



Published in final edited form as:

*J Alcohol Drug Educ.* 2017 April ; 61(1): 51–70.

## Social Support Influences on Substance Abuse Outcomes Among Sober Living House Residents with Low and Moderate Psychiatric Severity

Douglas L. Polcin, Ed.D. [Senior Scientist] and Rachael Korcha, M.A. [Associate Scientist]

Public Health Institute, Alcohol Research Group, 6001 Shellmound St #450, Emeryville, CA 94608

### Abstract

Social support and psychiatric severity are known to influence substance abuse. However, little is known about how their influences vary under different conditions. We aimed to study how different types of social support were associated with substance abuse outcomes among persons with low and moderate psychiatric severity who entered Sober Living Houses (SLHs). Two hundred forty-five individuals entering 16 SLHs were interviewed at baseline and 6, 12, and 18 months. The Brief Symptom Inventory assessed psychiatric symptoms and the Important People Instrument and a modified AA Affiliation Scale assessed social support. Social support variables predicted substance abuse outcomes for persons with low and moderate psychiatric severity. However, they were the strongest and most consistent predictors for the low severity group.

### Keywords

Social Support; Sober Living House; Recovery Home; Mental Health; Psychiatric Severity; Brief Symptom Inventory

---

There is an extensive literature supporting the contention that social support has a beneficial impact on a variety of health conditions, including substance abuse (Bond, Kaskutas, & Weisner, 2003; Cohen & Wills, 1985; Cutrona & Russell, 1990). However, despite the consensus about the benefits of social support for persons with alcohol and drug disorders, there is limited research on the effects of different types of social support in different contexts. For example, the effects of social support might vary in different treatment programs, at different time points in the recovery process, and among different subpopulations of persons with substance use disorders.

Studies of alcohol and drug treatment have also shown that psychiatric severity predicts worse outcome (Broome, Flynn, & Simpson, 1999; Compton, Cottler, Jacobs, Ben-Abdallah, & Spitznagel, 2003; Ritsher, McKeller, Finney, Otilingam, & Moos, 2002). However, there are a variety of significant limitations in these studies. One is that most of these studies only measure the influence of psychiatric symptoms in a limited context. For example, most studies assess psychiatric symptoms in formal treatment programs at baseline

and their influence on subsequent outcome. Thus, we have limited information about how psychiatric symptoms change over time and how changes impact longitudinal outcome. In addition, there are few studies that assess how the impact of psychiatric problems on outcome is influenced by a variety of factors, such as social support for recovery in one's social network and involvement in 12-step recovery groups. Overall, there has been a tendency in the literature to emphasize the study of persons with co-occurring disorders who have severe mental illnesses such as schizophrenia and substance abuse (e.g., Drake et al., 2016; Somers, Moniruzzaman, Rezanoff, Brink & Russolillo, 2016) and most of these studies have been conducted in treatment programs designed to address multiple problem areas in addition to psychiatric and substance abuse disorders. We have limited information about the influence of less severe psychiatric disorders in non-treatment settings that are being increasingly emphasized as vital resources for sustaining long-term recovery from substance abuse disorders. Sober living recovery homes are good examples of such services (Polcin & Henderson, 2008).

Sober Living Houses (SLHs) are alcohol- and drug-free living environments for persons with substance use disorders that emphasize social support for recovery as the primary therapeutic factor for sustaining long-term recovery (Polcin & Henderson, 2008). They do not provide on-site professional treatment services, but typically require or strongly encourage attendance at 12-step recovery groups. Studies of residents entering SLHs have documented significant, sustained reductions in substance use and legal problems and an increase in employment (Polcin, Korcha, Bond, & Galloway, 2010) over 18 months. Importantly, improvements were maintained over 18 months even though by that time most of the residents had left the houses. Although psychiatric symptoms improved over time, they were a significant predictor of worse substance use outcome (Polcin, Korcha, Gupta, Subbaraman, & Mericle, 2016). Consistent with the philosophy of recovery in SLHs, studies showed measures of social support predicted better substance use outcomes (Polcin et al., 2010). Specifically, higher involvement in 12-step recovery groups, lower levels of drinking in the residents' social network, and lower levels of drug use in the residents' social network predicted better substance use outcome.

