NARR affiliate, we identified recovery residence providers willing to partner with UTHealth (the research team) to open level II and III residences designed for people taking MOUD. In addition to having experience operating residences, providers had to be in a community where they could operate at least two homes, one for women and one for men. Providers also had to be in a community with MOUD providers (eg, methadone clinics and buprenorphine prescribers), complementary recovery support service providers and mutual aid groups (eg, 12-step recovery meetings). Providers who partnered with UTHealth to open new residences were asked to open the new residences within 90 days after receiving an executed contract and start-up funds from UTHealth. Start-up funds were provided to assist in obtaining, remodelling and furnishing new residences, paying staff involved in opening the new residences, and hiring staff necessary to operate the residences once they opened. The amount of funds provided for start-up varied by residence based on the cost of living in each location and the needs of each operator. Providers were asked to get NARR certified 180 days after receiving start-up funds. The Texas NARR affiliate helped the providers develop policies and procedures that supported people taking MOUD as part of their recovery and ensured the new residences complied with NARR standards.

Once the residences opened, providers began submitting monthly invoices to UTHealth to reimburse expenses accrued during the previous month. Importantly, providers are not reimbursed based on the number of beds in use during the previous month. Rather, providers are asked on average, to maintain at least an 80% occupancy in their residences. This is important to ensure that providers are financially stable during start-up or when a group of residents move out within a short period, leaving many beds empty. Each provider is asked to maintain a waitlist for their residences. Before placing a prospective resident on a waitlist, providers are asked to tell the

prospective resident about the possibility of obtaining a bed with a Project HOMES provider in a different city. If a prospective resident is interested in living in a different city, the prospective resident is referred to the provider in the other city. For prospective residents unable to pay for transportation to the other city, UTHealth purchases a one-way bus ticket to the new city for that prospective resident.

Project HOMES recovery residences

Prospective residents find out about Project HOMES residences by obtaining a referral from a treatment facility, MOUD provider, recovery support service or mutual aid provider in their community, or by completing an interest form on the Project HOMES website (https://www.go.uth.edu/homes). House managers run the recovery residences and are responsible for interviewing interested applicants and deciding who to admit. Each house has its own interview protocol, but in general, house managers assess for the following: (1) if the applicant is taking MOUD as prescribed by their physician and can continue paying for MOUD after moving into the home; (2) if an applicant sincerely wants to join a recovery community; and (3) if the individual will complement the cohort of current residents living in a residence. If deemed a good fit for the residence, the house manager invites the applicant to move into the residence. To minimise variance in the acceptance process across residences and ensure equity in access to housing, the Texas Recovery Oriented Housing Network, our technical assistance and certification provider, ensures residence operators comply with the NARR standards and code ethics.[8 34]

Usually, participants share a room with at least one other participant. In general, each room has a bed, dresser and nightstand for each resident. Dispensing medication, including MOUD, differs at each home. Some residences provide each resident with a lock box to store medications, and the resident is responsible for handling the medication. Other residences store medications in locked closets accessible only by the house manager for dispensing; the house manager observes the resident taking their medication and records it in a log book. Residents living in Project HOMES residences do not pay any rent. Residents are required to comply with the rules of the homes, which include following an individual recovery plan.

Evaluation design

Framework

The Socio-Ecological Model informed our evaluation protocol.[35–37] The model proposes that individual health behaviours are influenced by intrapersonal, interpersonal organisational, community and policy-level factors. For this study, we are collecting quantitative and qualitative data at the intrapersonal, interpersonal, organisational and community levels (figure 2).

