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ANXIETY SYMPTOMS AND ALCOHOL USE: A LONGITUDINAL ANALYSIS OF LENGTH OF TIME IN MUTUAL HELP RECOVERY HOMES

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ABSTRACT

Anxiety often co-occurs with alcohol abuse and predicts both the initial development of alcohol abuse problems and relapse among individuals in recovery. Individuals with comorbid substance abuse and anxiety symptoms may benefit from mutual-help environments, as these settings offer an increased amount of social support for individuals in recovery. Because symptoms of anxiety predict higher rates of relapse, mutually-supportive environments that potentially buffer anxiety might serve as beneficial recovery settings. This study examines anxiety symptoms and alcohol use over a 1-year period among a sample of adults in self-governed, communal-living recovery homes for substance abuse. We explore whether staying in a supportive recovery environment for 6 months or longer was associated with lower levels of anxiety and alcohol use over time. Findings indicate that individuals who remained for at least 6 months report significantly lower anxiety symptoms and rates of alcohol use over time. The implications of these findings are discussed.

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Anxiety often co-occurs with alcohol abuse and is a predictor of both the initial development of alcohol abuse problems, as well as relapse among individuals in recovery (Kushner et al., 2005; Zimmerman et al., 2003). About one-third of individuals seeking treatment for a DSM-IV alcohol use disorder have an anxiety disorder that is not substance-induced (Grant et al., 2004).

Research suggests that in most cases the onset of anxiety symptoms occurs prior to alcohol abuse, which is consistent with the self-medication model of comorbid anxiety and substance abuse (Merikangus et al., 1998; Sbrana et al., 2005). However, regardless of how alcohol use disorders develop initially, symptoms of anxiety or having an anxiety disorder when beginning treatment increases the likelihood of relapse into drinking among substance abusers in recovery (Charney, Palacios-Boix, Negrete, Dobkin, & Gill, 2005; Kushner et al., 2005). Furthermore, even in research where improvements in drinking behavior among individuals with anxiety disorders are observed, these drinking outcomes are still frequently worse than those without comorbid anxiety disorders (e.g., Burns, Teesson, & O'Neill, 2005).

Gender differences also may influence the relationship between alcohol use and symptoms of anxiety (Adewuya, Ola, & Aloba, 2006). While rates of alcohol dependence are higher for men than in women in both the general population and among alcohol users (Wu & Ringwalt, 2004), women who use alcohol tend to report higher levels of anxiety than men (Milani, Parrott, Turner, & Fox, 2004). Furthermore, men and women tend to differ on age of onset for some anxiety and alcohol use disorders (de Graaf, Bijl, Spijker, Beekman, & Vollebergh, 2003), prevalence of comorbidity of alcohol and anxiety disorders (Kessler et al., 1997; Rosse, 1995), coping and social resources during recovery (Timko, Finney, & Moos, 2005), and drinking patterns (Olenick & Chalmers, 1991). Clearly, gender is an important factor to consider when observing treatment outcomes for anxiety and alcohol use.

Observing how anxiety symptoms progress during the course of treatment for substance abuse might influence treatment outcomes, and identifying factors that enhance treatment for individuals in recovery with comorbid anxiety symptoms might be an integral step toward developing effective treatment programs. For example, individuals with comorbid substance abuse and anxiety symptoms may benefit from mutual-help environments (Magura et al., 2003; Myrick & Brady, 2001).

Social support is often regarded by treatment professionals as a significant benefit of self-help groups for substance abuse (Woff, Toumbourou, Herlihy, Hamilton, & Wales, 1996). More participation in some mutual-help settings might result in an increased amount of social support experienced by individuals in recovery (Humphreys, Mankowski, Moos, & Finney, 1999; Ouimette, Moos, & Finney, 1998), and such support has been associated with better outcomes with regard to both abstinence (Laudet, Cleland, Magura, Vogel, & Knight, 2004; Moos, Brennan, & Moos, 1991; Noone, Dua, & Markham, 1999) and mental

health symptoms (George, 1989; Laudet, Magura, Vogel, & Knight, 2000). Furthermore, research illustrates that social support plays a significant mediational role in the relationship between mutual-help participation and abstinence (Bond, Kaskutas, & Weisner, 2003; Humphreys et al., 1999; Laudet et al., 2004).