The purpose of this study was to test whether social support variables operated differently for residents experiencing low and moderate psychiatric distress. Psychiatric problems were strong, consistent predictors of worse outcomes, so we were particularly interested in understanding social support factors that benefit persons with higher psychiatric severity. Because the sample included very few persons with serious psychiatric disorders, we were limited to comparing those with low and moderate symptoms. We expected the influence of social support on substance use outcome would be strongest and most consistent among persons with higher severity because they were more vulnerable to substance use.

## Methods

### Data Collection Site

All study participants (N=245) were recruited from Clean and Sober Transitional Living (CSTL) in Sacramento County, California. During the time of the study, CSLT operated 16 freestanding SLHs and structured in two phases. The first (30 to 90 days) provided limits

and structure (e.g., curfews, mandatory 12-step meeting attendance, shared rooms) to help residents successfully transition into the facility. The second phase allowed for more autonomy (e.g., private rooms and fewer requirements for curfews and 12-step attendance). A “Residents Congress” consisted of current residents and alumni to help enforce house rules and provide management and input from residents. The cost for residency averaged \$695 per month which included family style meals and utilities. About 90% of the residents used their own financial resources or support from their families. A more extensive description of the CSTL program is provided by Polcin and Henderson (Polcin & Henderson, 2008).

## Procedures

Study participants were recruited and interviewed within their first week of entering the houses and interviewed again at 6-, 12-, and 18-month follow-ups. Initial interviews required about 2 hours and participants were paid \$30 for the first interview and \$50 for each follow-up. All participants gave informed consent and were told that all responses were confidential. Study procedures were approved by the Public Health Institute Institutional Review Board (IRB) and a federal certificate of confidentiality was obtained.

Among the sample of 245, 89% (N=218) gave at least one follow up interview. Follow up rates for each time point were 72% at 6 months, 71% at 12 months and 73% at 18 months. Baseline demographic and alcohol and drug comparisons were made between individuals interviewed and not interviewed at each time point and demonstrated no demographic or alcohol and drug differences evident at follow up. We did find that individuals located and interviewed spent on average more time in the SLHs than individuals lost to follow up.

## Measures

### Participant Characteristics

1. Demographic characteristics included standard demographic questions such as age, gender, and ethnicity.
2. Length of stay at the SLH was assessed as number of days in the residence.
3. Attendance at mental health services was assessed as a dichotomous yes/no measure assessing any attendance over a 6 month period of time.

### Psychiatric severity

1. Brief Symptom Inventory (BSI) (Derogatis & Lazarus, 1994; Derogatis & Melisaratos, 1983). This 53-item self-report inventory asks participants to rate the extent to which they have been bothered in the past week by various symptoms representing nine separate clinical dimensions (e.g., depression, anxiety and hostility). A 5-point scale ranging from 0 (Not at all) to 4 (Extremely) is used to rate items. A Global Severity Index (GSI) reflects a measure of overall psychiatric severity (Derogatis, 1993). The structure of the BSI used for the current analyses drew upon previous analyses of the dataset using latent class analyses (Polcin, Korcha, & Bond, 2015). Using Mplus statistical software (Muthen & Muthen, 2013) two levels of the GSI were found.

Because very few individuals in our sample could be characterized as having serious mental illness, we opted to use the terms low and moderate rather than high, which we think is a more accurate description of the severity level. For a complete description of latent class analysis procedures and findings see Polcin, Korcha, and Bond (2015).

**Social Support Measures**—The social support measures selected for the study included those found to predict outcome in previous studies (Polcin et al., 2010). Measures assessing positive influences included involvement in 12-step groups and the percent of persons in the individual's network who abstained from alcohol and drugs. Measures assessing negative influences included level of drinking and drug use in the social network. All of these variables were tested within the context of low and moderate psychiatric severity.