Intrapersonal-level quantitative data

Sample size. In a study of residents of level I homes, Jason *et al* reported 33.3% of recovery residence participants returned to substance use within 6 months compared with 41.5% of community participants. He estimated the odds of substance use reoccurrence to be 0.71 (95% CI 0.58, 0.87) at 6 months.[14] Assuming an α=0.05, a 1–β=0.80, and a prevalence of a return to substance use of 33.3% among people in a recovery residence and 41.5% in the community, we calculated sample sizes using ORs of returning to substance use at 6 months ranging from 0.51 to 0.91. We estimate needing 174 people per study arm (n=522). For a three-arm study with 70% retention, we intend to recruit 679 participants into the study. The retention rate was set at 70% rather than 80% due to the expected difficulty of retaining this population in the study, especially retaining those who return to use and are no longer living in a Project HOMES recovery residence.

Eligibility. Inclusion criteria are (1) having a primary diagnosis by a physician of opioid use disorder and taking MOUD or being willing to take MOUD before move-in date; (2) having a MOUD prescription and the ability to continue paying for the medication once moved into the residence; (3) living in a Project HOMES residence; and (4) being ≥18 years of age. In San Angelo, Midland and El Paso, the Project HOMES residences with a mix of residents taking MOUD and not taking MOUD, people having a primary diagnosis of stimulant use disorder were also eligible for the study beginning in June 2023. People with a stimulant use disorder were added in response to requests from our community partners in the western half of the state who found it difficult to fill their beds with people taking MOUD for opioid use in recovery.

Recruitment. People in the community arm are recruited and referred through formal partnerships with two MOUD providers and informal partnerships with MOUD and statewide recovery support services providers who share flyers and other promotional materials we provide to them with their clients. When a new resident moves into a residence, the house manager notifies our research team to schedule the baseline interview. Baseline data are collected from residents 8 to 14 days after moving into a Project HOMES residence. The 1-week to 2-week delay in enrolment allows time for the individuals to adjust to their new living situation and decide if they want to stay in the residence before being asked to complete the baseline and follow-up data collection protocol.

Retention. To retain study participants, we employ a caseload model, meaning that data are collected in person or virtually, allowing our research assistants the opportunity to form a human connection at baseline with study participants; each research assistant meets with the residents in his or her caseload throughout the data collection period. To maintain connection, research assistants follow a contact protocol that relies on regularly scheduled text messages, emails and phone calls. When a resident misses their data collection appointment or is lost to follow-up, research assistants send ‘alert’ text messages to