Taken together, it seems that participating in some mutual-help settings for longer periods of time might increase levels of social support for dually-diagnosed individuals and, in turn, contribute to better recovery outcomes over time (Laudet et al., 2004). A unique type of mutual-help setting is *Oxford House,* a network of self-governing, democratic recovery homes for individuals in recovery from substance abuse (see Jason, Ferrari, Davis, & Olson, 2006). Oxford Houses lack professional staff and place no restrictions on how long someone can remain a resident, which make these settings different from more traditional residential recovery environments (Oxford House, 2000). By combining elements of traditional residential treatment with the democratic principles of mutual-help organizations, Oxford Houses might function as continuous sources of mutual social support for individuals in recovery for substance abuse (Olson, Jason, Ferrari, & Hutcheson, 2005).

A recent study of the Oxford House model examined individuals randomly assigned to either a "usual care" condition or to an Oxford House upon discharge from inpatient substance abuse treatment (Jason, Olson, Ferrari, & LoSasso, 2006). Oxford House residents had significantly better outcomes with regard to substance use compared to participants engaging in standard substance abuse treatment. A study with the same sample found that there were more beneficial outcomes for both substance use and emotional self-regulation among Oxford House residents who stayed for 6 months or longer, compared to those who left prior to 6 months (Jason, Olson et al., 2007). Furthermore, Groh, Jason, Davis, Olson, and Ferrari (2007) examined the impact of baseline social support and length of residence on alcohol use outcomes among a national sample of Oxford House residents. Residents who had stayed in an Oxford House for at least 6 months had significantly better alcohol use outcomes at follow-up than residents that had not stayed for 6 months, regardless of baseline social support levels. This finding suggests that longer residence in an Oxford House may reduce alcohol use independently, or that residents who stay in Oxford House longer may develop highly supportive networks (Groh et al., 2007).

In summary, longer participation in mutual-help environments may increase positive social support (Humphreys et al., 1999; Ouimette et al., 1998), which in turn might improve outcomes for alcohol abstinence (Moos et al., 1991; Laudet et al., 2004; Noone et al., 1999) and mental health symptoms (George, 1989; Laudet et al., 2000). The present study examines the impact of gender and length of residence in mutually-supportive recovery homes for substance abuse (i.e., Oxford Houses) on 1-year follow-up outcomes for both anxiety symptoms and alcohol use rates. This prospective design examines a subset of a national sample of Oxford House residents who recently moved into one of these Houses (within

the past 30 days), and analyzes their self-reported anxiety symptoms and alcohol use over time. These participants were unique within our sample in that they did not have extensive previous experience within an Oxford House, providing a more homogenous group of individuals at baseline to explore potential effects of living in an Oxford House.

We predicted that there would be a significant multivariate effect for length of residence—that those individuals who remained in an Oxford House for at least 6 months would have lower symptoms of anxiety and lower rates of alcohol use at the 1-year follow-up compared to participants who left prior to 6 months. As an additional research question, we explored if there were any gender differences over time in anxiety and/or alcohol use among Oxford House residents. No *a priori* prediction concerning significant gender differences were made; we were unsure how several variables might interact with regard to gender over the course of the study (e.g., age of onset of alcohol use, coping resources, social support). However, we thought that it was important to observe the potential impact of gender on the other variables within the design of the study.

METHOD

Participants

A total of 897 participants (293 females, 604 males) were recruited for a national study of Oxford House residents (for a more detailed discussion of these recruitment methods, see Jason, Davis, Ferrari, & Anderson, 2007). Prior to a baseline assessment, the full sample of participants spent an average of 10.9 months (SD = 15.05)—with a range of a few days to 10.2 years—living in one of 170 Oxford Houses located across the United States. However, because we were interested in examining length of residence in an Oxford House prospectively, the present study examined a subset of the large national sample (n = 163) who lived in an Oxford House for 30 days or less prior to the baseline assessment. Of all participants in the sub-sample, 90 participants (55.2% of the sub-sample; 37 females, 53 males) completed all of the baseline and 1-year follow-up measures.

After removing four univariate outliers on variables in the statistical analyses (discussed below), the average age of the sub-sample was 36.0 (SD = 8.2, range = 18.6 – 55.7 years) and their reported average number of years of education was 12.3 years (SD = 2.10). The sub-sample consisted of 59.3% Caucasians, 31.4% African Americans, 5.8% Hispanic/Latinos, and 3.8% other ethnicities. With regard to income, participants earned an average of $540.58 per month during the baseline assessment (Range = $0.00 – $2300.00). On average, participants had been abstinent from alcohol for a mean of 192.8 days (SD = 222.40).

