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Recovery community centers: Characteristics of new attendees and longitudinal investigation of the predictors and effects of participation

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ABSTRACT

Objective: Recovery community centers (RCCs) have expanded across the U.S., serving as social "recovery hubs" that increase recovery capital (e.g., employment, housing) by providing resources that clinical care does not provide. While research supports RCCs' general utility, little is known about new participants' characteristics, predictors of engagement, services used, and benefits derived. Greater knowledge would inform the field about RCCs' clinical and public health potential.

Method: Prospective, single-group study of individuals ($N = 275$) starting at RCCs ($k = 7$) in the northeastern U.S. and reassessed 3 months later regarding the services these individuals used and the benefits they derived (e.g., reduced substance problems, enhanced quality of life [QOL]). Regression and longitudinal models tested theorized relationships.

Results: Participants were mostly young to middle-aged, racially diverse, single, unemployed, men and women, with low education and income, suffering from opioid or alcohol use disorder, with a history of psychiatric problems, low QOL, and prior treatment/mutual-help participation. Attendance varied greatly, but on average, was 1–2 times/week, with greater RCC engagement predicted by Hispanic ethnicity, shorter travel time, prior treatment, lower initial social support, and *relatively greater* baseline QOL (QOL was low overall). Commonly used and highly valued services included social support infrastructures (e.g., recovery coaching/meetings), and technological and employment assistance. In longitudinal analyses ($n = 138$), the study observed improvements in duration of abstinence, substance problems, psychological well-being, and QOL, but not in recovery assets.

Conclusion: Findings generally are consistent with prior observations that RCCs engage and provide benefits for individuals facing the greatest challenges in terms of clinical pathology and low QOL and resources.

1. Introduction

For the past 50 years in the United States and other middle- and high-income countries globally, alcohol and other drug (AOD) disorders have been addressed mostly via professionally directed clinical services (e.g., detoxification and stabilization, medications, counseling) and peer-led mutual-help organizations (MHOs), such as Alcoholics Anonymous (AA), Narcotics Anonymous (NA), SMART Recovery, and others (Bøg et al., 2017; Humphreys, 2003; Kelly, 2017; Kelly, Humphreys, & Ferri, 2020). Adding to these two approaches, a new breed of services has emerged that are neither purely professional nor peer-run. These new services (e.g., recovery community centers, recovery residences, collegiate recovery; Kelly, Fallah-Sohy, et al., 2020; Kelly & White, 2012; White, Humphreys, et al., 2012; White, Kelly, & Roth, 2012) combine voluntary, peer-led initiatives with professional activities and are intended to provide flexible community-based options to address psychosocial barriers to sustained remission (White, Humphreys, et al., 2012; White, Kelly, & Roth, 2012).

Recovery community centers (RCCs; also sometimes known as "recovery cafes" or "recovery support centers") are one of the most common and rapidly growing of these new additions to the recovery support infrastructure (Cousins et al., 2012; Kelly et al., 2017; Kelly, Fallah-

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Sohy, et al., 2020; Kelly, Stout, et al., 2020; Valentine, 2011). RCCs are literally and metaphorically, "new kids on the block" (Kelly, Fallah-Sohy, et al., 2020), as these novel entities are most often located on city blocks within the heart of communities and provide a variety of services, including recovery coaching, relapse prevention skills-building, employment and job training linkages, recreational activities, and a host of other support services intended for people in or seeking recovery (Kelly, Fallah-Sohy, et al., 2020). They appear to be operated by a combination of peer volunteers and addiction professionals (Cousins et al., 2012; Kelly, Fallah-Sohy, et al., 2020).

Conceptually, RCCs are founded on the principle that the achievement of sustained AOD remission is not just a function of medical stabilization (e.g., detoxification/medication) or acutely addressing psychopathology—although these are often critical—but also of providing and successfully mobilizing personal, social, environmental, and cultural resources that can be brought to bear on sustaining remission and recovery over time. The total aggregate of these resources has been termed, "recovery capital" (Cloud & Granfield, 2008). From a stress and coping theoretical perspective (Lazarus & Folkman, 1984), the greater the availability of, and access to, recovery capital, the greater the likelihood that individuals will be able to buffer stress associated with the adaptations needed to initiate and sustain stable remission (Kelly & Hoeppner, 2015; White & Cloud, 2008). The recovery support and services that RCCs provide, especially early in recovery, should therefore result in measurable benefits on indices of substance use as well as positive changes in broader indices of functioning and quality of life and well-being (Kelly & Hoeppner, 2015).

In addition to enhancing members' recovery capital, for new RCC participants beginning a recovery attempt, RCCs should facilitate greater abstinence and decreased harm by providing active exposure to existing RCC peers who have the lived experience and who can attract and engage people in or seeking recovery via the common bond of mutual-suffering and who model and reinforce successful recovery pathways. Yet despite their growth, RCCs have been subjected to little systematic study (Armitage et al., 2010; Kelly, Stout, et al., 2020; Mericle et al., 2014). Some of our prior research examining RCCs has detailed on-site interview results from RCC directors and staff regarding the physicality, locality, services offered; and described staffing, operations, and budgets (Kelly, Fallah-Sohy, et al., 2020); this work has provided some cross-sectional estimates of associations among RCC participation variables and benefits in psychological well-being and quality of life (Kelly, Stout, et al., 2020), but researchers have conducted few systematic longitudinal analyses among new RCC participants who are just beginning to use such resources to aid their recovery. More knowledge in these areas will inform national efforts by helping to estimate the potential clinical and public health utility of RCCs. In particular, prospective examinations of whether new RCC participants derive benefits from RCCs could lead treatment and criminal justice systems to more referrals to support those beginning a new recovery attempt; or, if research shows RCCS not to be beneficial, studies could point toward necessary changes in RCCs' structure or service provision, or the development of new models of recovery support services.

To this end, to gather more systematic prospective research on new RCC participants, the current study aimed to answer five key research questions regarding new members' use of RCCs in the first 3 months following initiation: 1) What are the characteristics of new RCC attendees? 2) How frequently do new RCC participants use RCCs? 3) What demographic, clinical, service use, and quality of life factors are associated with greater RCC engagement? 4) What services are new RCC participants using? and 5) What are the recovery benefits associated with RCC participation in the first 3 months after starting to attend an RCC?