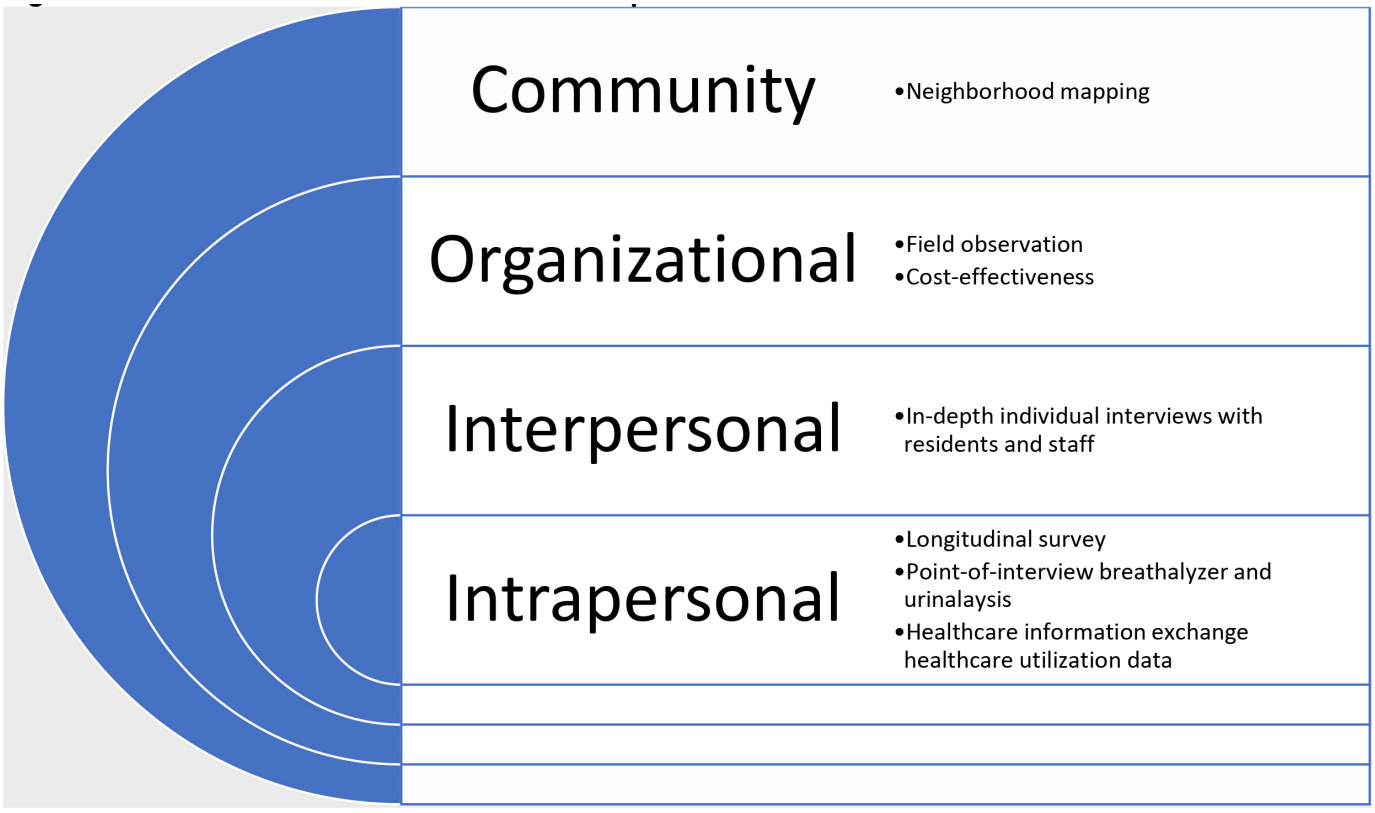

Figure 2 Levels of data collection in evaluation protocol. Note: levels of data collection informed by the socioecological model (Golden et al., 2015; Hovell et al., 2002; Wold and Mittelmark, 2018). Intrapersonal-level factors include a person's physical characteristics and cognitions. Interpersonal-level factors include the impact another person has on a person. Organisation-level factors include the influence of an organisation's physical space, policies and cultural norms on individual members of the organisation, and similarly, community-level factors include the impact of a community's physical space and cultural norms on an individual. The policy-level factors include the impact of city, state and federal laws legislating acceptable behaviour.

the resident to reschedule and rely on contacts provided by the resident, including recovery coaches and close friends or family members to re-establish contact with the resident (figure 3).

Data collection. Data are collected using REDCap,[38] a secure web application used for survey data collection (*REDCap*, n.d.). Project staff meets with participants in person or virtually using secure web-conferencing software at all data collection time points (baseline, and 3 and 6 months). After 6 months, residents who remain in the residences are only asked to update their contact information and complete a retrospective calendrical diary that asks about opioid, stimulant and alcohol use in the previous 3 months. A discharge survey is conducted 30–45 days after moving out of the residence. The discharge survey is used to assess changes in substance use and other measures 1 month after moving out of a Project HOMES residence. We give residents a US$25 gift card each time they complete a survey. When a participant is lost to follow-up, no longer wishes to be part of our study, dies or reaches the end of the study (completes interview after discharge), the data collector closes the record and documents the closure in REDCap. Because SAMHSA is the primary project funder, we collect data required by the Government Performance Results and Modernization Act. These data are shared with the Texas Health and Human Services Commission which combines our data with other data from other SAMHSA-funded opioid abatement projects and submits the combined data to SAMHSA.

Measures. Table 1 lists all variables of interest, scales and measurement time points. For remote sites where data are only collected virtually (San Angelo, Midland and El Paso), participants are not asked to submit urine or breathalyser tests.

