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Sober Living Houses for Alcohol and Drug Dependence: 18-Month Outcomes

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Abstract

Objective—A major challenge facing many individuals attempting to abstain from substances is finding a stable living environment that supports sustained recovery. Sober living houses (SLHs) are alcohol and drug-free living environments that support abstinence by emphasizing involvement in 12-step groups and social support for recovery. Among a number of advantages, they are financially self-sustaining and residents can stay as long as they wish. Although SLHs can be used as housing referrals after inpatient treatment, while clients attend outpatient treatment, after incarceration, or as an alternative to treatment, they have been understudied and underutilized.

Method—To describe outcomes of SLH residents we interviewed 245 individuals within one week of entering SLHs and at 6, 12 and 18-month follow up. Eighty-nine percent completed at least one follow-up interview. Outcomes included the Addiction Severity Index (ASI), Brief Symptom Inventory (BSI), and measures of alcohol and drug use. Covariates included demographic characteristics, 12-step involvement and substance use in the social network.

Results—Regardless of referral source, improvements were noted on ASI scales (alcohol, drug, and employment), psychiatric severity on the BSI, arrests, and alcohol and drug use. Substance use in the social network predicted nearly all outcome measures. Involvement in 12-step groups predicted fewer arrests and lower alcohol and drug use.

Conclusion—Residents of SLHs made improvements in a variety of areas. Additional studies should use randomized designs to **establish causal effects of SLHs**. Results support the importance of key components of the recovery model used by SLHs: 1) involvement in 12-step groups and 2) developing social support systems with fewer alcohol and drug users.

1. Introduction

Sober living houses (SLHs) are alcohol and drug free living environments for individuals who are attempting to maintain abstinence and develop a recovery oriented lifestyle (Polcin & Henderson, 2008). Despite research showing that living environments supportive of recovery are associated with better outcome (e.g., Braucht, Reichardt, Geissler, & Bormann,

1995; Hitchcock, Stainback, & Roque, 1995; Schinka, Francis, Hughes, LaLone, & Flynn, 1998), SLHs have been largely overlooked by policymakers and researchers. This paper represents a first step toward correcting this oversight. After reviewing selected studies that show alcohol and drug use is associated with characteristics of social networks and living environments, SLHs are introduced as an underutilized resource for alcohol and drug free housing. The paper then describes an exploratory investigation of outcomes for 245 individuals entering SLHs along with factors associated with outcome. The primary aim of the study was to provide preliminary data that could be used to support implementation of controlled studies comparing outcomes of residents in SLHs with outcomes of individuals with addictive disorders in other living environments.

1.1 Social Networks and Living Environments

The characteristics of one's social network are strong predictors of alcohol and drug treatment outcome (Beattie & Longabaugh, 1999; Moos, 2007; Zywiak, Longabaugh & Wirtz, 2002) and involvement in 12-step programs such as Alcoholics Anonymous (AA) appear to be especially helpful (Bond et al., 2003; Moos & Moos, 2006). Studies have also shown that provision of housing that is supportive of recovery is important, particularly for individuals who are homeless or reside in destructive environments that encourage substance use (Braucht, Reichardt, Geissler, & Bormann, 1995; Hitchcock, Stainback, & Roque, 1995; Schinka, Francis, Hughes, LaLone, & Flynn, 1998). These findings indicate that individuals completing treatment who remain homeless or return to substance using environments are more prone to relapse than clients living in environments supportive of sobriety.

Despite their importance, many individuals seeking to abstain from alcohol and drugs have difficulty establishing social support systems that reinforce sobriety and finding long-term, stable housing that is free of alcohol and drugs. Individuals with limited incomes who relapse are at risk for additional problems, such as homelessness, medical problems, psychiatric disorders, and arrests for misdemeanor nuisance crimes (Milby, et al., 2003; Polcin, 1999). The impact of these problems on local communities is significant. For example, in one county in California, Robertson, Zlotnick and Westerfelt (1997) examined substance use disorders among the homeless and found that 69% had a history of a substance use disorder and a majority (52%) had a current alcohol or drug disorder. Other studies have shown that poor heavy drinkers who become homeless frequently become major burdens to health, welfare, and criminal justice systems (Tam, Schmidt & Weisner, 1997).

1.2 Characteristics of Sober Living Houses

Sober living houses are not formal treatment programs and therefore are not obligated to comply with state or local regulations applicable to treatment. Thus, to a large extent, SLHs are free to operate as they wish. However, there are critically important principles that are emphasized in the literature on the SLH model of recovery (e.g., Polcin & Henderson, 2008; Wittman, 1998) and by Sober Living House Associations that have been formed to support and monitor them (e.g. The Sober Living Network in Southern California [SLN] and the California Association for Addiction and Recovery Resources [CAARR]). The essential characteristics of the contemporary SLHs model include: 1) an alcohol and drug free living environment for individuals attempting to establish or maintain abstinence from alcohol and drugs, 2) no formal treatment services but either mandated or strongly encouraged attendance at 12-step self-help groups such as Alcoholics Anonymous, 3) required compliance with house rules such as maintaining abstinence, paying rent and other fees, participating in house chores and attending house meetings, 4) resident responsibility for financing rent and other costs, and 5) an invitation for residents to stay in the house as long as they wish provided they comply with house rules (Polcin & Henderson, 2008). For a

more detailed description of traditional SLHs along with modified SLHs associated with outpatient treatment see Polcin et al (in press).