2. Methods

2.1. Participants

Participants were attendees at seven RCCs located in the New England region of the U.S. The study selected these seven RCCs from an overall group of 32 RCCs, which participated in a cross-sectional descriptive study described elsewhere (Kelly, Fallah-Sohy, et al., 2020; Kelly, Stout, et al., 2020). Study staff invited RCCs that ranked well in terms of quality of care (i.e., member reported usefulness of the RCC, ratings of the physical environment), reach (i.e., number of new members per month, overall number of visits per month), and equity (i.e., proportion of non-White, Hispanic, and female RCC members) to participate in this longitudinal study. The study conducted this purposeful sampling to select the "best", largest, and most diverse RCCs available from our overall sample of 32 centers as part of a proof-of-concept effort to determine whether RCCs conferred benefits under what might be considered the best RCC conditions. To recruit (1/25/2017–12/22/2017), RCC directors and staff told RCC attendees about the study and posted flyers in their RCCs. In some cases, study staff visited RCCs to make announcements and provide further information. Study staff also invited RCC directors and staff to participate in biweekly conference calls to assist with communication efforts regarding the study and facilitate study discussions among directors. To incentivize continued distribution of recruitment materials, the study provided centers a $25 donation per valid study participant. To be eligible for the study, RCC attendees needed to be 18 or older, currently seeking or in recovery from a drug or alcohol problem, currently attending one of the 7 selected RCCs, and needed to have started visiting that RCC within the past month (i.e., they were new attendees).

Of the 589 initially started online screens, 43 were not completed, 51 were duplicates of other screens, 21 were fraudulent (i.e., re-screened and changed answers to be eligible), and 136 were ineligible. The most common reason for being ineligible was that the potential participant had started utilizing one of the participating RCC longer than 1 month ago (69%; 94/136) or was not attending one of the participating RCCs (18%; 25/136). Thus, the study deemed 338 online screens eligible, and they proceeded to the baseline survey. Of these, 13 never started it, and 31 did not complete it, leaving 294 completed baseline surveys. Of these, 2 respondents indicated never having used a substance, and 17 indicated never having used a substance regularly. While not an explicit eligibility criterion, we excluded these cases from analyses, because seeking or being in recovery from a drug or alcohol problem was an eligibility criterion, which does not appear to be possible in the absence of lifetime substance use. We further reasoned that if this report of lack of substance use was merely a mis-click during the survey, the survey-taking might be construed to suffer from lack of attention, rendering the validity of the data questionable. Thus, the study includes $n = 275$ baseline surveys in the analyses.

2.2. Procedure

Interested RCC members used an open REDCap (Harris et al., 2009) survey link to complete eligibility screening. If eligible, participants signed an e-consent form, and then proceeded to the baseline survey. Participants received a $15 and $20 gift card, respectively, for their completed baseline and 3-month survey. Study staff reviewed the surveys for completeness and validity.

Links to the 3-month follow-up surveys were automatically sent out via REDCap 3 months after participants completed baseline surveys. Participants received reminders via phone, email, or text-message, based on preference, to complete follow-up surveys. REDCap sent these reminders 2 months, 1 month, 2 weeks, 1 week, and 1 day before the survey became available. For surveys not completed within a week of the due date, study staff reached out three times to remind participants to complete it. Additionally, study staff sent flyers to RCCs

containing study contact information with a reminder to complete 3-month surveys, and reached out to participant-named collaterals to obtain updated contact information for the participant and/or to remind them to complete the survey. Using these procedures, we obtained 3-month surveys for 60% (166/275) of valid baseline participants; we obtained some surveys later than the 3-month mark (median = 92 days, mean = 114 ± 58). We excluded very late surveys (i.e., 4+ months postbaseline, $n = 28$) from analyses capturing change over time or RCC engagement (i.e., total $n = 138$), but used all 3-month surveys for the rating of the RCC services (i.e., $n = 166$).

2.3. Measures

2.3.1. Demographics

The study survey asked participants about their age, gender, sexual orientation, race, ethnicity, education, income, employment, and marital status. To assess participants' involvement in the legal system, the study used an item from the TCU (Institute of Behavioral Research, 2007a,b): "What is your current legal status?" where response options were "none", "on probation only", "on parole only", "on probation and parole", "awaiting charge, trial or sentence", "outstanding warrant", "case pending", or "other", which we dichotomized into "any legal involvement" vs. "none".

2.3.2. Recover

The survey asked participants: "Would you describe yourself as being in recovery?" (yes/no). If yes, the survey asked "For how long have you been in recovery from addiction?".

2.3.3. Substance use

The survey provided participants with a list of substances (i.e., alcohol, marijuana, cocaine, heroin, unprescribed methadone, unprescribed buprenorphine, unprescribed other opioids, hallucinogens, synthetic marijuana, amphetamine, methamphetamine, benzodiazepines, barbiturates, inhalants, steroids, tobacco) and asked if they had ever used each drug 10+ times in their lifetime. If yes, the survey asked if they ever used it regularly (at least once per week) and, "Of the substances that you have used, which was the primary substance that you used (i.e., what was your drug of choice)?" From these responses, we coded primary substance, number of substances used regularly (excluding tobacco), and if they used tobacco ever and/or currently.

2.3.4. Mental health

The survey asked participants: "Has a doctor, nurse, or counselor ever told you that you have a mental or psychological condition?" If yes, the survey showed a list of 16 mental health conditions (excluding substance use disorders) and asked them to select all that applied. From these responses, we coded endorsement of mood disorder (Bipolar Disorder I or II, Dysthymic Disorder, Major Depressive Disorder), anxiety disorder (Agoraphobia, Generalized Anxiety Disorder, Obsessive-Compulsive Disorder, Panic Disorder, Post-Traumatic Stress Disorder, Social Anxiety Disorder, Specific Phobia), or other disorder (i.e., Anorexia Nervosa, Bulimia Nervosa, Delusional Disorder, Personality Disorder, Schizoaffective Disorder, Schizophrenia). The study also coded endorsement of multiple disorders (2+). Then the survey asked participants: "Have you EVER been treated in an emergency room for mental health problems in your lifetime?" If so, the survey asked them to indicate the number of times this had occurred since starting to attend their RCC, from which we coded a binary indicator.

