

# A Novel Investigation of Substance Use Outcomes in Substance-Specific Outdoor Behavioral Healthcare Programs

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## **Abstract**

Substance Use Disorders (SUDs) are one of the greatest public health burdens to date. Available evidence suggests that despite the availability of evidence-based therapeutic interventions, successful recovery from alcohol and drug dependence is hard to achieve and much harder to maintain over time. Further, young adults present with unique risk factors and tend to have a less optimal response to treatment. Consequently, a novel treatment has been developed in an effort to improve outcomes for young adults with SUDs. Substance-specific outdoor behavioral healthcare (S-OBH; term developed by the author for clarity herein) may be more appealing to young adults who have resisted or responded poorly to inpatient drug and alcohol treatment, which is identified as the standard of care. The current study sought to investigate whether S-OBH interventions are equivalent to the standard of care, using a non-inferiority design. The sample was 256 young adults ( $M_{age} = 25.8$ ) presenting for treatment at one of two experimental treatment sites or the active comparison site, residential treatment for SUDs. Primary study hypotheses were that S-OBH treatment would be associated with similar symptomatic improvements, relative to the comparison condition, particularly relevant to symptoms of SUDs and overall quality of life. Secondly, S-OBH would be associated with the maintenance of the hypothesized treatment gains during the 12-month follow-up period. Findings were consistent with hypotheses, suggesting that participants evidenced significant symptomatic reductions and maintained these improvements over a 12-month follow-up period, regardless of treatment condition. Results are discussed in terms of better understanding factors associated with a positive response to SUD interventions.

*Keywords:* substance use disorders, novel treatment, outdoor behavioral healthcare, non-inferiority design

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Substance abuse and dependence, newly characterized as Substance Use Disorders (SUDs) in the Diagnostic and Statistical Manual of Mental Disorders (DSM 5) (American Psychiatric Association, 2013), are widespread. While some data suggests that progress has been made in reducing the prevalence of SUDs in the United States, the recreational abuse of drugs and alcohol remains one of the greatest public health problems to date (Office of Applied Studies, 2008). In fact, SUDs cause greater mortality, morbidity, and disability than any other preventable health condition (Institute for Health Policy, 2001). Estimates of the total overall costs of substance abuse in the United States, including lost productivity and health and crime-related costs, exceed \$600 billion annually. This represents a greater economic burden than smoking, diabetes, and obesity combined (National Institute on Drug Abuse, 2011a; National Institutes of Health, 2011b; SAMHSA, 2010).

The sequelae associated with SUDs involve a variety of poor outcomes. SUDs are strongly correlated with interpersonal violence, child maltreatment, motor vehicle accidents, suicide, homicide, and criminal activity in general (National Institute on Drug Abuse, 2011a). Moreover, negative health-related consequences include greater risk of cardiovascular conditions, pregnancy complications, teenage pregnancy, human immunodeficiency virus/acquired immunodeficiency syndrome, and sexually transmitted diseases (National Institute on Drug Abuse, National Institutes of Health, 2011). More specifically, alcohol is the third leading cause of death in the US (Mokdad, Marks, Stroup, & Gerberding, 2000) and SUDs confer increased risk of psychiatric conditions, including but not limited to anxiety and depression (Grant et al., 2004), and maladjustment following trauma (Jacobsen, Southwick, & Kosten, 2001).

Young adults, individuals between the ages of 18-25, appear to have increased sensitivity to the deleterious impact of substance use and abuse. They have historically evidenced higher rates of alcohol and illicit drug use, compared with other age groups. Recent estimates indicate that rates of illicit drug abuse continue to rise in the young adult population (SAMHSA, 2010). In 2009, one-fifth of young adults met diagnostic criteria for an SUD (i.e., 21.2%; Center for Disease Control and Prevention, 2011). Further, young adults are the most vulnerable to comorbid psychiatric syndromes (Chan, Dennis, & Funk, 2008), as compared to other age groups. They report less commitment to their recovery and tend to have an earlier onset of use and abuse (Sinha, Easton, & Kemp, 2003). Given that early onset of drug use is strongly associated with progression from substance use to abuse and, ultimately, to long-term dependence (Chassin, Pitts, & Prost, 2002; Clark, Kirisci, & Tarter, 1998), the increasing rates of substance use among young people are of critical import.

