



The need for substance abuse after-care: Longitudinal analysis of Oxford House

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Abstract

Aims: There is a need to explore the processes of social support and self-efficacy change over time among individuals in recovery homes, and to assess the extent to which residents remain abstinent, obtain and maintain employment, refrain from criminal activity, and utilize health care systems both while within the and after leaving such settings.

Design: Residents were recruited and interviewed at an initial baseline phase and then re-interviewed at three subsequent 4-month intervals.

Setting: Oxford Houses are recovery home residences for individuals with substance abuse and dependence problems who seek a supportive, democratic, mutual-help setting.

Participants: A national US sample of Oxford House residents ($n=897$: 604 men, 293 women).

Measurements: Information was gathered on abstinence, social support, self-efficacy, employment, criminal history, and medical care utilization.

Findings: Change in cumulative abstinence was predicted by support for alcohol use, abstinence self-efficacy, and length of residency in OH (i.e., less than versus ≥ 6 months), even after controlling for initial time spent in OH.

Conclusions: Results suggest that receiving abstinence support, guidance, and information from recovery home members committed to the goal of long-term sobriety may enhance residents' abstinence self-efficacy and enable persons recovering from alcohol and other drug addiction to reduce the probability of a relapse.

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Keywords: Recovery homes; Substance abuse; Social support; Self-efficacy; Oxford House

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1. The need for substance abuse after-care

Substance-related disorders pose serious health threats and exact significant costs to individual users, their families and friends, and society. Despite increased knowledge regarding the harmful consequences that result from substance abuse, as well as persistent efforts to combat these problems, data from the 2003 National Survey on Drug Use and Health (SAMHSA, 2004) reveals that rates of use and abuse of legal and illicit psychoactive-substances have remained relatively stable. Acute treatments help patients achieve abstinence, but relapse rates following treatment are substantial. An important component of relapse appears to be immediate re-exposure to risks associated with one's ongoing living situation (e.g., high substance availability, family and peers non-supportive of recovery, interpersonal conflict, poorly structured time). Drug-free housing that supports recovery, risk avoidance, and employment might heighten one's chances of recovery (Jason, Olson, Ferrari, & Davis, 2004).

There is currently a rising interest in mutual-help groups and in self-help influenced treatments that offer an alternative to professional treatment and after-care. A mutual-help initiative that combines 12-step support within a network of community-based recovery homes for substance abuse is called *Oxford House* (OH). OH was established in 1975 for persons who seek a supportive, mutual-help, residential setting with recovering peers in order to develop long-term sobriety skills. To date, there are over 1200 OHs across the USA, as well as over 30 homes in Canada and eight in Australia. Each house is a rented, multi-bedroom dwelling for same-sex occupants, located in low-crime, residential neighborhoods, and each operates democratically by majority rule and residents govern by electing house officers (e.g., President, Secretary, Treasurer) every 6 months. Houses are not over-crowded and rarely are there more than 12 people in a house. Similar to AA, they are financially self-supported and there are no professionals involved. However, unlike AA there is no single, prescribed course for recovery that all members must follow. Similar to AA, members of an OH receive abstinence support from peers, which has been shown to be an important factor for successful outcomes (Longabaugh, Beattie, Noel, Stout, & Malloy, 1993).

Longabaugh et al. (1993) have proposed that the presence or absence of social support that advocates abstinence support may be related to recovery from substance abuse. That is, successful substance abuse outcomes might be most likely when one has social support networks that discourage substance use and advocate abstinence. In addition, the development of self-efficacy has been implicated as a critical factor in resisting the urge to use drugs and alcohol in high-risk situations after treatment (Solomon & Annis, 1990), and in maintaining long-term abstinence (Rychtarik, Prue, Rapp, & King, 1992). Thus, social factors or environments that promote the development of self-efficacy should reduce the likelihood of substance abuse relapse. Given the peer-based mutual-support approach to addiction recovery that OH might promote, it is possible that residents of OH gain both abstinence social support and abstinence self-efficacy in these environments, which might lead to more successful maintenance of abstinence over time.

Prior studies with Oxford House on client-demographic profiles that generally match the typical profile characteristics reported on recovering substance abusers from more traditional programs (e.g., Jason et al., 2004). In a cross-sectional study of 87 residents, Davis and Jason (2005) found that length of residency in OH was significantly related to decreased social support for alcohol and drug use and increased self-efficacy for abstinence; however, social support for alcohol/drug use fully mediated the link between length of residency and abstinence self-efficacy for women, but not for men. There is a need to examine abstinence social support and abstinence self-efficacy among larger longitudinal samples of OH residents.

The aim of the present study was to explore the processes of social support and self-efficacy change over a 1-year period of time among a national sample of OH residents. In addition, we examined the

extent to which OH residents remain abstinent, obtain and maintain employment, refrain from criminal activity, and utilize health care systems both while within the OH and after leaving such settings. Length of time was considered an important predictor, as it has been found that a six or more month stay in OH is considered optimal for residents to obtain the most benefits from this recovery home experience (see Jason, Olson, Ferrari, & Lo Sasso, *in press*). It was hypothesized that change in cumulative abstinence would be predicted by support for alcohol use, abstinence self-efficacy, and length of residency in OH (i.e., less than versus ≥ 6 months). We also examined whether support for substance use played a direct role in abstinence or whether its influence was mediated by abstinence self-efficacy.

2. Methods

2.1. Procedure

Analyses of records provided by Oxford House, Inc. (OH) using a geographical information systems program (GIS) indicated that the majority of OHs across the United States clustered in five regions. These cluster areas included: Washington/Oregon, Pennsylvania/New Jersey, North Carolina, Illinois, and Texas. Therefore, in the present study, participants were recruited from OHs clustered in these five geographic regions (total houses assessed=170).