1. **Alcoholics Anonymous Affiliation Scale (12-step Affiliation).** This measure includes 9 items developed by Humphreys, Kaskutas and Weisner (1998) to measure the level of affiliation a participant has with Alcoholics Anonymous (AA). The scale includes items relating to meeting attendance, sponsorship, spirituality, and volunteer service with an overall summation score from 0 - 9. Measures of internal consistency have been shown to be good across a variety of groups. All questions allowed for any 12-step group meeting, 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, Longabaugh, & Wirtz, 2002). The instrument asks 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 and drug and alcohol use (e.g., heavy user, light user, in recovery) was obtained for each person in the social network. Two outcome measures were taken from this instrument; the *drinking status of the social network* (calculated by multiplying the amount of contact by the drinking pattern of each network member, averaged across the network) and the *drug use status of the social network*, similarly calculated but using the drug use pattern of each social network member. Scores for the drinking and drug use status of the social network ranged from 0 to 2.37.
3. **Percent abstinent in the social network.** This is a measure taken from the Important People instrument (Zywiak, Longabaugh & Wirth, 2002) that asks respondents to indicate whether specific individuals in their social networks are abstinent from alcohol and drugs.

### Outcome measures

1. **Addiction Severity Index Lite (ASI):** The ASI is a standardized, structured interview that assesses problem severity in medical, employment, drug, alcohol, legal, family/social, and psychological. The ASI measures a 30 day time period and provides composite scores ranging between 0 and 1 for each problem area.

The ASI has demonstrated excellent reliability and validity in multiple studies (McLellan et al., 1992). Only the *ASI alcohol* and *ASI drug* scores were used as outcome measures for the present study.

2. Six month measures of alcohol and drug use (Gerstein et al., 1994): This instrument provides the outcome measures of 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* is a dichotomous yes/no outcome of any use of alcohol or drugs over the past 6 months.

## Analysis Plan

Means and percentages were used to depict how social support and substance use outcome variables differed over the 4 data collection time points disaggregated by low and moderate psychiatric severity. To assess the influence of social support on substance use we used generalized estimating equation (GEE) models (Diggle, Heagerty, Liang, & Zeger, 2002) disaggregated by low and moderate severity. Separate models assess associations between each of the social support variables (12-step affiliation, drug use in the social network, alcohol use in the social network, and percent abstinent in the social network) and each outcome (ASI alcohol scale, ASI drug scale, abstinence and peak density). These analyses included all time points combined and controlled for gender, age, race, and length of stay in the residence. Outcome variables with skewed distributions toward zero including the ASI alcohol, ASI drug, and drinking and drug use status of the social network were log transformed. Peak density (i.e., the most days used in the month of most use) models only included those that had used drugs or alcohol at least once during the past 6 months.

## Results

The majority of the participants were male (77%), never married (50%) and white (73%). Ages ranged from 18 to 71 with a mean of 37 years (sd=10). Eighty eight percent of the sample met DSM IV criteria for past year alcohol or drug dependence. Most residents had a prior history of receiving inpatient or outpatient substance abuse treatment and about a quarter were referred from the criminal justice system. 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. The average length of stay was slightly over five months.

Latent class analysis of the BSI resulted in two levels of psychiatric severity (Polcin, et al., 2015), which we describe as low and moderate. Of the 245 individuals recruited, the moderate group consisted of 27% of the sample (N=66). ANOVA and chi square procedures were used to test differences in demographic characteristics, social support, and drug and alcohol outcomes between the two groups. Results showed those in the moderate psychiatric severity group had a higher proportion of women (33%) than those with lower psychiatric severity (19%).

Not surprising, participants in the moderate severity group had higher rates of receiving mental health services. Because of a largely skewed distribution with a large number of 0's, we used a dichotomous measure of no treatment versus any treatment. Between the time that they entered the SLHs and 6-month follow up 26% of the individuals in the moderate group reported receipt of psychiatric services. Only 9% of those in the low group reported receipt of psychiatric services ( $X^2=7.82$ ,  $p<.01$ ). At the 12 month follow the proportions were similar, 23% for the moderate group and 9% for the low severity group ( $X^2=5.22$ ,  $p<.05$ ). However, despite higher receipt of psychiatric services among the moderate group, it should be noted that the vast majority of persons in the moderate group were not receiving any mental health services at either time point.