Given the significant impact and the extensive public health burden of SUDs, evidence-based treatments (EBTs) have been developed to specifically target substance-related pathology (Manuel, Hagedorn, & Finney, 2011; Moos, 2007). The extant literature indicates that there is consensus for the labeling of select SUD psychosocial interventions as “evidence-based” (McGovern & Carroll, 2003). While a thorough review of treatments is beyond the scope of this article,

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evidence-based SUD treatments include behavioral couples therapy, cognitive behavioral therapy (including relapse prevention), contingency management, motivational enhancement/motivational interviewing, and 12-step facilitation treatment (McGovern & Carroll, 2003; National Quality Forum, 2007).

In spite of the development of specialized and empirically supported SUD interventions, the available evidence suggests that sustained recovery from addiction is very difficult to achieve (Connors & Maisto, 2006). Published relapse rates vary considerably, depending on the operational definition utilized, time since treatment, and class of drug. For example, estimates suggest that at three months post-treatment, 40–60% of individuals in treatment for alcohol problems relapse to a first drink, whereas by 12 months, this rate increases to 70–80% (Lowman, et al., 1996). For illicit drug users, the three-month rate of relapse to first use is about 60% and the 12-month rate is approximately 75% (Connors, Maisto, & Zywiak, 1996). For individuals with comorbid psychiatric conditions, relapse rates tend to be higher. Glenn and Parson (1991) found that depressive symptoms were the single best predictor of alcohol relapse, following treatment. Moreover, adults with dual diagnoses of SUDs and Post-Traumatic Stress Disorder (PTSD) relapse significantly more quickly than adults without trauma-relevant sequelae (Bradizza, Stasiewicz, & Paas, 2006). Given the high rates of relapse following specialized substance abuse treatment, alternative treatment modalities are being developed in an effort to improve therapeutic outcomes for individuals with SUDs.

Outdoor Behavioral Healthcare (OBH) is one such example. OBH is an intensive, residentially-based therapeutic approach, offering an alternative for individuals who historically have refused, resisted, or prematurely terminated traditional forms of mental health interventions (Gass, Gillis, & Russell, 2012). The label “OBH” describes programs that utilize a multimodal treatment approach and deliver services in a wilderness setting (via exposition, backcountry travel, etc.; Russell, 2003). While programs are heterogeneous at this time, they contain select core components (Russell, 2001, 2006a). Group process, experiential learning, peak experiences, unfamiliar environments, and natural consequences are postulated as some of the primary mechanisms of action (Bandoroff & Scherer, 1994; Newes & Bandoroff, 2004; Russell, 2001). Further, Russell and Gillis (2017) developed and validated the Adventure Therapy Experiences Scale (ATES). The ATES identified unique factors believed to promote therapeutic gains, as well as distinguish OBH from more traditional forms of therapy. Findings were that group adventure, reflection, nature, and challenge, as experienced within a wilderness therapy context are theorized as active components of OBH. Research investigating the effectiveness of wilderness programming has grown exponentially over the past two decades (Norton et al., 2014) and the convergence of literature suggests that participants evidence marked symptom remission (Russell, 2003, 2005) and maintain symptomatic improvements throughout follow-up assessment periods (Lewis, 2013; Russell, 2005).

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Given the popularity of OBH programs, in select economic markets, in addition to the ubiquitous and negative effects of SUDs, a novel treatment modality has emerged. Substance-specific OBH programming (S-OBH; term developed by the author for clarity herein) integrates traditional, residential substance abuse treatment with the wilderness-based model of intervention. Further, this novel approach is focused on delivering therapeutic services to a high-risk population, young adults with SUDs. While some studies of wilderness therapy have explored reductions in substance abuse and dependence as an outcome of treatment (Bettmann, Russell, & Parry, 2014; Russell, 2007), this author is unaware of any prior investigation of therapeutic effectiveness of S-OBH specifically, in which participants with primary SUDs engage in treatment which includes components of both OBH and residential substance abuse treatment (i.e., drug and alcohol rehabilitation programming) and when recovery from substance dependence is the primary outcome of interest.

The objective of the current investigation was to examine the effectiveness of S-OBH programming, as compared to the standard of care, defined as residential substance abuse treatment. Substance-specific OBH (S-OBH) programs represent a novel and alternative treatment modality for young adults with SUDs. Prior research found that treatment satisfaction was strong, following OBH treatment (Russell, 2006b) and OBH programs provide services that may be more appealing to young adults for a variety of reasons (i.e., adventure activities, self-esteem enhancement, physical rigor, fewer distractions, etc.). Thus, a non-inferiority design was utilized (Greene, Morland, Durkalski, & Freuh, 2008). A non-inferiority design allows a novel experimental treatment to be contrasted with the standard of care in medicine (D'Agostino, Massaro, & Sullivan, 2003). Non-inferiority designs are appropriate when a placebo control condition is unethical and/or when a novel treatment may offer important advantages over currently available standard treatments, in terms of improved safety, convenience, better compliance, or cost (International Conference on Harmonization, 2001).