In addition to survey responses, available healthcare utilisation data are collected from each resident a year before entering the residence and will be prospectively analysed as long as the study is funded. These data are obtained via subcontracts with health information exchanges that have individual-level international classification of diseases (ICD-10) codes. Data are securely transferred to a project-dedicated server affiliated with the UTHealth's data repository. Data repository staff merge these data with survey data and create a deidentified dataset linked only by a study identification number for analyses by members of the research team.

Data analysis. We will use bivariate statistics (eg, t-tests and χ^2) to explore differences between groups. Hierarchical multivariate regression models that account for the

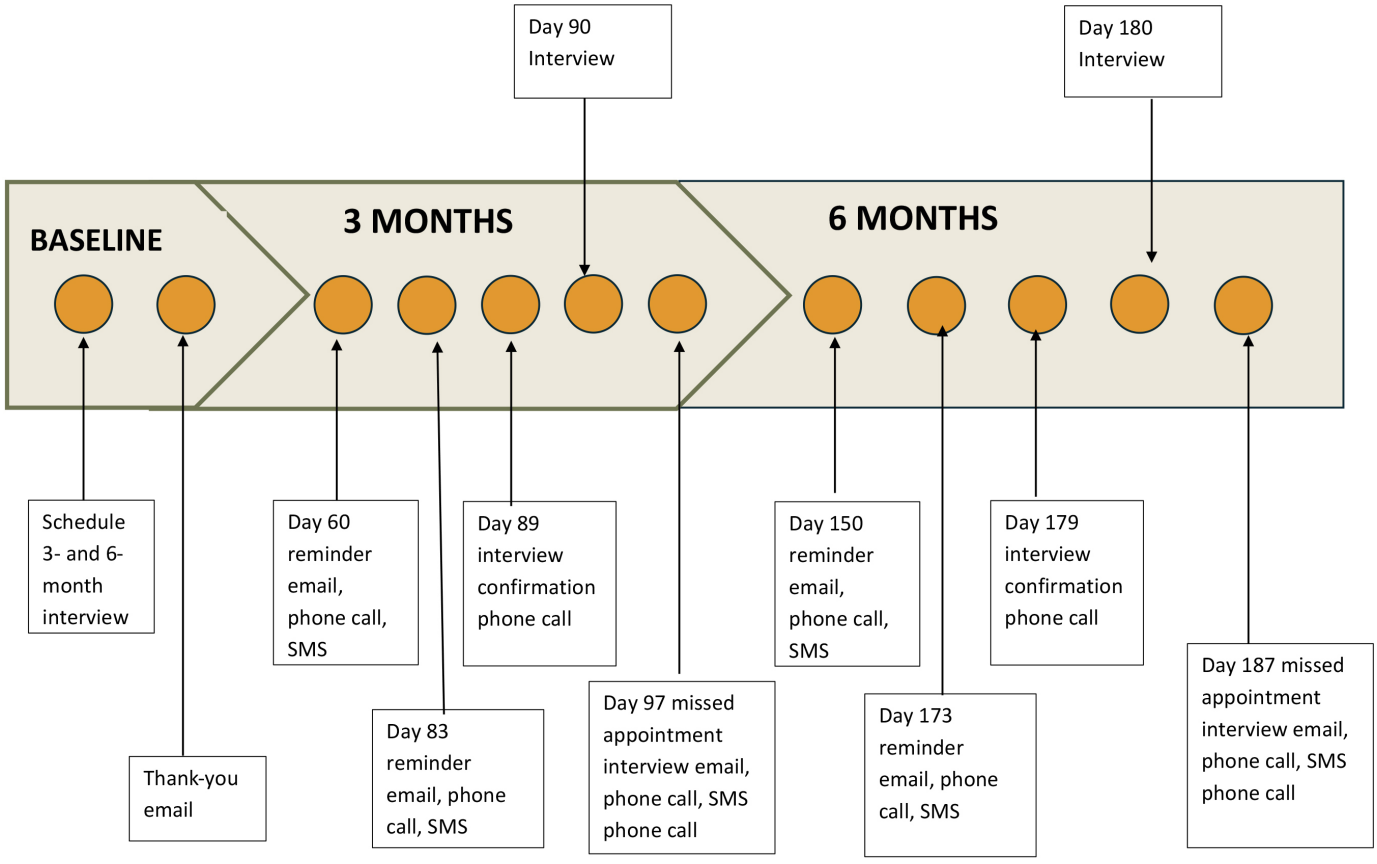

Figure 3 Retention protocol.