As Table 1 indicates, there were no significant differences between the low and moderate groups on any of the social support measures. Although not statistically significant, it should be noted that 12-step affiliation was higher for the moderate psychiatric severity group at each data collection time point, indicating a higher level of involvement in 12-step groups across all time points.

Table 2 shows there were significant differences between the two groups on measures of alcohol and drug problem severity. Consistent with previous reports using these data (Polcin, 2015), we found participants in the moderate group had higher scores on ASI alcohol and drug severity at each time point, the one exception being drug severity at 6 months. Comparison of substance use over a 6-month time period using the peak density and abstinence measures revealed only one significant difference between the two groups. Abstinence at 12 months was lower in the moderate group. However, the direction for most of the abstinence and peak density scores showed lower substance use for the low psychiatric severity group, although the differences were not large enough to reach statistical significance.

Generalized estimating equation (GEE) models were used to predict substance use outcomes for both groups and are shown in Table 3. Models controlled for gender, age, race, and length of stay in the sober living residence. Drug use in the social network and alcohol use in the social network were the strongest predictors for both groups. These variables were significant predictors for all outcomes among persons with low psychiatric severity and significant predictors for ASI alcohol and drug scales among the high severity group. However, drug and alcohol use in the social network were the strongest and most consistent predictors among the low psychiatric group. For the moderate psychiatric severity group, alcohol use in the network did not predict abstinence or peak density. Associations between the percent of abstainers in the social network and outcomes were different from the other social network measures. Percent of abstainers predicted peak density for both groups but not abstinence and trended toward significance for the ASI alcohol scale among participants in the low severity group.

Interestingly, 12-step affiliation did not predict any outcomes for persons with high psychiatric disorders. However, among persons with low severity it was a significant predictor of the 6-month measures of substance use (abstinence and peak density), but not the alcohol and drug ASI scales.

## Discussion

Social support factors are central to the recovery philosophy of SLHs and previous studies have documented a positive impact for 12-step affiliation and destructive effects for social networks with higher levels of drug and alcohol users (Polcin et al., 2010). Previous studies have also shown that lower levels of psychiatric severity are associated with better outcome (Polcin et al., 2016).

We hypothesized that the influence of social support variables would be strongest in persons with moderate psychiatric severity (compared to low) because of its association with worse outcome. We expected persons with lower severity would be doing relatively better in their recovery and have less room for improvement. However, results showed social influences were stronger predictors of outcome for the lower severity group. For example, 12-step affiliation predicted 6-month measures of abstinence and peak density for the low severity group but not the moderate group. In addition, significance levels for alcohol use in the social network and drug use in the social network predicting outcomes were stronger in the low severity group. A potential mitigating factor for these findings could be lower statistical power in the moderate group because of the lower N (N=66) as compared to the low severity group (N=179). However, the coefficients for social influence variables predicting substance use outcomes were generally higher for the low severity group.

### Social Network Influences

The strongest social influence predictors for both groups were variables that put participants at risk for substance use and higher severity of drug and alcohol problems: alcohol and drug use in the social network. The findings highlight the importance of residents developing and maintaining social networks that avoid or at least limit contact with heavy alcohol or drug users. We also found some data, albeit less consistent, supporting the importance of developing social networks with persons who abstain from alcohol and drugs. Percent abstainers predicted peak density for individuals in both the low and moderate groups. These findings are consistent with other studies showing a relationship between social network characteristics and outcome (e.g., (Bond et al., 2003). They are also consistent with reports from SLH managers who emphasize the benefits of positive social support for recovery in the SLH environment (Polcin & Korcha, 2015). It therefore behooves SLH providers to continue facilitation of peer support for recovery among residents in the houses, involvement in 12-step recovery groups, and avoidance or at least minimization of persons who use substances.