Study hypotheses were that the experimental treatment (S-OBH) would not be inferior to the comparison treatment, which is the standard of care and includes evidence-based treatment for SUDs. Specifically, participants would evidence improvements in symptoms of SUDs, from baseline to post-treatment and from post-treatment to the 12-month follow up assessment. Second, in an effort to uniquely extend prior work in the area (related to OBH effectiveness), additional hypotheses were that participants would evidence improvements in their overall quality of life from baseline to post-treatment and therapeutic improvements would be maintained over a 12-month follow-up period.

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## Method

### Participants

Participants were seeking substance-specific treatment at one of two S-OBH programs (located in Utah and North Carolina) or at an active comparison treatment program (located in North Carolina). To be eligible for study inclusion, participants had to: a) be between the ages of 18 and 33 years old, b) evidence adequate cognitive functioning to allow completion of the self-report instruments, c) present without psychotic symptoms, d) not need in-patient detoxification at the time of admission for treatment, and e) volunteer for participation and provide informed consent for study procedures. Participants were screened for eligibility and matriculated into the study without regard to gender, race, or ethnicity (rates of young adult participation and retention, by treatment program, are described below).

**Experimental treatment (S -OBH Site #1).** A total of 144 young adults were eligible to participate. Of those, 89 people completed the baseline assessment (62%). Reasons for non-participation include disinterest, refusal, staff error, and/or incomplete responses within the requisite time period following admission. Seventy-four participants completed the graduation assessment. Of the 74 people who completed the graduation assessment, 62 completed the three-month (84%) and 51 completed the 12-month follow-up (69%).

**Experimental treatment (S-OBH Site #2).** A total of 158 young adults were eligible to participate. Of those, 109 people completed the baseline assessment (69%). Reasons for non-participation include disinterest, refusal, staff error, and/or incomplete responses within the requisite time period following admission. Seventy-eight people completed the graduation assessment. Of those who completed the graduation assessment, approximately 61 people and 56 people completed the three-month (78%) and 12-month (72%) follow-up assessments, respectively.

**Standard Treatment (Comparison Site).** A total of 105 young adults were eligible to participate. Of those, a total of 78 people completed the baseline assessment (74%) and 58 people completed the graduation assessment. Of those who completed the graduation assessment, approximately 49 people and 44 people completed the three-month (84%) and 12-month (76%) follow-up assessments, respectively.

### Procedures

**Recruitment.** Participants were recruited for study participation by on-site personnel upon admission. Program staff, trained to matriculate participants into the study, provided information regarding study procedures, the risks and benefits of taking part in the study, and the voluntary nature of their participation (i.e., they could withdraw at any time without penalty or prejudice). Following, written informed consent for study participation was obtained. A standardized continuous

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enrollment protocol, in which each young adult who met inclusionary criteria was offered the opportunity to participate, was utilized to collect data between the dates of 2008-2012.

**Study design and data collection.** A quasi-experimental repeated measures design, with a naturalistic follow-up, was employed. A non-inferiority methodological design was employed (International Conference on Harmonization, 2001). A non-inferiority design (described elsewhere) (D'Agostino, Massaro, & Sullivan, 2003) allows the researcher to contrast outcomes from a novel experimental treatment with the standard of care. Pre-treatment data was collected at baseline (i.e., within 48 hours of admission) and post-treatment data was collected at graduation (within 48 hours of completing the treatment program). The protocol also included longitudinal assessments, at three and 12-months post-treatment. Following study matriculation, baseline and graduation data was collected via self-report in a quiet, private space with a trained researcher on hand to answer any questions. During the longitudinal phase of the study, trained research personnel administered the assessment battery over the telephone. Participants were compensated using a lottery system as well as a weighted compensation schedule across assessments and were fully debriefed upon study completion.

Extensive training was provided to program staff assisting with recruitment, tracking, and data collection at the three programs. Training of recruitment staff included procedures for sampling, delivery of study scripts, exclusion criteria, and protection of human subjects (e.g., informed consent, withdrawal, right to refuse, etc.). The principal investigator provided training and oversight to all staff having contact with participants throughout the duration of the study. Systematic training included direct instruction on administering the assessment battery, including observations of data collection administration, repeated site visits to monitor for assessor drift, and training in procedures for maintaining participant involvement. Research personnel involved in telephone interviews for the longitudinal phase of the study were trained to mastery on administration of clinical interviews, procedures for managing suicidal or homicidal ideation, and subject debriefing. Training and ongoing oversight was provided by the principal investigator.