Procedure

After recruitment, all participants were informed that their answers would remain completely confidential and that they were allowed to withdraw from the study at any time. At baseline, the research personnel discussed the consent form with participants and asked them to complete a telephone contact sheet for reaching them at follow-up waves of the study. The majority of surveys were administered to participants in their House, although some were administered by telephone (usually if an individual left an Oxford House in-between follow-up waves), or at the 2001 Oxford House world convention. Participants who were recruited at the 2001 Oxford House world convention completed the survey in a conference room which had been set aside for that purpose (see Jason, Davis et al., 2007). The research personnel went over all directions and remained available to answer questions. After completing the surveys, each participant received a check for $15.

The larger, national study by Jason, Davis, et al. (2007) contained four waves of assessment, with data collected in 4-month intervals. For all waves after baseline, research personnel attempted to contact participants based on the telephone contact information they provided. Once contacted, all other assessment waves included surveys administered either in person, by mail, or over the telephone, and each participant again was given a $15 payment for each wave. All participants were thanked for volunteering to participate and given the research team's contact information if they had questions. After all of the data was collected, all participants were given written educational feedback that discussed the success of the study and restated the purpose of the project.

Measures

General baseline demographic and background information for participants, including initial time living in an Oxford House, was obtained from self-report items on the *Addiction Severity Index–Lite (ASI;* McLellan et al., 1992). The *ASI* examines medical status, drug use, alcohol use, illegal activity, family relations, and psychiatric symptoms. Furthermore, questions measure the number, duration, and extent of problem symptoms for both lifetime and in the past 30 days. This measure has been used frequently in research over the past 15 years and has test-retest reliability of 0.83 or higher (McLellan et al., 1992). Because we used the *ASI* only for demographic variables in the present study, no reliability coefficients were calculated.

Time living in an Oxford House and alcohol use was determined using Miller and Del Boca's (1994) *Form 90 Timeline Followback.* Adequate to excellent test-retest reliabilities have been reported for alcohol consumption (0.91 to 0.97) and days living in a residence (0.74 to 0.99; Miller, 1996). For the present study, this measure assessed residential history and alcohol use within the past 90 days at each assessment. This information from all follow-up waves created a

dichotomous variable for whether or not each participant remained living in an Oxford House for (at least) 6 months.

The target outcome variable for alcohol abstinence in the present study was calculated as a rate of change in cumulative sobriety based on self-reported days of alcohol use. This rate is our most accurate representation of alcohol use over the course of the study in this sample (Jason, Davis, et al., 2007). The cumulative number of days that a participant used alcohol across all waves of data collection was calculated as a function of the number of days that the participant was positional in the study. A slope equal to one indicates that the participant remained completely abstinent from alcohol use during the study, and any slope below one would indicate some degree of alcohol use (lower numbers indicating a higher percentage of days using alcohol).

The *Global Appraisal of Individual Needs-Quick Screen (GAIN-QS;* Dennis & Titus, 2000) was used to measure symptoms of anxiety. It is a clinical screening instrument used to assess a variety of psychological issues among the general population. While the *GAIN-QS* is not a diagnostic tool, it has been utilized within clinical screening contexts to identify problem areas and psychological symptoms that warrant further explanation (Titus & Dennis, 2000).

To measure anxiety symptoms in the present study, the *Anxiety Symptom Index* was utilized at baseline and at 1-year follow-up. This 7-item subscale asks about symptoms of anxiety over the past 12 months. In the standardization sample, this measure provided a Cronbach's alpha of 0.88 ($N = 448$, $M = 3.49$, $SD = 2.64$) for adults (Titus & Dennis, 2000). Within the present sample, this measure shows a Cronbach's alpha of 0.83 ($n = 163$, $M = 4.69$, $SD = 2.29$) at baseline, and 0.82 ($n = 95$, $M = 2.98$, $SD = 2.31$) at 1-year follow-up.

RESULTS

Descriptive Statistics

Descriptive statistics for the baseline and outcome variables for anxiety symptoms and the rate of change in cumulative alcohol sobriety are reported in Table 1. Prior to baseline, participants spent 1 month or less in an Oxford House. Of all participants in the sub-sample, 90 participants completed all baseline and 1-year follow-up measures. Of these participants, 37 individuals stayed in an Oxford House for 6 months or longer, while 53 individuals stayed for less than 6 months during the course of the study.