Previous studies of SLHs showed a relationship between 12-step affiliation and outcome (Polcin et al., 2010). However, results from the current study suggest that the relationship may be driven primarily by persons with lower psychiatric severity. We found no association between 12-step facilitation and outcomes for the moderate severity group. There may be a number reasons for this finding. First, it could be that other factors are more important in influencing outcome for those with moderate or high psychiatric severity, such as provision of mental health treatment to address psychiatric symptoms. Second is the possibility that persons with relatively higher psychiatric severity have more difficulty benefiting from 12-step recovery groups even if they have high levels of involvement.

It was interesting that the level of 12-step affiliation among persons in the moderate severity group was slightly higher compared to the low group. However, despite slightly higher levels of involvement, 12-affiliation did not predict outcome for persons in that group while it did for persons with low severity. A possible explanation is that participants in the study with moderate or higher psychiatric severity had difficulty with some aspects of 12-step involvement that are important. For example, Polcin and Zemore (2004) studied a sample of 200 persons with alcohol problems and found those with higher psychiatric severity had similar level of involvement in Alcoholics Anonymous as persons with low severity. However, persons with higher severity had lower scores on measures of spirituality, which is an important component of 12-step recovery, as well as lower scores on a measure of AA achievement, which was defined as completing the 12 steps of AA and serving as a sponsor for others. Importantly, these measures of spirituality and AA achievement were associated with length of sobriety. The authors concluded that persons with higher psychiatric severity may need assistance from professionals or their peers to develop spirituality, feel comfortable serving as a sponsor for others, and complete the 12 steps of AA.

### Addressing Psychiatric Problems

Providers of SLH services might consider several strategies to assist persons with moderate to high psychiatric severity. For example, some of these individuals might be able to increase the beneficial aspects of 12-step recovery groups by attending “Dual Recovery Anonymous” (DRA) meetings (Dual Recovery Anonymous, 2016). DRA is a 12 step self-help program designed to assist persons suffering from dual problems of substance abuse and psychiatric problems. The program helps persons recover from both substance abuse and psychiatric problems by focusing on relapse prevention and managing psychiatric symptoms.

Another strategy for improving the beneficial impact of 12-step groups for persons with moderate to high psychiatric severity might involve use of 12-step facilitation methods. For example, an AA facilitation intervention described by Kaskutas, Subbaraman, Witbrodt, and Zemore (2009) resulted in strong intervention effects on abstinence for persons with relatively higher psychiatric severity. However, the study was conducted in treatment settings that used a modified therapeutic community (T.C.) approach and modifications might be needed to address psychiatric symptoms among SLH residents.

A final consideration has to do with mobilization of various services and strategies to directly address psychiatric symptoms. Despite reports of psychiatric symptoms among persons in the moderate group, over 73% did not receive any mental health services over a 6-month assessment period. Clearly, there need to be good collaborative relationships between SLHs and local community mental health providers so residents who need mental health services can readily receive them. In addition, there may be modifications that SLHs could make onsite to increase peer support for residents experiencing mental health symptoms (Polcin & Korcha, 2015). One would be to develop onsite groups or workshops where residents could share their experiences about managing psychiatric symptoms and information about resources that have been helpful to them. Such a forum might be especially helpful to new residents suffering from psychiatric symptoms who might benefit from hearing the experiences of senior peers (i.e., those with more recovery time) who

experience similar problems. In addition, the sharing of practical information about mental health services could help facilitate access to services. For example, information about procedures to schedule an appointment, where the services are located, directions how to get to the center, required paperwork, and staff who provide services might be enormously helpful. Although SLHs are not licensed as treatment providers and cannot provide professional onsite services, there is no reason why SLHs could not invite outside speakers to present information about mental health services or contract with outside professionals to facilitate these groups.

## Implications for Research and Services

Results from this study suggest several issues to consider in terms of directions for research on SLHs and provision of services in SLHs and similar residential recovery programs.