Participants for this study were recruited through two methods. The method soliciting the most participants ($n=797$, 88.9% of the sample) utilized an announcement that was published in the monthly OH newsletter distributed by OH, Inc. The announcement indicated that we were conducting a national study and provided contact information. We then contacted OHs within the target geographic areas via letters addressed to House Presidents, conducted follow-up phone calls to the houses, and where possible members of the research team arranged to visit houses. Of 189 houses that were approached, 169 (89.4%) houses had at least one individual who agreed to participate in the study and the average number of participants per house was 4.7 (there were an average of 7.1 individuals per house). For the second method, 100 individuals filled out the baseline questionnaires at an annual OH Convention. There were approximately 300 people at this convention, and the authors attempted to secure a sample of those attending the Convention (a table was set up in a room where individuals could complete the questionnaires with our research staff). We recognize that this is a convenience sample of those who attend the conference and elected to participate, and self-selection factors were presumably in operation. However, analyses of data collected at the Convention versus data collected using the first method did not reveal significant differences in outcome variables.

In each case, the longitudinal nature, purpose, and goals of the study were explained to the potential participants. Staff members also explained that participation was entirely voluntary, withdrawal from participation without pressure was possible at any time, and the consent form was reviewed in detail with each participant. After completing the baseline surveys, each participant received a \$15 payment. There were three subsequent waves of data collected at 4-month intervals (i.e., at 4, 8, and 12 months) and \$15 payments were made to participants following each survey. Data were gathered by research staff who primarily administered questionnaires in person to the participants. Some data were collected by telephone, particularly when an individual had left an Oxford House. As a measure of reliability of participants' self-reports of alcohol and drug use, upon completion of the final surveys, research staff interviewed a random sample of the fourth wave participants' *Important Person*, who was a person

identified by each participant (at the first interview) as someone who would be knowledgeable about the participant's alcohol and drug use.

2.2. Measures

2.2.1. Addiction severity index

The *Addiction Severity Index-lite* (ASI; McLellan et al., 1992) is a reliable and well validated instrument that assesses problem areas commonly related to substance abuse including medical status, drug use, alcohol use, illegal activity, family relations, family history, and psychiatric condition. We administered the entire scale at the baseline and portions of it (viz. related to employment and criminal involvement) at the final, fourth follow-up assessment. McLellan et al. (1992) indicate that it is appropriate and psychometrically sound to administer only sub-sections of this scale. The following information was derived from the ASI along with socio-demographic data: substance abuse history, physical and mental health information, and criminal activity. In each area, objective questions measure the number, extent, and duration of problem symptoms in the person's lifetime and in the past 30 days.

2.2.2. Alcohol and substance abuse

At the baseline and at each of the subsequent follow-up waves, participants were administered a modified version of Miller and Del Boca's (1994) *Form 90 Timeline Follow-back*, which measures general health care utilization and residential history, and past 90-day alcohol and drug use. The Form 90 has been reported to have good reliability for all key summary measures of alcohol consumption and psychosocial functioning and moderate reliability for most frequently used illicit drugs. Consistency of self-reported drinking has not been found to suffer across test–retest interviews (Tonigan, Toscova, & Miller, 1996). Even though the intervals in the present study were 4 months, the instrument was used to capture alcohol and drug usage during the last 90 days of the 4-month period.

2.2.3. Important people and activities inventory

At baseline and at each follow-up assessment, participants also completed a modified version of Clifford and Longabaugh's (1991) *Important People and Activities Inventory* (IPA) that solicited information regarding individuals' social support networks related to substance use and abstinence. This scale provides detailed information regarding the composition and utilization of individuals' support networks. In the first section of the IPA, respondents list the names of persons (>12 years old) who have been important to them in the past 3 months. Respondents also provide information on how often others use alcohol or drugs during activities that are important to the participant (Beattie et al., 1993). This measure yields 11 indices, including an overall *Composite Support Index* (CSI) and a *support for drinking/drug use* score representing the extent to which an individual's network is supportive of substance use versus abstinence. While the original IPA scale elicits information with respect to alcohol use only, in the present study, additional items were added to assess support for drug use (independent of alcohol use). We also used an index capturing the percentage of abstainers and recovering individuals in respondents' social networks (calculated by dividing the number of abstinent and recovering persons identified in an individual's network by the total number of persons in one's social network).

2.2.4. Alcohol and drug abstinence self-efficacy

At baseline and each of the three follow-up sessions, all participants were administered the 20-item *Alcohol Abstinence Self-Efficacy* scale (AASE; DiClemente, Carbonari, Montgomery, & Hughes, 1994) and a slightly modified version with 20 items to measure *Drug Abstinence Self-Efficacy* scale (DASE). The AASE is a self-report measure derived from Bandura's (1986) cognitive-behavioral self-efficacy theory and based on empirical studies of high-risk situations for relapse (e.g., DiClemente, Fairhurst, & Piotrowski, 1995). Instructions for the AASE asked respondents to imagine themselves in each of 20 situations and to indicate how confident they were that they would not drink in each situation. Individuals rated their level of confidence to not use alcohol on a 5-point Likert scale (1 = *not at all confident*, 5 = *extremely confident*). The DASE version was identical to the AASE except that the words "drink alcohol" were replaced by the words "use drugs" in order for respondents to answer regarding their confidence that they would not to use drugs in each of the 20 situations. The alphas for the AASE and DASE were 0.98 and 0.99, respectively.