SLHs have their origins in the state of California and most continue to be located there (Polcin & Henderson, 2008). It is difficult to ascertain the exact number of SLHs that exist because they are not formal treatment programs and are therefore outside the purview of state licensing agencies. However, in California many SLHs are affiliated with coalitions or associations that monitor health, safety, quality and adherence to a peer oriented model of recovery, such as CAARR or SLN. Over 24 agencies affiliated with CAARR offer clean and sober living services. The SLN has over 300 individual houses among it membership.

There are similarities between SLHs and other residential facilities for substance abusers, such as "halfway houses." Both are designed to promote recovery in a non-clinical home-like environment. Still, there are important differences as well. Unlike most halfway houses, SLHs have the advantage of being financially self-sustaining through resident fees. Most residents meet their financial obligations through work, but others have access to family support or government entitlement programs such as social security income. A second difference is the residents of SLHs can stay as long as they wish, provided they meet their financial obligations and abide by the rules, such as maintaining abstinence from drugs and alcohol. Finally, there is typically no requirement about involvement in formal treatment for most SLHS. Individuals in halfway houses have usually completed residential treatment or are attending outpatient programs (Polcin & Henderson, 2008).

An alternate housing model for recovery from addiction that is similar to SLHs is the Oxford House Model (O'Neill, 1990). There are a number of similarities between Sober Living and Oxford Houses including an emphasis on peer support for recovery, no provision of formal treatment services, a requirement that residents abstain from alcohol and drugs, financial self-sufficiency, and an open-ended length of stay (Polcin & Borkman, 2008). Both are ordinary houses located in residentially zoned areas (Wittman, 2009). As such, they fall under the protection of the Fair Housing Amendments Act of 1988 (FHAA) regarding the right to live in any residentially zoned area and personal privacy under the Fourth Amendment. The FHAA prohibits housing discrimination by allowing people with disabilities to live together for a shared purpose, such as mutually assisted recovery and maintenance of an abstinent lifestyle. For a more complete description of the zoning and legal issues that apply to Sober Living and Oxford Houses and recent challenges to these regulations see Wittman (2009).

There are also a number of differences between the Sober Living and Oxford House models. First, SLHs have the option of requiring residents to attend 12-step meetings as a condition of residency. Oxford Houses generally encourage but never mandate attendance at 12-step meetings. Second, Oxford house rules require that each house be managed by a rotating democratically elected group of residents. SLHs vary in management styles, with some houses emphasizing peer management and leadership of the house and others relying on a strong house manager who is ultimately responsible to the owner/landlord. Third, Oxford houses mandate a range of 6 to 10 members in each house, while the numbers of residents in SLHs vary widely depending on the house. Finally, because all Oxford houses fall under the auspices of Oxford House Inc, they tend to be more homogenous than SLHs. Some SLHs are not part of any larger association and associations that currently exist have different regulations.

1.3 Philosophy of Recovery in Sober Living Houses

Central to recovery in SLHs is involvement in 12-step self help groups (Polcin & Henderson, 2008). Residents are usually required to attend meetings and expected to be

actively working a 12-step recovery program (e.g., obtain a sponsor, work the 12 steps, etc.). However, some houses will allow other types of activities that can substitute for 12 step groups, provided they constitute a strategy for maintaining ongoing abstinence.

Developing a social network that supports ongoing sobriety is also an important component of the recovery model used in SLHs. Residents are encouraged to give and receive support and encouragement for recovery with fellow peers in the house. Residents who have been at the house longest and who have more time in recovery are usually encouraged to provide support to new residents. This type of "giving back" is consistent with a principle of recovery in 12-step groups. Residents are also encouraged to avoid friends and family who might encourage them to use alcohol and drugs, particularly individuals with whom they have used substances in the past.

While some SLHs use a "strong manager" model where the owner or manager of the house develops and enforces the house rules, contemporary SLH associations such as CAARR and SLN emphasize a "social model approach" to managing houses that empowers residents by providing leadership position and forums where they can have input into decision making (Polcin & Henderson, 2008). Some houses have a "residents' council," which functions as a type of government for the house.

1.4 Purpose

In order to test whether a large, rigorous examination of SLHs is warranted (e.g., randomized clinical trial), this paper reports on longitudinal outcomes for 245 SLH residents at 6, 12 and 18 months. Lack of significant improvement over time or exacerbation of alcohol and drug use would suggest that additional study of SLHs was not necessary. However, significant improvement over time would suggest the need to test whether individuals in other living situations made similar improvements or whether improvements were due to the beneficial effects of SLHs.