2.3.5. Utilization of addiction and recovery services

Participants checked off which of 7 addiction services they had ever participated in, including formal treatment (i.e., detox, inpatient, outpatient) and recovery support services (i.e., sober living environment, recovery high school, college recovery program, and faith-based recovery services). Participants saw a list of 12 mutual-help organizations (MHO; i.e., Alcoholic Anonymous, Narcotics Anonymous, Marijuana Anonymous, Cocaine Anonymous, Crystal Methamphetamine Anonymous, SMART Recovery, LifeRing Secular Recovery, Moderation Management, Celebrate Recovery, Women for Sobriety, Secular Organization for Sobriety, and Dual Diagnosis Anonymous) and indicated which ones they had ever used. They reported if they had attended in the past 90 days and from this, we coded a binary indicator each for having attended a 12-step MHO or other MHO.

2.3.6. RCC experience

The study assessed accessibility of the RCC with two survey questions, pertaining to mode of transportation (e.g., walk, drive, public transport) and length of time needed to travel to the RCC (in minutes). The survey asked participants about the referral source (see Table 1) for their specific RCC (using the piping function in REDCap), and the length of time since they started attending it (in years). During the screener, they indicated the date on which they first visited their RCC, from which we calculated the number of days between the baseline survey and the date they started at the RCC.

2.3.7. RCC services

Participants saw a list of 23 services that RCCs provide, as generated by RCC directors from prior work (Kelly, Fallah-Sohy, et al., 2020). For each service, participants indicated if they had used it at their RCC, and if so, how helpful it was, rated on a 7-point scale (1 = "not helpful at all", 4 = "moderately helpful", and 7 = "extremely helpful").

2.3.8. Substance use

At baseline and at follow-up, the survey asked participants: "Are you currently abstinent from all substances (yes/no)?" and then: "To the best of your knowledge, what is the date that you last used ANY type of drug (including alcohol)?" Using this date and the date of the survey, we calculated the length of abstinence in days, from which we then coded a binary indicator variable: 1+ month or less due to the skew of the data. The survey asked participants to indicate the number of days during the past 90 during that they got drunk and/or high, and how many days use of alcohol or other drugs interfered with their functioning (Global Appraisal of Individual Needs; GAIN; Dennis et al., 2003). From this, we calculated a binary indicator: problem-free for 90 days vs. not.

2.3.9. Recovery assets

The study used two scales to assess hypothesized assets gained through RCC participation. The study assessed recovery capital using the Brief Assessment of Recovery Capital (BARC-10) scale (Vilsaint et al., 2017), a 10-item, self-report scale rated on a 6-point Likert scale (1 = "strongly disagree", 6 = "strongly agree"). Example items include: "I get lots of support from friends"; "I have enough energy to complete the tasks I set myself"; "My living space has helped to drive my recovery journey"; and "I am happy dealing with a range of professional people" ($\alpha = 0.92$ at baseline). The study assessed social support for recovery using the 9-item social support subscale of the Texas Christian University "Client Evaluation of Self and Treatment" (CEST-SS; Institute of Behavioral Research, 2007a,b), where we used the aforementioned 6-point Likert scale instead of a 5-point Likert scale, and used "I" instead of "you" (e.g., "I have good friends who do not use drugs"; $\alpha = 0.90$ at baseline).

2.3.10. Indices measuring of quality of life, self-esteem, and psychological distress

Three scales were used to assess these indices. The EUROHIS-QOL (Schmidt et al., 2006) is a widely used eight-item measure of quality of life, adapted from the WHO measure on quality of life. Items are rated on a 5-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied), with larger values indicating greater QOL ($\alpha = 0.91$). A single-item measure, "I have high self-esteem", rated on a 10-point scale (1 = "Not very true of me", 10 = "Very true of me") assessed self-esteem

Table 1
Characteristics of new RCC members ($n = 275$).

	Total	
	Mean/ %	(SD/ n)
Demographics		
Age (in mean, SD)	38.7	(11.5)
Gender		
Female	39.3	(108)
Male	58.9	(162)
Non-binary	1.8	(5)
Sexual orientation (% non-heterosexual)	21.8	(60)
Hispanic (% yes)	15.3	(42)
Race		
White	62.5	(172)
African American	25.1	(69)
Multi-racial	7.3	(20)
American Indian	1.5	(4)
Other	2.5	(7)
Education		
High school or less	55.3	(152)
Some college or other degree	35.3	(97)
BA or higher	9.5	(26)
Income (i.e., total household past year)[a]		
Less than $10,000	51.6	(142)
$10,000 to $49,999	28.0	(77)
$50,000 or more	5.1	(14)
Employment (90 days prior to first RCC attendance)[b]		
Unemployed	43.3	(119)
Part-time (including irregular work)	9.5	(26)
Full-time (35+ h/week)	8.4	(23)
Marital status		
In a relationship (married, living as married)	23.3	(64)
No longer together (divorced, widowed)	19.6	(54)
Not married nor living together	57.1	(157)
Legal involvement (% yes)	29.1	(80)
Recovery		
Self-reporting as "in recovery" (% yes)		
In recovery	89.5	(246)
Seeking recovery	9.5	(26)
Substance use		
Primary substance used		
Heroin & other opioids	43.3	(119)
Alcohol	25.8	(71)
Cocaine	17.1	(47)
Marijuana	8.7	(24)
Other	4.4	(12)
Number of substances used regularly (1+ per week)		
1 substance	13.8	(38)
2 substances	12.4	(34)
3+ substances	73.8	(203)
Tobacco use		
Ever	74.5	(205)
Current	60.7	(167)
Mental health		
ED visit for mental health (% yes)		
Ever	46.2	(127)
In the 90 days prior to starting at this RCC	11.3	(31)
Lifetime diagnosis (% yes)	62.2	(171)
Multiple disorders	41.1	(113)
Mood disorder	8.7	(24)
Anxiety disorder	6.2	(17)
Other disorder	2.9	(8)
Utilization of addiction and recovery services		
Formal treatment (% ever)		
Outpatient addiction treatment	41.5	(114)
Alcohol/drug detoxification	43.3	(119)
Inpatient or residential treatment	53.5	(147)
Recovery support services (% ever)		
Sober living environment	57.8	(159)
Recovery high schools	1.8	(5)
College recovery program	1.5	(4)
Faith-based recovery services	17.5	(48)
Mutual-help (% used in the past 90 days)		
12-Step MHO	87.3	(240)
Other MHO	17.5	(48)
RCC experience		
Accessibility of the RCC		
Mode of transportation (% walks there)	54.9	151
Time to get there (% within 15 min or less)	47.3	130
Referral source		
Family and friends	41.5	(114)
SUD treatment (detox, inpatient, outpatient)	20.7	(57)
Housing and social services (e.g., Sober Living, shelter, including DSS)	22.5	(62)
RCC outreach (e.g., street outreach, internet, pamphlets, community event, ads)	7.6	(21)
Health care (PCP, ED)	3.6	(10)
other (e.g., employer, 12-step, church, academic, prison)	3.3	(9)
Days since started at RCC		
Started on date of baseline survey	28.0	(77)
If >0, number of days since started at RCC (mean, SD)	14.2	(12.8)