2.2.5. Statistical analysis

Latent growth curve analysis was used to model trajectories of variables related to participants' rate of change in abstinence during the time of their participation in the current 1-year longitudinal study (baseline, 4-month, 8-month, and 1-year assessments). Latent growth curve analysis is a form of multilevel modeling in which separate growth curves are estimated within individuals. Latent growth curve analysis has been applied to the study of substance use outcomes in preventive interventions (Brown, Catalano, Fleming, Haggerty, & Abbott, 2005), variations in drinking trajectories (Greenbaum, Del Boca, Darkes, Wang, & Goldman, 2005), the structure of aggression and drug use (Farrell, Sullivan, Esposito, Meyer, & Valois, 2005), and normative beliefs and substance initiation (Lillehoj, Trudeau, & Spoth, 2005). The widespread use of growth curve models reflects the advances made in longitudinal analysis in the previous two decades (Shadish, 2002).

The dependent measure for the present growth curve analysis was the variable *cumulative days abstinent*. This variable had the following properties: (a) ratio-scaled, (b) showing systematic change (regular, time-related increases or decreases), and (c) having increasing variability over time. These properties were necessary in order for a model to identify a common growth factor. In other words, to examine change over time it is necessary that a variable reflect "growth over time," such as height or weight. Rate of change in abstinence represents the most accurate history of substance use available. The repeated assessments provide greater sensitivity to detect departures from complete abstinence. In addition, as this is a large sample, there is adequate power to detect small effects.

Because residents in this sample had lived in an OH ranging from a period of only a few days to 9 years at baseline data collection, it was most appropriate to analyze only the 1-year prospective data, rather than rely on retrospective recall regarding substance use prior to the commencement of the study. Thus, rate of change was calculated as a function of the cumulative numbers of days abstinent from alcohol or drugs, beginning with the time of the first survey.

In regression analyses, we calculated an observed rate of change in sobriety. This variable examined a rate of change calculated by the number of actual days sober divided by the total possible days sober. A rate of change, or slope, equal to 1.00, indicates that the individual remained alcohol- or drug-free during each day of the 12-month study (i.e., number of days abstinent is equal to number of days participating in the study). A trajectory with a slope less than 1.00 indicates some substance use during their participation in the current study.

3. Results

Statistical analyses were performed in two stages: descriptive analyses exploring the sample and latent growth curve analysis investigating model trajectories of variables related to abstinence. Results of data analyses indicated no significant differences between participants based on data collection method (in person versus by telephone). Of the random sample of collateral informants who were contacted regarding participants who reported they were abstinent from drugs throughout the study ($n=114$), 98% reported consistently regarding participant's drug abstinence and 97% furnished collateral reports that were consistent with participants' reports of abstinence from alcohol ($n=111$).

3.1. Descriptive analyses

Characteristics of the sample at baseline are presented in [Table 1](#), reported separately for females and males. We felt that it was important to examine these data based on possible gender differences, as [Davis and Jason \(2005\)](#) found that gender moderated the relationship between social support and abstinence self-efficacy. Furthermore, there is considerable evidence that women and men react differently to after-care services ([DeLeon, 1997](#)). At baseline, the sample consisted of 293 female and 604 male residents. Participants were ethnically diverse, with 58.4% being Caucasian, 34.0% African American, 3.5% Hispanic, and 4% other. Regarding marital status, 49% were single/never married, 46.2% were divorced/widowed or separated, and only 4.8% were married. On average, 69.3% of the respondents report being employed full-time and 13.9% part-time, while 11.6% reported being unemployed and 3.8% were retired or disabled. The average age of sample participants was 38.4, and the average total monthly income was \$981.80. Most participants reported multiple alcohol and drug dependencies, as well as prior participation in numerous substance abuse treatment programs. Thus, it is evident by their substance use and treatment histories that this sample represents a chronic substance abusing population.

As noted in [Table 1](#), the women and men in this sample reported fairly similar profiles in terms of ethnicity, marital status, and current legal status. However, women in comparison to men were younger and had significantly less employment, employment income, education, time in OH, and number of alcohol treatments, but women reported significantly more use of psychological medications, attempted suicide, and physical and sexual abuse. Additionally, although the men in this sample had used various substances for significantly longer lengths of time than the women, the pattern of lifetime abuse of drugs was similar for women and men (e.g., alcohol was used for the longest amount of time, followed by cannabis, cocaine, and amphetamines respectively). Further, on average, both women and men reported histories of numerous charges, convictions, and having spent time incarcerated. Although men had significantly higher rates with respect to historical legal issues, a slightly higher percentage of women were currently on probation or parole, awaiting charges, trial, or sentencing, and who entered Oxford House based on prompting by the legal system.

3.2. Outcome characteristics across waves 1 through 4

Descriptive variables related to the key outcome areas for the sample across the four survey waves are presented in [Table 2](#). These variables depict participants' use of alcohol and drugs, employment, involvement with the legal system, utilization of the health care system for medical, psychological, and

Table 1
Baseline mean frequencies and percentages of sociodemographic characteristics by gender