Our preliminary analyses of a subsample of residents in SLHs suggested they made improvements at 6 and 12 months (Polcin et al., in press). Our primary interest here was to assess outcomes using the full sample over an 18-month period and assess how a variety of covariates were related to outcome. Primary outcomes included severity of drug and alcohol problems. Secondary outcomes included measures of employment, psychiatric, legal, medical, and family problems. We hypothesized that residents who entered the SLHs with high problem severity would improve at 6 months and those improvements would be maintained at 12 and 18 months. Because some referrals came from controlled environments and some residents had already begun a recovery program before they entered the SLH, we expected that they would enter with lower problem severity and maintain that low severity at 6, 12 and 18 months. Because the philosophy of recovery in SLHs rests on the premise that it is crucial to 1) build a social network that supports abstinence and 2) actively work a 12-step program of recovery, we expected measures of these two factors to correlate with outcomes across time points.

2. Method

2.1 Data Collection Site

All study participants were recruited from Clean and Sober Transitional Living (CSTL) in Sacramento County California. CSLT operates 16 freestanding SLHs (136 bed capacity) and is structured into two phases. The first (30 to 90 days) is designed to provide more limits and structure (e.g., curfews, mandatory 12-step meeting attendance, shared rooms) to help residents successfully transition into the facility. The second phase allows for more autonomy (e.g., private rooms and fewer requirements for curfews and 12-step attendance).

A "Residents Congress" consisting of current residents and alumni help enforce house rules and provide input into the management of the houses. The cost at entry into the house is $695 per month which includes family style meals and utilities. About 90% of the residents use their own financial resources (e.g., employment earnings, savings, family resources, or Social Security Income) to meet housing costs. About 10% of the residents receive financial support from the Substance Abuse Services Coordinating Agency (SASCA), an agency created for graduates of drug treatment programs in the California Department of Corrections. For a more extensive description of CSLT see Polcin and Henderson (2008).

2.2 Procedures

Study participants were recruited and interviewed within their first week of entering the houses between January 2004 and July 2006 and interviewed again at 6-, 12-, and 18-month follow-ups. Interviews required about 2 hours and participants were paid $30 for the baseline interview and $50 for each of the follow up interviews. All participants signed an informed consent to take part in the study and all were informed that their responses were confidential. Study procedures were approved by the Public Health Institute Institutional Review Board and a federal certificate of confidentiality was obtained, adding further protection to confidentiality.

To reach individuals for follow up interviews we required them to provide contact information (e.g., phone number, address, e-mail, names of friends who might know there whereabouts, family members' phone numbers, health service professions from whom they received services, shelters they frequented, and criminal justice personnel). Among the sample of 245, 89% (N=218) participated in at least one follow up interview. Follow up rates for each time point included 72% at 6 months, 71% at 12 months and 73% at 18 months. To assess whether individuals that we located and interviewed at follow up differed from those whom we were not able to locate we conducted baseline comparisons. Separate baseline comparisons were made for individuals interviewed and not interviewed at each time point. On each of these comparisons we found no differences in terms of demographic characteristics, Addiction Severity Index scales (i.e., medical, legal, alcohol, drug, family, and vocational), psychiatric symptoms, and maximum number of days of substance use (alcohol or drugs) per month during the previous 6 months. Thus, the demographic characteristics and problem severity of individuals successfully followed up and lost at follow up were not significantly different.

2.3 Measures

Several measures were limited to baseline administration and were included as descriptive characteristics:

1. *Demographic Characteristics* included standard demographic questions such as age, gender, ethnicity, marital status, and education.
2. *DSM IV Checklist for Past 12 Month Alcohol and Drug Dependence* was used to assess substance use disorders over the past 12 months. Items are based on DSM IV diagnostic criteria (American Psychiatric Association, 2000) Forman, Svikis, Montoya & Blaine, 2004).

Outcome measures included the Addiction Severity Index (ASI), which measures severity of problems over the past 30 days. In place of the ASI psychiatric severity scale we used the Brief Symptom Inventory. Finally, we used measures that assess the past 6 months in terms of substance use and arrests.

1. *Addiction Severity Index Lite (ASI)*: The ASI is a standardized, structured interview that assesses problem severity in six areas: medical, employment/support, drug/

alcohol, legal, family/social and psychological. The ASI measures a 30 day time period and provides composite scores between 0 and 1 for each problem area. The ASI has demonstrated excellent reliability and validity in numerous studies (McLellan et al., 1992). Although the instrument includes a measure of psychiatric severity as well, we opted to use a more comprehensive measure for psychiatric symptoms which is described below.

2. *Psychiatric symptoms*: To assess current psychiatric severity we used the Brief Symptom Inventory (Derogatis & Melisaratos, 1983). This 53-item measure assesses severity of psychiatric symptoms on nine clinical scales as well as three global indices. Items are rated on a 5-point scale and ask about symptoms over the past 7 days. We used the Global Severity Index (GSI) as an overall measure of psychiatric severity.