Note:
[a] Not reported by $n = 47$ (17%).
[b] Not reported $n = 107$ (39%).

(Robins et al., 2001). Psychological distress was assessed using the Kessler-6 (Furukawa et al., 2003), a six-item scale assessing how often mental health difficulties are experienced (e.g., nervousness and depression) on a 5-point scale (0 = "none of the time" to 4 = "all of the time") during the past 30 days ($\alpha = 0.93$).

2.3.11. RCC engagement

At the 3-month follow-up, the survey asked participants: "In the past 3 months (90 days), on how many days did you visit [your RCC]?" Because the distribution was heavily skewed and did not respond well to any linear transformation, we coded a binary, roughly median-split variable based on the data structure: attended RCC on 33% of days in the past 90 days or more (i.e., approximately twice per week on average) vs. less, because the distribution did not follow a parametric probability distribution.

The Massachusetts General Hospital Partners Healthcare Internal Review Board for the protection of human subjects reviewed and approved the study procedure and protocol.

2.4. Analytic strategy

To describe RCC new members and the services they used, we calculated means with standard deviations and percentages with cell size.

Next, given high rates of survey non- or late completion, we conducted a series of univariate logistic regression analyses to identify factors related to survey completion, where we modeled both the probability of completing the 3-month survey at all (60%; 166/275) and, in separate analyses, within 4 months of completing the baseline (50%; 138/275). As predictors, we considered demographic, substance use, mental health, RCC accessibility, referral source, recovery asset, quality of life, and service use variables.

To identify factors related to RCC engagement, we used logistic regression, where we modeled the probability of attending the RCC on more than 15% (i.e., roughly once per week or more) of the 90 days preceding the 3-month follow-up. For very late surveys (i.e., 4+ months postbaseline, $n = 28$), we marked their RCC engagement as missing, because they were reporting on qualitatively different days relative to their start at the RCC, with only 32% of late survey respondents reporting attending their RCC more than 15% of days, compared to 57% of on-time survey respondents ($\chi(1) = 5.89$, $p = 0.02$). We included all $n = 275$ in analyses, and used multiple imputation to address missing data, as implemented via the MI and MIANALYZE procedures in SAS, where we imputed 20 datasets. We included in the generation of the 20 datasets

all variables used to predict survey noncompletion. Study staff then used the same set of variables as predictors of RCC engagement. To identify relevant factors, we first conducted univariate logistic regressions on the 20 imputed datasets for each of these variables, and then built a multivariable model that included all variables that were related to RCC engagement ($p < 0.10$ level). In the multivariable model, we also included factors that were not significantly related to engagement but were related to survey completion and thus we retained them as control variables.

Finally, to test if substance use, recovery assets, and quality of life outcomes changed from baseline to follow-up, we used repeated measures analyses, where scores at baseline and follow-up were the dependent variable vector, and TIME (reference = baseline) was the binary predictor. The study also included in the model as covariates variables significantly related to survey noncompletion. In all models, the study modeled subjects as nested within sites. Because some sites had few participants (range: 8–77), we combined parent and satellite RCCs (two cases), and combined the remaining 3 sites into one category, resulting in a 3-category site variable. We used linear mixed effects models as implemented via MIXED procedure in SAS for normally distributed variables (i.e., BARC, CEST-SS, EUROHIS-QOL, self-esteem, Kessler-6), and generalized linear models as implemented via the GENMOD procedure in SAS for binary (i.e., abstinent, abstinent 1+ month, problem free for 90 days), using the binomial distribution. As before, we marked follow-up values for very late surveys as missing, because of reporting on a different timeframe. Both MIXED and GENMOD use likelihood-based modeling that produce unbiased estimates under missing completely and missing-at-random missingness patterns (Carpenter et al., 2006; Fairclough, 2010; Molenberghs et al., 2004).

3. Results

3.1. What are the characteristics of new RCC attendees?

RCC attendees who had recently started visiting one of the seven included RCCs (Table 1) were on average 38.7 ± 11.5 years of age, predominantly male (59%) and White (63%), with very limited economic resources (e.g., 52% with less than $10,000 total household income last year). Most participants (76.7%) reported not currently being in a relationship. Of note, 22% of all participants indicated a non-heterosexual sexual orientation.