Descriptor variable	Sample percentage	Women percentage	Men percentage	Statistical significance
Ethnicity				
Caucasian	58.4	57.7	58.8	
African American	34.0	34.5	33.8	
Hispanic/Latino	3.5	2.4	4.0	
Other	4.2	5.5	3.5	
Marital status				
Never married	49.0	48.8	49.2	
Divorced, widowed, or separated	46.2	44.7	46.8	
Married	4.8	6.5	4.0	
Employment status^a				
Full-time	69.3	60.6	73.5	**
Part-time	13.9	17.8	11.9	**
Unemployed	11.6	17.4	8.8	**
Retired/disabled	3.8	2.1	4.6	
Psychological status^b				
History of psych meds	43.0	55.0	37.1	**
Attempted suicide	30.1	42.5	24.0	**
History of physical abuse	46.1	65.1	20.7	**
History of sexual abuse	35.3	72.4	33.3	**
1 or more inpatient treatments	40.1	44.9	37.8	
1 or more outpatient treatments	40.0	45.3	37.6	
Legal status				
On probation/parole ^c	30.3	32.3	29.3	
Awaiting charges, trial, sentencing ^c	9.0	10.6	8.3	
OH entry prompted by legal system ^c	13.7	14.1	13.4	
Descriptor variable	Sample Mean (S.D.)	Women Mean (S.D.)	Men Mean (S.D.)	Statistical significance
Age ^d	38.4 (9.2)	36.5 (8.5)	39.4 (9.4)	**
Education ^d	12.6 (2.1)	12.4 (2.3)	12.8 (1.9)	**
Income (\$)				
Employment ^e	794.0 (887.6)	563.8 (655.4)	903.3 (960.2)	**
Illegal activities ^e	2.7 (53.6)	.5 (7.5)	3.8 (64.8)	
Total income ^{e, f}	981.8 (867.5)	750.7 (734.9)	1087.8 (918.0)	**
Time in OH ^g	10.8 (15.6)	8.6 (13.2)	11.9 (15.6)	**
Time since last alcohol use ^d	1.7 (2.2)	1.2 (1.6)	1.9 (2.4)	**
Time since last drug use ^d	1.8 (2.8)	1.4 (2.4)	2.0 (3.0)	**
Lifetime substance use^d				
Alcohol	18.3 (10.3)	15.0 (9.5)	19.9 (10.3)	**
Alcohol to intoxication	14.4 (10.9)	11.7 (10.1)	15.7 (11.1)	**
Heroin	2.6 (6.6)	2.3 (5.4)	2.7 (7.1)	
Methadone	0.4 (2.2)	0.5 (2.3)	0.4 (2.1)	
Other opiates/analgesics	2.3 (6.0)	2.3 (5.7)	2.2 (6.1)	
Barbiturates	1.9 (5.4)	1.9 (5.3)	2.0 (5.5)	
Sedative/hypnotics/tranq	2.5 (6.1)	2.9 (6.1)	2.4 (6.1)	
Cocaine	8.3 (8.1)	7.5 (7.6)	8.7 (8.3)	

(continued on next page)

Table 1 (continued)

Descriptor variable	Sample	Women	Men	Statistical significance
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	
Lifetime substance use ^d				
Amphetamines	4.1 (7.0)	4.3 (7.0)	4.1 (7.0)	
Cannabis	10.5 (10.5)	8.0 (9.2)	11.7 (10.9)	**
Hallucinogens	3.2 (6.1)	2.5 (5.3)	3.5 (6.5)	*
Inhalants	1.1 (4.2)	1.2 (4.6)	1.0 (4.0)	
More than 1 substance	10.4 (10.5)	8.6 (9.2)	11.3 (10.3)	*
Substance abuse treatments ^b				
# of alcohol treatments	2.8 (4.2)	2.3 (3.8)	3.0 (4.4)	*
# of drug treatments	2.9 (3.5)	2.8 (2.6)	2.9 (3.9)	
Legal history ^b				
Times charged	10.3 (15.0)	8.3 (14.5)	11.3 (15.2)	**
Times convicted	3.1 (5.8)	2.5 (4.6)	3.4 (6.3)	*
Months incarcerated	15.8 (36.5)	7.6 (18.6)	19.7 (41.9)	**
<i>n</i>	897	293	604	

^a Within the past 3 years.

^b Lifetime data.

^c Currently.

^d In years.

^e In the past 30 days.

^f Total income comprises dollars received from employment, unemployment compensation, DPA, pension, benefits or social security, mate, family or friends, and illegal activities.

^g In months.

* $p \leq 0.05$, two-tailed.

** $p \leq 0.01$, two-tailed.

substance abuse treatment, self-efficacy for abstinence from alcohol and drugs, and abstinence social support over the span of the study. Repeated measures statistical tests reported in Table 2 are based on similar numbers across waves.

Table 2 shows that 607 participants from the initial measurement wave (68% of the sample) remained in the study at wave 4,¹ and of this group, only 13.5% reported having used either drugs or alcohol at the

¹ Using baseline data, we examined if there were any differences between those who were interviewed versus those who were not interviewed at wave 4. Independent sample *t*-tests and chi-square analyses indicated that there were no significant differences for ethnicity, marital status, and years of education, employment status, income, psychological status, or prior alcohol/drug treatments between those participants who completed wave 4 versus those individuals who did not complete wave 4. However, those who were not available to be interviewed compared to those who were interviewed at wave 4 had higher baseline substance use [percent who used any substances in the past 90 days = 22.1% versus 12.6%, $\chi^2(1, N=895)=13.52, p<0.01$; percent who used drugs in the past 90 days = 19.4% versus 10.4%, $\chi^2(1, N=895)=13.55, p<0.01$; and percentage who used alcohol in the past 90 days = 14.2% versus 8.1%, $\chi^2(1, N=895)=7.96, p<0.01$], had a shorter total length of alcohol sobriety, 1.4 versus 1.8 years, $t(2, 895)=-2.98, p<0.01$, and a shorter total length of drug sobriety, 1.4 versus 2.0 years, $t(2, 895)=-3.27, p<0.01$, although they had less total lifetime years using alcohol, 12.7 versus 15.2 years, $t(2, 870)=-3.11, p<0.01$. Additionally, those unable to be surveyed compared to those surveyed at wave 4 were more likely to be awaiting charges, trial, or sentencing, 7.6% versus 12.1%, $\chi^2(1, N=895)=4.78, p<0.05$, respectively, and more likely to have been incarcerated within 90 days prior to baseline, 12.2% versus 5.3%, $\chi^2(1, N=895)=13.19, p<0.01$. Those who did not complete the study were also younger [36.8 versus 39.2 years, $t(2, 891)=-3.71, p<0.01$], had less time living in an OH [7.8 versus 12.3 months, $t(2, 886)=-4.25, p<0.01$], and had lower AASE [78.4 versus 81.8, $t(2, 885)=-2.24, p<0.01$] and lower DASE [78.3 versus 81.4, $t(2, 885)=-1.93, p<0.01$] scores.