3. *Six month measures of alcohol and drug use*: These measures were taken from Gerstein et al. (1994) and labeled Peak Density and 6-month abstinence. Peak Density is the number of days of any substance use (i.e., any alcohol or drug) during the month of highest use over the past 6 months (coded 0–31). *Six-month abstinence* was a dichotomous yes/no regarding any use of alcohol of drugs over the past 6 months.

4. *Arrests*: This measure was taken from Gerstein et al. (1994) and was defined as number of arrests over the past 6 months.

Two measures were included as covariates because they assess factors emphasized by as important to recovery in SLHs.

1. *Alcoholics Anonymous Affiliation Scale*: This measure includes 9 items and was developed by Humphreys, Kaskutas and Weisner (1998) to measure the strength of an individual's affiliation with AA. The scale includes a number of items beyond attendance at meetings, including questions about sponsorship, spirituality, and volunteer service positions at meetings. An overall scale score ranging from 0 – 9 is generated by summing the items. Measures of internal consistency have been shown to be good across a variety of groups. We included involvement in other 12-step groups in addition to AA, such as Narcotics Anonymous (NA). We therefore refer to "12-step" affiliation throughout the paper rather than AA affiliation.

2. *Drinking and drug use status in the social network*: These measures were taken from the Important People Instrument (Zywiak, et al., 2002). The instrument allows participants to identify up to 12 important people in his or her network whom they have had contact with in the past six months. Information on the type of relationship (e.g., spouse, friend), amount of contact over the past 6 months (e.g., daily, once or twice a week) and drug and alcohol use over the past 6 months (e.g., heavy user, light user, in recovery) was obtained for each person in the social network. The drinking status of the social network was calculated by multiplying the amount of contact by the drinking pattern of each network member, averaged across the network. The same method is applied to obtain the drug status of the network member; the amount of contact is multiplied by the pattern of drug use and averaged across network members.

2.4 Analysis Plan

To assess longitudinal changes for each of our outcome measures (ASI scales, GSI, Peak Density, abstinence and arrests) we used Generalized Estimating Equation (GEE) models (Diggle, Heagerty, Liang & Zeger, 2002) that compared each follow up time point (i.e., 6, 12 and 18 months) with baseline. Each outcome measure was entered into a separate model

controlling for a variety of baseline demographic covariates (i.e., age, race, education, marital status and gender). We developed additional GEE models to assess whether factors that are central to the recovery philosophy of SLHs (i.e., involvement in 12-step groups and establishing a social network supportive of abstinence) were related to outcome. A key advantage of the GEE models is that resulting coefficients allow for a longitudinal interpretation of within-individual change in the outcome over time and associations with time varying covariates of interest. Separate models examined how the 12-step involvement, drinking status of the social network and drug use status of the social network were related to each outcome. Models controlled for demographic characteristics and time of the interview. Because most of our outcome measures were continuous (ASI, GSI, and Peak Density) most outcomes are reported as coefficients and standard errors. Those that are dichotomous (abstinent versus not and arrested versus not) are reported as odds ratios. GEE analyses were conducted using Stata Version 9 statistical software (Stata, 2005).

3. Results

3.1 Sample

Two hundred forty five residents of CSLT were recruited into the study during their first week after entering the house. In order to maximize our ability to generalize results we employed few inclusion/exclusion criteria: all study participants were age 18 or older and competent to provide informed consent. See Table 1 for a depiction of demographic characteristics of the sample. Most participants were men (77%), white (72.5%) and middle age (mean=38, s=0.65). Over three fourths had at least a high school education or GED and the average income from all sources the month before entering the SLH was $963 (se= $120). About half had never been married and slightly less (48%) had children under age 18. Nearly all the participants had a history of previous treatment (94%) and 60% had been admitted to a residential treatment program within the past 6 months (not shown in the table).

3.2 Baseline Characteristics

In addition to demographic characteristics, Table 1 shows referral sources and pre-baseline functioning. The most common referral source was self, family or friend (44%). Although 29% were referred through the criminal justice system, a much higher 42% indicated that they had been arrested at least once over the past 6 months. Thus, having spent some time in a controlled environment before entering the SLH did not necessarily mean that the individual was referred to the SLH from that controlled environment. The most common substances that residents were dependent on during the past year were methamphetamine (53%) and alcohol (49%) (not shown in the table). Responses on the ASI for lifetime use of alcohol and drugs was extensive, with 97% of the sample reporting at least 3 years of substance use at baseline. The median number of years of substance us over participants' lifetimes was 18.

Table 2 shows values for study variables at all 4 time points. Relative to individuals entering treatment in our geographical area (e.g., Polcin & Beattie, 2007;Polcin & Weisner, 1999) residents entered with lower ASI alcohol (mean=0.16, se=0.02), drug (mean=0.08, se=0.01) and legal (mean=0.11, se=0.02) severity. Other baseline measures were of moderate to high severity, which included other ASI scales (family, medical and vocational) and the GSI. Measures that assessed the previous 6 months before residents entered the SLH revealed more extensive substance use. For example, the average Peak Density (maximum number of days of substance use per month) over the 6-month period prior to entering the house was 18.81 (se=0.83) within a potential range of 0 to 31.