Polysubstance use was the norm, with 74% reporting use of 3+ substances regularly, and with opioids being the most frequently reported primary substance (43%), followed by alcohol (26%). Approximately two-thirds (61%) were current smokers. A large percentage of new RCC members reported a lifetime diagnosis of non–substance use mental health disorder (62%), with many indicating multiple disorders (41%). The vast majority had used 12-step MHOs (87%), and many had participated in formal treatment, including residential treatment (54%), outpatient (42%), and recovery support services (e.g., 58% had used sober living environments). The study found that these services contributed to referrals to RCCs, though the largest number of new RCC members had heard about RCCs through family and friends (42%). Between one quarter and one-third of study participants (29%) reported current legal system involvement. In terms of accessibility of the RCC, most study participants reported walking there (55%), some used public transportation (27%), and very few drove themselves (10%). Typically, participants could get there within 15 min (47%), though it could also take about 30 min (36%) or more (17%), though rarely more than 1 h (4%).

3.2. How frequently are new RCC participants using RCCs?

3.2.1. RCC engagement

During the 90 days following their baseline survey, participants, on average, reported attending their RCC on 33 ± 30% of days (min = 0%, max = 100%), or roughly 2 days per week, if equally distributed across the 90 days. There was no clear central tendency of RCC use. A small number of participants reported never attending their RCC after completing their baseline survey (5/138 = 4% of participants). The modal response was attending once per week (i.e., 14.4% of days, 17/138 = 12% of participants), or 4–5 days per week (i.e., 67% of days, 11/138 = 8% of participants). The median was a little more than once a week (17% of days). For conceptual clarity, we distinguished between participants who reported attending on 15% of days or less (i.e., 1 day per week or fewer on average) vs. more than 15% of days, which amounted to 43% (59/138) vs. 57% (79/138) of participants, respectively.

3.3. What factors are associated with greater RCC engagement?

3.3.1. Preliminary analyses

Of the 32 effects that we tested as related to participants completing the follow-up survey within 30 days of their 3-month follow-up due date (Supplemental Table), four variables were significant: mode of transportation, with participants who were "walking there" less likely to complete surveys (OR = 0.50 [0.31–0.81], $p < 0.01$); length of travel, with participants able to get there within 15 min less likely to complete surveys (OR = 0.41 [0.25–0.66], $p < 0.01$); greater social support for recovery (OR = 1.35 [1.06–1.73], $p = 0.02$); and prior outpatient addiction treatment (OR = 1.81 [1.11–2.94], $p = 0.02$) related to survey completion. When modeling survey completion regardless of timing (i.e., including those completing beyond 30 days of their 3-month follow-up due date), the social support predictor became weaker and nonsignificant (OR = 1.17 [0.92–1.48], $p = 0.19$), and the effect of outpatient treatment slightly stronger (OR = 1.92 [1.16–3.18], $p = 0.01$). No new factors emerged.

3.3.2. Predictors of RCC engagement

Univariate logistic regression analyses (Table 2) identified 3 variables related (at <0.05) to RCC engagement, with greater engagement among Hispanic participants (OR = 1.83 [1.11–3.30], $p = 0.02$), participants who could get to the RCC within 15 min (OR = 1.41 [1.01–1.95], $p = 0.04$), and participants with higher QoL scores at baseline (OR = 1.63 [1.08–2.46], $p = 0.02$). Two additional variables (i.e., mode of transportation, self-esteem) were significant at a more liberal type I error threshold of $p < 0.10$, and we included them in a multivariable predictor model. Social support for recovery was not related to RCC engagement in univariate analysis, but we did include it in the multivariable model as a control variable because it was a predictor of survey completion. In the multivariable model (Table 2), all of these variables except for self-esteem were associated with a greater likelihood of attending the RCC on more than 15% of days.

3.4. What services are new RCC participants using?

The service that new RCC members used (Table 3) most frequently at the RCC was "all recovery" meetings, which are mutual help meetings that welcome all approaches to recovery (e.g., spiritual, medication-assisted, etc.; used by 63%) and peer-facilitated recovery support groups (56%). The study also found employment assistance (used by 39%) and recreational/social activities (34%) to be important. Participants rated as most helpful access to technology and recovery coaching, both of which received a rating of 6.3 on a scale from 1 to 7. NARCAN training and/or distribution was used by only a few (11%), despite the high percentage of participants reporting opioids as their primary substance.

3.5. What are the outcomes at 3 months after starting to attend an RCC?

Descriptively, all eight outcomes that we examined improved over the 3 months after starting RCC utilization (Table 4). Likelihood-based

Table 2
Predictors of RCC engagement (n = 275 included, n = 138 with known outcome).

Type of variable	Univariate			Multivariable[b]		
Variable	OR	95% CI	p	aOR	95% CI	p
Demographics						
Age	1.02	(1.00, 1.05)	0.11			
Gender (female vs. male)[a]	1.65	(0.73, 3.74)	0.22			
Sexual orientation (any vs. heterosexual)	0.74	(0.51, 1.07)	0.11			
Race (Black vs. White)[a]	1.19	(0.70, 2.04)	0.52			
Ethnicity (Hispanic vs. not)	1.83	(1.11, 3.00)*	0.02	2.32	(1.28, 4.19)**	0.006
Education (ref = High school or less)						
Some college or other degree	1.40	(0.84, 2.32)	0.19			
BA or higher	0.91	(0.48, 1.72)	0.77			
Income (ref = Less than $10,000)						
$10,000 to $49,999	0.93	(0.48, 1.82)	0.84			
$50,000 or more	0.99	(0.30, 3.21)	0.98			
Accessibility of the RCC						
Mode of transportation (walks there vs. not)	0.75	(0.54, 1.04)	0.08	0.58	(0.38, 0.89)*	0.015
Time to get there (within 15 min vs. more)	1.41	(1.01, 1.95)*	0.04	1.67	(1.11, 2.52)*	0.016
Substance use						
Recovery stage (seeking vs. in recovery)	0.72	(0.42, 1.24)	0.23			
Primary substance (opioid vs. other)	0.80	(0.59, 1.07)	0.14			
Polysubstance use (3+ vs. 1–2 substances)	1.29	(0.89, 1.86)	0.18			
Tobacco use (current vs. not)	0.96	(0.70, 1.30)	0.77			
Baseline levels of substance use outcomes						
Abstinent from all substances (in %, n)	1.25	(0.71, 2.18)	0.43			
Length of abstinence (1+ month vs. less)	1.29	(0.93, 1.78)	0.13			
Problem-free for 90 days (no days drunk, etc.)	1.15	(0.78, 1.69)	0.47			
Mental health						
ED visit for mental health	1.19	(0.88, 1.62)	0.26			
Lifetime diagnosis of mental health issue	1.05	(0.76, 1.46)	0.77			
Referral source (family/friends vs. other)	0.84	(0.61, 1.15)	0.27			
Recovery assets						
Recovery Capital (BARC; 10 items, 1–6 scale)	1.21	(0.85, 1.71)	0.28			
Social support for recovery (CEST-SS)	0.81	(0.58, 1.12)	0.20	0.53	(0.33, 0.83)**	0.007
Quality of life						
Quality of life (EUROHIS-QOL)	1.63	(1.08, 2.46)*	0.02	2.09	(1.16, 3.77)*	0.015
Self-esteem (1 item, 1–10 scale)	1.11	(0.99, 1.25)	0.08	1.03	(0.88, 1.22)	0.705
Psychological distress (Kessler-6)	0.82	(0.59, 1.14)	0.24			
Addiction and recovery services use						
Outpatient addiction treatment	1.31	(0.97, 1.76)	0.08	1.60	(1.11, 2.32)*	0.013
Alcohol/drug detoxification	1.18	(0.83, 1.68)	0.36			
Inpatient or residential treatment	1.10	(0.79, 1.52)	0.57			
12-Step MHO	1.46	(0.90, 2.35)	0.12			
Other MHO	1.26	(0.86, 1.84)	0.23			
Sober living environment	0.83	(0.61, 1.12)	0.22			