Table 2
Outcome characteristics across study waves 1 through 4

Descriptor variables	Wave 1	Wave 2	Wave 3	Wave 4
	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)	Mean (S.D.)
Alcohol/drug use ¹				
% who used alcohol or drugs	15.7	10.5	9.7	13.5
% who used alcohol	10.1	5.0	7.7	10.3
% who used drugs	13.3	9.0	7.0	9.8
Days consumed alcohol	2.2 (9.1)	1.4 (8.9)	1.8 (9.5)	3.7 (14.9)**
Days used drugs	5.5 (20.5)	3.7 (15.6)	2.3 (11.0)	5.6 (24.0)**
Employment				
% employed ^a	81.5	86.6	83.3	79.5
Days paid for work ^a	42.0 (28.0)	49.8 (26.5)	50.5 (27.0)	48.4 (40.4)**
Employment income ^b	794.0 (887.6)			941.9 (960.8)**
Total monthly income ^b	981.8 (867.5)			1133.7 (970.6)**
Legal status ^a				
% incarcerated	7.5	3.4	3.4	4.8
Days in jail	1.3 (7.0)	0.7 (6.1)	0.7 (6.3)	2.0 (12.7)
Days in prison	0.6 (6.3)	0.2 (3.5)	0.5 (6.0)	1.44 (11.0)
Medical status ^a				
Days in hospital for medical problems	0.5 (3.4)	0.3 (1.5)	0.8 (4.4)	0.8 (6.3)
Visits to doctor, nurse, p.a., etc.	2.6 (7.9)	2.4 (7.2)	2.1 (5.9)	2.0 (5.7)
Days taking Rx for medical problems	21.3 (36.1)	22.4 (38.7)	21.7 (36.8)	22.6 (37.2)
Psychological status				
Days experienced psyc problems ^b	3.6 (8.0)			3.9 (8.2)
Days taking Rx for psyc problems ^b	0.4 (0.5)			0.2 (0.4)
Days in residential Tx for psyc problems ^a	1.1 (7.1)	0.4 (5.3)	0.5 (4.6)	0.4 (5.2)
Sessions with counselor for psyc problems ^a	2.9 (10.1)	1.8 (6.5)	1.4 (6.7)	1.6 (5.7)**
Alcohol/drug treatment ^a				
Days attended 12-step meeting	44.9 (28.1)	40.5 (26.9)	35.1 (27.0)	33.4 (29.4)**
Days in residential drug treatment	7.1 (20.3)	1.6 (10.4)	1.1 (8.1)	1.1 (8.6)**
Days in residential alcohol treatment	6.5 (19.4)	1.1 (8.7)	.7 (5.7)	1.0 (7.8)**
Sessions with counselor for alc. problems	4.9 (14.0)	2.2 (7.8)	1.4 (7.5)	1.6 (7.8)**
Sessions with counselor for drug problems	5.4 (14.9)	2.3 (7.7)	1.6 (8.0)	1.4 (8.1)**
Days in hospital for detox	0.6 (3.5)	0.1 (1.1)	0.2 (1.4)	0.1 (0.7)**
Days in residential detox	0.3 (2.4)	0.1 (0.9)	0.1 (1.6)	0.0 (0.4)
Self-efficacy—alcohol ^a	80.7 (21.2)	80.4 (23.8)	79.3 (25.2)	84.6 (20.1)**
Self-efficacy—drug ^a	80.4 (22.3)	80.8 (23.8)	81.1 (25.0)	84.6 (21.3)**
% of network abstinent/in recovery ^a				
For alcohol use	75.0	79.0	79.0	77.0**
For drug use	90.0	94.0	94.0	93.0**
<i>n</i>	897	685	588	607

^a In the past 90 days.

^b In the past 30 days.

** $p \leq 0.01$, two-tailed, based on repeated measures analyses.

final assessment, and the average number of days they consumed alcohol or used drugs was 3.7 and 5.6, respectively. It appears that the highest rates of substance use for this sample occurred during waves 1 and 4, with lower rates at waves 2 and 3, but overall, the rates were relatively low across waves. Throughout

the study, the rate of *employment* for participants ranged from a high of 86.6% to a low of 79.5%. At wave 4, their average monthly income from employment was \$941.90, which was a significantly higher than their baseline employment-related income.