A total of four univariate outliers (1 female, 3 males) that were over three standard deviations above or below the mean were removed from the analysis: three people on the previous number of days of alcohol sobriety, and one person on the rate of change in cumulative sobriety variable (the final analysis produced comparable results when these outliers were included).

Table 1. Anxiety and Alcohol Scores Based on Oxford House (OH) Time Categories and Gender

Anxiety Scores

			Wave 1		Wave 4	
OH time	Gender	(*N*)	(*M*)	(*SD*)	(*M*)	(*SD*)
< 6 months	Male	23	4.43	2.64	2.96	2.31
	Female	28	5.32	1.93	4.00	2.23
≥ 6 months	Male	27	4.37	2.19	2.22	2.08
	Female	8	4.38	1.30	1.63	1.92

Rate of change in cumulative alcohol sobriety

			Slope	
OH time	Gender	(*N*)	(*M*)	(*SD*)
< 6 months	Male	23	.66	.35
	Female	28	.61	.38
≥ 6 months	Male	27	.91	.18
	Female	8	1.00	0.0

The rate of change in cumulative alcohol sobriety and previous number of days of alcohol sobriety variables were found to be both skewed and kurtotic. However, subsequent attempts to transform the variables did not resolve the issue. Because *MANOVA* is generally robust to normality violations (Tabachnick & Fidell, 2007, p. 251), the original variables were retained in the analysis. The skewness and kurtosis will be considered in the interpretation of the results. This problem is likely due to the fact that a very high percentage of participants (>50%) remained completely abstinent from alcohol use throughout the study, creating a ceiling effect in the distribution of scores for cumulative sobriety.

Attrition Analyses

To determine if the group that remained in the study and the attrition group differed on a number of baseline variables, *independent samples t-tests* and *chi-square analyses* were employed. Results indicated that the two groups did not differ significantly in gender, ethnicity, age, total monthly income, or years of education. Moreover, the group that remained in the study did not significantly

differ from the attrition group on baseline anxiety levels or in their baseline number of days of alcohol sobriety.

Group Comparisons

In addition to the attrition analyses, participants stayed in residence for more than 6 months and those individuals who dropped out in less than 6 months were compared on a number of variables. Participants who stayed for 6 months or longer in an Oxford House were significantly less likely to be female than those individuals who remained for under 6 months, $\chi^2(1, n = 86) = 8.76$, $p = .003$. However, these two samples of individuals did not differ significantly in baseline anxiety scores, number of days of alcohol sobriety, ethnicity, age, years of education, or total monthly income.

Although these groups did not differ significantly on anxiety scores or alcohol sobriety, these two variables were employed as covariates in the longitudinal analysis, because despite the lack of significant group differences, both of these variables might have a significant influence on the combined dependent variables.

Longitudinal Analysis

A 2 (OH time: less than six months vs. six months or longer) × 2 (Gender: male vs. female) *MANCOVA* was conducted on two dependent variables: anxiety and alcohol use outcomes at the 1-year follow-up. Because the groups based on time in an Oxford House did not significantly differ on baseline scores for anxiety symptoms or alcohol sobriety, a regular *MANOVA* is more powerful than using a repeated measures approach (Weinfurt, 2000, p. 341). The following variables were employed as covariates in the analysis: baseline anxiety scores and baseline number of days abstinent from alcohol. Because of the restricted range in previous amount of time living in an Oxford House in this sample (because all of the sub-sample had lived in an Oxford House for 1 month or less), it was not used as a covariate. To remain conservative, we employed previous amount of time living in an Oxford House as a covariate in the initial analysis to control for potential effects of the 30-day time period, but it did not significantly predict the outcomes and was dropped from the analysis.

The SPSS GLM method was utilized to conduct the analysis. Various SPSS programs were used to examine the accuracy of data entry, missing values, and statistical assumptions of multivariate analyses. We report the analysis without using missing data estimation (when missing data estimation was used, the results of the analysis followed the same pattern with slightly higher effect sizes). There were no multivariate outliers for the outcomes variables. Other evaluations of the assumptions of multicollinearity and homogeneity of regression yielded no problems for the analysis. Regarding the homogeneity of variance-covariance matrices, there was a violation of Box's *M,* $p = .021$. Although this test is very

strict, Pillai's criterion was observed instead of Wilks' Lambda because we analyzed unequal cell sizes.