Note: Modeling the probability of reporting RCC attendance on more than 15% of days in the past 90 days (57%).
* p=< 0.05.
** p=< 0.01.
[a] Other categories modeled, but not shown due to small sample sizes.
[b] Univariate predictors were included in the multivariable model if $p < 0.10$.

repeated measures analyses indicated that there were significant improvements on five of these outcomes. The percentage of participants reporting 1+ month of abstinence from substance use increased, as did the percentage of participants reporting being problem-free for 90 days. Indicators of recovery assets did not improve significantly. All three indicators of psychological well-being and quality of life significantly improved over time.

Table 3
RCC services used and their perceived helpfulness (n = 166).

RCC service	Used service		Rated helpfulness	
	%	(n)	Mean	(SD)
All recovery meetings	63.3	(105)	6.1	(1.3)
Peer-facilitated recovery support groups	56.0	(93)	6.1	(1.2)
Mutual-help groups	45.2	(75)	6.2	(1.2)
Employment assistance	38.6	(64)	5.8	(1.4)
Recreational/social activities	34.9	(58)	5.8	(1.4)
Recovery coaching	34.3	(57)	6.3	(1.3)
Opportunity to volunteer/give back to the center	30.1	(50)	6.2	(1.3)
Technology/internet access	29.5	(49)	6.3	(1.2)
Basic needs assistance	24.7	(41)	5.9	(1.6)
Housing assistance	22.3	(37)	5.4	(1.8)
Expressive arts	16.3	(27)	6.2	(1.3)
Recovery advocacy outreach and opportunities	15.1	(25)	6.4	(1.1)
Mental health support	15.1	(25)	5.4	(1.6)
Education assistance	12.7	(21)	6.0	(1.1)
NARCAN training and/or distribution	11.4	(19)	6.0	(1.2)
Health, exercise, and nutrition programs	11.4	(19)	5.9	(1.0)
Family support services	9.0	(15)	6.1	(1.1)
Financial services	7.8	(13)	6.1	(1.2)
Medication-assisted treatment	7.8	(13)	5.9	(1.3)
Legal assistance	7.8	(13)	5.1	(1.4)
Health insurance education	6.6	(11)	5.5	(1.9)
Smoking cessation support	5.4	(9)	4.8	(1.6)
Child care services	3.6	(6)	5.8	(1.3)

Note: Helpfulness rated on a 1–7 scale, where 1 = "Not at All Helpful" and 7 "Extremely Helpful"; only participants who indicated using a service were asked to rate it.

Table 4
RCC outcomes 3 months after starting at the RCC.

	Baseline all (n = 275)		Baseline retained (n = 138)		3-Month all (n = 138)		Change (n = 275)		
	M/%	(SD/n)	M/%	(SD/n)	M/%	(SD/n)	b	95% CI	p
Substance use									
Abstinent from all substances (in %, n)[a]	88.7	(244)	91.3	(126)	91.3	(126)	0.14	(−0.42, 0.69)	0.63
Length of abstinence (1+ month vs. less)[a]	64.4	(177)	65.2	(90)	75.4	(104)	0.49	(0.10, 0.87)	0.01*
Problem-free for 90 days (no days drunk, high, interfered)[a]	38.9	(107)	46.4	(64)	65.2	(90)	0.97	(0.57, 1.37)	<0.0001**
Recovery assets									
Recovery Capital (BARC; 10 items, 1–6 scale)	4.8	(1.0)	4.9	(0.9)	4.9	(0.9)	0.00	(−0.14, 0.14)	1.00
Social support for recovery (CEST-SS; 9 items, 1–6 scale)	4.8	(1.0)	5.0	(0.9)	4.9	(1.0)	0.01	(−0.15, 0.17)	0.90
Quality of life (QoL) (in mean, SD)									
Quality of life (EUROHIS-QOL; 8 items, 1–5 scale)	3.4	(0.8)	3.5	(0.7)	3.6	(0.8)	0.14	(0.03, 0.24)	0.01*
Self-esteem (1 item, 1–10 scale)	6.2	(2.8)	6.4	(2.8)	6.7	(2.6)	0.41	(0.04, 0.77)	0.03*
Psychological distress (Kessler-6, 6 items, 0–4 scale)	2.3	(1.0)	2.2	(0.9)	2.0	(1.0)	−0.22	(−0.37, −0.07)	0.00**

Note: M = mean, SD = standard deviation, b = estimate of TIME (ref = baseline); model includes significant predictors of 3-month within-window survey completion (i.e., mode of transportation to RCC, travel time to RCC, has utilized outpatient treatment, level of perceived social support for recovery) as covariates and models participants as nested within sites; all n = 275 included in repeated measures model.