1. There is a need for research to assess the influence of a wide variety of social variables on outcomes, including those that facilitate and hinder the development of desired recovery oriented behaviors in different contexts.
2. Twelve-step affiliation was associated with outcome for persons with low but not moderate severity. This was the case even though participants in the moderate severity group had slightly higher levels of involvement in 12-step groups at all the data collection time points. There is a need for research that helps us better understand why persons with higher psychiatric severity have a harder time benefitting from involvement in 12-step groups.
3. Sober living house operators and practitioners in similar recovery residences should consider potential strategies for improving the beneficial impact of 12-step groups for persons with moderate psychiatric symptoms. Strategies might include attending DRA meetings rather than generic 12-step meetings and implementing onsite 12-step facilitation groups that are targeted to persons with co-occurring mental health and substance abuse disorders.
4. Study findings confirm the important influence that social networks have on recovery outcome. It is therefore important to encourage persons with substance abuse problems to develop social networks composed primarily of persons who are either abstainers, in recovery or at least moderate users. The peer support emphasis in SLHs needs to be constantly monitored and encouraged because it is one important way of building a social network among the residents that supports recovery.
5. SLHs and similar recovery residence should do more to facilitate access to mental health services that can mitigate the destructive impact of all types of psychiatric symptoms, not just symptoms of serious mental illness. For example, there may be modifications that SLHs could make onsite to encourage use of local mental health services, provide information about mental health disorders, and increase peer support to help residents better manage their psychiatric symptoms.

## Acknowledgments

Funded by the National Institute on Drug Abuse grant R03DA035175. The authors thank Amy Mericle, Ph.D. for consultation on statistical analysis.

## References

- Bond J, Kaskutas LA, Weisner C. The persistent influence of social networks and Alcoholics Anonymous on abstinence. *Journal of Studies on Alcohol*. 2003; 64(4):579–588. [PubMed: 12921201]
- Broome KM, Flynn PM, Simpson DD. Psychiatric comorbidity measures as predictors of retention in drug abuse treatment programs. *Health Services Research*. 1999; 34(3):791–806. [PubMed: 10445903]
- Cohen S, Wills TA. Stress, social support, and the buffering hypothesis. *Psychological Bulletin*. 1985; 98(2):310–357. [PubMed: 3901065]
- Compton WM III, Cottler LB, Jacobs JL, Ben-Abdallah A, Spitznagel EL. The role of psychiatric disorders in predicting drug dependence treatment outcomes. *The American Journal of Psychiatry*. 2003; 160(5):890–895. [PubMed: 12727692]
- Cutrona, CE., Russell, DW. Type of social support and specific stress: toward a theory of optimal matching. In: Sarason, BR.Sarason, IG., Pierce, GR., editors. *Social Support: An interactional view*. New York, NY: Wiley; 1990. p. 319-366.
- Derogatis, LR., Lazarus, L. SCL-90-R, Brief Symptom Inventory, and matching clinical rating scales. In: Maruish, M., editor. *The Use of Psychological Testing for Treatment Planning and Outcome Assessment*. Hillsdale, NJ: Lawrence Earlbaum Associates; 1994. p. 217-248.
- Derogatis LR, Melisaratos N. The Brief Symptom Inventory: an introductory report. *Psychological Medicine*. 1983; 13(3):595–605. [PubMed: 6622612]
- Derogatis, LR. BSI Brief Symptom Inventory: Administration, scoring, and procedure manual. 4th. Minneapolis, MN: National Computer Systems; 1993.
- Diggle, P.J., Heagerty, P., Liang, K-Y., Zeger, S.L. *Analysis of Longitudinal Data*. 2nd. Oxford, UK: Oxford University Press; 2002.
- Drake RE, Luciano AE, Mueser KT, Covell NH, Essock SM, Xie H, McHugo GJ. Longitudinal course of clients with co-occurring schizophrenia-spectrum and substance use disorders in urban mental health centers: A 7-year prospective study. *Schizophrenia bulletin*. 2016; 42(1):202–211. [PubMed: 26294706]
- Dual Recovery Anonymous World Network Central Office. Online Resource Center. 2016 <http://www.draonline.org/>.
- Gerstein, DR., Johnson, RA., Foote, M., Suter, N., Jack, K., Merker, G., Fountain, D. *Evaluating Recovery Services: The California Drug and Alcohol Treatment Assessment (CALDATA): Methodology Report*. Sacramento, CA: State of California Department of Alcohol and Drug Programs; 1994.
- Humphreys K, Kaskutas LA, Weisner C. The Alcoholics Anonymous Affiliation Scale: development, reliability, and norms for diverse treated and untreated populations. *Alcoholism: Clinical and Experimental Research*. 1998; 22(5):974–978.
- Kaskutas LA, Subbaraman MS, Witbrodt J, Zemore SE. Effectiveness of Making Alcoholics Anonymous Easier (MAAEZ): a group format 12-step facilitation approach. *Journal of Substance Abuse Treatment*. 2009; 37(3):228–239. [PubMed: 19339148]
- McLellan AT, Kushner H, Metzger D, Peters R, Smith I, Grissom G, Argeriou M. The Fifth Edition of the Addiction Severity Index. *Journal of Substance Abuse Treatment*. 1992; 9(3):199–213. [PubMed: 1334156]
- Muthén, LK., Muthén, BO. *Mplus version 7.2*. Los Angeles, CA: Muthén & Muthén; 2013.
- Polcin D, Korcha R, Gupta S, Subbaraman MS, Mericle AA. Prevalence and trajectories of psychiatric symptoms among sober living house residents. *Journal of dual diagnosis*. 2016; 12(2):40–149.