correlation between residents of a recovery residence and differences in time living in a residence will be used to explore associations between outcomes and explanatory variables.

Interpersonal-level qualitative data

We are conducting semistructured, in-depth interviews with Project HOMES residents and providers to learn about their experiences and perceptions of living and working in recovery residences specifically developed for people taking MOUD as part of their recovery.

Recruitment. Project HOMES research staff visit each recovery residence city two times per year. During each visit, we invite any interested residents, former residents and recovery residence providers to participate in in-depth interviews. Recovery residence providers may be recovery residence owners, operators, directors, CEOs, house managers, resident advisors or peer support specialists/recovery coaches. We also provide residents and providers with the study contact number if they would like to participate in an interview outside of a scheduled site visit time.

Eligibility. Residents are eligible to participate in an in-depth interview if they currently live or have previously lived in a Project HOMES recovery residence. Residents should have lived in the recovery residence for at least a month or longer before participating in an interview. Recovery residence providers are eligible to participate if they work directly with residents or if they are involved in managing a Project HOMES recovery residence.

Data collection. Interviewers read participants an informed consent form and answer any questions related to the interview process. Participants are asked to provide their verbal assent to indicate their agreement to participate in the interviews. The interviews are conducted virtually or in person in a private setting, such as an office or a room within a recovery residence. All interviews are recorded and transcribed. The interviews range from 45 to 90 min. We give all past and current resident participants a US$25 gift card for participating in an in-depth interview. Recovery residence stakeholders do not receive compensation for participating in an in-depth interview. Data collection is ongoing.

Measures. We ask resident participants a range of questions related to their recovery journey and experiences living in a recovery residence developed for people taking MOUD. Interview topics include recovery history, adjusting to the recovery residence, social support, recovery residence structure and MOUD policies, experiences with taking MOUD for recovery, MOUD-related stigma, community support for people taking MOUD, mental health and tobacco use within the residences.

We ask provider participants questions related to their experiences opening and managing recovery residences developed for people taking MOUD as part of their

Table 1 Constructs assessed with the longitudinal survey

Construct	Scale	Baseline	Follow-up
Primary outcomes			
Recovery capital	Assessment of Recovery Capital	X	X
Employment	Self-report	X	X
Income	Self-report	X	X
Substance use experience	Sobriety date		
	Addiction Severity Index (ASI) Lite	X	X
	Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST)	X	X
Healthcare utilisation	Self-report and health information exchange data about inpatient and emergency department visits	X	X
MOUD adherence	Self-reported adherence barriers and facilitators Morisky Medication Adherence Scale-8	X	X
Other behaviours and covariates			
Demographic characteristics	Age, race/ethnicity, gender, sexual orientation, relationship status, number of dependents, previous substance use treatment and recovery experiences	X	
Homelessness	Self-report	X	X
Criminal justice involvement	Addiction Severity Index Lite (ASI Lite)	X	X
Depression and anxiety symptoms	Patient Health Questionnaire-4	X	X
Commitment to sobriety	Commitment to Sobriety Scale	X	X
Self-efficacy	Situational Confidence Scale-8	X	X
Outcome expectations	Self-report measures	X	X
Coping	Brief Coping Orientations to Problems Experienced Inventory (Brief COPE)	X	X
Mental health diagnoses	Self-report	X	
Trauma	Brief Trauma Questionnaire	X	

recovery. Interview topics include impressions of recovery residences developed for people taking MOUD, key challenges of working with people taking MOUD in the recovery residence setting, thoughts regarding MOUD, MOUD-related stigma, tobacco use within recovery residences, resident needs and fit within the homes, recovery residence policies and structure, COVID-related experiences and training needs. Given the iterative nature of qualitative research, we add, remove or revise interview questions as we learn new information through the interviewing and analysis process.