In regard to *legal status*, there was a directional decrease in the percentage of participants incarcerated between the start and end of the study. In contrast, the *medical status* of participants, which included number of days spent in hospital, visits to the doctor, and days taking prescription drugs, remained relatively stable across the four waves. With respect to *psychological status*, as evident in Table 2, over the course of the study, there were directional decreases in the days spent in residential treatment and significant decreases in sessions with a counselor for psychological problems. Participants evidenced a significant decrease over the four waves with respect to *alcohol and drug treatment*, which included the number of days that participants attended 12-step meetings, days in residential and outpatient treatment, as well as sessions with substance abuse counselors and days spent in hospital detoxification programs. At the final assessment, participants' *self-efficacy for remaining abstinent from alcohol and from drugs* had significantly increased. Significant increases were also noted with the percentage of participants' social network members who were abstinent/in recovery from alcohol use and the percentage of participants' social network members who were abstinent or in recovery from drug use.

3.3. Models of abstinence

As noted above, latent growth curve analysis was used to model trajectories of variables related to participants' rate of change in abstinence during the time of their participation in the current 1-year longitudinal study, and a trajectory with a slope less than one indicates some substance use during their participation in the current study. Of the 748 cases in which a slope could be calculated (i.e., participants in which we collected more than one wave of assessment data), 79.4% of the alcohol abstinence trajectories and 80.5% of the drug abstinence trajectories have slopes equal to 1. The observed slopes from these trajectories were treated as dependent variables in OLS regression analyses. Sample size for this analysis is reduced somewhat further by missing data on some of the predictors. Results from these analyses for cumulative alcohol sobriety are presented in Table 3.

Our first hypothesis was that change in cumulative abstinence would be predicted by support for alcohol use, abstinence self-efficacy, and length of residency in OH (i.e., less than versus ≥ 6 months; length of residency in OH was the variable that assessed the participant's residency in the OH during the course of the 1 year longitudinal study). We selected these constructs to be tested based on theoretical issues described in the introduction and findings in Table 3. Before testing for these effects, we controlled for a series of socio-demographic and other key variables. Model 1 includes the following control covariates: participant age, years of education, gender, never married versus ever married, African American versus non-African American, lifetime months incarcerated at wave 1, composite alcohol use score on the ASI at wave 1, and initial length of stay in OH (i.e., number of months individuals had resided in OH prior to the wave 1 assessment). Only this last variable was significantly related to the slope of cumulative abstinence.

In Model 2, we entered a contrast that indicated whether an individual left OH prior to 6 months versus stayed at least 6 months. In this model, leaving OH prior to 6 months was associated with a significant reduction in the slope of cumulative abstinence, and the significance of the length-of-initial-stay predictor dropped from a significance of $p < 0.001$ to $p < 0.05$. Support for alcohol use was added in Model 3. This variable was the mean score across available longitudinal assessments of the support for alcohol use

Table 3
Regression models predicting longitudinal slope of cumulative alcohol sobriety ($N=642$)

Parameter	Model 1: covariates only	Model 2: add stayed in OH ≥ 6 months	Model 3: add support for alcohol use	Model 4: add abstinence self-efficacy
Age	0.08	0.05	0.05	0.04
Education	0.03	0.02	0.03	0.02
Sex (female)	0.04	0.08*	0.07	0.05
Never married	-0.01	-0.03	-0.01	-0.04
African American	0.03	0.02	-0.01	-0.01
Lifetime months incarcerated	0.00	-0.01	-0.02	-0.01
Initial alcohol ASI	-0.06	-0.04	-0.03	-0.02
Length of time in OH at w1	0.14***	0.08*	0.08	0.06
Stayed in OH ≥ 6 months	-	0.29***	0.28***	0.24***
Support for alcohol use	-	-	-0.19***	-0.15***
Alc. abstinence self-efficacy	-	-	-	0.25***
R	0.202	0.343	0.392	0.456
R^2	0.041	0.118	0.154	0.208
R^2 change	-	0.077	0.036	0.054
F change	-	54.9***	26.8***	43.2***
NDf	8	9	10	11
DDf	633	632	631	308
F	3.37***	9.36***	11.45***	15.02***

ASI=Addiction Severity Index; OH=Oxford House; * $p<0.05$; ** $p<0.01$; *** $p<0.001$.

(using the CSI from the IPA).² This predictor also added significantly to the model (R^2 change=0.036, $p<0.001$) and predicted lower alcohol sobriety. The final model includes the measure of abstinence self-efficacy. As shown in Table 3, this variable also added significantly (R^2 change=0.054, $p<0.001$) and predicted greater cumulative sobriety. Results of predictions of cumulative drug sobriety were similar. (Findings for drug abuse were similar, and these findings can be obtained by writing the first author.)

We next examined whether support for substance use played a direct role in abstinence or whether its influence was mediated by abstinence self-efficacy using a *latent growth curve model* (LGM). It is possible that residents of OH gain both abstinence social support and abstinence self-efficacy, which might lead to more successful maintenance of abstinence over time, and it is also possible that the effects of the abstinence social support on successful maintenance are mediated by self-efficacy. The LGM provides a method for representing individual growth curves as latent variables in a structural equation model. Repeated-measures data are organized into latent intercepts (or “levels”) and latent slopes that can be treated as dependent variables in a structural model. In this model, support for alcohol use and abstinence self-efficacy were represented as latent variables with four indicators corresponding to the four repeated assessments. These constructs were fit as single-variable factors rather than as bivariate intercept

² Social support was averaged across the three time points because there was no systematic increase in social support over time and a latent growth curve of social support could not be identified. This is in large part due to the fact that the measure was created as an individual difference measure. In other words, it is designed to describe differences across individuals rather than change within an individual over time. Individual difference measures tend to have high test–retest reliability by definition, and this can be a problem when the intent is to measure a variable that changes over time. However, the lack of identified change does not necessarily mean that OH residents are not experiencing change in support over time. Because a measure is designed to have high stability does not mean that the construct itself is not changing.

and slope factors. Parameter estimates for the structural model for alcohol are given in Fig. 1. The χ^2 (chi-square) for this model was 179.0 with $df=74$; a number of fit indices suggested acceptable fit to the data (NFI=0.98, RFI=0.98, CFI=0.99, RMSEA=0.04). Results indicated that change in cumulative abstinence, represented by the latent slope variable, was predicted by support for alcohol use, abstinence self-efficacy, and length of residency in OH (i.e., less than versus ≥ 6 months) even controlling for initial time spent in OH. It should be noted that initial time spent in OH was associated with higher levels of abstinence self-efficacy, although there was no significant relation between time and support for alcohol use. Additionally, length of residency in OH predicted increased abstinence self-efficacy as well as continued abstinence. (Similar findings occurred for drug usage and these data are available by contacting the first author.).