- Polcin DL, Henderson DM. A clean and sober place to live: philosophy, structure, and purported therapeutic factors in sober living houses. *Journal of Psychoactive Drugs*. 2008; 40(2):153–159. [PubMed: 18720664]
- Polcin DL, Korcha R. Motivation to maintain sobriety among residents of sober living recovery homes. *Substance Abuse and Rehabilitation*. 2015; 6:103–111. [PubMed: 26392791]
- Polcin DL, Korcha R, Bond J. Interaction of motivation and psychiatric symptoms on substance abuse outcomes in sober living houses. *Substance Use and Misuse*. 2015; 50(2):195–204. [PubMed: 25290664]
- Polcin DL, Korcha R, Bond J, Galloway GP. Sober living houses for alcohol and drug dependence: 18-month outcomes. *Journal of Substance Abuse Treatment*. 2010; 38(4):356–365. [PubMed: 20299175]
- Polcin DL, Zemore S. Psychiatric severity and spirituality, helping, and participation in alcoholics anonymous during recovery. *The American journal of drug and alcohol abuse*. 2004; 30(3):577–592. [PubMed: 15540494]
- Ritsher JB, McKeller JD, Finney JW, Otilingam PG, Moos RH. Psychiatric comorbidity, continuing care and mutual help as predictors of five-year remission from substance use disorders. *Journal of Studies on Alcohol*. 2002; 63(6):709–715. [PubMed: 12529071]
- Somers JM, Moniruzzaman A, Rezanoff SN, Brink J, Russolillo A. The prevalence and geographic distribution of complex co-occurring disorders: a population study. *Epidemiology and psychiatric sciences*. 2016; 25(03):267–277. [PubMed: 25989819]
- Zywiak WH, Longabaugh R, Wirtz PW. Decomposing the relationships between pretreatment social network characteristics and alcohol treatment outcome. *Journal of Studies on Alcohol*. 2002; 63(1):114–121. [PubMed: 11925053]

**Table 1**

Descriptive statistics for social support predictors by psychiatric status

	Social Support Predictors														
	12-Step Affiliation			% abstainers in Network			Drug Use of Network			Alcohol Use of Network					
	<i>Low psych</i>	<i>Mod psych</i>	<i>Sd</i>	<i>Low psych</i>	<i>Mod psych</i>	<i>Sd</i>	<i>Low psych</i>	<i>Mod psych</i>	<i>Sd</i>	<i>Low psych</i>	<i>Mod psych</i>	<i>Sd</i>			
Baseline	5.0	2.2	1.9	0.61	0.29	0.62	0.31	1.3	1.5	1.3	1.6	0.8	1.6	0.8	1.3
6-month	5.8	2.0	1.6	0.64	0.30	0.69	0.28	1.2	1.2	1.2	1.4	0.5	1.0	0.5	1.0
12-month	5.4	2.2	1.6	0.66	0.29	0.68	0.32	1.2	1.4	1.3	1.7	0.5	1.1	0.4	0.6
18-month	4.8	2.6	2.1	0.06	0.10	0.06	0.07	0.9	1.1	1.4	1.7	0.4	0.9	0.6	1.1

ANOVA comparisons at each time point found no significant differences between low and moderate psychiatric groups for each social support variable.