### **Treatment Conditions.**

**Standard treatment.** The standard treatment, utilized as an active control for the experimental condition, was a residential drug and alcohol rehabilitation program, located in North Carolina. The program is privately owned, not-for-profit, and offers similarly intensive (i.e., clinical profile of clients, length of stay, severity of SUDs) substance abuse rehabilitation services as the experimental treatment under investigation. Further, the program is located in a naturalistic setting, on 160 acres and serves a young adult population with similar census and staff: client ratios as the experimental treatment condition. Participants in the standard treatment condition received interventions with empirical support in treating SUDs (i.e., individualized treatment plan, availability of a continuum

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of care, gender-specific programming, family education and involvement, alumnae support and follow up, etc.). The program also provided evidenced-based interventions for SUDs, in varying treatment modalities (i.e., individual, group, etc.), including cognitive-behavior therapy, relapse prevention, recovery management, contingency management, motivational enhancement/motivational interviewing, and 12-step facilitation treatment.

***Experimental Treatment.*** The two S-OBH treatment programs provided similar specialty substance abuse services as the standard treatment (described above) with the adjunction of OBH-specific programming (also referred to as adventure-based programming in the literature). The OBH model asserts that a contextual shift away from the home environment, where problems are being maintained, provides an important backdrop for individuals to change behavior. The OBH therapeutic modality has been presented extensively elsewhere (Gass, Gillis, & Russell, 2012; Newes, & Bandoroff, 2004; Russell, 2001) and an exhaustive review is beyond the scope of this article; thus, only the essentials will be provided. Importantly, individuals are fully disengaged from their previous environments, including contact with individuals outside treatment, either face-to-face or through telecommunication devices. Clients are immersed in a simple wilderness-based environment, with distractions greatly minimized. This new context allows participants to develop critical skills that can then be employed to manage their recovery, rather than trying to develop such skill repertoires under the contextual control of the home (and substance using) environment. Further, juxtaposed against a change in environment is a set of developmentally appropriate and progressive challenges, designed to enhance self-efficacy. Behavioral symptoms targeted in treatment include challenging problematic cognitions and changing behavior patterns associated with functional impairment, particularly as they are related to SUDs. Treatment also addresses interpersonal relationship skills, improving communication with family and important loved ones, and learning adaptive emotion regulatory strategies.

Program curricula are designed to prepare clients for outdoor activities, while also assessing and conceptualizing their clinical needs, developing individualized treatment and relapse prevention plans, and providing weekly group and individual therapy. Multiple behavior management strategies are employed to teach, reward, and elicit adaptive behavior. Contingency management is used to reinforce target behaviors. Towards this end, clients progress through a series of levels that are cumulative and build upon demonstrated progress at the prior stage. Each level includes behaviorally-defined objectives, which are comprised of developmental tasks such as skill acquisition, social-cognitive growth, community involvement, generalizing learned skills to the natural environment, and expanding adaptive coping. Additional behavioral techniques include the use of metaphor, vicarious and instrumental conditioning, goal setting, and adoption of wellness behaviors, including but not limited to healthy nutritional habits, consistent exercise, instrumental and social support, and sleep hygiene skills.

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### Measures.

**Treatment Outcome Package (TOP).** The Treatment Outcome Package, including the supplemental Drug and Alcohol Scale (TOP) (Kraus, Seligman, & Jordan, 2005) measure a broad array of theoretically relevant psychological outcome variables and was used as the primary index of treatment outcomes. The TOP has a number of advantages over other treatment outcome measures. The TOP was developed by administering more than 200,000 longer versions to the full continuum of patient populations and levels of care. Consequently, the TOP has demonstrated excellent construct, external, convergent, and divergent validity as well as reliability (Kraus, Seligman, & Jordan, 2005; Kraus, Wolfe, & Castonguay, 2006). Further, the TOP has stable factor structures, which is a limitation of a number of other outcome assessment methods (Mueller, Lambert & Burlingame, 1998). The TOP has no ceiling effects and measures the full range of pathology. Consequently, the TOP is highly sensitive to change across short spans of time.