3.4. Staying versus leaving OH

Examining differences between the participants who remained living in an OH throughout the entire study (32.6% of the sample) versus those of those who left by waves 2, 3, or 4 (67.4% of the sample), there were no significant differences for ethnicity, employment status, total income, or psychological status, based on independent sample *t*-tests or chi-square analyses. Compared to participants who stayed in OH across all four waves, individuals who left OH had higher rates of any substance use over the last

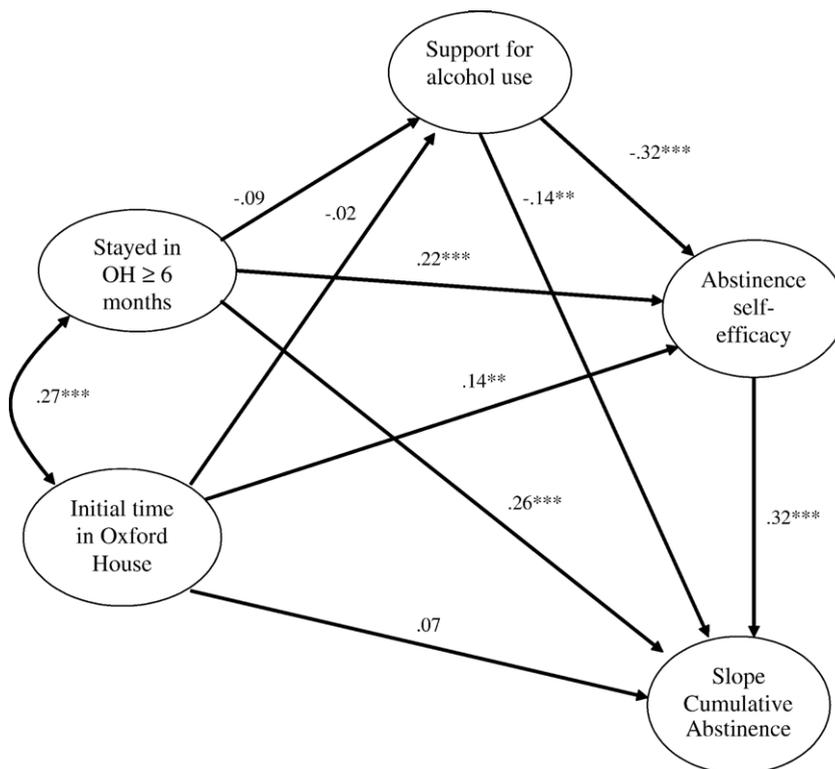


Fig. 1. Results of testing latent growth model regarding alcohol abstinence. Notes: * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

90 days at wave 4 [18.5% versus 3.1%, respectively, $\chi^2(1, N=595)=26.43, p<0.01$]; however, these findings indicate that 81.5% of those who left the house and were interviewed at the final wave remained consistently alcohol- and drug-free.

Those individuals who were no longer living in an OH at wave 4 compared to continued residents had spent less time in OH at baseline [9.8 versus 17.5 months, $t(2, 593)=5.59, p<0.01$] and were younger [38.0 versus 41.6 years, $t(2, 593)=4.49, p<0.01$]. Examining wave 4 data, those who had left versus those who remained in an OH spent more days in hospitals for medical problems over the past 90 days [1.2 versus 0.1 days, $t(2, 594)=-1.96, p<0.05$], spent more days in residential treatment for drug use in the past 90 days [6.3 versus 5.8 days, $t(2, 593)=-2.14, p<0.05$] as well as more time in residential treatment for alcohol use in the past 90 days [1.4 versus 0 days, $t(2, 592)=-2.06, p<0.05$], had lower self-efficacy for abstinence from alcohol [82.9 versus 88.7, $t(2, 596)=3.23, p<0.01$] and lower self-efficacy for abstinence from drugs [82.8 versus 89.4, $t(2, 596)=3.62, p<0.01$], and lower percentage of network members in abstinence or recovery for alcohol use [74.8% versus 80.0%, $t(1, 585)=2.19, p<0.05$] and drug use [92.6% versus 95.7%, $t(1, 584)=2.37, p<0.05$].

4. Discussion

Our data analytic approach was based on a theoretical framework which posited that change in cumulative abstinence would be predicted by social support for alcohol (or drug) use, abstinence self-efficacy, and length of residency in OH (i.e., less than versus ≥ 6 months). These hypotheses were confirmed, and the results were consistent with research indicating that substance abusers are more likely to maintain abstinence in abstinent supportive settings (Longabaugh, Mattson, Connors, & Cooney, 1994; Longabaugh, Wirtz, Beattie, Noel, & Stout, 1995). It is likely that OH settings promote abstinent support systems, as the present study found that the networks of OH members were mostly composed of individuals who were abstinent or in recovery. An OH recovery home experience of communal living may help develop a sense of bonding with similar others who share common abstinence goals (Ferrari, Jason, Davis, Olson, & Alvarez, 2004; Jason et al., in press). The OH communal living experience also appears to increase self-efficacy to refrain from using alcohol and other drugs. Facilitating this personal resource is important given indications that abstinence self-efficacy is related to more successful abstinence and coping activities during recovery maintenance (DiClemente et al., 1995). Receiving abstinence support in a setting that promotes abstinence self-efficacy may reduce the probability of a relapse among substance abusers.