3.3 Longitudinal Outcomes

The average length of stay in the SLHs was over 5 months but that varied considerably. At the 6-month time point, 42% were still residing in the SLHs. Residency dropped to 18% at 12 months and 16% at 18 months. Table 3 shows significant findings for study outcome variables over the three follow up time points controlling for demographic factors. The coefficients (continuous variables) and odds ratios (dichotomous variables) show how each outcome measure at each time point compared to baseline. The coefficients and odd ratios showed improvement between baseline and 6 months and then remarkably little change between at 12 and 18 months. For example, ASI alcohol scores indicated low severity at baseline (mean=0.16, se=0.02) that nonetheless showed significant improvement at 6 months (mean=0.10, se=0.01). The improvement noted at 6 months did not decline at 12 or 18 months. In fact, we found the same coefficient at 6, 12 and 18 month follow up (−0.04[0.01], p<.01). Similarly, ASI drug coefficients showed that severity at 6 months (mean=0.05, se=0.01) declined relative to an already low severity at baseline (mean=0.08, se=0.01) and then varied by no more than .01 at 12 and 18 months. All time points were significant at the .05 or .01 significance level.

Other outcome variables also showed significant levels of improvement by 6 months that did not decline at 12 and 18 months, including, Peak Density (p<.001), abstinence (p<.001), ASI employment (p<.001) and arrests (p<.001). See Table 3 for the coefficients and odds ratios at each time point. At baseline, we found that 19% of the sample had been abstinent from alcohol and drugs for 6 months. At the 6-month time point, that proportion increased to 39% and by 18 months it was 42% reporting complete abstinence. Peak Density (maximum number or days/month of alcohol or drug use) declined from a mean of 18.81(0.83) days per month at baseline to 10.35(0.93) at 6 months. This improvement continued to the 18-month time point (mean=11.73, se=0.97). We found the same pattern for ASI Employment, with a mean of 0.76 (0.02) at baseline, 0.53(0.2) at 6 months and 0.59(.02) at 18 months. For proportion arrested, there were 42% who had been arrested at least once in the 6 months before entering the SLH. That proportion decreased to 26% at 6 months and was 28% at 18 months.

Although GSI showed significant improvement between baseline and 6 months (−0.16, se=0.05, p<01) and baseline and 12 months (−0.14, se=0.05, p<.01), the difference between baseline and 18 months was not statistically significant. Nevertheless, we continued to see a statistical trend at 18 months (p=.058), which reflects some degree of ongoing improvement relative to baseline, despite a decline from 12 months.

ASI and substance use outcomes at 12 and 18 months changed very little despite the lower number of individuals still residing in SLHs. While 42% of the sample were still living in the SLHs at 6 months, that declined to 18% at 12 months and 9% at 18 months. When we used linear and logistic regression models to examine whether length of time in the SLH was associated with primary outcomes (ASI drug, ASI alcohol, Peak Density and abstinence) at 18 months, we found no significant relationships.

Outcomes that were assessed and not found to improve significantly over time included ASI legal, family and medical scales. However, there was a trend for improvement at the 12 month time point for family severity and all time points indicated less severity relative to baseline. As described below, we did find that several factors significantly impacted these variables despite their lack of improvement over time. Potential reasons for the lack of improvement are reviewed in the Discussion section.

3.4 Twelve-Step and Social Network Predictors of Outcome

In addition to tracking longitudinal changes over time, we were interested in factors that were associated with areas showing improvement (e.g., ASI scales, alcohol and drug use, GSI and arrests). Longitudinal models assessed how data collection time points were associated with outcome variables controlling for a variety of demographic factors. In general, few demographic characteristics were related to outcomes (see Table 3). However, the notable exception was the relationship between age and abstinence. Older age categories were over twice as likely to be abstinent than those age 18–28. Not surprising, residents with at least a high school diploma had lower ASI employment severity. However, they also were nearly twice as likely to be abstinent over the past 6 months and about half as likely to be arrested.

Because involvement in 12-step recovery groups and developing a social network supportive of abstinence are central to the recovery philosophy of SLHs we wanted to see how these factors related to outcome measures. Twelve step involvement was relatively high across all 4 time points (>5 on a scale of 0 to 9), although there was an increase from baseline (mean=5.1, se=0.13) to 6 months (Mean=5.8, se=0.14) that was largely maintained at 12 months (5.5, se=0.15). There were similar patterns for alcohol and drug related social support. Across all time points, large majorities reported having no heavy drinkers or drug users in their social network. At baseline, 24%reported having at least one heavy drinker in their social network and that declined to 16% at 6 months. At 12 and 18 months it was 20% and 14% respectively. For heavy drug users, 22% of the participants reported having at least one heavy drug user in their social network at baseline. That was nearly cut in half by 6 months (12%) and stayed about the same at 12 months (12%) and 18 months (11%).