When observing Pillai's criterion, the combination of dependent variables was significantly affected by only one of the covariates: baseline anxiety scores, $F(2, 79) = 3.68$, $p = .03$. Although previous number of days of alcohol sobriety was not significant, it was maintained in the analysis for its practical significance for alcohol use outcomes. For the independent variables, whether a participant stayed in an Oxford House for 6 months or longer, $F(2, 79) = 9.86$, $p < .001$, partial $\eta^2 = .20$, significantly affected the combined dependent variables. Gender did not show a significant multivariate effect on the combined dependent variables.

To observe the impact of the main effect of staying in an Oxford House for 6 months or longer on each dependent variable, univariate *ANOVA* results were interpreted at an adjusted alpha level of .025 (adjusted for multiple tests). For groups based on Oxford House time, there were significant univariate effects for both follow-up anxiety, $F(1, 80) = 7.31$, $p = .008$, partial $\eta^2 = .084$, and rate of change in cumulative alcohol sobriety, $F(1, 80) = 18.05$, $p < .001$, partial $\eta^2 = .184$. Based on the estimated marginal means adjusting for the two covariates, those who remained in an Oxford House for 6 months or longer had significantly lower ($M = 2.01$, $SE = .43$) follow-up anxiety than those who left prior to 6 months ($M = 3.43$, $SE = .30$). Figure 1 shows actual baseline and follow-up anxiety scores for participants. Additionally, participants who remained in an Oxford House for 6 months or longer had higher rates of alcohol sobriety ($M = .95$, $SE = .06$) than those who did not stay for 6 months ($M = .64$, $SE = .04$).

DISCUSSION

We predicted that those residents who remained in an Oxford House for at least 6 months would have lower symptoms of anxiety and lower rates of alcohol use at the 1-year follow-up than those individuals who left prior to 6 months. Results of the present study supported this prediction, even when controlling for previous length of alcohol sobriety and pre-test anxiety symptom scores. These results partially replicated Jason, Davis et al.'s (2007) outcomes with the full sample of Oxford House residents, noting that remaining in an Oxford House for 6 months or longer significantly predicted lower rates of alcohol use. However, because this current investigation only examined residents who were relatively new to Oxford Houses, these findings might be more generalizable to individuals who are more recently out of treatment. Furthermore, other research groups examining more traditional residential treatment modalities for substance abusers have also found that a 6 month length of stay is associated with higher abstinence and might be a critical time-point during recovery (Bleiberg, Devlin, Croan, & Briscoe, 1994; Hubbard, Craddock, Flynn, Anderson, & Etheridge, 1997).

Additionally, these prospective findings for anxiety symptoms suggest a moderate effect of staying in an Oxford House for 6 months or longer on reducing

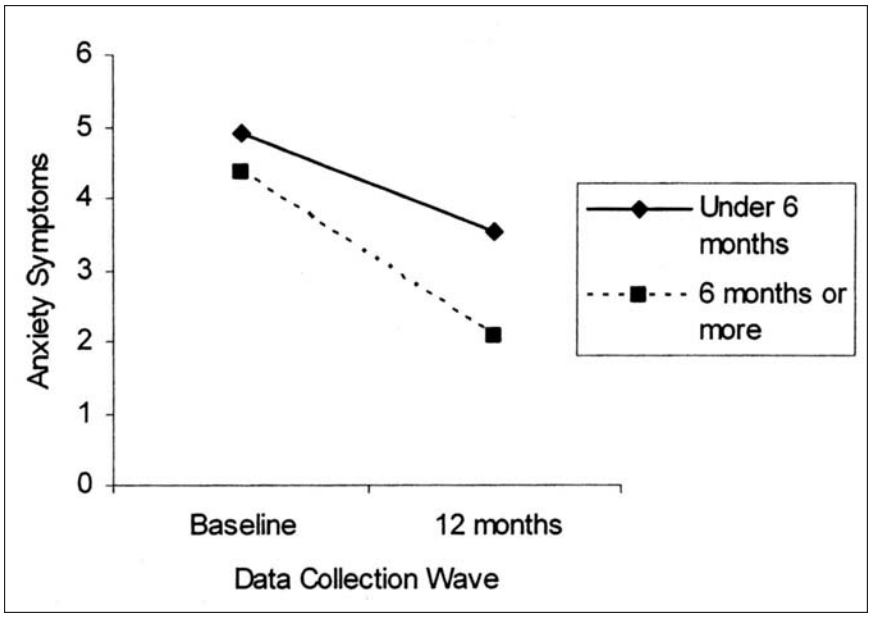

Figure 1. Actual mean anxiety symptom ratings at baseline and the 12 month follow-up among the two groups based on length of residence in an Oxford House.

symptoms of anxiety. The results expand upon prior research of the Oxford House model that has focused primarily on substance use outcomes (e.g., Jason, Olson et al., 2006). There are multiple possibilities for why length of stay in a mutually-supportive setting could have an impact on anxiety over time. As discussed earlier, prior research suggests that increased duration of participation in certain mutual-help environments can increase social support, which could subsequently improve outcomes for both mental health symptoms and alcohol abstinence (Laudet et al., 2000, 2004).