* p=< 0.05.

** p < 0.01.

[a] Binary distribution modeled using GENMOD.

4. Discussion

This prospective study of new RCC participants suggests that RCCs tend to be accessed mostly by individuals with a generally high density of clinical pathology and low recovery capital, quality of life, and functioning, who utilize and value available recovery-specific social support structures and recreational activities as well as access to technology, employment, housing, and basic needs linkages. RCC participation also appears associated with health and psychosocial benefits in terms of increased abstinence, lowered substance-related harms, and enhancements in psychological well-being and quality of life.

4.1. Characteristics of new RCC participants

New RCC participants were mostly young to middle-aged, racially diverse, single, unemployed, adult men and women, with low education and income, suffering from primary opioid or alcohol use disorder, with a history of comorbid mental health problems and with prior professional and mutual-help organization participation. This cluster of characteristics reflecting high levels of clinical severity and few available resources to aid recovery is indicative of a need to provide the kinds of recovery-specific support and infrastructures that RCCs are shown to possess (Haberle et al., 2014; Kelly, Fallah-Sohy, et al., 2020; Valentine, 2011). In light of the current opioid addiction and overdose crisis, we found it encouraging to see that RCCs are utilized particularly by those with primary opioid problem histories. The other major primary substance that RCC members reported was alcohol. Given the much lower proportion of those in the population meeting criteria for OUD compared to AUD annually (e.g., National Survey on Drug Use and Health; Substance Abuse and Mental Health Services Administration, 2019), findings suggest that RCCs may play a particularly helpful role for those suffering from opioid problems who tend to need more services (Hoffman et al., 2019), are more stigmatized (Earnshaw et al., 2019), and have much lower recovery capital and quality of life compared to those with primary alcohol problems when starting recovery (Kelly et al., 2018).

By far the largest referral source to RCCs was through family and friends. A further 21% of initiates reported being referred by treatment programs; no one reported referral from criminal justice settings despite that almost one-third reported current criminal justice system involvement. This lack of justice system referral may reflect lack of knowledge of the existence or purpose of RCCs within that system. Given high relapse and recidivism rates following treatment or incarceration and the potential benefits observed here, increasing treatment and criminal justice referrals to RCCs could improve remission and crime recidivism rates by helping individuals access prosocial recovery support and build recovery capital (Kelly, Stout, et al., 2020). Such postincarceration RCC linkage trials could be conducted, comparing RCC linkage to probation/parole-as-usual for those with SUD histories to help determine whether linkage to and utilization of RCCs might mitigate SUD relapse risk and related crime.

Also, of note, LGBTQ sexual orientation was significantly overrepresented in our sample, with just more than 1 in 5 participants self-identifying as something other than heterosexual. This is substantially higher than in the U.S. general population, where surveys estimate national nonheterosexual prevalence to be closer to 4.5% (Newport, 2018); our sample is indicative of the noted overrepresentation of sexual minorities among those with substance-related disorders (McCabe et al., 2013; Medley et al., 2016). Our larger cross-sectional survey of RCC participants that encompassed 31 centers observed similarly high levels of LGBTQ engagement (Kelly, Stout, et al., 2020). This particularly high representation of recovering LGBTQ persons among both new and longer-term RCC attendees across a large number of centers may reflect the explicitly warm and accepting social climate of RCCs that is exemplified in their maxim, “many pathways [to recovery], all are celebrated”, which may extend beyond substance use to help recovering LGBTQ persons feel more welcome and less judged at RCCs.

Unemployment and underemployment were high, especially for this age group (i.e., average age 39 years; U.S. Bureau of Labor Statistics, 2018). Also, our sample of RCC initiates had low levels of education and were less than one-third as likely as the general U.S. population to have a bachelor’s degree (U.S. Census Bureau, 2017; 9.5% vs 33.4%). For many entering recovery, finding a job and/or finishing or beginning educational goals are important objectives and many individuals appear to use RCCS’ available resources and rate them highly. There is potential for greater formal linkages between RCCs and collegiate recovery programs, which are growing around the country.

4.2. Frequency and predictors of RCC participation

The frequency of participants’ RCC use varied quite a bit, but averaged approximately one to two days per week during this first 3-month initiation period. The study observed a general pattern in terms of predictors of greater engagement, whereby those who were perhaps in greatest need (i.e., those individuals with more severe scores on several indicators, such as prior use of outpatient treatment, lower social

support for recovery) tended to use RCCs more frequently, perhaps to meet those needs. One unanticipated exception to this pattern was that those with higher baseline levels of quality of life and functioning were more likely to attend RCCs. That said, this finding should not be construed to mean, in any absolute sense, that those engaged with RCCs were objectively high in functioning and quality of life. Indeed, the average quality of life score in the current sample was very low (i.e., 3.42)—approximately one full standard deviation lower than that observed in general population samples (e.g., 4.2; da Rocha et al., 2012; Kelly et al., 2018; Schmidt et al., 2006). Thus, those with very low, but *relatively* greater, quality of life and functioning are more likely to become engaged in RCCs. A certain minimum level of quality of life and behavioral functioning may be required before individuals can make use of what RCCs have to offer. Result also indicated that RCCs may be of particular value for those of Hispanic ethnicity. Racial-ethnic differences should be evaluated further as well as what variables appear to explain these observed differences (e.g., disparities in income/education).

The transportation mode used to get to RCCs as well as the time it takes to get to them were both independent predictors of RCC engagement in multivariable analyses: those typically walking to RCCs attended less often, but those getting there more quickly—irrespective of *how* they got there—used them more often. This finding speaks to the relatively greater importance of temporal, rather than geographical, proximity and suggests that RCCs need not necessarily be close by, but it should not take too long to get to them.