Data analysis. A team of trained qualitative researchers code and analyse the interview transcripts using ATLAS.ti V.23.[39] The qualitative team codes all transcripts using mutually agreed on codebook and processes and conducts weekly debriefing to increase the credibility and trustworthiness of the analysis.[40] Specifically, they discuss potential new codes, deliberate on these codes fit with the data and incorporate new codes into the codebook when appropriate. The team also keeps detailed analytic memos on emerging themes during the coding process.

Initially, the qualitative team applies thematic analysis to the resulting codes, looking for patterns, similarities, differences and special cases, in the coding.[41] They are attentive to outcomes that agree or disagree with established literature. Analytic memos collected during coding are incorporated into the thematic analysis to enrich data. The qualitative team is establishing a comprehensive list of themes and is visualising how the themes are connected to one another and to the established literature.

In addition to thematic analysis, the team is using narrative analysis and discourse analysis to further interrogate the transcripts. Using narrative analysis, we examine patterns in the ways people share their stories of their drug and recovery journey. By noting the different types of experiences along people's journeys, we can identify possible points for intervention and support. Discourse analysis allows us to understand the ways people talk about the people, things and settings that are part of drug journeys and recovery and how they enact their identities.[42] By developing an understanding about the ways that people in recovery talk about their former use and the process and patterns in recovery, we can begin to understand the larger world of drug use and recovery and the facilitators and barriers they see and encounter as they navigate their shifting identities and pathways forward.

Organizational-level field observations

Members of the qualitative team also conduct ethnographic observations to better understand the day-to-day experience of those in the home. Research staff identify themselves and the purpose of the visit to staff and residents of the home. These observations are as unobtrusive as possible, occurring only in common areas of the home. When appropriate, research staff members participate in house activities like morning meditations or eating dinner with the residents and staff. Following visits to the recovery residence, research staff document their visits via field notes that contain the observation date, location and a thick description of the events they witnessed.[43] Field notes are stored on a secure network drive maintained by the investigators.

Community-level neighborhood mapping

We conduct environmental audits to ascertain neighbourhood amenities and characteristics relevant to substance use recovery. Members of the qualitative team walk the neighbourhoods surrounding the recovery homes in both Austin and Houston, documenting features of the surrounding environment such as green space, alcohol and tobacco retailers, mutual help group availability and access to public transportation. This neighbourhood audit will be combined with data from online sources to more robustly characterise these communities, such as walkability metrics and census data. In areas where walking the neighbourhood is not physically possible, team members write field notes and take photographs where appropriate.

Organisational-level cost-effectiveness of recovery residences

Evidence suggests that, compared with TAU, peer-led recovery homes can reduce substance use, increase likelihood of employment and reduce the number of days engaged in illegal activities. There is less known, however, about whether such homes are cost-effective relative to TAU.

While a few studies have shown that, on average, there are benefits to individuals participating in peer-led recovery homes, this is a necessary, but not sufficient condition to establish cost-effectiveness. To date, there are no cost-effectiveness analyses of recovery homes. This research aim will fill this void. To execute the economic evaluation, we will conduct the following two analyses: we will evaluate the cost-effectiveness of recovery homes by comparing the ratio of the incremental cost of the recover residencies ΔC (difference in programme costs between recovery homes and TAU) less averted health costs such as emergency department utilisation and criminal activity/recidivism due to residencies, to the incremental effectiveness (QALYs) ΔE (difference in effectiveness between recovery homes and TAU). The cost-effectiveness analysis will be repeated for each of our outcomes of interest; that is, we will calculate the cost effectiveness of recovery homes in being able to decrease have a reoccurrence of substance use, decrease criminal justice involvement/recidivism and decrease emergency department visits.