The TOP measures subjective distress, symptomatic states, and overall functioning; these psychological areas are recommended as critical indicators of therapeutic effectiveness by the Society for Psychotherapy Research's core Battery Conference (Horowitz, Lambert & Strupp, 1997). For each of 58 phrases in the adult version (e.g., "had trouble falling asleep"), participants are asked to rate the frequency of the described experience on a one (all the time) to six (none of the time) scale, which yields scores on 11 subscales. The following factors were examined in the current evaluation a) Substance Abuse: symptoms of substance abuse and dependence and b) Quality of life: how well someone perceives his/her life in general. The TOP supplemental Drug and Alcohol Scale measures an individual's use of 16 disparate classes of substances, plus alcohol. It also assesses past-month and historical use of drugs and alcohol. The Drug and Alcohol Scale measures negative consequences, secondary to substance use, as well as various theoretically relevant issues, such as commitment to recovery, affiliation with substance-using peers, and severity of cravings/desires to use.

The TOP was administered at every assessment. Raw scores are converted into standardized z-scores, with a mean of zero, which is the general population average and a standard deviation of 1. Higher scores represent more severe symptoms or poorer functioning while negative scores indicate fewer symptoms or healthier functioning. The supplemental Drug and Alcohol Scale also was administered at every assessment and yielded data about the frequency and severity of past-month drug and alcohol use.

### Results

Participants in the OBH programs were slightly younger in age ( $M_{age} = 24.3$ ;  $SD = 2.8$ , range 19-33 years old) than participants in the comparison condition ( $M_{age} = 27.1$ ;  $SD = 3.3$ , range 21-33 years old;  $t = 63.50$ ,  $p < .001$ ). Also, there were fewer females in the OBH programs (19.9%) than in the standard treatment program (45.7%;  $\chi^2 = 19.51$ ,  $p < .001$ ). There was not a significant difference in



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treatment duration by program ( $p > 1.0$ ), with participants in the OBH programs receiving, on average, 49 days of treatment and participants in the standard treatment program receiving, on average, 43 days of treatment.

### Baseline Descriptive Data

First, a series of analyses were conducted to examine substance use rates at baseline.

**S-OBH Site #1.** Alcohol and marijuana were the most frequently used drugs at baseline assessment, with an average of approximately 10 days of drinking (8 days drinking until drunk) and 11 days of using marijuana/hashish in the past 30 days. All participants reported substance use problems at baseline, and (93%) reported clinically significant substance use problems.

**S-OBH Site #2.** Alcohol and marijuana were the most frequently used drugs at baseline, with an average of approximately 7 days of drinking (slightly over 5 days drinking until drunk) and 13 days of using marijuana/hashish in the past 30 days. Approximately 97% participants of reported substance use problems at baseline, and 95% reported clinically significant substance use problems.

**Comparison Site.** Alcohol and marijuana were the most frequently used drugs at baseline, with an average of approximately 11.5 days of drinking (over 7.5 days drinking until drunk) and over 6 days of using marijuana/hashish in the past 30 days. Approximately 96% participants reported substance use problems at baseline, and 91% reported clinically significant substance use problems.

### Treatment Descriptive Data

Next, analyses were conducted to describe changes in symptoms of substance use occurring during the course of the study.

**S-OBH Site #1.** At three months after treatment, the average number of days drinking in the past 30 days was under two (just over one until drunk) and one day (on average) of using marijuana/hashish. At 12 months after treatment, the average number of days of drinking in the past 30 days was under five (under four until drunk) and under five (on average) of using marijuana/hashish. More generally, on average participants reported lower levels of substance use problems from baseline to graduation, and at the three and 12-month follow-up. Over 93% of participants reported reductions in substance use problems from baseline to treatment termination/graduation. Over 87% of participants reported reductions in substance use problems from baseline to three months post-treatment. Finally, 92% of participants reported reductions in substance use problems from baseline to 12 months post-treatment.

**S-OBH Site #2.** At three months after treatment, the average number of days of drinking in the past 30 days was under two (just under one until drunk) and one day (on average) of using marijuana/hashish. At 12 months after treatment,

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the average number of days of drinking in the past 30 days was less than three (less than one until drunk) and just over four (on average) of using marijuana/hashish. Over 92% of participants reported reductions in substance use problems from baseline to treatment termination. Over 98% of participants reported reductions in substance use problems from baseline to three months post-treatment. Finally, over 90% of participants reported reductions in substance use problems from baseline to 12 months post-treatment.

**Comparison Site.** At three months after treatment, the average number of days of drinking in the past 30 days was under one (under one until drunk) and less than one day using marijuana. At 12 months after treatment, the average number of days of drinking in the past 30 days was 2.3 (less than one drinking until drunk) and just over one (on average) of using marijuana. Over 93% of participants reported reductions in substance use problems from baseline to treatment termination (graduation). Over 91% of participants reported reductions in substance use problems from baseline to three months post-treatment. Over 93% of participants reported reductions in substance use problems from baseline to 12 months post-treatment.