Table 4 shows how involvement in 12 step groups and characteristics of the social network (drinking and drug use within the social network) predict outcome. These analyses show associations that include all 4 time points. Thus, Table 4 builds on the outcomes exhibited in Table 3 by adding an additional covariate to each model. Involvement in 12-step groups was strongly associated with outcome measures that assessed a 6-month time period (Peak Density, Abstinence and Arrests). In contrast, the social network variables were not only significant for these variables measuring a 6-month period of time, but with nearly all of our other outcome measures that showed improvement as well (i.e., ASI alcohol, drug and employment scales; psychiatric severity on the Global Severity Index). The only 2 non-significant associations for social network factors and outcomes were: 1) Drug use in the social network did not predict ASI employment and 2) Drinking in the social network did not predict GSI or arrests.

4. Limitations

There are several limitations that are inherent in the study. First, although we conducted longitudinal comparisons within participants, we did not compare outcomes of SLH residents with any type of comparison or control group. We therefore cannot necessarily conclude that SLHs caused the improvements. Individuals self selected themselves into the SLHs and the characteristics of these individuals may have at least in part accounted for the longitudinal improvements. Second, on measures that assess a 6-month period of time the improvements noted may have been a function of “regression toward the mean.” This concept suggests that extreme scores drift toward the mean over time. There is the potential that during the 6 months prior to entering the sober living houses participants exhibited extremes in problem behaviors that improved at subsequent time points due to regression toward the mean. However, regression toward the mean would not apply to ASI alcohol and drug scales because those scores were very low at baseline. A third limitation is that we were not able to locate some participants at follow up time points and these individuals

might have had worse outcomes. While individual time points had follow up rates ranging from 71% to 73%, 89% of the participants completed at least one follow up interview. In addition, as noted in the Procedures section above, when we conducted baseline comparisons of participants who were contacted for follow up interviews with those lost at follow up we did not find any difference in terms of severity of ASI scores or alcohol and drug use. Finally, our sample was largely white and male and participants with different demographic characteristics might respond differently to residence in SLHs.

5. Discussion

Overall, the findings support the need for further studies on SLHs that examine their effectiveness relative to outcomes of individuals in other living situations. Longitudinal, within individual comparisons of participant functioning over time showed that significant improvements were made between baseline and 6 months on all primary outcomes and some secondary outcomes as well. It is noteworthy that the improvements were generally maintained at 12 and 18 months. In addition, analyses reported here used GEE models to show that theoretically relevant covariates (i.e., characteristics of the social network and 12-step involvement) were associated with outcome.

In the discussion below we first consider in more detail findings for outcome variables measuring a 6-month period of time (i.e., 6-month abstinence, Peak Density, days of employment, and number of arrests). We then address findings for variables measuring shorter time periods, such as the ASI scales. We end with an analysis of how our findings support previous research emphasizing the importance of social factors in recovery and considerations for additional research.

5.1 Findings for Variables Measuring 6 Months

Variables that measured a 6 month period of time showed large improvements between the baseline interview and all follow up time points. These included measures of alcohol and drug abstinence, Peak Density of substance use (days of use per month during the month of highest use), days of employment and arrests. Overall, the 6 month period before entering the houses showed that residents were experiencing significant problems. For example, the vast majority (81%) reported some alcohol or drug use and Peak Density of substance use was on average 19 days per month. About half had not been employed at all during the 6 month period and 42% had been arrested. Because these problem areas were high at baseline there was room for improvement on these measures during subsequent assessments. When we examined demographic factors as covariates of these outcomes across all four data collection time points it was clear that improvements were being made by a variety of demographic groups. An exception included young age groups (18–28) having smaller proportions reporting abstinence over a 6-month time period. One reason could be that the older age groups might have had more unsuccessful attempts to control their use and thus opted for a goal of complete abstinence. If younger residents did have fewer failed attempts to control their use they may be more likely than older residents to feel that controlled use is an attainable goal.

5.2 ASI and Brief Symptom Inventory

Measures that assessed a shorter time period, such as the ASI (one month) and Brief Symptom Inventory (7 days) showed more variability. For example, legal severity was relatively low at entry into the houses and did not change to any significant extent at 12 or 18 months. While some individuals entering the houses did not have any legal issues, and thus had low ASI legal severity scores, others had legal requirements to abstain from alcohol and drugs. Over a quarter of the sample was referred from the criminal justice system.

However, by the time these individuals were entering SLHs their legal status may have been less concerning because the most important decisions about their legal status were already decided. Typically, if they complied with SLH rules, such as abstinence, their legal issues were resolved.

Two ASI scales that showed relatively low severity at entry into the houses (i.e., alcohol and drug and scales) nonetheless showed significant improvement between baseline and 6 months that was maintained at 12 and 18 months. The fact that residents had relatively low alcohol and drug severity at baseline is not surprising given that entry into the houses required some demonstrated motivation for recovery to be accepted as a resident. Many residents had already started attending 12-step meetings or had come from controlled environments where access to substances would have been difficult (e.g., residential treatment or incarceration).