Data synthesis

The research team meets monthly as a learning community to discuss preliminary and published data analyses, how these analytic findings are complementary and how findings contribute to the academic literature and recovery residence policy and practice. To engage scholars, policy-makers and practitioners outside of the research team, members of the team present findings at community meetings and conferences. Insights gained from these meetings and conferences are shared with the larger team at the monthly meetings.

DISCUSSION

Strengths

This study was designed to determine if level II and II homes are as successful as Oxford Houses and California sober living homes are. This study was also designed to explore conditions at multiple levels of the socioecological model.[35–37] This study uses longitudinal quantitative data to understand which demographic and psychosocial (intrapersonal level) constructs are associated with MOUD adherence and recovery maintenance. This study uses qualitative individual interviews to identify commonalities and differences between resident and staff perceptions of housing culture that support or hinder MOUD adherence and recovery maintenance, which are interpersonal-level factors. At the organisational level, this study describes how the implementation of different housing policies and management styles creates a culture that bounds interpersonal interactions and shapes individuals' attitudes about their homes. The cost-effectiveness study provides data to guide policy-makers seeking to fund the cost of recovery residences, factors relevant to the policy level of the socioecological model.[35–37] At the community level, neighbourhood mapping describes how the community in which homes are located can support or undermine the creation of a house culture and individual residents' recovery maintenance.

Limitations

This study does have limitations. Data are collected from a convenience sample. The residences included in the study are only located in Texas, and they were selected as community partners by the evaluation team. This introduced organisational-level selection bias. Furthermore, people recruited into the recovery residence arms must first consent to the study, be interviewed by resident managers and be invited to move into the residences, and remain in the residences for at least 8–14 days before being consenting to join the study and providing baseline data. Thus, people who provide baseline data likely differ from those who are not invited to live in a residence or who move out before providing baseline data. Similarly, the community arm relies on a convenience sample of

people recruited from referrals by community contacts and outreach workers employed by the study. Despite relying on convenience sampling, this evaluation study will provide some of the first comparative data on the effectiveness of MOUD recovery residences.

Impact

Findings from this study will provide needed data on the effectiveness of level II and III recovery residences for people taking MOUD as part of their recovery plan. Researchers can use study findings to inform future research. The findings can assist practitioners in establishing house culture and retaining residents. Policy-makers can use findings when making funding recommendations for recovery residences for people taking MOUD.

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Contributors JMW is the guarantor of this study and accepts full responsibility for conducting the study. He has access to the data and controls the decision to publish. He is a multiprincipal investigator with expertise in substance use recovery support services. He led the drafting and submission of the manuscript. KRG is a co-investigator with expertise in substance use recovery support services and qualitative research. She assisted in drafting the qualitative sections of the manuscript. SR is a member of the CoLab research team with expertise in dissemination and implementation research. She provided guidance on how to prepare a protocol manuscript for publication and edited the final draft of the manuscript prior to submission. HSB is a co-investigator and health economist. He drafted the cost-effectiveness section of the manuscript. CMGC is a co-investigator with expertise in studies involving big data and data visualisation. She assisted in drafting the Methods section of the manuscript. JJY is a co-investigator and biostatistician. He drafted the study design and data analysis sections of the manuscript. ERH is the CoLab Projects Manger. He assisted in drafting the data collection section of the manuscript. INZ is a CoLab doctoral student assisting with data collection and analysis. INZ assisted in drafting the qualitative Methods section of the manuscript. HLNS is a CoLab doctoral student assisting with data collection and analysis. She drafted the mapping section of the manuscript. SAM is a multi-principal investigator with expertise in substance use recovery support services and qualitative research methods. She assisted with drafting the qualitative section of the manuscripts and provided substantive edits on all sections of the manuscript prior to submission.

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