It was also important to explore the 6-month length of stay in OH criterion given DiClemente et al. (1995) claim that efficacy expectations, which are related to addictive behavior change, stabilize after 6 months of abstinence in accordance to process of change theory (Prochaska & DiClemente, 1992). In addition, other evidence suggests that it may take approximately 6 months for OHs to adequately exert their effects on recovery (Jason et al., submitted for publication). Our results support that staying in OH at least 6 months was related to increased self-efficacy and maintaining abstinence. This outcome suggests that maintaining residency for at least 6 months of time might be a critical factor in promoting positive outcomes. However, it should be noted that, if residents who are found to be using substances are asked to leave Oxford House, some of the association may be a consequence of substance use. But, the theory of abstinent social support networks indicates that residents need to be in the OH environment a certain minimal amount of time to obtain the maximal effects.

The present study suggests that Oxford House is a network of abstinent support settings that is associated with maintenance of abstinence while living in the setting and post-residence. At the final wave 4, only 13.5% of participants reported using either alcohol or drugs, and of those who had left the OH, only 18.5% indicated using any substances. These findings are supportive of the Oxford House model, although the data need to be cautiously interpreted as there was some attrition over the course of the year-long study and there was no control group. Nevertheless, in a separate study (Jason et al., *in press*), individuals completing substance abuse treatment were randomly assigned to either an OH or usual after-care condition. At a 24-month follow-up, significantly lower substance use rates were found for those in the OH (31%) versus the usual after-care condition (65%). Taken together with the findings of that study, the present study suggests that the OH model may reduce substance abuse relapse rates. The public health implications of these findings are heightened because these OH homes are self-governing and require minimal costs with residents paying their own expenses for housing and food.

Results from the present study also indicate a general trend toward increased employment and income, and low levels of involvement in the legal system related to residency in OH. This result was in contrast to the finding that individuals with substance abuse disorders are more likely to be unemployed (Treatment Improvement Protocol 38, 2000) and have involvement with the criminal justice system. Those individuals with substance abuse problems often lack the benefits of employment, which provides a source of income, requires managing the use of time, improves self-esteem, and is associated with reductions in substance use (Copeland & Hall, 1992). In the present study, employment income significantly increased over time from \$794 to \$942 per month and 80% of participants reported being employed by the last assessment. In addition, the percentage of incarceration remained at low levels throughout the study (less than 5% were incarcerated by the wave 4). In part, these findings may reflect other forms of support that may be operating with the house systems (e.g., where peers encourage and help fellow residents to find work) that might help residents obtain stable employment. Additionally, residing in OH may support individual behavior changes that lead to low levels of involvement with the criminal justice system. Residents' successes with respect to maintaining abstinence likely bolster and are bolstered by their heightened ability to obtain and maintain employment, and their reduced association with criminal systems while living within these recovery settings.

4.1. Limitations and future directions

There are several limitations in the present study. For instance, we used a naturalistic follow-up of residents recruited from a large sample of facilities located in states where clusters of OHs are found. There was a considerable range in the study sample with respect to how long participants had been residing in OH at the start of the study. While much outcome research has a standard practice of recruiting participants at roughly the same point in treatment, and another study with OH used such a design (Jason et al., *in press*) interviewing individuals who just arrived in OHs. However, the present research design allowed the investigators to enroll a larger sample by including all available residents, and then statistically controlling for length of time living in OHs prior to the study start.

Attrition did occur between the baseline and last wave of data collection, and there were a number of differences between those who ultimately dropped out of the study and those who continued to participate.¹ Still, the tracking rates were relatively good for this national sample, and on the primary outcome data, there were only small differences between those who remained in and those who attrited. In addition, we did not use a control group to assess what might occur had residents not been provided this

abstinent supportive environment. However, as noted, a randomized study of Oxford Houses (Jason et al., *in press*) had findings on substance abuse indices that were in line with present study, and these convergent findings increase confidence in the overall validity and reliability of these results regarding effectiveness.

Finally, there might have been some selection bias in the recruitment effort, with only more motivated residents expressing an interest in participating in this study. As all participants were abstinent at the time of baseline assessment, participants who might have had a negative initial reaction to Oxford House might have left early, and therefore might not have been included in the sample. Clearly, some selection bias did occur with the current sample, and this possibly contributes to the low rates of substance use at the 12-month assessment in the current study (13.5%).

Typically, after treatment for substance abuse, whether in hospital-based treatment programs or therapeutic communities, many patients return to former high-risk environments or stressful family situations. Returning to such settings without a network of people to support abstinence increases chances of relapse (McCusker, Willis, Vickers-Lahti, & Lewis, 1998). As a consequence, alcohol and substance use recidivism following treatment is high for both men and women (Hubbard, Flynn, Craddock, & Fletcher, 2001). It is possible that non-treatment factors may be the best predictors of future recovery status (Vaillant, 1983; Westermeyer, 1989). Programs like OH that provide naturally occurring abstinent social supportive settings might represent effective ways to promote abstinence. Future research is needed to identify whether certain types of residents might have less positive outcomes in OHs, as well as better understanding those person–environment matches that either facilitate or impede recovery.

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