On two scales measuring relatively short time periods (ASI employment and the Global Severity Index from the BSI), we found residents entered with high severity that improved at 6 months and was maintained at 12 months. For employment, significant improvement also persisted through the 18-month follow up point. For the Global Severity Index, the level of psychiatric symptoms was no longer statistically significant (compared to baseline), but it nonetheless continued as a clear statistical trend only slightly beyond the .05 level of significance.

It is not surprising that employment severity was relatively high at pre-baseline given the demographic finding that over three-quarters of the sample spent some period of time in a controlled environment during the 30 days before they entered the facility. Whether the controlled environment was incarceration, residential treatment or some other facility it would have detracted from employment stability. In addition, given that residents were expected to pay for rent and other fees, it was not surprising that employment severity improved.

It was interesting that the improvements seen at 6 months were maintained at 12 and 18 months despite the fact that the vast majority of residents had left the residence at 18 months. At 18 months there was no relationship between outcome and length of stay in the SLHs. Some of this may be due to residents having on average about a 5-month length of stay, well beyond the minimum 3-month length of stay recommended for residential treatment by NIDA (1999). While SLHs are not residential treatment, they have enough similarities with it that one might expect that the amount of time necessary to maximize effects would be similar. Thus, with a 5-month length of stay a majority of residents might have maximized their benefit by the time they left. However, it was also interesting that the relationship between social network variables (12-step involvement and drug and alcohol use in the social network) continued across all follow up time points. The consistency of outcomes across time points and the ongoing associations between social support variables and outcome suggests the possibility that many residents were able to develop and maintain social support for abstinence even after they had left the residence.

There were few demographic characteristics that predicted ASI and GSI scales. The few significant predictors that were found revealed no pattern of subgroups that benefited more than others. This finding supports the contention that a variety of individuals are able to use SLHs to make improvements in these areas.

5.3 Social Support Influences

The findings that level of involvement in 12-step groups and characteristics of the social network were related to outcome supports a growing body of literature emphasizing these

factors in addiction outcome. For example, Bond et al (2003) studied a sample of individuals entering alcohol treatment and found that fewer numbers of heavy drinkers in the social network and higher level of involvement in 12-step groups were associated with better drinking outcome at 1- and 3-year follow up. Moos and Moos (2006) found similar results in a sample of treated and untreated individuals with alcohol use disorders who were followed up over 16 years. They found involvement in AA and access to more social support resources were associated with less drinking. In a review of outcome research in the drug and alcohol field Moos (2007) emphasized a number social support factors, all of which are relevant to AA, as important in recovery from addiction: 1) social bonds that shield one from substance use, 2) social rewards for pro-social behaviors that are inconsistent with substance use, and 3) social learning theory that involves individuals learning how to cope with stress and get needs met without alcohol and drug use.

In addition to supporting previous research on the social factors influencing recovery, the study findings also support the purported mechanisms of how SLHs are helpful (Polcin & Henderson, 2008). Central to the philosophy of recovery in SLHs is the notion that persons with substance use disorders need a sustained living environment (i.e., longer than that typically offered by inpatient treatment) that is free of alcohol and drugs and offers social support for sobriety. Results confirmed that to the extent individuals had more alcohol and drug users in their social networks they were more likely to have worse outcomes on most of our study variables. Also central to the recovery philosophy of sober living houses is the notion that involvement in self help groups is important. Study results showed that greater involvement in 12-step groups resulted in better outcome.

6. Conclusion

SLHs offer an alcohol and drug abstinent living environment and social support for recovery for individuals attempting to abstain from alcohol and drug use. Strengths of the SLH model include: 1) they are financially self sustained through resident fees and 2) residents can stay as long as they wish. The SLHs studied here served as referral sources for a wide variety of individuals with substance use disorders, including those completing inpatient treatment, attending outpatient programs, leaving incarceration and voluntarily seeking help outside the context of formal treatment. Examination of longitudinal outcomes showed that residents in SLHs made significant improvements in a variety of areas, including alcohol and drug use, employment, psychiatric severity, and arrests. **However, causality cannot necessarily be attributed to SLHs because study participants were not randomly assigned to different study conditions**. As expected, residents who had social networks that contained less alcohol and drug use and those with higher involvement in 12-set groups had better outcome. The results reported here support the need for larger, controlled trials that compare outcomes of residents in SLHs with outcomes of individual in other living environments. The important mechanisms of 12-step group involvement and alcohol and drug use in the social network warrant further investigation in SLHs and other places where individuals seeking recovery reside.

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Table 1

Baseline characteristics

	N=245
Demographics	**%**
Male	77
Never Married	50
Children under 18	48
White/Caucasian	73
GED/High School Education	79
Controlled Environment (past 30days)	76
Employed / past 6 months	51

REFERRAL SOURCE	
CRIMINAL JUSTICE	29
INPATIENT	15
SELF / FAMILY / FRIEND	44
OTHER	12
Continuous Measures	**mean (*se*)**
Age	38 (0.65)
Income from all sources	$963 (120.26)
Length of stay (# days)	166 (11.20)

Table 2

Outcomes and Covariates at each Time Point.