4.3. RCC services used

Participants reported high use of the socially based recovery specific infrastructure (all recovery meetings, peer-facilitated meetings, recovery coaching) and activities supporting the growth of recovery capital (employment assistance, access to technology/computers), as well as recreational activities, with access to technology and recovery coaching rated as among the most helpful. Particularly early on in recovery, especially among new RCC initiates, more intensive social exposure to other RCC peers may be needed. These role models can impart and reinforce recovery coping skills that can help to boost abstinence self-efficacy as well as foster a sense of belonging that can help to decrease self-stigma and shame. Participants also rated opportunities to volunteer and give back, as well as recovery outreach and advocacy opportunities, as particularly helpful. These opportunities appear to be highly valued among these new RCC initiates, as well as those who have been using RCCs for some time (Kelly, Stout, et al., 2020). Thus, RCCs appear to provide a high degree of social reciprocity, with members both receiving and giving help. This social exchange appears to be well-liked and may be one of many inherent rewarding therapeutic elements of RCCs. The low level of education among this sample, with more than 50% reporting high school or less as the highest level completed, may also indicate a need to access training/employment assistance and access to technology as well as create more formal linkages to educational achievement services, including GED certificate and collegiate recovery programs as noted previously (Laudet et al., 2015). SUD treatment facilities are designed to address clinical symptoms only, thus RCCs may be uniquely positioned to address the other deficits related to recovery capital.

Participants highly valued NARCAN overdose training and distribution but only 11.4% of our sample of new RCC initiates used them despite that a large proportion (42.2%) had primary opioid use disorder histories. The reason for this disparity warrants further investigation, because those suffering from OUD themselves are very likely to witness overdose among their peers (Bohnert et al., 2009) and, consequently, greater emphasis in NARCAN overdose reversal training could save lives and help to reduce the public health burden related to opioids.

4.4. Changes in substance use, functioning, quality of life, and psychological well-being

The study observed significant improvements in abstinence, substance use problems, psychological well-being, and quality of life during the first 3 months of participation. While the current, single-group study design prohibits clear causal connections specifically attributable to RCC participation, such derived benefits fit well with the theoretical rationale for RCCs and are consistent with observational and other published data in this arena (Haberle et al., 2014; Kelly, Fallah-Sohy, et al., 2020; Kelly, Stout, et al., 2020; Mericle et al., 2014). More rigorous, comparative research is needed, however, to confirm any benefits as well as their magnitude.

The lack of an increase in recovery assets was somewhat puzzling, especially considering that our prior cross-sectional study showed a meaningful impact of greater RCC participation on increases in recovery capital (Kelly, Stout, et al., 2020). The lack of association in the current study could be due to the fact that our prior cross-sectional analyses included participants much further along in their recovery (by many months and years) and measurable improvements on at least some indices of recovery capital may take longer to show. Indeed, the BARC-10 measure that we used in our studies may capture some, but not all, aspects of recovery capital that are most relevant early in recovery. Future research is needed to confirm these conjectures.

A small number of participants used smoking cessation support (<6%), and this service received the lowest helpfulness rating, despite high prevalence of current smoking (61%). Whether this is due to poor visibility and/or variable provision of quality smoking cessation services or whether these services are unappealing at this stage of recovery in which individuals are focusing more on the more acutely lethal risks of relapse to other drugs is unclear (Kelly et al., 2019; Kelly et al., 2020). However, given that many with AOD disorders may prefer to stop smoking sequentially—after, rather than at the same time, they address their AOD use (Kodl et al., 2006)—and RCCs appear to be able to engage recovering individuals over the long-term (e.g., Kelly, Stout, et al., 2020), RCCs may be an ideal venue for providing and promoting smoking cessation interventions once people have established a stronger foundation in their AOD recovery and wish to address chronic health harms related to tobacco use.

4.5. Limitations

There are a number of important limitations inherent in the study design, procedures, and sample, which should be taken into account when drawing conclusions or making inferences from our findings. First, this was a single-group study without a comparison condition so we cannot speak to the relative advantage of RCC use compared to nothing or other types of service. The observed improvements in substance use and functioning may have occurred merely with the passage of time. Also, participants volunteered and self-selected into this study from a sampling of seven of among the largest and potentially highest functioning RCCs across New England and New York State. More specifically, participants were from RCCs specifically selected to reflect the best quality, largest, and most racially/ethnically diverse from our larger sample of 32 centers. Thus, findings from this proof-of-concept style of study may not generalize to other RCCs, and we do not know how "typical" our study participants are of new participants at those RCCs, nor how they may generalize to other RCCs either regionally or nationally. Furthermore, this study had a very high level of survey non-completion. While analyses that aimed to detect variables that were systematically predictive of survey noncompletion found that only four of 32 factors were related, we cannot assume that noncompleters differed only in ways that were captured by our assessment battery. Consequently, conclusions reported here are preliminary and tentative pending future replications.

4.6. Conclusions

With these significant limitations in mind, while placing our positive results in the context of others (Armitage et al., 2010; Haberle et al., 2014; Kelly, Fallah-Sohy, et al., 2020; Kelly, Stout, et al., 2020; Mericle et al., 2014), findings here show coherence with the theoretical rationale of RCCs and are empirically consistent with prior observations that RCCs attract, engage, and provide benefits for individuals struggling with AOD disorders who are potentially facing the greatest challenges in terms of both density of clinical pathology and the lowest levels of quality of life and recovery resources. While more rigorous research of these novel but rapidly growing services is needed, RCCs appear to provide a somewhat unique community-based venue for accessing highly valued, recovery-specific social support and needed resources that can instill hope, decrease stress, and help individuals to establish a solid foundation for recovery.

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CRediT authorship contribution statement

John F. Kelly: Funding acquisition, conceptualization, investigation, supervision, initial draft/revised draft writing/review/editing; Bettina B. Hoeppner: Formal analyses, writing/review/editing. Robert L. Stout: supervision/mentorship, writing/review/editing; Leonard Jason: supervision/mentorship, writing/review/editing; Nilofar Fallah-Sohy: investigation, data curation, project administration, writing/review/editing; Julie Cristello: Investigation data curation, project administration, writing/review/editing.

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