### Relapse

Relapse from post-treatment to the three and 12-month follow-up assessments were then examined. Statistically significant changes in scores on the substance abuse factor of the TOP were used to measure a return to using substances. The substance abuse factor has excellent sensitivity and specificity for substance abuse and dependency issues (Krause, Seligman, & Jordan, 2005) and measures both consumption of alcohol and/or drugs, negative consequences related to use, and the cognitive aspects of SUDs, including preoccupation with substance use, time spent planning to use, etc. Measuring relapse is a point of considerable contention in the substance abuse literature (Maisto, Pollock, Cornelius, Lynch, & Martin, 2003) and, to date, there is not one acceptable definition of “relapse” (McKay, Franklin, Patapis, & Lynch, 2006). In the current study, relapse was defined as a statistically significant increase on the SA score of 1.0 or more, as this suggests a marked increase in symptoms of SUDs. Thus, it was determined to be an appropriate gauge to assess return to substance use, following a period of treatment and abstinence.

**S-OBH Site #1.** Approximately 11% of participants reported increases in substance use problems from treatment termination to three months post-treatment that fell in the sub-clinical range. An additional 18% of participants reported a clinically significant increase from treatment termination to the three-month follow-up (i.e., a relapse). This suggests that 71% of participants are maintaining therapeutic improvements at the three-month follow-up assessment. Approximately 13% of participants reported increases in substance use problems from treatment termination to the 12-month follow-up that fell in the sub-clinical range. An additional 25% of participants reported a clinically significant increase from treatment termination to the 12-month follow-up (i.e., a relapse). This suggests that approximately 62% of participants are maintaining therapeutic

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improvements at the 12-month follow-up assessment.

**SA-OBH Site #2.** Approximately 4% of participants reported increases in substance use problems from treatment termination to three months post-treatment that fell in the sub-clinical range. An additional 12% of participants reported a clinically significant increase from treatment termination to the three-month follow-up. This suggests that 84% of participants are maintaining therapeutic improvements at the three-month follow-up assessment. Approximately 2% of participants reported increases in substance use problems from treatment termination to the 12-month follow-up that fell in the sub-clinical range. An additional 22% of participants reported a clinically significant increase from treatment termination to the 12-month follow-up (i.e., a relapse). This suggests that approximately 76% of participants are maintaining therapeutic improvements at the 12-month follow-up assessment.

**Comparison Site.** Approximately 8% of participants reported increases in substance use problems from treatment termination to three months post-treatment that fell in the sub-clinical range. An additional 16% of participants reported a clinically significant increase from treatment termination to the three-month follow-up. This suggests that 76% of participants are maintaining therapeutic improvements at the three-month follow-up assessment. Approximately 8.6% of participants reported increases in substance use problems from treatment termination to the 12-month follow-up that fell in the sub-clinical range. An additional 8.6% of participants reported a clinically significant increase from treatment termination to the 12-month follow-up (i.e., a relapse). This suggests that approximately 83% of participants are maintaining therapeutic improvements at the 12-month follow-up assessment.

### Quality of Life

A global index of quality of life also was examined (Kraus, Seligman, & Jordan, 2005). This factor measures an individual's perception of how various aspects of his or her life are going. The items on this factor ask about satisfaction with life in general, general mood and feelings, relationships with others, and daily responsibilities. Consistent with other factors, a high score on this factor indicates more problems in overall quality of life.

**S-OBH Site #1.** On average, participants reported improvements in quality of life from baseline to graduation and at three and 12-month follow-up assessments. Over 78% of participants reported improvements in quality of life from baseline to treatment termination. Approximately 51% of the sample maintained (or further improved) quality of life gains from graduation to the three-month follow-up. Finally, 64% of the sample maintained (or further improved) quality of life gains from graduation to the 12-month follow-up.

**S-OBH Site #2.** On average participants reported improvements in quality of life from baseline to graduation and at three and 12-month follow-up assessments. Over 81% of participants reported improvements in quality of life

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from baseline to treatment termination. Over 53% of the sample maintained (or further improved) quality of life gains from graduation to the three-month follow-up. Finally, 58% of the sample maintained (or further improved) quality of life gains from graduation to the 12-month follow-up.