	ASI Alcohol	ASI drug	ASI employment	GSI	Peak density	12-Step Scale	Drinking status of network	Drug status of network	Abstinence	Arrests
	(se)	(se)	(se)	(se)	(se)	(se)	(se)	(se)	%	%
Baseline	0.16	0.08	0.76	0.83	18.81	5.15	1.32	0.80		
	(0.02)	(0.01)	(0.02)	(0.05)	(0.83)	(0.13)	(0.10)	(0.10)	17.0	41.9
6-month	0.10	0.05	0.53	0.69	10.35	5.84	1.18	0.51		
	(0.02)	(0.01)	(0.02)	(0.05)	(0.93)	(0.14)	(0.10)	(0.08)	45.5	26.0
12-month	0.10	0.06	0.54	0.70	9.59	5.47	1.22	0.49		
	(0.01)	(0.01)	(0.03)	(0.05)	(0.94)	(0.16)	(0.11)	(0.08)	49.1	22.0
18-month	0.10	0.06	0.59	0.72	11.73	5.15	0.96	0.35		
	(0.01)	(0.01)	(0.02)	(0.06)	(0.97)	(0.20)	(0.10)	(0.05)	43.1	27.6

Note: Drinking status of the social network, drug status of the social network and AA scale were used as covariates. All other variables were outcome variables.

Table 3

Outcome measures over time using generalized estimating equation (GEE) models

Demographic	Continuous measures					Dichotomous measures	
	ASI alcohol	ASI drug	ASI employment	GSI	Peak density	Abstinence	Arrests
	Coef (s.e.)	Coef (s.e.)	Coef (s.e.)	Coef (s.e.)	Coef. (s.e.)	OR_{adj} (95% CI)	OR_{adj}(95%CI)
Interview							
Baseline (ref)	---	---	---	---		---	---
6-month	−0.04 (0.01)[b]	−0.03 (0.01)[b]	−0.15 (0.01)[c]	−0.16 (0.05)[b]	−8.6 (1.1)[c]	2.9 (1.9–4.3)[c]	0.5 (0.3–0.7)[c]
12-month	−0.04 (0.01)[b]	−0.02 (0.01)[b]	−0.14(0.01)[c]	−0.13 (0.05)[b]	−8.9 (1.1)[c]	3.8 (2.5–5.7)[c]	0.4 (0.2–0.6)[c]
18-month	−0.04 (0.01)[b]	−0.02 (0.01)[a]	−0.12 (0.01)[c]	ns	−7.0 (1.1)[c]	3.3 (2.2–5.0)[c]	0.5 (0.3–0.7)[c]
Age							
18–28 (ref)	---	---	---	---		---	---
29–37	−0.05 (0.01)[a]	ns	ns	ns	ns	2.3 (1.3–4.1)[b]	ns
38–44	ns	ns	ns	ns	ns	2.2 (1.2–4.0)[a]	ns
45–71	ns	ns	ns	ns	ns	2.5(1.4–4.7)[b]	ns
Race							
Other (ref)	---	---	---	---	---	---	---
White	0.04 (0.02)[a]	ns	−0.05 (0.02)[a]	ns	ns	ns	0.6 (0.4–0.9)[a]
Education							
No HS diploma (ref)	---	---	---	---	---	---	---
HS diploma+	ns	ns	−0.14 (0.03)[c]	ns	ns	1.8(1.1,3.0)[a]	0.6 (0.4–0.9)[a]
Marital Status							
Married/div/sep (ref)	---	---	---	---	---	---	---
Never married	ns	ns	ns	ns	ns	ns	1.5 (1.0–2.3) [c]
Sex							
Female (ref)	---	---	---	---	---	---	---
Male	ns	ns	ns	ns	ns	ns	1.6(1.0, 2.6)[a]

[a] p<.05;

^{b}p<.01;

^{c}p<.001

Table 4

Covariates predicting outcome measures using generalized estimating equation (GEE) models

	Continuous measures					Dichotomous measures	
	ASI Alcohol	**ASI Drug**	**ASI employment**	**GSI**	**Peak density**	**Abstinence**	**Arrests**
	Coef(S.E)	**Coef(S.E)**	**Coef(S.E)**	**Coef. (S.E)**	**Coef. (S.E)**	**OR_{adj}(95%CI)**	**OR_{adj}(95%CI)**
12 Step involvement scale	ns	ns	ns	ns	−1.20 (0.24)[c]	1.2(1.l–1.4)[c]	0.9(0.8–1.0)[b]
Drinking status of social network	0.05 (0.01)[c]	0.02 (0.01)[c]	−0.04 (0.01)[b]	ns	4.81 (0.87)[c]	0.5 (0.4–0.7)[c]	ns
Drug status of social network	0.03(0.01)[b]	0.04 (0.01)[c]	ns	0.13 (0.04)[b]	6.77 (0.90)[c]	0.4 (0.2–0.5)[c]	1.4 (1.0–2.0)[a]

Note: Coefficients and odds ratios have been adjusted for time of interview, age, race, education, marital status and sex.

[a] p<.05;

[b] p<.01;

[c] p<.001