On the other hand, it is also possible that the high rates of abstinence within this sub-sample may have reduced the odds of participants experiencing substance-induced anxiety symptoms. However, as previously discussed, the onset of anxiety symptoms typically occurs prior to alcohol abuse (Merikangus et al., 1998; Sbrana et al., 2005). The complex relationships between length of treatment, social support, alcohol use, and anxiety symptoms warrant further research before substantive conclusions can be made about mechanisms by which these variables might interact over time.

Our lack of findings for gender on the combined outcome variables was surprising considering gender differences frequently observed in previous research

on these constructs (e.g. Kessler et al., 1997). In part, this may have been due to the low number of female participants who remained in an Oxford House for 6 months or longer, which reduced our statistical power to detect significant gender effects. This finding in itself is interesting, as we did not anticipate gender differences in length of stay. Arfken, Klein, di Menza, and Schuster (2001) found that female participants were less likely to complete treatment or stay in treatment for substance use as long as men in their sample. This is in contrast to findings by Timko et al. (2005), who found that women tend to stay longer in professional treatment for alcohol abuse than men, and also tend to have better long-term outcomes. Although the number of women in our sub-sample might have been too small to detect gender effects, an interesting trend did emerge. All of the women who resided in an Oxford House for 6 months or longer remained completely abstinent (see Table 1). Additionally, this group in the analysis experienced the greatest directional (though not significant) decrease in anxiety symptoms over time. While we may have lacked enough statistical power to detect any gender interactions within this sub-sample, future research in this area certainly is warranted.

Limitations and Future Directions

Several limitations affect the present study. For example, we did not utilize a control or comparison group that was not involved to some degree in Oxford House. Furthermore, while significant results for anxiety symptoms were obtained for those residents who remained in an Oxford House for 6 months or longer, Figure 1 showed that over time most participants experienced at least minimal improvements in anxiety symptoms. In addition, given the high rates of alcohol abstinence in the sub-sample, it is possible that there was some self-selection bias. In fact, the majority of the participants in the full sample maintained their sobriety (Jason, Davis et al., 2007). Perhaps residents who chose to participate in the present study were more motivated to engage in treatment than most individuals in recovery for substance abuse.

Furthermore, it may be argued that the group who remained in an Oxford House for 6 months or longer had lower rates of alcohol consumption throughout the study because they potentially still lived in an Oxford House at the time of 1-year follow-up. Analyses, however, indicate that nearly half of the participants in the sub-sample who lived in an Oxford House for at least 6 months during the study moved out by time of 1-year follow-up. In addition, participants still had the opportunity to drink alcohol while they lived in an Oxford House, but many remained abstinent in compliance with House rules.

Attrition was also problematic in analysis of this sub-sample. However, with sufficient power to detect baseline differences between the attrition group and the group that remained in the study, we did not find any significant differences in major baseline variables included in this analysis. While this does not decrease

the inherent bias in the sample due to attrition, it does suggest that there were no major differences between the two groups at baseline.

Another limitation in our sample was the lack of diagnostic measures for anxiety outcomes. A large amount of previous research on anxiety and alcohol use has involved samples that include individuals with anxiety disorders (e.g., Burns et al., 2005; Kushner et al., 2005). There is an argument to be made for measuring the construct of anxiety on a continuum, as it is a common human emotion that exists beyond diagnostic boundaries. Individuals with substance abuse problems can still experience anxiety without having a diagnostic disorder, and these symptoms can contribute to relapse (Charney et al., 2005).

Nevertheless, our results suggest that spending more time in a mutually-supportive environment may have beneficial impacts for individuals in recovery from substance abuse. Specifically, spending at least 6 months in a residential, self-governing setting might reduce symptoms of anxiety and alcohol use over time. Despite the limitations, our prospective analysis suggested that participation in an Oxford House can have a substantial effect on these mental health and alcohol use outcomes. Future research should identify mechanisms by which mutually-supportive treatment options for people in recovery can be of benefit and specify the potential pathways by which these benefits (including social support) might be obtained.

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