**Comparison Site.** On average, participants reported improvements in quality of life from baseline to graduation and at three and 12-month follow-up assessments. Approximately 91% of participants reported improvements in quality of life from baseline to treatment termination/graduation. Over 70% of the sample maintained (or further improved) quality of life gains from graduation to the three-month follow-up. Over 77% of the sample maintained (or further improved) quality of life gains from graduation to the 12-month follow-up.

### Primary Analyses

All participants, across the three sites reported significant symptoms of substance abuse and dependence upon admission to treatment. At each site, participants' scores were highly elevated, more than 10 standard deviations above the mean, suggesting marked symptoms of SUDs and related problems. Across both the experimental and standard treatment conditions, participants reported similar types and patterns of substance abuse. Alcohol and marijuana were endorsed as the most frequently used substances, regardless of program enrollment. This is consistent with existing data, indicating that marijuana is the most commonly used illicit drug in the US, particularly among adolescents and young adults. In fact, over 35% of self-reported marijuana users meet criteria for an SUD (SAMHSA, 2011).

Intent-to-treat analyses were conducted with a last observation carried forward method to address the potential influence of participant attrition. The first repeated measures analysis of variance (ANOVA) was conducted with the overall substance use problems scale from the TOP as the dependent variable. This variable was selected as it captures symptoms of substance abuse and dependence across sites (see Table 1 for means and standard deviations as a function of assessment point and group). The overall multivariate test of an interaction between group and repeated assessment was not significant [Wilks' Lambda (3, 282) = 0.97,  $F = 2.30$ ,  $p = 0.077$ , partial eta squared = .024]. Therefore within subject and between group effects were examined separately. In terms of within-subject effects (adopting a Greenhouse-Geisser correction for violations of sphericity), there was a significant effect of repeated assessment [ $F(1.77, 504.776) = 186.854$ ,  $p < .001$ , partial eta squared = 0.39]. This effect suggests a significant decrease in substance use problems across sites. In terms of group effects, there was not a significant difference across sites when substance use problems scores were collapsed across repeated measures [ $F(1, 284) = 1.19$ ,  $p = .275$ , partial eta squared = .004].

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Table 1

*Means and Standard Deviations of Substance Use Problems reported on the TOP as a Function of Assessment Point and Group*

<u>0 = comparison, 1 = OBH</u>		<u>Mean</u>	<u>Std. Deviation</u>
Baseline	.00	10.5440	5.25835
	1.00	10.7006	5.18590
	Total	10.6527	5.18148
Grad	.00	2.2860	3.13773
	1.00	3.0982	3.03213
	Total	2.8496	3.07171
3-MOS	.00	.9157	1.90844
	1.00	.7969	1.79000
	Total	.8333	1.81798
12-MOS	.00	1.0690	3.39899
	1.00	1.9091	2.80250
	Total	1.6519	3.00507

Table 2

*Means and Standard Deviations for Frequency of Past-Month Alcohol Use as a function of Assessment Point and Group*

<u>0 = comparison, 1 = OBH</u>		<u>Mean</u>	<u>Std. Deviation</u>
Baseline	.00	6.94	6.952
	1.00	9.05	8.548
	Total	8.62	8.248
Graduation	.00	.00	.000
	1.00	.10	.762
	Total	.08	.679
3-mos	.00	.31	1.014
	1.00	1.74	4.939
	Total	1.45	4.457
12-mos	.00	2.63	5.005
	1.00	3.27	6.727
	Total	3.14	6.387

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The second repeated measures ANOVA was conducted on number of days drinking during the past 30 days. These analyses were conducted as exploratory follow-up analyses to the primary analysis above in order to determine if the pattern of data varied when alcohol use was examined separately as opposed to the broader substance use problems index used in the primary analysis. Results from the analyses mirrored those of the primary analysis with significant ( $p < .05$ ) reductions in alcohol use across sites, but no between-group differences ( $p > .05$ ). See Table 2 for means, standard deviations, and graphic representation of these data.

### Discussion

Following treatment and throughout the follow-up assessment period, participants reported significant improvements in symptoms of SUDs across all three sites. Participants reported marked and significant symptom remission, regardless of site; thus, the primary study hypothesis was confirmed (see Table 1). The novel, substance-specific OBH (S-OBH) treatment was not inferior to the standard treatment for SUDs. More specifically, the current investigation yielded effectiveness data that are comparable to that of the standard, state-of-the-art treatment for SUDs. Substance-specific OBH treatment may be more appealing to prospective clients, particularly young adults who appreciate a naturalistic treatment environment, rigorous physical activities, adventure-based programming, and cooperative group living, rather than an institutional or hospital setting. Taken together, results from the current study indicate that substance-specific OBH treatment may be a robust alternative to the standard residential programming for SUDs (which served as a comparison condition for the current study).

It is important to note that at treatment termination, participants across programs reported symptoms of SUDs that remained in the elevated range, although much improved from baseline. This is consistent with a wealth of data indicating the importance of sustained recovery. More specifically, abstinence duration is associated with improved outcomes. Thus, the longer an individual is sober or drug-free, the more likely he or she is to remain sober, drug-free, and committed to recovery (McKay, 1999). Given that treatment termination occurred fairly early in the recovery process (i.e., approximately 50 days), some participants remained symptomatic. However, by the three-month follow-up assessment, participants' symptoms were subthreshold. By the 12-month follow-up assessment, participants (regardless of site) reported mild symptoms of SUDs. This is highly consistent with the extant literature, which documents the treatment refractory nature of SUD symptoms in young adult populations.

Relapse remains one of the most difficult issues facing practitioners and researchers in the field of substance abuse. In fact, most individuals who seek treatment for SUDs tend not to maintain continuous abstinence following treatment termination (Witkiewitz & Marlatt, 2004). In the current study, estimates of relapse rates within and across sites are much improved, compared

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to relapse rates in the overall treatment-seeking population. Depending on the substance studied and the methodological approach to defining relapse in various studies, rates of relapse generally are between 60-75% for alcohol and 70-80% for illicit drugs in the first 12 months after treatment (Chung & Maisto, 2006; Project Match Research Group, 1997; Tims, Leukefeld, & Platt, 2001). Current study findings indicate rates of relapse ranging from 16-29% at the three-month assessment and 17-38% at the 12-month assessment interval.

In the current study, relapse was measured by a significant increase in symptoms of SUDs. This method of assessment, based on retrospective recall, may not yield the most accurate rates of relapse. Further, differing definitions of relapse greatly impact data interpretation. For example, rates of relapse are highly variable depending on whether the operational definition considers any substance use, only heavy substance use, or a combination of use and negative consequences. Additionally, findings from studies with follow-up durations of two years or more have indicated that the majority of participants move back and forth between abstinence and heavy use (McKay et al., 2006) and may experience multiple relapses between treatment episodes (Dennis, Scott, & Funk, 2003). As a result, interpretation of data is complicated.

A primary limitation of the current research is the lack of random assignment. Young adults self selected to participate in experimental or standard treatment programming. Thus, there were differences in select demographic sample characteristics, including age and gender. Given the difficulties inherent in attempting to statistically control for real group differences (Miller & Chapman, 2001), the author did not “correct” sample differences with covariate analyses. Thus, including matched samples is a priority and should be a focus of future work in the area. Further, the current study methodology included an active comparison group, thus allowing conclusions about non-inferiority to be made and study hypotheses to be supported or rejected. However, the absence of an inert condition does not allow threats to internal validity to be addressed as effectively. This is an ongoing complication in psychosocial research, as random assignment that involves withholding active treatments poses an ethical problem. Given the severity of participants’ SUDs and the imperative for prompt and effective services, it presents a complex issue to deny potentially effective treatment from individuals, in order to study therapeutic effectiveness. The current methodological approach is comparable to the convention established by the literature in the area (Greene et al., 2008); however, the effects of repeated assessment and participant maturation could not be ruled out as alternative explanations for the observed results. Consequently, future research should utilize randomization and an inert comparison group, which would allow stronger causal conclusions to be drawn. Data collection was deemed appropriate in the current study given the relatively under-developed state of the literature. However, this will nonetheless be an important issue to address in subsequent research as the field moves towards more sophisticated measurement.

Additional limitations of the current study include restrictions on sample generalizability and the lack of non-obtrusive measures. Consequently, issues

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such as demand characteristics and expectancy effects may have influenced participants' responses. Finally, these data are self-report and were collected using retrospective recall. It would be ideal to triangulate data with that from other respondents, such as therapists, to provide a more comprehensive understanding of therapeutic effects. Moreover, data collection in the substance abuse field is increasingly moving towards the inclusion of biological variables, as well as "real time" data collection procedures, to address biases (McKay et al., 2006).

These limitations notwithstanding, the current study represents an important contribution to the extant literature in that it suggests that substance-specific OBH treatment effectively reduces symptoms of SUDs in a young adult population; thus, it appears to be a viable alternative to the standard of care. These particular findings are unique, representing an important step in better understanding the scope of treatment for SUDs, in expanding effective treatment modalities, and in gaining critical knowledge about what types of treatment work best and for whom.



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