**Table 2**

Descriptive statistics for outcome measures by psychiatric status<sup>ℳ</sup>

	ASI Alcohol						ASI Drug						Peak Density						Abstinence (%)						
	Low psych		Mod psych		Sd		Low psych		Mod psych		Sd		Low psych		Mod psych		Sd		Low psych		Mod psych		Sd		
	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	X	Sd	
Baseline	0.11	0.22	0.29	0.33 <sup>***</sup>	0.07	.10	0.08	0.11 <sup>**</sup>	18.5	13.0	19.7	12.7	21.9	11.9	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.07
6-month	0.07	0.14	0.20	0.29 <sup>***</sup>	0.05	.09	0.05	0.09	9.9	12.7	11.7	12.3	42.8	30.0	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
12-month	0.06	0.13	0.20	0.24 <sup>***</sup>	0.04	.08	0.05	0.09 <sup>*</sup>	8.6	12.3	12.2	13.0	50.4	33.3 <sup>*</sup>	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
18-month	0.07	0.15	0.17	0.24 <sup>**</sup>	0.04	.07	0.06	0.09 <sup>*</sup>	11.2	13.0	13.2	13.8	43.1	39.6	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04

<sup>ℳ</sup> significance reflects ANOVA/Chi2 comparisons between low and moderate psychiatric groups for each outcome at each time point.

- \*  $p < 0.05$ ;
- \*\*  $p < 0.01$ ;
- \*\*\*  $p < 0.001$

Generalized estimating equation models of social support predicting drug and alcohol outcomes by psychiatric distress<sup>†</sup>

**Table 3**

	Low psychiatric distress		Moderate psychiatric distress	
	Coefficient	95% CI	Coefficient	95% CI
<b>12-Step Affiliation</b>				
ASI Alcohol	-0.05	-0.13 0.03	-0.02	-0.13 0.09
ASI Drug	-0.03	-0.10 0.04	-0.05	-0.16 0.05
Peak Density	-0.04*	-0.07 -0.00	-0.03	-0.07 0.02
Abstinence (OR)	1.29***	1.15 1.45	1.1	0.9 1.30
<b>% Abstainers in Network</b>				
ASI Alcohol	-0.35 <sup>^</sup>	-0.71 0.02	0.04	-0.36 0.43
ASI Drug	0.03	-0.35 0.42	-0.49	-0.89 -0.08
Peak Density	-0.26**	-0.44 0.07	-0.30*	-0.56 -0.03
Abstinence (OR)	1.21	0.74 1.98	0.60	0.28 1.32
<b>Drug Use of Network</b>				
ASI Alcohol	0.39*	0.03 0.75	0.35*	0.08 0.62
ASI Drug	0.72***	0.50 0.94	0.46***	0.22 0.70
Peak Density	0.25***	0.14 0.37	0.18*	0.02 0.34
Abstinence (OR)	0.31***	0.19 0.50	0.45*	0.22 0.90
<b>Alcohol Use of Network</b>				
ASI Alcohol	0.79***	0.48 1.09	0.28*	0.06 0.50
ASI Drug	0.41***	0.13 0.69	0.32*	0.05 0.59
Peak Density	0.20***	0.08 0.33	0.11	-0.05 0.28
Abstinence (OR)	0.48***	0.32 0.71	0.56	0.30 1.10 <sup>^</sup>

<sup>†</sup> models run separately for low and moderate psychiatric distress

\*  $p < 0.05$ ;

\*\*  $p < 0.01$ ;

0.10 > d  
v  
;1000.0 > d  
\*\*\*

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript