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ECONOMIC SUPPLEMENT IN ALCOHOL USE DISORDER  
TREATMENT**

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A RANDOMIZED PILOT TRIAL ASSESSING A BEHAVIORAL ECONOMIC  
SUPPLEMENT IN ALCOHOL USE DISORDER TREATMENT

by

Lidia Z. Meshesha

A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree

Doctor of Philosophy

Major: Psychology

The University of Memphis

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## Abstract

Meshesha, Lidia Z. The University of Memphis. A Randomized Pilot Trial Assessing a Behavioral Economic Supplement in Alcohol Use Disorder Treatment. Major Professor: James G. Murphy, Ph.D.

**Objective.** Behavioral economic (BE) research has demonstrated that increasing the salience of delayed substance-free rewards increases individuals' capacity for delaying gratification and allocating behavior towards larger, delayed rewards rather than smaller more immediate reward such as alcohol use. This study aimed to improve the efficacy of outpatient alcohol use disorder (AUD) treatment by adding elements that target BE mechanisms of change. The study hypothesized that the Substance-free Activity Session (SFAS) intervention will reduce alcohol use, alcohol-related problems, relative reinforcement from alcohol use, and increase future orientation compared to an active control at 3-month follow-up. **Method.** Participants were 41 adults engaged in AUD treatments (all met DSM-5 diagnostic criteria for AUD) at community based outpatient treatment facilities. Following baseline assessment, participants were randomized to either an individual single-session intervention focused on increasing engagement in substance-free activities and future orientation (SFAS) or to an individual sleep hygiene and nutrition education (SHyNE) control condition. Both groups received four weekly text-message reminders of the contents of the session. Participants (68.3% male; 70.7% Caucasian,  $M$  age = 38.75,  $SD$  = 13.56) reported 27.44 ( $SD$  = 14.25) binge drinking episodes in the past 90-days and 9.31 ( $SD$  = 6.62) drinks per drinking day at baseline. **Results.** A series of regression models (negative binomial hurdle and linear regression) that controlled for baseline levels of the outcome indicated that SFAS participants reported fewer binge drinking episodes, and reduced proportionate substance-related (relative to substance-free) reinforcement compared

to controls. Further, contrary to our hypothesis, the SFAS condition was associated with less reductions of alcohol-related problems at 3-month follow-up compared to controls. Results did not indicate group differences in future orientation. SFAS participants reported high average session satisfaction ratings 9.08 ( $SD = .94$ , on a scale of 1-10). **Conclusion.** These preliminary pilot study results support the feasibility and acceptability of supplementing already existing outpatient AUD treatment with a single-session intervention plus remote delivery of booster contacts aimed at targeting behavioral economic elements of change. The efficacy results were ambiguous but suggest that the SFAS warrants further study as a potential means of enhancing alcohol treatment efficacy.

## A Randomized Pilot Trial Assessing a Behavioral Economic Supplement in Alcohol Use Disorder Treatment

An estimated 4.9% of the world's adult population (240 million people) suffer from alcohol use disorder (AUD; Gowing et al., 2014), including 5% of the U.S. population (16.3 million people; Center for Behavioral Health Statistics and Quality, 2015). AUD is associated with significant economic burden on society through health-care costs, public safety, as well as crime and lost productivity (Collins, Lapsley, Lecavalier, & Single, 2000). Alcohol-related deaths are the third leading lifestyle-related cause of death in the U.S. with approximately 88,000 deaths attributable to alcohol use each year (Stahre, Roeber, Kanny, Brewer, & Zhang, 2014).

Prolonged heavy alcohol use is associated with a myriad of physical health consequences as well as comorbid psychiatric disorders (National Institute of Alcohol Abuse and Alcoholism [NIAAA], 2000). Studies have shown the association between excessive alcohol consumption and hypertension, liver cirrhosis, chronic pancreatitis, and injuries and violence (Corrao, Bagnardi, Zambon, & La Vecchia, 2004). Individuals with heavy alcohol consumption may also be at an increased risk for developing certain cancers, including cancers of the oral cavity, esophagus and larynx, liver, and breast (Corrao et al., 2004; Baan et al., 2007). Further, those with AUD are three times more likely to suffer from an anxiety disorder (Anthenelli, 2010) and about four times more likely to suffer from a major depressive episode (Agosti & Levin, 2006). Posttraumatic stress disorder is also highly comorbid with AUD (Foa et al., 2013). Efficacious AUD treatments are needed to address this substantial public health impact.

## **Alcohol Use Disorder Treatments**

Behavioral therapies based in the principles of social learning theory and cognitive behavior therapy (CBT) are one of the most utilized treatments for AUD (Fuller and Hiller-Sturmhofel, 1999; Longabough et al., 2005). Marlatt and Gordon's (1985) influential relapse prevention treatment model proposes that treatment should target the cognitive, affective and situational triggers of alcohol use, and provide the patient with coping skills training to overcome identified triggers. CBT based AUD treatment protocols often include identification of various triggers for relapse, coping skills training, alcohol-refusal skills training, psycho-education on the effects of alcohol, functional analyses of alcohol use, and increasing self-efficacy of quitting use (Epstein & McCrady, 2009; Carroll, 1999).

Treatments based in CBT are generally effective for AUD (Miller and Welbourne, 2002). However, a meta analysis of randomized control trials assessing CBT for AUD found a relatively small ( $g = 0.154$ ) effect size (Magill & Ray, 2009). Despite the demonstrated efficacy of CBT treatments for AUD, there is a need to enhance the treatment and increase outcome effect sizes with brief supplemental elements that target theoretically based mechanisms of behavior change. A randomized controlled trial suggested that a brief behavioral economic supplemental session – focused on increasing engagement in future oriented substance-free activities – significantly enhanced outcomes of a standard motivational interviewing intervention in a sample of college student heavy drinkers (Murphy et al., 2012a; Murphy et al., 2012b).

## **Behavioral Economic Theory of Substance Abuse**

In the operant conditioning model, positive reinforcement is defined as a process where a behavior increases following the presentation of a reinforcing stimulus (food, drugs, etc.). For

example, in substance use, the consumption of alcohol is reinforcing due to the initial euphoria, improved social interaction, sexual behavior facilitation, ameliorating stress, and self-medication for mental distress (Müller & Schumann, 2011). However, prolonged and heavy alcohol use is often associated with negative consequences (e.g., health, legal, financial, or interpersonal difficulties). Thus,

if the substance user's reward valuation is viewed over a relatively brief window of time, substance use is viewed as adaptive as it will deliver the short-term rewards. However, over time, the consistent pattern of allocating behavior towards the brief yet intense reward associated with substance use often comes at the expense of patterns of long terms rewards associated with allocating behavior towards more stable and less intense reward such as developing healthy interpersonal relationships, hobbies, fitness, or career goals. Behavioral economic researchers termed this pattern of behavior as a *reinforcement pathology* (Bickel, Johnson, Koffarnus, MacKillop, & Murphy, 2014). Reinforcement pathology reflects the relatively normative pattern of preference for immediate reward, that is magnified by two unique properties of substance use - 1) tendency to produce brief duration reward, followed by periods of acute withdrawal or dysphoria, and 2) tendency to undermine the individual's ability to obtain and experience other substance-free rewards, particularly in the context of an environment with restricted access to alternative rewards.

According to behavioral economic theory, individual person-level factors *and* alternative reinforcers available in the environment together influence decisions about whether and how much to consume psychoactive substances. Certain substance-free activities can serve as substitutes for substance use in that increasing price (i.e. decreased access/availability) to substance-free activities can increase alcohol consumption (Rachlin, 2000). Inversely, some

substance-free activities available in the environment may change rate of substance use, such that consumption of a substance is likely to decrease as a result of increasing engagement in substance-free activities (Rachlin, 1997).

Numerous empirical studies have shown that high rates of substance use are most likely in contexts devoid of substance-free sources of reinforcement and that chronic substance abuse is associated with diminished dopamine response to naturally occurring substance-free rewards such as food or erotic stimuli (Koob, 2006; Volkow & Baler, 2014). Conversely, studies have shown that substance use will generally decrease if access to alternative reinforcers is increased (Carroll, Anker, & Perry, 2009; Cosgrove, Hunter, & Carroll, 2002; Higgins, Heil, & Lussier, 2004). Functional magnetic resonance imaging (fMRI) studies have shown that chronic substance abusers report diminished neural activation to nondrug rewards (Lubman et al. 2009). Studies with non-addicted populations have shown that an environment enriched with substance-free reinforcers may serve as a protective factor against substance use (Audrain-McGovern, Rodriguez, Rodgers, & Cuevas, 2011; Bardo, Klebaur, Valone, & Deaton, 2001). However, in addiction, the reinforcing value of a substance becomes greater than available natural reinforcers, such that they can no longer compete as effectively with substance-related reward, leading to escalating patterns of substance use and diminishing engagement in drug-free activities (Vuchinich & Tucker, 1988; Higgins, Heil, & Lussier, 2004).

Alternative reinforcers not only play a role in the development and maintenance of substance use disorders, but also in treatment. Murphy, Correia, Colby, & Vuchinich, 2005) found that women drinkers who, at baseline, derived a larger proportion of their total reinforcement from drinking were less likely to reduce their drinking after a brief intervention than were women who derived a greater proportion of reinforcement from substance-free

activities. Suggesting the importance of available substance-free reinforcers in improving treatment response and reducing alcohol use. Another study found that drinkers who were asked to increase engagement in exercise and creative activities (although not asked to change their drinking pattern) spontaneously reduced their drinking compared with control participants (Correia et al. 2005). Contingency management (CM) treatment for cocaine depend patients showed increases in both abstinence and frequency of engagement in drug-free activities (Rogers et al., 2008). Suggesting that development of non-drug sources of reinforcers may play an important role in competing with drug use and maintaining abstinence after treatment.

***Delayed reward discounting.***

Individuals who drink heavily may under-engage in constructive alternatives to drinking because the benefits of these activities are generally delayed. Delayed reward discounting (DRD) is a behavioral economic measure of impulsivity that assesses the degree of decrease in subjective value associated with reward delay. Although the value of all rewards decreases as their receipt is delayed, there are substantial individual differences in the degree that delayed rewards are discounted, and this discounting phenomenon may be a core feature of substance abuse (Bickel et al., 2014; Bickel, Landes, Hill & Baxter, 2011).

Alcohol use generally provides immediate reinforcement through anxiety or stress reduction, feelings of euphoria, and social facilitation while the consequences of alcohol use are delayed (Sayette et al., 2012; Murphy, Barnett, & Colby, 2006). Comparatively, many substance-free activities such as working, exercise, or getting an education often provide delayed rewards. Consequently, individuals who show a strong preference for immediate rewards (and therefore devalue delayed rewards) may highly value alcohol (Vuchinich & Simpson, 1998). However, research on discounting suggests that preferences among immediate and delayed reinforcers are

not stable, and many failures of self control may be related to the fact that the reduction in value follows a hyperbolic rather than an exponential decay function (Green & Myerson, 2004).

Individuals who sharply discount the value of delayed outcomes may be less likely to engage in the behaviors that contribute to positive future health, career, or family outcomes, and may instead allocate their behavior towards immediately reinforcing activities such as consuming alcohol. Indeed, numerous studies have demonstrated that substance abusers discount the value of delayed rewards more steeply than control participants (Petry & Casarella, 1999; MacKillop et al., 2010; Reynolds, 2006; Baker, Johnson, & Bickel, 2003; Dixon, Marley, & Jacobs, 2003; Heil, Johnson, Higgins, Bickel, 2006; Madden, Petry, Badger, & Bickel, 1997). Delay discounting is commonly measured in the lab by presenting individuals with a series of choices between smaller, sooner rewards and larger, later monetary rewards. Many of these studies have examined discounting and alcohol use and have shown that higher discounting is associated with higher rates of consumption and alcohol-related problems. Further, substance abuse treatment studies have demonstrated discounting reductions among patients who received effective treatment (Yi et al., 2008; Landes, Christensen, & Bickel, 2012). Suggesting that reducing substance use or obtaining abstinence may lead to decreased rates of discounting.

Findings from alternative reinforcement and delayed discounting research have led to efficacious treatment approaches such as contingency management and community reinforcement approach that attempt to increase relatively immediate sources of substance-free reinforcement (Petry, Martin, Cooney, & Kranzler, 2000). However, these treatments require substantial resources on the part of the treatment provider (counselors, money for vouchers) and the participant (attending approximately 20 counseling sessions) and are, unfortunately, not routinely incorporated into outpatient AUD treatments due to providers' concerns of associated

costs (Petry & Simcic, 2002; Kirby, Benishek, Dugosh, & Kerwin, 2006). Thus, despite the demonstrated relevance of reinforcement variables to alcohol abuse, they are underutilized in AUD treatment, and a key next step in increasing the public health impact of these basic reinforcement mechanisms is to investigate their utility as brief supplements to AUD treatments.

### **Brief Intervention Approaches to Increase Engagement in Substance-Free Activities and Reduce Delayed Reward Discounting**

Behavioral economic laboratory research suggests that increasing the salience of delayed outcomes and the extent to which the behavior leading to those rewards or punishers is viewed as part of a coherent pattern can reduce impulsive choices (Hofmeyr, Ainslie, Charlson, & Ross, 2011; Monterosso & Ainslie, 1999). Loewenstein and Prelec (1992; 1993) showed that if future events were framed as part of a temporally extended sequence or pattern, their value was discounted less steeply than if they were independent events in separate, discrete choices. A study found delayed discounting reductions among overweight and obese women who were asked to engage in Episodic Future Thinking – a task that involves writing about a possible positive future event (Daniel, Stanton, & Epstein, 2013). A clinical implication of this research is that, short of creating immediate and powerful alternatives to substance use through intensive contingency management (Higgins, Heil, & Lussier, 2004), or cognitive rehabilitation approaches (Bickel, Yi, Landes, Hill, & Baxter, 2011), interventions should attempt to encourage substances abusers to view their day-to-day behavior as comprising patterns leading towards long-term outcomes.

As previously noted, behavioral economic theory suggests that individuals with problematic alcohol (or drug) use overvalue the reinforcing efficacy of alcohol relative to other reinforcers. Researchers have measures relative reinforcing value of alcohol by determining the

amount of resources (e.g., time, money) individuals are willing to allocate to obtain the substance. Alcohol demand curve indices of reinforcing efficacy are derived from a hypothetical alcohol purchase task inquiring participants how many drinks they would purchase across a range of prices (Murphy & MacKillop, 2006). Indices of alcohol demand were significantly associated with intervention response (MacKillop and Murphy, 2007; Murphy et al., 2005), such that higher pretreatment reinforcing value was associated with increased levels of follow-up drinking.

A key and unique implication of behavioral economic theory is that interventions should attempt to aggregate more global day-to-day decisions and activities (both substance-related and substance-free) into cohesive patterns that have implications for long-term substance-free rewards. Although many CBT or coping skills protocols encourage engagement in substance-free leisure activities, there is no systematic effort to increase patterns of substance-free activity engagement by identifying and making delayed rewards/goals salient, and by framing patterns of behavior allocation in terms of their impact on obtaining those rewards/goals. There is a need for novel brief approaches to incorporate these behavioral economic intervention approaches to potentially enhance the efficacy of evidence-based AUD treatments.

Murphy et al., (2012a) developed a one-session supplement to a standard alcohol brief motivational intervention (BMI) for college student heavy drinkers called the Substance-Free Activity Session (SFAS). The SFAS uses well-validated principles of motivational interviewing (MI) and personalized feedback to target the behavioral economic mechanisms of substance-free reinforcement and delayed reward discounting. MI is a nonjudgmental, client-centered therapeutic approach that is specifically designed to address the ambivalence that a person may have about changing a behavior (Miller & Rollnick, 2012). The key techniques of MI include:

(a) expressing empathy and understanding regarding a person's thoughts and situation, and carefully articulating that understanding to the client; (b) developing discrepancy between the client's values and their behavior; (c) rolling with resistance – or respecting the client's readiness to change; (d) avoid arguments – the client is encouraged to discuss their perspectives, thus the clinician should avoid being argumentative; and (e) increasing and supporting the client's self-efficacy for behavior change. In MI, it is important that the clinician acts as a collaborator in the process of behavior change rather than as an authority figure or expert who provides instructions.

In the Murphy et al., 2012a study, all students received a standard counselor-delivered BMI and were randomized to either the SFAS session or a control session (progressive muscle relaxation training). The SFAS (Murphy et al., 2012b) was an individual counseling session designed to increase the salience of the student's values, academic and career goals, discuss the potentially negative relationship between substance use and goal accomplishment, and increase engagement in substance-free alternative activities. The session provided information on college graduation rates, national average income for college graduates versus high school graduates, association between GPA and hours spent drinking, attending classes and studying. Participants also received personalized feedback on the requirements their major and intended career, a list of extracurricular and community activities tailored to the student's major and career goals, and a graph of the amount of time they allocate to various activities (class, studying, extra-curricular activities, exercise, and drinking/drug use), and a list of substance-free recreational or leisure activities that were aligned with their interests.

The overall goals of the SFAS were to enhance the value of delayed academic and career goals, to help students to make a connection between their current patterns of behavior (e.g., drinking, studying, and attending class) and the attainment of these delayed rewards, to increase

engagement in substance-free academic and leisure activities by providing personally tailored information on these activities and discussing barriers to engagement. At the end of the SFAS session, students were encouraged to set academic, career, and personal goals and the counselor worked with the student to generate a plan to work towards those goals.

Murphy and colleagues' (2012a) findings indicated that compared to the active control (BMI + Relaxation), those in the BMI + SFAS condition had significantly larger reductions in alcohol-related problems. Additionally, moderation analyses indicated that individuals with elevated depression at baseline, or lower levels of substance-free reinforcement, had greater reductions in heavy drinking when assigned to BMI + SFAS compared to BMI + Relaxation. Further, those in the SFAS condition reported increased time spent studying in the evenings and higher scores on an index of future time orientation. However, the study did not find significant changes in total substance-free reinforcement or changes in standard measures of delayed discounting.

Murphy et al.'s (2012a) findings provided support for the efficacy of the SFAS and its impact on behavioral economic mechanisms of change (future orientation and substance-free activity participation). The SFAS approach extends traditional CBT interventions, which often include a module on enhancing pleasant events, by 1) implementing a more tailored and personalized approach to identifying alternative activities that are consistent with personal goals, 2) providing personalized feedback that aggregates behaviors into patterns and frames those patterns in terms of their impact on future rewards, and 3) attempting to increase the subjective salience and value of future outcomes. Personalized feedback and MI are used to highlight the delayed value of rewards and to increase engagement of patterns in substance-free activities associated with personal values/goals and delayed reinforcement.

## **Present Study**

The goal of the proposed project was to assess the efficacy of the behavioral economic SFAS when adapted to an adult outpatient alcohol treatment-seeking population. This intervention increased the potency of Murphy et al. (2012a)'s SFAS (which was originally developed for non-treatment seeking college students) by including booster contact in the form of text messages or emails that provide ongoing feedback on activity patterns, goal pursuit/progress, and personalized information on locally available substance-free activities once a week, for one month after the intervention session. This study evaluated the efficacy of the SFAS as an adjunct to standard outpatient treatment in the context of a randomized pilot trial.

This was a randomized 2-group (SFAS vs. Sleep Hygiene and Nutrition Education [SHyNE] control condition) pilot trial with 41 patients seeking AUD outpatient treatment. Patients received the SFAS or SHyNE sessions as a supplement to their Treatment as Usual (TAU). Sleep hygiene and nutrition education was selected for the control condition because improvement in sleep or nutrition was not expected to change participants' level of alcohol use, yet the session controlled for counselor contact time (see further detail in Method section). Study hypotheses were as follows:

Hypothesis 1) TAU + SFAS patients will report significantly lower levels of alcohol use at 3-month follow-up compared to participants in the TAU + SHyNE condition.

Hypothesis 2) TAU + SFAS patients will report significantly lower levels of alcohol-related problems at 3-month follow-up compared to participants in TAU + SHyNE condition.

Hypothesis 3) TAU + SFAS participants will report significantly lower reinforcement ratio from substance-related activities and increased constructive activity engagement at 3-month follow-up compared to participants in the TAU + SHyNE condition.

Hypothesis 4) TAU + SFAS participants will report lower alcohol demand as measured by the hypothetical Alcohol Purchase Task at 3-month follow-up compared to participants in the TAU + SHyNE condition.

Hypothesis 5) TAU + SFAS participants will report increased sensitivity to delayed outcomes and future time orientation at 3-month follow-up compared to participants in the TAU + SHyNE condition.

## **Method**

### **Participants and Procedure**

Participants were patients recruited from various outpatient substance-use treatment programs including two different intensive outpatient programs (IOP,  $n = 28$  at the primary IOP site, and  $n = 7$ , at the second IOP site), mutual help groups including SMART Recovery and Alcoholics Anonymous ( $n = 3$ ), psychiatric outpatient treatment ( $n = 2$ ), and community based mental health counseling ( $n = 1$ ). Treatment at the IOP sites (where 88% of sample was recruited from) consisted of group sessions led by licensed counselors approximately three hours per day for three days a week for approximately 6 weeks. The group sessions were based in cognitive behavioral therapy (CBT) and focus on psycho-education, communication skills (assertiveness) training, rational behavior problem solving, mood management, stress management, enhancing social support and alternatives to drinking, and coping skills (Kaden, 1995; Monti, 2002). The two IOP sites differed in their treatment policies where the primary IOP had a harm-reduction approach whereas the second IOP required abstinence from patients while in treatment. Participants recruited from mutual help groups (AA and SMART Recovery) were attending weekly support groups that focus on recovery from AUD. Participants recruited from psychiatric outpatient treatment attended routine appointments with psychiatrists who prescribed

psychotropic medications for AUD. Participant recruited from the community mental health counseling attended weekly individual counseling sessions focused on behavioral treatment for co-occurring AUD and mental health diagnosis. The above listed treatment facilities did not deliver treatment through motivational interviewing, incorporate personalized feedback, or any of the specific SFAS elements.

Patients were approached and screened for study eligibility if they were engaged in treatment. Eligible participants had a diagnosis of AUD, had used alcohol in the past 3-months, were 18 years of age or older, were willing to provide contact information for themselves and two other individuals (for follow-up purposes), and speak, read, and write in English. One hundred and thirty-nine ( $N = 139$ ) participants were approached and screened for study participation. Of the participants screened, 41 were eligible and randomly assigned (stratified by gender and treatment location) to one of the two study conditions (treatment as usual [TAU] + SFAS or TAU + sleep hygiene and nutrition education [SHyNE]). Participants were not enrolled if they declined to participate ( $n = 32$ ), dropped out of treatment ( $n = 39$ ), or if they did not meet DSM-5 AUD diagnostic criteria in the past 3-months ( $n = 27$ ). See Figure 1.

Patients were informed that the study was designed to supplement their treatment and to maintain a healthy lifestyle, and that the study would involve random assignment to a single individual session, along with some brief email/text follow-up focused on either sleep hygiene and nutrition or identifying their personal/life goals and increasing engagement in activities that are consistent with those goals. Eligible patients were asked to sign a consent form to enroll in the study. They completed a baseline self-report assessment battery and a clinical interview consisting of a 90-day-timeline follow back of substance use and DSM-5 diagnostic interview for substance use disorders.

After completing the baseline assessment, participants were randomly assigned to one of the study conditions, and were asked to come back within 7 days for either the one-hour long SFAS or the SHyNE control session (described in detail below). Subsequently, upon completion of the intervention session, participants were asked to complete a brief and confidential questionnaire to evaluate the intervention. Interventionists were either a clinical psychologist or clinical psychology doctoral students with previous clinical, motivational interviewing, and SFAS experience.

Participants received brief weekly text message or email based booster contact to augment the SFAS or SHyNE session for one month after the intervention session. Thirty-eight ( $n = 38$  participants chose to receive the booster messages via text-message and  $n = 3$  [2 for SHyNE and 1 for SFAS boosters] via email). Three months post the baseline intervention and two-months post the booster contact, participants were asked to complete a follow-up self-report assessment battery and a 90-day-timeline follow back of substance use. The follow-up assessed the immediate and extended impact of the interventions on drinking levels and engagement in substance-free activities. Participants received \$25 for completing the baseline assessment and \$40 for the follow-up assessment.

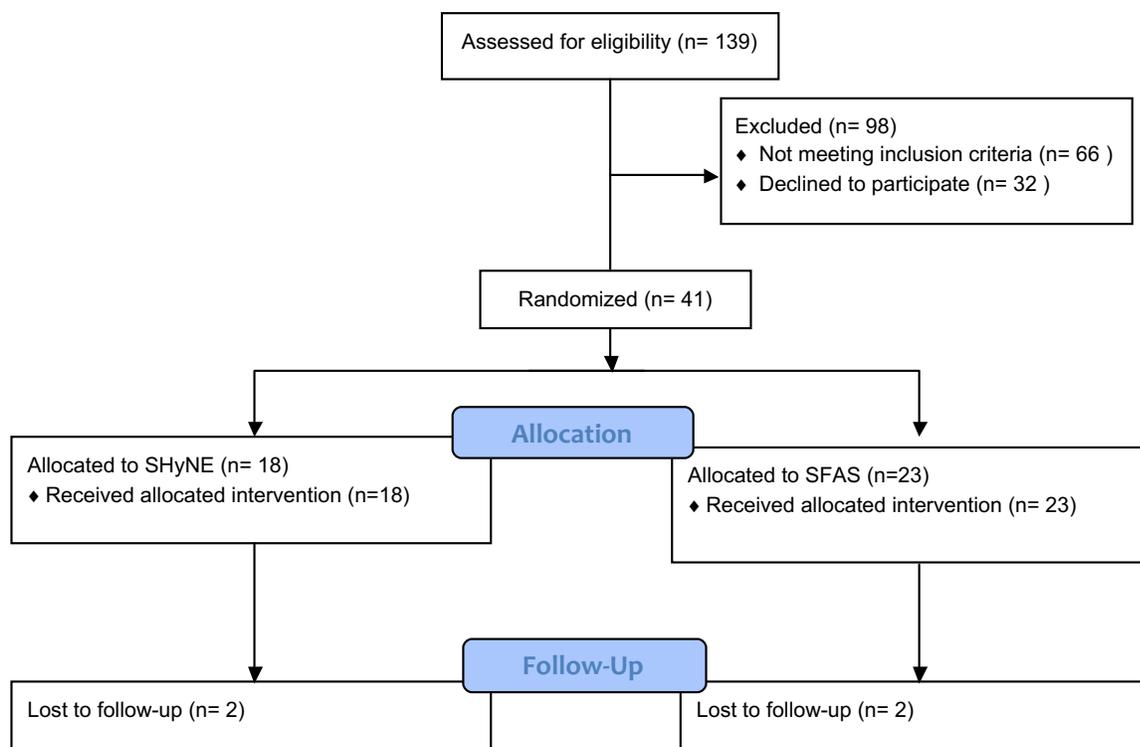


Figure 1. CONSORT diagram of participant recruitment, randomization, and completion of follow-up assessment of the study.

## Intervention

### *Substance Free Activity Session (SFAS).*

The SFAS used a motivational interviewing approach to attempt to develop participants’ motivation to engage in substance-free activities and enhance the salience of delayed rewards (e.g., the benefits of obtaining additional education, developing a hobby, generating social support, pursuing exercise goals). See Appendix for SFAS treatment manual. Although the SFAS was specifically tailored to the interests and goals of the participant, there was a unifying focus of encouraging participants to identify short and long-term goals related to substance-free activities, discussing the importance and potential benefits of those goals, and the potential negative influence of alcohol misuse on goal pursuit. Next, the clinician encouraged the

participant to identify regular patterns of (substance-free) behaviors that would facilitate progress towards the identified goals and values. Information on the nature of the patient's goal was collected in the assessment and the SFAS included personalized, specific information about career, health, hobby, family, friend, and community activities consistent with the participant's goals. For example, if a participant stated they would like to exercise more, the intervention provided them tailored information on local gyms, exercise groups, or different opportunities available near their home to help them meet their goal, along with information about the short and long-term benefits of exercise. Participants were also asked to report the level of importance different domains of life (e.g., family, parenting, recreations, spiritual...etc.) and how consistent their actions have been towards that domain in the past week.

The SFAS also included personalized information on participants' reported time allocation to a variety of constructive activity categories (e.g., exercise, job-related activities, hobbies) as well as drinking/drug use. This was used to facilitate discussion regarding the degree of congruence between recent behavior allocation and long-term goals/values. Based on the activities discussed in the time allocation feedback, the current and future values of various activities in which the participant engages were discussed. Participants were presented with a personalized graph of the importance of different life domains (values) and how consistent their actions have been towards those values to elicit discussion on increasing action consistent with personally held values. Further, the clinician provided the participant a personalized list of substance-free activities related to their interests and available in the community. The participant and the clinician formulated specific goals to help the participant re-allocate his or her time and optimize progress towards career, family/social, health/wellness, and other goals. As an extension of goal setting, participants were asked to write about a specific positive future event

they hope to take place three months into the future. This type of writing called, Episodic Future Thinking, has been shown to reduce impulsivity and enhance future orientation (Daniel, Stanton, & Epstein, 2013).

The four weekly booster texts/emails provided reminders about the activities/goals participants committed to in the SFAS session, and provide additional feedback on locally available substance-free activities consistent with their stated interests. The information included in the SFAS is not included in standard outpatient alcohol use treatments.

### ***Sleep Hygiene and Nutrition Education (SHyNE).***

The SHyNE protocol was developed using sleep hygiene educational materials from The National Sleep Foundation (2015) and nutrition educational materials from the United States Department of Agriculture Food and Nutrition Service (2015). The SHyNE session was an individual, educational format session that was interactive but did not include personalized feedback or motivational interviewing components. For SHyNE participants, booster texts/emails provided reminders of information on sleep and nutrition education. Murphy et al. (2012a) used relaxation as the active control condition, however, all patients in the primary IOP site received relaxation training as part of the treatment as usual. Sleep disturbances among alcohol use disorder patients are common and studies have shown that sleep disturbances are associated with risk for relapse (Arnedt, Conroy, & Brower, 2007). However, there is no evidence to suggest that treatment of sleep disturbance reduces alcohol use. A randomized control trial that aimed to improve sleep among patients recovering from alcohol dependence found that although sleep quality improved, there was no difference in drinking outcomes when compared to an active control group (Arnedt, Conroy, Armitage, & Brower, 2011). Similarly, AUD is often associated with poor nutrition (Lieber, 2003), however, there is no evidence that

improving nutrition will decrease alcohol use. Thus, sleep hygiene and nutrition education was not expected to change participants' level of alcohol use but served as a credible control for counselor contact time and attention.

### **Training of Clinicians and Supervision**

Intervention sessions was conducted by three clinical psychology graduate students and a licensed clinical psychologist who had completed over 20 hours of training and supervision in motivation interviewing including readings, DVDs, role-playing, previous experience in delivering the SFAS intervention, and supervision. All sessions were audio-taped and reviewed during weekly group supervision with a licensed clinical psychologist with expertise in motivational interviewing and brief interventions.

### **Measures**

#### ***Evaluation of Intervention Internal Validity.***

To ensure the integrity of the intervention session across clinicians, 10% of the SFAS ( $n = 4$ ) and SHyNE ( $n = 4$ ) session audio-recordings were randomly selected and reviewed by a two trained independent coders. Sessions by each clinician were reviewed using a brief intervention adherence protocol commonly used in intervention trials (Martens, Smith & Murphy, 2013; Murphy et al., 2012b). Each component on the protocol was rated as a 0 (*Didn't do it, N/A*), 1 (*Did it poorly or didn't do it but should have*), 2 (*Meets Expectations*), or 3 (*Above Expectations*). A score of 2 or higher indicated that the intervention component was delivered in a way that is consistent with the protocols in terms of content and motivational interviewing style. Additionally, intervention cross contamination was also rates as 0 (*Didn't do it, N/A*), 1 (*Did it minimally*), 2 (*Did it moderately*), or 3 (*Did it a great amount*).

Further, a random 20-minute segment of the SFAS recording was selected and coded for motivational interviewing adherence. Coding was completed by two independent reviewers (different individuals from those who coded intervention content fidelity) who were trained in motivational interviewing and the SFAS but were not interventionists for this trial. The Motivational Interviewing Treatment Integrity (MITI; Moyers, Manuel, & Ernst, 2014) was used to code on the four global scores of the MITI (cultivating change talk, softening sustain talk, partnership, and empathy) rated on a 5-point Likert scale with 1 indicating low and 5 indicating high MI adherence. The MITI also included 8-items on MI consistent behavior counts which include rolling with resistance, asking open ended questions, and reflections. Each of the 8 items was rated as a 0 (*Didn't do it, N/A*), 1 (*Did it poorly or didn't do it but should have*), 2 (*Meets Expectations*), or 3 (*Above Expectations*).

### ***Booster Contact***

At the end of each of the four weekly booster messages, participants were asked to reply to the message with the letter “C” to confirm receipt of the message.

### ***Evaluation of Participant Satisfaction***

Participants were asked to complete a brief assessment at the end of the SFAS or SHyNE session to assess for satisfaction with intervention and clinician. For example, on a scale of 1-10 participants were asked to rate “How interesting did you find the session?” and “How would you rate this session overall.” Participants were also asked to confidentially rate the clinician, “The person I met with was easy to talk to” on a Likert scale of 1 (*Strongly Disagree*) - 4 (*Strongly Agree*).

### ***Self-Reported Intervention Benefit***

At 3-month follow-up, participants reported on the intervention's benefit on the following seven domains: treatment helpfulness in overall treatment progress, goal pursuit, time management, balanced life, improved sleep, improved diet, and change in drinking or drug use. Participant rated how helpful the intervention was for them on a Likert scale of 1 (*Extremely Unhelpful*) - 5 (*Extremely Helpful*).

### ***Timeline Follow-back Interview of substance use (TLFB).***

The Timeline Follow-back Interview of substance use (TLFB) is a calendar-assisted measure based on the participant's retrospective account of their substance use (Sobell & Sobell, 1996). The TLFB has been shown to have excellent reliability and validity in clinical and nonclinical populations. At baseline and follow-up, the 90-day TLFB was clinically administered to obtain drinking and drug use pattern data for the three-months prior to the intervention and the three-months post-intervention. The primary drinking-related dependent variables were number of past three-month binge drinking days (5/4 drinks for men/women), number of past three-month drinking days, number of past-month drinks consumed, and number of drinks per drinking day. Past three-months of drinking data were utilized to capture true baseline drinking levels prior to receiving any treatment, as participants varied in the length of time spent in treatment prior to study enrollment. To enhance recall for specific activities, participants were asked to bring their day planner or smart-phone to the assessment and will be provided with calendars with holidays and events from each day during the past month.

### ***Structured Clinical Interview for DSM-5.***

A Structured Clinical Interview (SCID) for substance use disorders (adapted for Diagnostic and Statistical Manual-5 [DSM-5] criteria) were clinically administered for each

participant at baseline and 3-month follow-up to assess for past three-month alcohol and drug use disorders (First, 1995). The 11 items on the SCID correspond to the substance use disorder diagnostic symptoms in DSM-5. Responses were dichotomously coded (present/absent) to assess for substance use disorder severity. The presence of 2-3 symptoms are indicative of mild substance use disorder, 4-5 symptoms of moderate substance use disorder, and 6 or more symptoms of severe substance use disorder.

***The Short Inventory of Problems (SIP).***

The SIP, a short version of the Drinker Inventory of Problems (Miller, Tonigan, & Longabaugh, 1995), is a 15-item self-report measure that assesses alcohol-related consequences (Forcehimes, Tonigan, Miller, Kenna, & Baer, 2007). The SIP was administered at baseline and follow-up to assess past three months of alcohol-related consequences. In this sample, internal consistency for the total SIP score was excellent at baseline ( $\alpha = .90$ ), and 3-month follow up ( $\alpha = .95$ ).

***Alcohol Purchase Task (APT)***

The Alcohol Purchase Task (APT; Murphy & MacKillop, 2006) was used to measure alcohol demand. The APT presents participants with a hypothetical drinking scenario and participants are asked how many drinks they would purchase and consume at 17 ascending prices. Prices range from \$0 (free) to \$3.00 increasing by 50-cent increments, \$3.00 to \$10.00 increasing by \$1.00 increments, and \$10.00 to \$20.00 increasing by \$5.00 increments. The APT yields five demand curve indexes: 1) Intensity – number of drinks consumed when the price is \$0; 2) Breakpoint (the first price at which alcohol consumption is suppressed); 3)  $O_{\max}$  (maximum alcohol expenditure, computed by multiplying the number of drinks consumed by the price of each drink); 4)  $P_{\max}$  (price at maximum expenditure/the price associated with  $O_{\max}$ ); and

5) Elasticity of demand (sensitivity of alcohol consumption to increases in cost). Analyses examined variability of these indices as a function of treatment condition, it is hypothesized that the SFAS will suppressed hypothetical drink purchases and consumption.

***Brief Delayed Reward Discounting.***

This study utilized a brief measure of delayed reward discounting using (Gray, Amlung, Acker, Sweet, & MacKillop, 2014). This is a measure of delayed reward discounting with 8 sets of choices between two hypothetical amounts of money. Delayed discounting was assessed using the approach described by Gray et al., 2014. Hypothetical money choices provide a reliable and valid estimate of discounting rates (MacKillop & Kahler, 2009). It is hypothesized that the SFAS will increase the extent to which participants organize their behavior around distal sources of reinforcement relative to proximal reinforcement (e.g., substance use). In this sample, internal consistency for delayed discounting scores of Impulsive Choice Ratio (ICR) were good at baseline ( $\alpha = .78$ ) and 3-month follow-up ( $\alpha = .81$ ).

***Consideration of Future Consequences (CFC) Scale.***

The Consideration of Future Consequences (CFC) scale is a measure of future orientation and assesses the extent to which individuals are influenced by the immediate versus distant consequences of their behavior (Strathman, Gleicher, Boninger, & Edwards, 1994). Participants respond to each of 12 items on a 5-point scale from 1 “extremely uncharacteristic” to 5 “extremely characteristic.” The CFC has demonstrated good internal consistency and test-retest reliability (Strathman et al., 1994) as well as convergent and construct validity (Adams & Nettle, 2009). In this sample, internal consistency for the CFC scale were good at baseline ( $\alpha = .75$ ) and 3-month follow-up ( $\alpha = .81$ ).

*Activity Level Questionnaire – Substance Use Version (ALQ-SUV).*

The ALQ-SUV was used to measure past-month reinforcement from substance-related and substance-free activities. Past-month activity frequency and enjoyment ratings were made with 5-point Likert scales (0–4; Correia, Carey, Simons, & Borsari, 2003). Frequency ratings range from 0 (zero times per week) to 4 (more than once per day), and enjoyment ratings range from 0 (unpleasant or neutral) to 4 (extremely pleasant). The frequency and enjoyment ratings are multiplied to obtain a cross-product score (range = 0–16), which reflects reinforcement derived from the activity (Correia et al., 2003). Total substance-free and reinforcement ratios variables were computed. The reinforcement ratio is computed by dividing the substance-related reinforcement by all available reinforcement (Substance-Free Reinforcement + Substance-Related Reinforcement). We evaluated whether or not the SFAS resulted in decreased reinforcement ratio scores relative to the control condition. Internal consistency for the substance-free total score was acceptable at baseline ( $\alpha = .70$ ), and good at 3-month follow up ( $\alpha = .83$ ). In this sample, internal consistency for substance-related reinforcement scores were good at baseline ( $\alpha = .83$ ) and 3-month follow-up ( $\alpha = .84$ ).

*Time Allocation.*

Participants were asked to report the number of hours they spend engaged in various activities during a typical week in the past month including including time spent working, exercising, community engagement, socializing with family, and time spent using alcohol and drugs. The study evaluated whether or not the SFAS resulted in decreased time using alcohol or drugs, and increased time spent in substance-free activity categories, and decreases in alcohol problems. This data was also used to provide the personalized feedback on time allocated to substance use and to several categories of substance-free activities in the SFAS.

### ***Professional and Personal Aspirations.***

The study collected information on SFAS participants' careers, professional interests, financial goals, as well as personal goals such as health management (i.e. exercise, diet, medication adherence), familial, social, and other relationships, and community organizations. This information was used to provide participants with personalized tips on goal achievement strategies and relevant community activities during the SFAS session.

### ***Valued Living Questionnaire (VLQ)***

The Valued Living Questionnaire (VLQ) is a two-part assessment of personally held values and the consistency of an individual's actions with those values (Wilson, Sandoz, Kitchens, & Roberts, 2011). The first part asked participants to rate the importance of various life domains (e.g. family, employment, spirituality) on a 10-point Likert scale (1 = Not Important at All and 10 = Extremely Important). The second part, asked participants to rate how consistent their actions (past week) have been with each value (1 = *Not at All Consistent* and 10 = *Extremely Consistent*). Participants' ratings were graphed and presented to participants during the SFAS session to highlight discrepancies with the participant's actions and their values. The VLQ was not used as an outcome measure.

### ***Depression, Anxiety and Stress Scale (DASS)***

Depressive symptoms were measured using the Depression, Anxiety and Stress Scale (DASS-21; Lovibond & Lovibond, 1995). The DASS-21 is a self-report instrument that consists of three, 7-item subscales: stress, anxiety, and depression. Participants indicated on a 4-point scale how much each item has applied to them over the past week. Sample items include, "I found it hard to wind down," "I was aware of dryness in my mouth," and "I couldn't seem to

experience any positive feeling at all.” In this sample, internal consistency for the DASS depression score were excellent at baseline ( $\alpha = .92$ ) and 3-month follow-up ( $\alpha = .92$ ).

## **Results**

### **Data Analytic Plan**

Data analyses were computed using SPSS version 21.0 and MPlus version 7.3. Values greater than 3.29 *SDs* above the mean on a given variable were considered outliers and Winsorized to one unit greater than the greatest non-outlier value (Tabachnick & Fidell, 2013).

Baseline descriptive characteristics of the overall sample were conducted, including demographic information as well as the means and standard deviations for the primary alcohol outcome variables. Further, *t*-tests and chi-square analyses were performed to determine whether or not there were baseline group differences on any demographic or alcohol-related variables (See Table 1).

Attrition effects were evaluated by testing whether systematic differences exist between those participants who complete the 3-month follow-up ( $n = 37$ ) versus those who did not ( $n = 4$ ). Maximum likelihood estimation was used to estimate all regression parameters. Maximum likelihood assumes that data are missing at random under the analytic model, and it is a preferred method for estimation when some data are missing (Schafer & Graham, 2002).

A series of regression models (negative binomial hurdle and linear regression) were computed to assess for associations between treatment condition and all outcome variables at follow-up. Negative binomial hurdle (NBH) regression models were used to examine associations between treatment condition and zero-inflated (greater than 15% zeros) and overdispersed (i.e., variance exceeds the mean) primary alcohol outcome variables (binge drinking episodes, number of drinking days, total number of drinks, and drinks per drinking day

– as measured by the TLFB). NBH models estimate two processes simultaneously, the first is the zero-inflated process (i.e., the “hurdle”) where sampling zeroes are identified and a logistic model is assessed for likelihood of a true zero value and the second process is the negative binomial process assessing the count variables (Bandyopadhyay, DeSantis, Korte, & Brady, 2011). Further, linear regression models were utilized to evaluate associations between treatment condition and primary alcohol-related problems variable (as measured by the SIP) and alcohol use disorder symptoms (as measured by a clinical interview).

NBH or linear regression models were also used to estimate treatment group differences in the secondary outcomes of behavioral economic variables of alcohol demand, substance-free activity variables of the proportional reinforcement from substance-free activities relative to total reinforcement (as measured with the ALQ-SUV), weekly time allocation to vocational, exercise, and other substance-free activities (measured with time allocation survey), and the extent to which participants are sensitive to immediate versus delayed outcomes (measured with proportional choice of delayed and larger monetary choices compared to sooner and smaller monetary choices on the delayed discounting choice task as well level of future orientation on the CFC). Of note, the study evaluated four alcohol demand indexes: Intensity, Breakpoint,  $O_{max}$ , and  $P_{max}$ . The elasticity demand curve parameter was omitted from the final analyses due to small cell sizes produced by follow-up attrition and reported consumption values that prohibited calculation of elasticity (e.g., invariant consumption across all price points).

All regression analyses included treatment condition and baseline levels of the outcome as covariates. Additional exploratory analyses controlled for treatment site and duration, but they yielded similar results and thus we present the more parsimonious models without these exploratory covariates.

## Baseline Characteristics

Study participants (68.3% male; 70.7% Caucasian,  $M$  age = 38.75,  $SD$  = 13.56) reported 37.41 ( $SD$  = 19.84) drinking days in the past 90-days, 27.44 ( $SD$  = 14.25) binge drinking episodes, 9.31 ( $SD$  = 6.62) drinks per drinking day, and 7.39 ( $SD$  = 2.61) AUD symptoms at baseline (see Table 1). Participants had been engaged in treatment on average 25.98 ( $SD$  = 15.19) days at study enrollment. Approximately 39% of the sample were married or living with a partner, 39% were single, and 22% were either divorced, separated, or widowed. Participants reported on employment status: 43.9% were employed full-time, 4.9% were employed part-time, 36.6% were unemployed, 2.1% were in school full-time, and 7.3% were on disability. Approximately 30% of the sample reported annual household income less than \$50,000, 30% between 50,000 and \$75,000, and 40% above \$75,000 per year. Statistical analyses indicated no significant differences between the treatment groups on any demographic variables or baseline alcohol-related outcome variables.

Four participants did not complete the 3-month follow-up (90.2% overall follow-up rate; two from each treatment condition). There were no significant baseline differences for participants who completed and those who did not complete the follow-up assessments on number of binge drinking episodes ( $t(39) = -.72, p = .47$ ), number of drinks consumed ( $t(39) = -.50, p = .62$ ), drinking days ( $t(39) = .30, p = .77$ ), drinks per drinking day ( $t(39) = .46, p = .65$ ), or alcohol-related problems ( $t(39) = -.25, p = .81$ ).

This study utilized four interventionists, the primary interventionist completed 48.8% of the total interventions ( $n = 12$  for SFAS,  $n = 8$  for SHyNE), the second interventionist completed 41.5% of the interventions ( $n = 10$  for SFAS,  $n = 7$  for SHyNE), the third clinician completed 7.3% of the interventions ( $n = 1$  for SFAS,  $n = 2$  for SHyNE), and the fourth clinician completed

2.4% of the intervention ( $n = 1$  for SHyNE). Linear regression models were conducted to assess for interventionist effect on alcohol outcome variables at 3-month follow-up. All models controlled for treatment condition and baseline level of outcome variable. Results indicated no significant differences in binge drinking binge drinking episodes ( $B (SE) = 0.41 (0.51), p = .421$ ), number of drinks consumed ( $B (SE) = 0.52 (0.58), p = .373$ ), drinking days ( $B (SE) = 0.43 (0.39), p = .286$ ), drinks per drinking day ( $B (SE) = 0.26 (0.54), p = .627$ ), or alcohol-related problems ( $B (SE) = 0.12 (0.16), p = .452$ ).

Table 1. Descriptive statistics, N (%) or mean (standard deviation), for demographic and primary alcohol variables.

	SFAS (n=23)	SHyNE (n=18)	Total Sample (N=41)	Statistical Test
Gender				$\chi^2 (2) = 0.88$
Male	n = 15 (65.2%)	n = 13 (72.2%)	n = 28 (68.3%)	
Female	n = 7 (30.4%)	n = 5 (27.8%)	n = 12 (29.3%)	
Transgender	n = 1 (4.3%)	n = 0 (0.0%)	n = 1 (2.4%)	
Race				$\chi^2 (2) = 2.94$
White	n = 18 (78.3%)	n = 11 (61.1%)	n = 29 (70.7%)	
Black	n = 4 (17.4%)	n = 7 (38.9%)	n = 11 (26.8%)	
Multiracial	n = 1 (4.3%)	n = 0 (0.0%)	n = 1 (2.4%)	
Site				$\chi^2 (1) = 0.04$
Primary IOP	n = 16 (69.6%)	n = 12 (66.7%)	n = 28 (68.3%)	
Other	n = 7 (30.4%)	n = 6 (33.3%)	n = 13 (31.7%)	
Age	37.83 (12.26)	38.78 (13.56)	38.24 (12.69)	t (39) = 0.24
Days in Treatment	26.87 (17.71)	24.83 (11.60)	25.98 (15.19)	t (39) = -0.42
Depression	33.13 (12.24)	29.44 (11.33)	31.51 (11.85)	t (39) = -0.99
Binge Episodes in Past 90 Days	26.61 (14.58)	28.50 (14.18)	27.44 (14.25)	t (39) = 0.42
Drinking Days in Past 90 Days	32.61 (20.29)	43.56 (17.95)	37.41 (19.84)	t (39) = 1.80
Number of Drinks in Past 90 Days	279.67 (267.80)	428.85 (297.57)	345.21 (287.58)	t (39) = 1.69
Drinks Per Drinking day in Past 90 Days	8.48 (5.10)	10.38 (6.21)	9.31 (5.62)	t (39) = 1.08
SIP	23.91 (10.56)	21.22 (9.58)	22.73 (10.11)	t (39) = -0.84
AUD Symptoms	7.35 (2.52)	7.44 (2.79)	7.39 (2.61)	t (39) = 0.12

Note. IOP = Intensive Outpatient Program; SIP = Short Inventory of Problems; AUD = Alcohol Use Disorder.

## **Intervention Validity, Feasibility, & Acceptability**

### ***Internal Validity***

Two independent coders rated the SFAS and SHyNE sessions for content fidelity. Scores of 2 or higher indicated that the elements of the interventions were delivered in a manner consistent with the protocol. For the SFAS protocol, average rating was 2.07 ( $SD = .09$ ), with 100% of the intervention elements meeting or exceeding expectations. Similarly, the SHyNE protocol average rating was 2.03 ( $SD = .07$ ), with 100% of the intervention elements meeting or exceeding expectations. Cross contamination between SFAS and SHyNE were also assessed. For the SFAS sessions, average rating was .13 ( $SD = .23$ ) with one SFAS session rated at 1 (*Did it minimally*) for discussing sleep. For the SHyNE session, an average rating was .00 ( $SD = .00$ ), with 0% of sessions discussing contents of SFAS protocol.

Coding on MI specific skills was rated following the recommendations of Moyers, Manuel, & Ernst, 2014. Average rating for the 4 items on the global scale (e.g., cultivating change talk, developing discrepancy) was 4.41 ( $SD = .23$ , on a scale of 1-5) and the average rating for the 8 items of MI consistent behavior counts (e.g., rolling with resistance, use of reflective listening) was 2.14 ( $SD = .29$ , on a scale of 0-3), with 92% of the behavior counts rated as meeting or exceeding expectations. Overall ratings suggest that study clinicians consistently administered the intervention elements of both SFAS and SHyNE protocols and adhered to an MI style for the SFAS.

### ***Post-session Participant Satisfaction Ratings***

Participants in the SHyNE condition reported average satisfaction ratings for clinicians of 3.67 ( $SD = .31$ , on a scale of 1-4) and session satisfaction ratings of 8.44 ( $SD = 1.76$ , on a scale

of 1-10). SHyNE participant satisfaction ratings did not significantly differ across interventionists for clinician rating ( $t(13) = -.75, p = .47$ ) or session rating,  $t(13) = -0.01, p = .99$ .

Participants in the SFAS condition reported average satisfaction ratings for clinicians 3.79 ( $SD = .30$ , on a scale of 1-4) and session satisfaction rating of 9.08 ( $SD = .94$ , on a scale of 1-10). SFAS participant satisfaction ratings did not statistically differ across interventionists for clinician rating ( $t(20) = -1.06, p = .31$ ) or session rating,  $t(20) = -0.81, p = .43$ .

There were no reported significant group differences in satisfaction ratings for clinician ( $t(39) = -1.25, p = .22$ ) or satisfaction ratings for the session ( $t(39) = -1.36, p = .18$ ) across treatment conditions.

### ***Booster Contact***

All participants confirmed receiving at least one of the four booster messages. On average SFAS participants confirmed receiving 3.2 (.95) and SHyNE participants confirmed receiving 3.06 (1.16) booster messages. There were no significant group differences in confirmation of receiving booster message ( $t(39) = -0.49, p = .63$ ).

### ***Follow-up Ratings of Perceived Helpfulness***

At 3-month follow-up, participants reported on the benefit of the intervention they received in various domains targeted by each intervention (e.g., goal pursuit for SFAS or improved sleep for SHyNE; see Table 2). Results did not indicate statistically significant differences across groups, however, SFAS participants' mean scores indicated non-significant trend level difference in time management and means were slightly higher in perceived helpfulness in overall treatment treatment progress, goal pursuit, and obtaining balanced life. Whereas, the SHyNE condition reported higher means in improved sleep and diet. These ratings are consistent with each intervention's targeted elements.

Table 2. Mean (standard deviation) for participant ratings of perceived benefit of interventions and effect size (Cohen's *d*) in each category at 3-month follow-up.

<b>Perceived Helpfulness of Study</b>	<b>SFAS Mean (SD)</b>	<b>SHyNE Mean (SD)</b>	<b>Effect size (<i>d</i>)</b>
Overall Treatment Progress	4.10 (.79)	3.80 (.86)	.36
Pursuing Goals	4.05 (.76)	3.73 (.79)	.41
Time Management	3.80 (.62)	3.33 (.82)	.65 †
Balanced Life	3.95 (.76)	3.47 (1.13)	.50
Improved Sleep	3.35 (.93)	3.73 (.78)	.44
Improved Diet	3.40 (.75)	3.47 (1.06)	.08
Changed Drinking of Drug Use	3.75 (1.16)	3.67 (.98)	.07

†  $p < .1$

### **Primary Outcomes –Substance Use and –Related Outcomes**

#### ***Alcohol and Drug Use Outcomes (TLFB)***

Zero-inflated negative binomial regression analyses, controlling for baseline level of binge episodes, indicated that individuals in the SFAS condition had lower binge episodes at 3-month follow-up compared to those in the SHyNE condition, ( $B (SE) = -1.01 (0.07), p < .001$ ) when assessing the negative binomial process of the model but there were no observed group differences in the zero-inflated process of the model  $B (SE) = 0.32 (0.28), p = .147$ . See Table 4 and Figure 2. Further analyses indicated that although greater percentage of SHyNE participants reported no binge episodes, (61.1% for SHyNE compared to 39.1% for SFAS), of participants who reported having binge episodes, the SHyNE ( $M = 6.20, SD = 11.43$ ) condition reported more frequent binge episodes compared to SFAS,  $M = 3.95, SD = 6.47$ . Results did not indicate treatment group differences in number of past 90-days drinks consumed either in the negative binomial process ( $B (SE) = -0.54 (0.35), p = .125$ ) or zero-inflated process ( $B (SE) = 0.07 (0.21), p = .726$ ); no differences in number of drinking days in the past 90-days either in the negative binomial process ( $B (SE) = -0.30 (0.42), p = .479$ ) or zero-inflated process ( $B (SE) = 0.09 (0.19), p = .1646$ ); and no differences in the number of drinks per drinking day in the past 90-days either

in the negative binomial process ( $B (SE) = -0.20 (0.45), p = .654$ ) or zero-inflated process ( $B (SE) = 0.05 (0.23), p = .820$ ). See Table 4.

Results did not indicate treatment group differences in number of days used illicit drugs at follow up, either in the negative binomial process ( $B (SE) = 0.19 (0.24), p = .417$ ) or zero-inflated process ( $B (SE) = -0.32 (0.19), p = .102$ ).

Table 3. Mean (standard deviation), between and within group effect size (Cohen's *d*) for primary alcohol and drug use outcome (past 90 days) variables at baseline and 3-month (adjusted for baseline value) follow-up for participants who completed the follow-up assessment.

	SFAS ( <i>n</i> =21)	SHyNE ( <i>n</i> =16)	Total ( <i>n</i> =37)	Between Group ( <i>d</i> )
Binge Episodes	26.43 (13.97)	30.00 (13.93)	27.97 (13.88)	
Binge Episodes -3M	3.83 (6.47)	6.36 (11.43)	5.09 (8.864)	.27*
Binge Episodes Within Group <i>d</i>	2.08	1.85	1.96	
Drinking Days	32.05 (20.45)	43.75 (15.39)	37.11 (19.12)	
Drinking Days – 3M	11.50 (16.04)	9.93 (17.38)	10.72 (16.41)	-.09
Drinking Days Within Group <i>d</i>	1.12	2.06	1.48	
Number of Drinks	278.33 (275.22)	450.34 (309.47)	352.72 (299.08)	
Number of Drinks -3M	78.57 (112.75)	50.32 (105.50)	64.45 (107.98)	-.25
Number of Drinks Within Group <i>d</i>	.95	1.73	1.28	
Drinks per Drinking Day	8.62 (5.30)	10.17 (5.90)	9.29 (5.54)	
Drinks Per Drinking Day -3M	5.27 (6.19)	3.45 (5.08)	4.59 (5.67)	-.32
Drinks per Drinking Day Within Group <i>d</i>	.58	1.22	.84	
Illicit Drug use Days	9.81 (24.47)	18.69 (28.78)	13.65 (26.42)	
Illicit Drug use Days -3M	10.20 (18.87)	2.67 (16.47)	6.43 (18.26)	-.42
Illicit Drug use Days Within Group <i>d</i>	.02	.68	.32	

Note. \* Indicate between group differences at  $p < .05$  in negative binomial regression models controlling for baseline levels; IOP = Intensive Outpatient Program; 3M = 3-month follow-up; SIP = Short Inventory of Problems; AUD = Alcohol Use Disorder.

Table 4. Negative binomial hurdle or linear regression results for alcohol and drug use outcome variables.

	SFAS <i>M (SD)</i>	SHyNE <i>M (SD)</i>	<i>B (SE)</i>	[95% CI]	<i>p</i>
<b>Binge Episodes</b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	3.95 (6.47)	6.20 (11.43)	-1.01 (.07)	[-1.12, -0.90]	< .001*
Baseline Binge Episodes			0.32 (.28)	[-0.14, 0.78]	.254
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			-0.25 (.17)	[-0.53, 0.03]	.148
Baseline Binge Episodes			-0.44 (.17)	[-0.73, -0.16]	.011
<b>Number of Drinks (Past 90 Days)</b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	65.84 (112.75)	65.44 (103.41)	-0.54 (.35)	[-1.18, 0.04]	.125
Baseline Number of Drinks			0.94 (.18)	[0.65, 1.23]	< .001
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			0.07 (.21)	[-0.27, 0.41]	.726
Baseline Number of Drinks			-0.38 (.24)	[-0.77, 0.01]	.112
<b>Drinking Days (Past 90 Days)</b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	10.25 (16.04)	11.50 (17.07)	-0.30 (.42)	[-0.99, 0.39]	.479
Baseline Drinking Days			0.98 (.10)	[0.82, 1.15]	< .001
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			0.09 (.19)	[-0.22, 0.40]	.646
Baseline Drinking Days			-0.59 (.21)	[-0.94, -0.23]	.006
<b>Drinks Per Drinking Day (Past 90 Days)</b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	5.29 (6.19)	3.96 (5.02)	-0.20 (.45)	[-0.95, 0.54]	.654
Baseline Drinks per Drinking Day			1.01 (.04)	[0.95, 1.08]	< .001
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			0.05 (.23)	[-0.31, 0.40]	.820
Baseline Drinks Per Drinking Day			-0.18 (.24)	[-0.57, -0.22]	.455
<b>Drug Use Days (Past 90 Days)</b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	5.29 (6.19)	3.96 (5.02)	0.39 (.48)	[-0.40, 1.18]	.415

Baseline Drug Use Days	0.04 (.01)	[0.03, 0.05]	< .001
Zero-inflated process			
Treatment (SHyNE = 0; SFAS = 1)	-0.64 (.38)	[-1.27, -0.01]	.095
Baseline Drug Use Days	-0.03 (.01)	[-0.04, -0.02]	< .001

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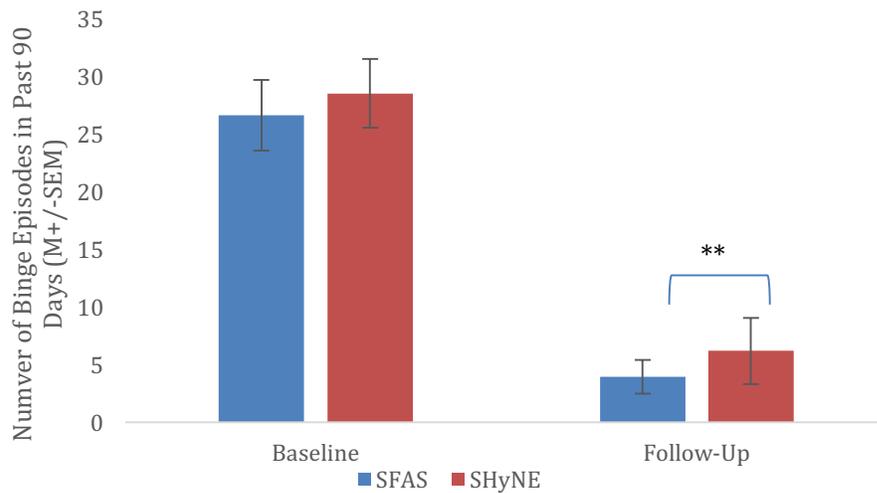


Figure 2. Number of binge episodes in the past 90 days at baseline and 3-month follow-up (follow-up values displayed are adjusting for baseline levels) by treatment condition.  $**p < .001$

### ***Alcohol-Related Problems***

Linear regression analyses, controlling for baseline level of total alcohol-related problems, indicated that although there was an overall reduction in alcohol-related problems among participants who endorsed alcohol consumption at follow-up, individuals in the SFAS condition ( $M = 14.13$ ;  $SD = 11.54$ ;  $n = 14$ ) did not reduce alcohol-related problems at 3-month follow-up at a comparable level as those in the SHyNE condition, [ $M = 6.00$ ;  $SD = 6.95$ ;  $n = 9$ ;  $B (SE) = 0.41 (0.16)$ ,  $p = .008$ ]. See Table 5 and Figure 3. Similarly, results indicated significant differences in the SIP subscales such that individuals in the SFAS condition reported greater interpersonal ( $B (SE) = 0.53 (0.13)$ ,  $p < .001$ ) and intrapersonal ( $B (SE) = 0.41 (0.15)$ ,  $p = .008$ ) alcohol-related problems, and a non-significant trend level differences in physical ( $B (SE) = 0.33 (0.17)$ ,  $p = .052$ ) alcohol-related problems compared to the SHyNE condition at 3-month follow-up. Results did not indicate treatment group differences in social responsibility ( $B (SE) = 0.28$

(0.17),  $p = .095$ ) or impulse control ( $B (SE) = 0.19 (0.18)$ ,  $p = .282$ ) alcohol-related problems at 3-month follow-up.

Linear regression analyses, controlling for baseline level of alcohol use disorder symptoms indicated a non-significant trend level differences in treatment group differences at 3-month follow-up,  $B (SE) = 0.30 (0.15)$ ,  $p = .051$ . See Table 5.

Table 5. Linear regression results for alcohol related problems and alcohol use disorder symptoms

	SFAS <i>M (SD)</i>	SHyNE <i>M (SD)</i>	<i>B (SE)</i>	[95% CI]	<i>p</i>
<b>Total Alcohol-Related Problems</b>					
Treatment (SHyNE = 0; SFAS = 1)	14.13 (11.54)	6.00 (6.95)	0.41 (.16)	[0.16, 0.67]	.008**
Baseline Total SIP Score			0.27 (.17)	[-0.01, 0.54]	.101
<b>Interpersonal Alcohol-Related Problems</b>					
Treatment (SHyNE = 0; SFAS = 1)	3.53 (3.46)	0.42 (0.90)	0.53 (.13)	[0.32, 0.75]	<.001*
Baseline Interpersonal SIP Subscale			0.39 (.14)	[0.16, 0.62]	.006
<b>Intrapersonal Alcohol-Related Problems</b>					
Treatment (SHyNE = 0; SFAS = 1)	3.60 (2.53)	1.75 (1.91)	0.41 (.15)	[0.16, 0.66]	.008*
Baseline Intrapersonal SIP Subscale			0.34 (.16)	[0.08, 0.60]	.033
<b>Physical Alcohol-Related Problems</b>					
Treatment (SHyNE = 0; SFAS = 1)	2.60 (2.56)	1.17 (1.27)	0.33 (.17)	[0.05, 0.61]	.052 †
Baseline Physical SIP Subscale			0.07 (.18)	[-0.22, 0.37]	.675
<b>Social Responsibility Alcohol-Related Problems</b>					
Treatment (SHyNE = 0; SFAS = 1)	2.33 (2.55)	1.33 (2.06)	0.28 (.17)	[0.04, 0.56]	.095
Baseline Social Responsibility SIP Subscale			0.40 (.16)	[0.14, 0.67]	.012
<b>Impulse Control Alcohol-Related Problems</b>					
Treatment (SHyNE = 0; SFAS = 1)	2.07 (2.09)	1.33 (1.67)	0.19 (.18)	[-0.10, 0.50]	.282
Baseline Impulse Control SIP Subscale			0.13 (.19)	[-0.18, 0.43]	.499
<b>AUD Symptoms</b>					
Treatment (SHyNE = 0; SFAS = 1)	3.57 (3.34)	2.33 (3.23)	0.30 (.15)	[0.05, 0.56]	.051
Baseline AUD Symptoms			0.60 (.13)	[0.39, 0.82]	.001

Note. SIP = Short-Inventory of Problems, AUD = Alcohol Use Disorder.

†  $p < .1$ , \* $p < .05$ , \*\* $p < .01$

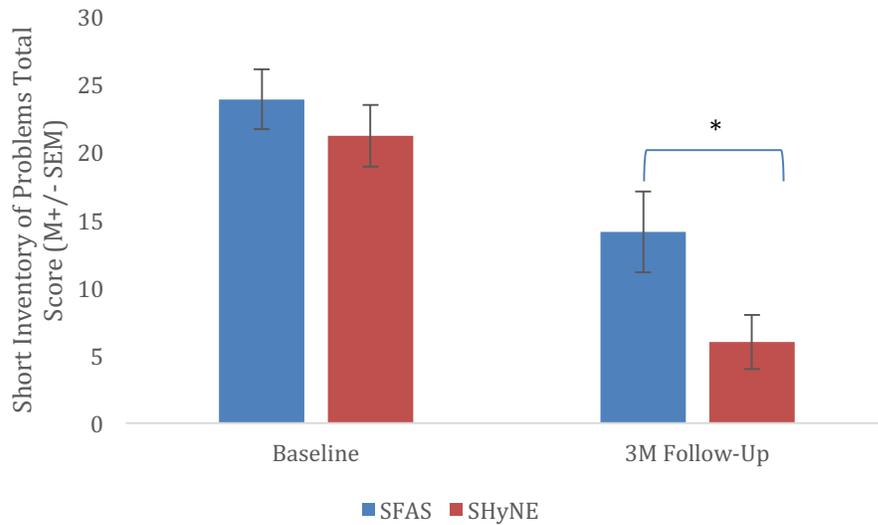


Figure 3. Alcohol-related problems (total score) at baseline and 3-month follow-up by treatment condition. \* $p < .05$

### Secondary Outcomes: Behavioral Economic Variables

#### *Alcohol Purchase Task (APT)*

Zero-inflated negative binomial regression analyses, controlling for baseline level of APT demand metric  $P_{\max}$  (price associated with the maximum expenditure APT index  $-O_{\max}$ ), indicated that individuals in the SFAS condition had lower  $P_{\max}$  values at 3-month follow-up compared to those in the SHyNE condition, ( $B (SE) = .85 (0.31), p = .005$ ) when assessing the negative binomial process of the model (logistic assessment of intensity – decision to purchase drinks vs. decision to decline purchase) and SFAS participants were more likely to decline purchasing any hypothetical drinks compared to SHyNE participants in the zero-inflated process of the model  $B (SE) = 0.42 (0.17), p = .016$ . See Table 6 and Figure 4).

Zero-inflated negative binomial results, controlling for baseline level of APT demand metric  $O_{\max}$  (maximum APT expenditure), did not indicate treatment group differences in APT

demand metric  $O_{\max}$  at 3-month follow-up neither in the negative binomial process ( $B (SE) = -0.07 (0.19), p = .705$ ) nor zero-inflated process,  $B (SE) = 0.26 (0.18), p = .115$ . See Table 6.

Zero-inflated negative binomial regression analyses, controlling for baseline level of APT demand metric Intensity (number of hypothetical drink purchases when drinks are free or \$0), did not indicate significant treatment group differences at 3-month follow-up ( $B (SE) = .27 (0.28), p = .330$ ) when assessing the negative binomial process of the model. However, the zero-inflated process of the model indicated that SFAS participants had more 0 intensity values compared to SHyNE participants at 3-month follow-up,  $B (SE) = 0.47 (0.17), p = .006$ . See Table 6 and Figure 5.

Zero-inflated negative binomial regression analyses, controlling for baseline level of APT demand metric Breakpoint (the price at which consumption is suppressed), did not indicate significant treatment group differences at 3-month follow-up ( $B (SE) = .26 (0.22), p = .225$ ) when assessing the negative binomial process of the model. However, the zero-inflated process of the model indicated that SFAS participants had more 0 breakpoint values compared to SHyNE participants at 3-month follow-up,  $B (SE) = 0.47 (0.16), p = .004$ . See Table 6.

Table 6. Negative binomial hurdle regression results for alcohol demand variables.

	SFAS <i>M (SD)</i>	SHyNE <i>M (SD)</i>	<i>B (SE)</i>	[95% CI]	<i>p</i>
<b>APT Demand P<sub>max</sub></b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	2.61 (3.21)	8.44 (7.84)	-0.85 (.31)	[-1.34, -0.35]	.005**
Baseline P <sub>max</sub>			0.69 (.41)	[0.02, 1.34]	.089
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			0.42 (.17)	[0.13, 0.67]	.016**
Baseline P <sub>max</sub>			0.33 (.16)	[0.07, 0.70]	.038
<b>APT Demand O<sub>Max</sub></b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	10.10 (13.07)	19.34 (15.93)	-0.07 (.19)	[-0.38, 0.24]	.705
Baseline O <sub>max</sub>			1.02 (.05)	[0.94, 1.10]	<.001
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			0.26 (.18)	[-0.01, 0.56]	.115
Baseline O <sub>max</sub>			0.56 (.17)	[0.30, 0.84]	.001
<b>APT Demand Intensity</b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	9.85 (7.88)	12.19 (7.93)	0.27 (.28)	[-0.19, 0.73]	.330
Baseline Intensity			1.00 (.06)	[0.91, 1.10]	<.001
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			0.47 (.17)	[0.19, 0.76]	.006**
Baseline Intensity			0.02 (.19)	[-0.29, 0.33]	.915
<b>APT Demand Breakpoint</b>					
Negative binomial process					
Treatment (SHyNE = 0; SFAS = 1)	6.38 (8.19)	11.25 (8.31)	0.26 (.22)	[-0.09, 0.62]	.225
Baseline Breakpoint			0.96 (.07)	[0.84, 1.08]	<.001
Zero-inflated process					
Treatment (SHyNE = 0; SFAS = 1)			0.47 (.16)	[0.20, 0.73]	.004**
Baseline Breakpoint			0.43 (.17)	[0.15, 0.70]	.011

Note. APT = Alcohol Purchase Task.

\*\**p* < .01

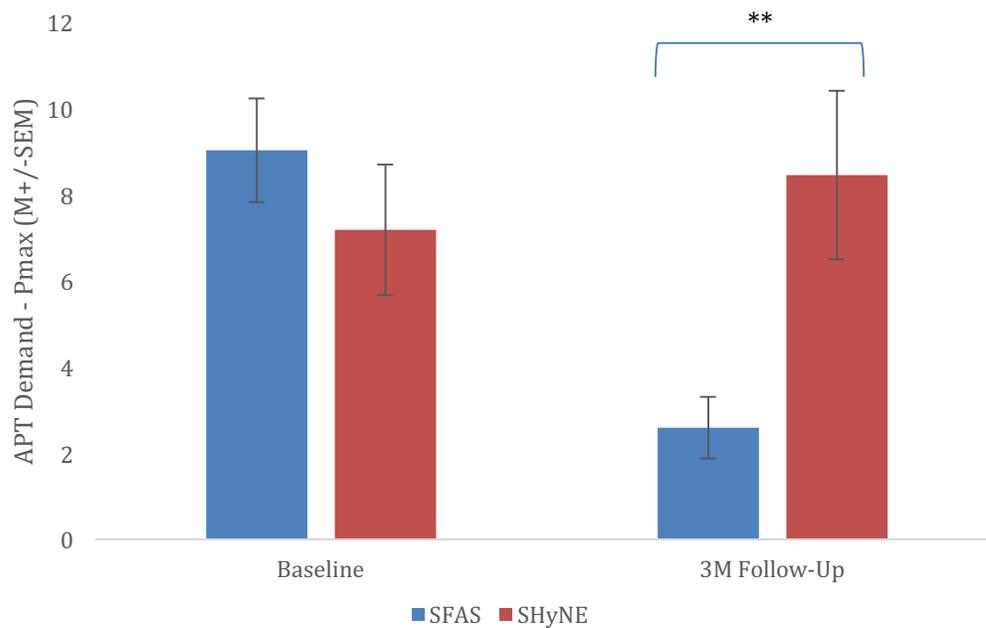


Figure 4. Alcohol Purchase Task (APT) demand metric  $P_{max}$  values at baseline and 3-month follow-up by treatment condition.  $**p < .01$

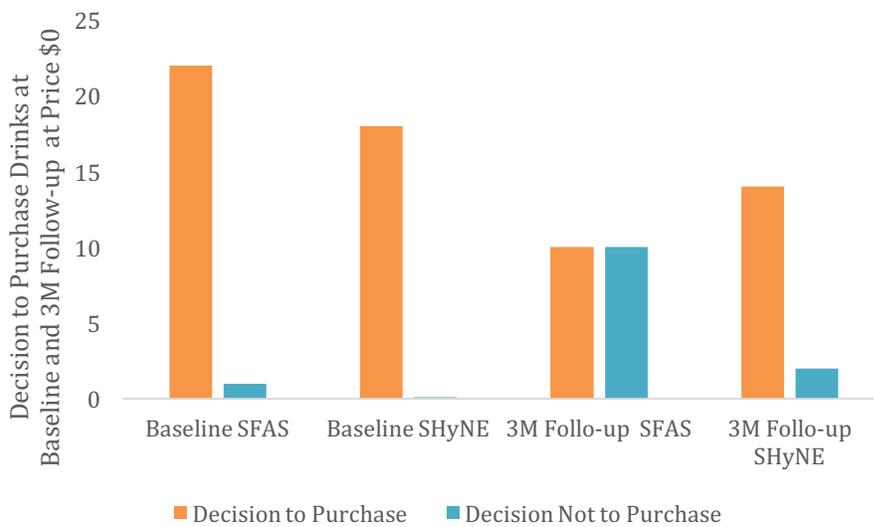


Figure 5. Number of participants who decided to purchase any drinks with the Alcohol Purchase Task (APT) at baseline and 3-month follow-up by treatment condition.

### ***Delay Discounting***

Linear regression analyses, controlling for baseline level of delay discounting score of Impulsive Choice Ratio (ICR), did not indicate treatment group differences in ICR at 3-month follow-up,  $B (SE) = 0.13 (0.15)$ ,  $p = .399$ . See Table 7.

### ***Consideration of Future Consequences (CFC)***

Linear regression analyses, controlling for baseline score of consideration of future consequences (CFC), did not indicate treatment group differences in CFC scores at 3-month follow-up,  $B (SE) = 0.18 (0.13)$ ,  $p = .157$ . See Table 7.

### ***Activity Level Questionnaire – Substance Use Version (ALQ-SUV).***

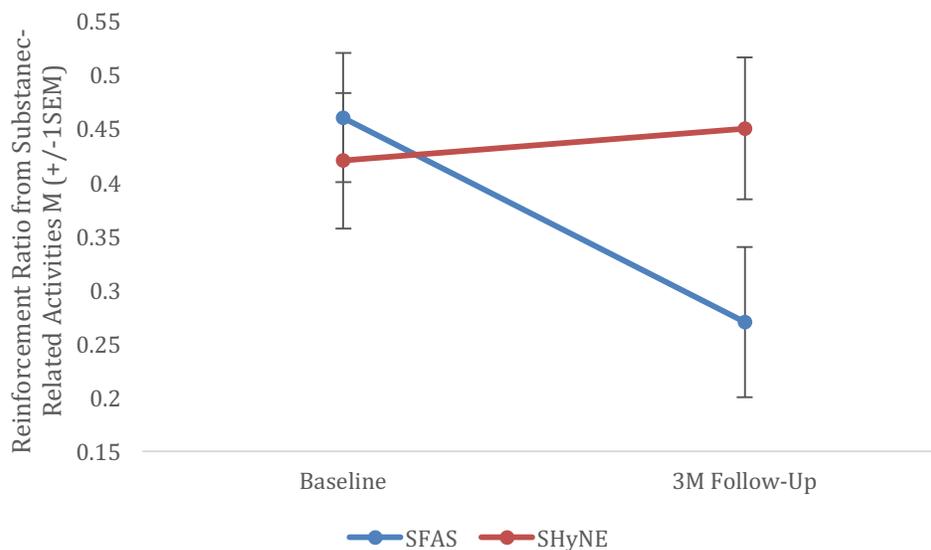
Linear regression analyses, controlling for baseline level of relative reinforcement obtained from substance-related activities (reinforcement ratio) and depression, indicated that individuals in the SFAS condition reported reduced proportionate reinforcement from substance-related activities (reinforcement ratio) at 3-month follow-up compared to those in the SHyNE condition,  $B (SE) = -0.33 (0.14)$ ,  $p = .017$ . See Table 7 and Figure 6.

Table 7. Linear regression results for behavioral economic variables of relative reinforcing value of alcohol-related activities (Reinforcement Ratio), Impulsive Choice Ratio (ICR) as a measure of delay discounting, and future orientation.

	SFAS <i>M (SD)</i>	SHyNE <i>M (SD)</i>	<i>B (SE)</i>	[95% CI]	<i>p</i>
<b>Reinforcement Ratio</b>					
Treatment (SHyNE = 0; SFAS = 1)	0.28 (.33)	0.45 (.25)	-0.33 (.14)	[-0.55, -0.10]	.017*
Baseline Reinforcement Ratio			0.20(.16)	[-0.06, 0.46]	.199
Depression			0.34 (.15)	[0.09, 0.60]	.026
<b>Delay Discounting (ICR)</b>					
Treatment (SHyNE = 0; SFAS = 1)	0.58 (.24)	0.51 (.28)	0.13 (.15)	[-0.12, 0.37]	.399
Baseline ICR			0.45 (.14)	[0.23, 0.67]	.001
<b>Consideration of Future Consequences (CFC)</b>					
Treatment (SHyNE = 0; SFAS = 1)	41.47 (8.02)	37.57 (7.45)	0.18 (.13)	[-0.03, 0.39]	.157
Baseline CFC			0.53 (.12)	[0.34, 0.72]	<.001
Depression			-0.29 (.13)	[-0.50, -0.08]	.024

Note. ICR = Impulsive Choice Ratio; CFC = Consideration of Future Consequences.

\* $p < .05$



*Figure 6.* Level of reinforcement from substance-related activities relative to all available activities (reinforcement ratio) at baseline and 3-month follow-up by treatment condition.

### ***Time Allocation***

Zero-inflated negative binomial and linear regression analyses, controlling for baseline time allocation to the respective substance-free categories, did not indicate significant treatment group differences at 3-month follow-up for any of the weekly time allocation categories. See Table 8.

Table 8. Negative binomial hurdle or linear regression results, treatment condition mean and standard deviation values for weekly time allocation variables at 3-month follow-up.

Time Allocation Variables	SFAS <i>M (SD)</i>	SHyNE <i>M (SD)</i>	<i>B (SE)</i>	[95% CI]	<i>p</i>
<b>Exercise</b>					
Negative Binomial Process					
Treatment (SHyNE = 0; SFAS = 1)	6.95 (6.11)	4.88 (6.94)	-0.13 (.42)	[-0.81, 0.56]	.764
BL Time on Exercise			1.01 (.02)	[0.97, 1.04]	<.001
Zero-Inflated Process					
Treatment (SHyNE = 0; SFAS = 1)			-0.24 (.15)	[-0.48, 0.01]	.118
BL Time on Exercise			-0.71 (.14)	[-0.94, -0.48]	<.001
<b>Vocation (Work/School)</b>					
Negative Binomial Process					
Treatment (SHyNE = 0; SFAS = 1)	41.03 (19.29)	27.48 (24.2)	-0.74 (.55)	[-0.03, 0.39]	.182
BL Time on Vocation			1.08 (.22)	[0.34, 0.72]	<.001
Zero-Inflated Process					
Treatment (SHyNE = 0; SFAS = 1)			-0.31 (.19)	[-0.03, 0.39]	.102
BL Time on Vocation			-0.61 (.22)	[0.34, 0.72]	.007
<b>Significant Other</b>					
Negative Binomial Process					
Treatment (SHyNE = 0; SFAS = 1)	9.43 (11.11)	11.24 (12.2)	0.52 (.55)	[-0.39, 1.43]	.345
BL Time with Significant Other			0.99 (.19)	[0.67, 1.31]	<.001
Zero-Inflated Process					
Treatment (SHyNE = 0; SFAS = 1)			0.07 (.19)	[-0.24, 0.38]	.707
BL Time with Significant Other			-0.47 (.21)	[-0.81, -0.13]	.024
<b>Volunteer or Spiritual Activity</b>					
Negative Binomial Process					
Treatment (SHyNE = 0; SFAS = 1)	2.95 (4.53)	5.07 (6.71)	-0.45 (.55)	[-1.35, 0.46]	.419
BL Time on Volunteer or Spiritual			0.88 (.13)	[0.40, 1.36]	.003
Zero-Inflated Process					
Treatment (SHyNE = 0; SFAS = 1)			0.15 (.18)	[-0.15, 0.43]	.408
BL Time on Volunteer or Spiritual			-0.35 (.22)	[-0.72, 0.02]	.118
<b>Family of Origin</b>					
Treatment (SHyNE = 0; SFAS = 1)	10.84 (8.16)	18.84 (13.8)	-0.01 (.13)	[-0.21, 0.20]	.946
BL Time with Family of Origin			0.75 (.09)	[0.59, 0.90]	<.001

Note: BL = Baseline

## Discussion

The current study aimed to adapt the Substance-Free Activity Session (SFAS) – a behavioral economic theory based single session intervention – as a supplemental treatment for an adult outpatient alcohol treatment-seeking population. The intervention included four weekly booster contacts in the form of text message or email reminding participants about session content and provide ongoing personalized feedback on goals and locally available substance-free activities. This study assessed the feasibility and acceptability of the SFAS as well as the impact of the SFAS on alcohol and drug use outcomes, alcohol-related problems, and behavioral economic outcome measures on relative reinforcement to substance-related (reinforcement ratio) and pro-social activity engagement (time allocation) and future orientation compared to a control condition of sleep hygiene and nutrition education (SHyNE). The overall pattern of results provides limited initial support for the utility of the SFAS as an adjunctive treatment to standard outpatient programs as patients in the SFAS condition reported reduction in binge drinking episodes, reduction in reinforcement ratio, and reduction in hypothetical drink purchases. However, there were no overall group differences in drinking level and control participants reported greater reductions in alcohol problems. Specific findings, implications, study limitations as well as intervention feasibility and acceptability are discussed below.

### *Treatment Fidelity, Feasibility, and Acceptability*

The study's outcomes suggest the feasibility and acceptability of the SFAS as an adjunctive treatment for standard outpatient alcohol treatment. Independent coders confirmed that the delivery of both interventions, the SFAS and SHyNE, were consistent with the study protocol and that key elements of the interventions were delivered as expected with minimal cross contamination between the two protocols. Further, trained MI coders confirmed that the

SFAS sessions were delivered in MI style where clinicians' behavior in session was rated to be consistent with an MI approach.

Participants in both conditions gave high satisfaction ratings for their clinician as well as the contents of the sessions. Although there were no statistical differences in satisfaction ratings between both conditions, the SFAS average satisfaction ratings for both clinician and session were slightly higher when compared to SHyNE. At follow-up, the SFAS participants reported greater perceived helpfulness of the the SFAS in the domains it targeted -goal pursuit, time management, and achieving balanced life- with medium to large effect sizes compared to the SHyNE condition ( $d = 1.7, .65, .50$ , respectively, Table 2).

These findings suggest that trained clinicians would be able to effectively deliver the intervention in the context of an already established treatment program and that it can be successfully incorporated within treatment as usual as well as be well accepted by patients. The study intervention clinicians were not part of participants' mental health treatment team and were introduced to the participant for the purpose of the study. It is possible that patients would benefit further from an SFAS session delivered by a counselor who already has an established therapeutic relationship and may be able to deliver an SFAS intervention that is more personalized as the therapist would be knowledgeable about the patient's needs in the context of the treatment as a whole. However, the role of the SFAS' interventionist has yet to be investigated. Future studies would benefit from examining treatment outcomes for the SFAS either delivered by a clinician familiar to the patient (e.g., their own treatment provider) or a clinician who is not as familiar to the patient (e.g., a study interventionist).

## **Primary Outcomes – Substance Use and –Related Problems**

### ***Alcohol and Drug Use Outcomes***

SFAS participants reported greater reductions in heavy drinking episodes at follow-up compared to SHyNE participants in the continuous negative binomial model. The binary zero-inflated model, although not statistically significant, suggested that SHyNE participants may have been less likely to have binge episodes. In other words, although fewer SHyNE participants engaged in any binge drinking, those who had any binge episodes in the past 3-months had more frequent episodes.

Overall, both treatment conditions reduced on all drinking outcomes at 3-month follow-up compared to baseline, which is likely due to their treatment as usual. There were no group differences observed in the drinking or drug use variables besides binge drinking episodes. This result is somewhat consistent with Murphy et al., 2012's findings that the SFAS was associated with greater reductions in heavy drinking among participants who reported low levels of substance-free reinforcement or high levels of depression at baseline. Although this sample was not powered to test for moderated effects, the current sample's overall reported depression level is notably higher in comparison to the collegiate sample in Murphy et al.'s (2012) study. Their finding that the SFAS was associated with greater reduction in heavy drinking for individuals with higher depression, is consistent with our results within a population who report significant depressive symptoms. The current results further confirm the utility of the SFAS for populations with lower available sources of reinforcement. Our findings are consistent with a recent multi-session intervention trial that utilized a behavioral activation approach to target increased substance-free activities and lowering depression for patients in residential substance use treatment and found an associated reduction in drinking levels (Daughters et al., 2017). Although

we did not observe differences in depression levels, our results do suggest SFAS participants lowered their relative reinforcement from substance-related activities compared to SHyNE (see below for further discussion on reinforcement ratio). One of SFAS's primary intervention targets is increasing engagement in substance-free, prosocial, and constructive activities (Murphy et al., 2005). Thus, increasing the availability of alternative rewards for individuals who had fewer available substance-free reinforcement could have been a mechanism for facilitating reductions in heavy drinking. Nevertheless, our results for reduction in binge episodes should be interpreted with caution as we did not observe reductions in both likelihood of engaging in binge drinking as well as reductions in frequency of binge drinking. Further, the effect size of overall drinking improvements observed in this population (Table 3) is larger compared to prior studies of behavioral treatment for AUD (Magill & Ray, 2009). This result could have contributed to a potential ceiling effect for overall drinking improvements and in addition to the small sample size prevented the detection of treatment effect of the SFAS. Future replication studies with bigger sample size are needed to assess these outcomes as well as better evaluate mediators of treatment outcomes.

### ***Alcohol Related Problems***

All participants reported reductions in alcohol-related problems at follow-up compared to baseline, which is likely due to their engagement in treatment as usual. However, contrary to our hypothesis #2, our results indicated that the SHyNE condition was associated with lower alcohol-related problems at follow-up compared to the SFAS condition. This finding is surprising given that SFAS participants had fewer heavy drinking episodes at follow-up compared to SHyNE and no group differences in our other measures of drinking level (number of drinking days, number of drinks consumed, or drinks per drinking day). In other words, SFAS participants reported

greater alcohol-related problems despite having fewer heavy drinking episodes compared to SHyNE participants. These findings should be interpreted with caution given the smaller sample size, as alcohol-related problems were only computed for individuals who endorsed alcohol consumption at follow-up.

This tentative finding is inconsistent with results reported by Murphy et al., 2012, which suggested the SFAS intervention lowered alcohol-related problems among heavy drinking college students. This discrepancy in findings may be due to the level of treatment the two samples received. The sample in Murphy et al.'s study received only a brief alcohol intervention plus the SFAS or relaxation training (two sessions total) whereas in the current sample, participants in both conditions received more intensive and comprehensive treatment which may have attenuated the unique contribution of the SFAS intervention. Additionally, the different outcomes in the two studies may be due to the severity of problems experienced by non-treatment seeking young adults compared to treatment seeking adults. The two studies (Murphy et al., 2012 and the current study) utilized different measures of alcohol-related problems, making it difficult to directly compare the level of severity reported. However, the nature of the samples (treatment seeking vs. non-treatment seeking) can speak to the participants' level of impairment caused by alcohol. It may be that participants in the current study are experiencing more severe problems that have persisted for a longer period and that this intervention may not have been as potent for a more severe population compared to relatively higher functioning full-time college student population.

One possible interpretation for this findings is that education on sleep hygiene and nutrition was a more powerful intervention than anticipated when delivered in addition to treatment as usual and resulted in improved sleep and nutrition quality. Better sleep and nutrition

could have helped participants increase their energy level thereby producing improved mood and accomplish more during the day, mitigating some of the negative consequences of alcohol. Prior studies have shown that although behavioral treatment for sleep among patients in AUD treatment have no effect on alcohol consumption or relapse rate, it has shown to effectively improve sleep quality and overall daytime functioning (Arnedt, et al., 2011; Currie, Clark, Hodgins, & Guebaly, 2004, Brower, 2015). However, these studies did not report findings on the effects of improved sleep on alcohol-related problems. Future investigations are necessary to evaluate the effects of treating poor sleep in AUD treatment. Further, there is a lack of research on the utility of nutrition education or intervention for patients in AUD treatment (Bowman, Deringer, Fritz, Raidl, & Paradis, 2016). Our results could suggest the potential benefit of incorporating sleep hygiene and nutrition education as part of treatment for patients in AUD treatment, however, further investigation is warranted prior to making conclusive remarks.

Alternately, it is possible that the SFAS participants reported higher alcohol-related problems due to increased awareness of the negative impact of alcohol. The content of the SFAS intervention requires participants to reflect on how alcohol consumption has interfered with their goals and values. Thus, one argument could be that these results suggest an iatrogenic effect – an unintended worsening of symptoms after treatment (Moos, 2012). In other words, the SFAS intervention prohibited participants from experiencing reductions in alcohol-related problems at the same rate as the SHyNE condition, potentially because participants were experiencing increased negative affect due to heightened salience of their problems engendered by drinking. Although possible, an iatrogenic effect due to the SFAS intervention is unlikely because our general results did not indicate an overall deterioration of substance use outcomes.

An alternative explanation to an iatrogenic effect is that the increased awareness of alcohol-related problems may be helping participants increase action towards resolving those problems. During the SFAS session, some of the most frequently endorsed goals were related to repairing relationships, self-care in the form exercise or continued mental health treatment, and pursuing a career or employment opportunities. Resolution of such goals, can often be complex and take substantial time to accomplish. Thus, the current study's 3-month follow-up period may have been too brief to see the successful realization of these goals and observe the associated reduction in alcohol-related consequences. In their study targeting substance-free activity engagement and improved depression for patients in residential alcohol treatment, Daughters et al., 2017, found that reductions in adverse consequences from substance-use was not significantly different from the control condition until six-months post treatment and those reductions were retained at 1-year follow-up. Findings from Daughters et al. (2017) further support the interpretation of the current study's alcohol-related problems at 3-month follow-up may have been due to the natural progression of treatment and longer time is necessary to see the long-term effects on the intervention. Furthermore, results from the SIP subscales support this interpretation as they indicate that SFAS participants reported lower alcohol-related problems in the domains of interpersonal, intrapersonal, and physical consequences but there were no group differences in the impulse control or social responsibility sub-scales. Items on the interpersonal, intrapersonal, and physical problems sub-scales reflect more long lasting, internal and emotionally complex consequences like, "I have felt guilty or ashamed because of my drinking" or "A friendship or close relationship has been damaged by my drinking." Whereas items on the impulse control and social responsibility subscales are more behaviorally oriented, such as, "I have taken foolish risks when I have been drinking" or "I have failed to do what is expected of

me because of my drinking.” Therefore, these results may suggest that SFAS participants are changing their behavior such they may no longer be engaging in impulsive or socially unfavorable behaviors, however, the emotional response to the changed behavior has yet to emerge. Future replication studies with larger samples and longer follow-up periods are needed to better understand the progression of these outcomes over time.

## **Secondary Outcomes: Behavioral Economic Variables**

### ***Alcohol Purchase Task***

Our findings that the SFAS condition had lower alcohol demand as measured by the index of  $P_{max}$  and lower likelihood to make any hypothetical drink purchase (results of the negative binomial process when dichotomously assessing participants’ decision to purchase one or more drinks vs decline to purchase) compared to those in the SHyNE condition at 3-month follow-up provide partial support for hypothesis #4. This finding is consistent with the broader literature suggesting the treatment implications of alcohol demand. Heavy drinkers treated by naltrexone reported reductions in intensity,  $O_{max}$ , and breakpoint indices of alcohol demand (Bujarski, MacKillop & Ray, 2012). In the context of behavioral treatment, although Dennhardt, Yurasek, & Murphy (2015) did not find that the SFAS was associated with changes in alcohol demand, they found that demand (intensity,  $O_{max}$ , and elasticity) generally improved after brief alcohol intervention and that change in demand predicted reductions in drinking and alcohol-related problems at follow-up. The abovementioned studies suggest that alcohol demand is susceptible to intervention and that changes in valuation of alcohol predict drinking outcomes. The current study is the first to report findings that the SFAS, an intervention targeting increased engagement in goal-oriented substance-free activity and valuation of future outcomes, may have lowered the reinforcing value of alcohol above and beyond traditional outpatient treatment. The

mechanism of this change may have been due to participants' lowered reinforcement from substance-related activities, thereby producing an associated reduction in perceived value of alcohol. However, it should be noted that this study's negative binomial regression models did not indicate significant effects of the SFAS in the demand metrics of intensity,  $O_{max}$ , and breakpoint like the previous studies. Future replication studies are warranted to further investigate the impact of the SFAS on other demand metrics and possible mechanisms of this change.

### ***Future Orientation***

The current results did not find significant group differences on either measure of future orientation (Consideration of Future Consequences and Delay Discounting). These results did not support hypothesis #5, in which we anticipated that SFAS participants would report increased sensitivity to delayed outcomes and future time orientation at 3-month follow-up compared to participants in the SHyNE condition. However, it is worth noting that although there were no statistically significant findings, the mean score for Consideration of Future Consequences scale at follow up were higher for SFAS participants compared to the SHyNE (See Table 7). It is possible that statistical significances were not detected due to small sample size. Murphy et al. (2012) found a non-significant trend level effect where young adult heavy drinkers who received the SFAS intervention showed increased scores in consideration of future consequences. However, the authors did not find an effect on delay discounting, nor did discounting predict outcomes.

The current study was the first to incorporate an Episode Future Thinking (EFT) task to the SFAS intervention. EFT requested participants to vividly imagine experiencing a positive event in the future, with the intention to increase future orientation. Indeed, previous studied

have shown reductions in delay discounting among participants with alcohol dependence (Snider, LaConte, & Bickel, 2016) as well as obesity (Daniel, Stanton, & Epstein, 2013) immediately after an EFT task. The current study did not measure delay discounting immediately after the intervention but only at the 3-month follow-up. Our null results for delay discounting and consideration of future consequences may suggest that the intervention has proximal effect of future orientation but that the effects are not sustained over time. Future research should measure future orientation immediately after treatment to better capture the direct effect of the treatment.

The literature suggests that higher discounting is associated with greater substance use even after an intervention (Passeti, Clark, Mehta, Joyce, & King, 2008; MacKillop & Kahler, 2009). Inversely, studies have found that a naturalistic index of delay discounting (greater proportional relative discretionary expenditures towards savings rather than alcohol) predicted natural recovery from alcohol misuse among adults (Tucker, Foushee, & Black, 2008). Overall, prior research suggest that discounting is a predictor of treatment response and there may be less evidence to suggest that discounting rates are changed as a result of treatments such as the SFAS that target future orientation yet there might be some preliminary evidence for changes in consideration of future consequences (Murphy et al., 2012; Dennhardt, Yurasek, & Murphy, 2015). There needs to be further research investigating the intervention's impact on future orientation as measured by the Consideration of Future Consequences Scale.

### ***Time Allocation and Relative Reinforcement Ratio***

Our results did not indicate that treatment condition produced change in prosocial and constructive activity engagement as measured by the weekly time allocation (Table 8). However, our results did suggest the SFAS condition was associated with significant reductions in the

reinforcement ratio compared to SHyNE condition. This finding is in partial support of hypothesis #3, in which we anticipated that SFAS participants would report significantly lower reinforcement ratio from substance-related activities and increased substance-free activity participation and engagement at 3-month follow-up compared to participants in the SHyNE condition. This study was unable to replicate the time allocation findings from Murphy et al., 2012, in which they found that the SFAS was associated with change in the goal-oriented activity of increased evening time allocated to studying among heavy drinking college students. This lack of finding may be a result of the heterogeneity of the current sample who, by comparison to college students, may not have one common goal (i.e., graduating college with good grades). As a result, it is difficult to aggregate and measure one category of constructive, prosocial, goal oriented activity that all participants share, as it will likely vary across all individuals in the study. Further, it is also possible that participants in the current study may not have access to the types of rewards that are more readily available for college students (e.g., built in social networks, social and academic events, mentors and advisors...etc.).

Our finding that the SFAS was associated with reduction in reinforcement ratio is largely consistent with prior studies. Murphy et al., 2005 found that participants who derive greater proportion of their total reinforcement from substance-related activities reported elevated drinking after an intervention. Further, Dennhardt et al., 2015 reported that reductions in reinforcement ratio predicted lower levels of alcohol-related problems and marijuana use at 6-month follow-up among heavy drinking young adults. These two studies (Murphy et al. 2005 and Dennhardt et al. 2015) suggest that changes in reinforcement ratio is predictive of SFAS intervention outcomes. Furthermore, the current findings that the SFAS reduced reinforcement-ratio 3-months later could perhaps suggest that the SFAS may have beneficial long-term

outcomes. Future studies with longer follow-up assessments are needed to better examine the extended effects.

This study is the first to demonstrate that the SFAS was associated with reductions in reinforcement ratio among participants who are already engaged in treatment and that these effects were specific to the SFAS intervention. These results are an exciting and promising supplement to outpatient AUD treatments with potential benefit to adult treatment seekers. However, further research is warranted that includes a larger sample of treatment seekers and that outcomes be observed over a longer follow-up period to assess if the effects are retained.

### **Implications**

The overall results of the present study indicate that a single session SFAS intervention with brief booster contacts delivered remotely via text message or email have the potential to enhance treatment outcomes for patients engaged in outpatient AUD treatment. Further, this pilot trial demonstrated feasibility and acceptability of the SFAS as a supplement to outpatient treatment. This is the first study to implement the behavioral economic theory informed SFAS intervention within the context of outpatient treatment program and tailor it for treatment seekers. Prior to the present study, the SFAS has primarily been utilized as an adjunctive intervention in conjunction with brief motivational interventions for non-treatment seeking young adults (Murphy et al., 2012; Yurasek et al., 2015).

Overall, the results of the present study indicate that a the SFAS was associated with lower frequency of heavy drinking episodes, alcohol demand metric of  $P_{max}$ , and reinforcement ratio to substance-related activities relative to all available activities, above and beyond treatment as usual. These findings have important implication for researchers and clinicians looking to improve AUD treatment outcomes. This is a preliminary study with promising results to suggest

that a brief, single-session intervention with remotely delivered booster contact, may contribute unique and positive treatment elements not typically included in outpatient treatment.

This study also included a novel method of delivering booster content to participants. Study participants were sent either a text message or email (depending on participant preference) with brief reminders of their goals and personalized information on locally available substance-free activities. Prior research with remote SFAS booster content delivery utilized a phone call to remind participants on the contents of the in-person intervention (Murphy et al., In Progress). The current study found that, on average, participants confirmed reading 3 out of 4 of the booster messages, perhaps future studies should continue to prompt participants to confirm booster receipt to insure all intervention delivery (the current study only sent one prompt per message). Further, our study did not assess the direct impact of the text message/email booster or in-person intervention delivery on study outcomes. Future dismantling studies are needed to parse out the most potent elements of the intervention. Regardless, there is evidence to suggest that electronically delivered interventions, and in particular, interventions targeting substance-free activity engagement are effective in improving heavy drinking outcomes. A recent review of interventions utilizing behavior change techniques (BCTs) delivered digitally, though computer or mobile device, for heavy or hazardous drinking, reported that “behavior substitution” which is akin to substance-free reinforcement was one of the main treatment targets that is associated with greater alcohol intake reductions (Garnett et al., 2018). The authors further write that the mechanism for this process’ effectiveness, “Is that [behavior substitution] helps people who are engaged in self-directed behavior change identify practical and specific ways of reaching their drinking reduction goals” (p. 8). Thus, incorporating interventions such as the SFAS, targeting future orientation and goal directed behavior, into already existing alcohol treatment facilities

may be an essential next step in improving outcomes. The results of this pilot trial call for further investigation on the utility of the SFAS as a supplemental treatment for standardized outpatient programs.

### **Limitations and Future Directions**

A notable limitation for this study is in the comparison group. First, the study did not include an assessment only control condition with no additional clinician contact time for participants above and beyond their treatment as usual. An assessment only condition would be a useful comparison group to evaluate the outcomes of this treatment seeking population with no additional intervention. Second, although not likely, it is important to consider that the SHyNE control condition may have been more potent of an intervention than anticipated and may have produced change for participants in the context of sleep and nutrition improvements. Future studies should consider a more benign topic of discussion for an active control condition.

Due to the pilot nature of the present study, it was difficult to determine or parse out the specific effects of the booster contacts on study outcomes. It is necessary for future studies to assess the influence of booster contacts by varying the frequency and duration of the delivery. There is also a need to assess participants' feedback on the booster's utility and efficacy in helping with goal pursuit, substance-free activity engagement, and overall gains in treatment outcomes. Future studies are needed to better evaluate the different components of the intervention and their contributions to treatment outcomes.

The study had a single follow-up assessment at 3-months following baseline. This follow-up period may have been too brief and prevented the observation of the intervention's effect over a longer period of time. Particularly, it would have been beneficial to assess if reductions in heavy drinking episodes were sustained over time and if any other drinking level

outcomes would have emerged. Further, a longer period of follow-up assessments would have allowed for an evaluation of participant's reported alcohol-related problems over time and to assess if SFAS participants lower their alcohol-related problems to the same level or produce even further reductions in comparison the SHyNE condition. Future replication studies are needed to assess intervention outcomes at multiple follow-up assessments over a longer period of time.

It should also be noted that the small sample size of this study may have prevented the detection of significant group differences in the treatment effects. In particular, this study did not have large enough sample sizes across the different treatment facilities to adequately evaluate the different potential impact of the SFAS implementation across different AUD treatment modalities. Further, the study utilized retrospective self-report data for all drinking and activity engagement variables and these reports may have been subject to recall bias. Although the 90-day timeline follow back has been found a reliable measure of alcohol consumption (Sobell & Sobell, 1996) and researchers report that self-reported alcohol use and alcohol-related problems can be valid and reliable (Arterberry, Martens, Cadigan, & Smith, 2012), it is worth noting this potential limitation. Future studies can consider prospective assessments on drinking and activity engagement level, perhaps using method such as ecological momentary assessments to more accurately measure frequency of alcohol consumption and activity engagement.

Despite these limitations, the current study has a potential to provide feasible and effective supplement to outpatient treatment programs. This pilot study was able to provide initial evidence for effectively incorporating the behavioral economic theory based SFAS intervention within an adult treatment seeking population. Further, our results suggest that the SFAS was associated with possible reductions in frequency of heavy drinking episodes and

lower relative reinforcement from substance-related activities above and beyond treatment as usual. Studies have demonstrated that extant outpatient alcohol treatment has relatively low effect sizes (Magill & Ray, 2009) and there is a need for improving treatment outcomes. The findings from this study provide preliminary support for the feasibility of incorporating the SFAS into treatment as usual and the potential to improve patient outcomes enrolled in outpatient treatment with a single session, theory based intervention that would be relatively low cost to incorporate within treatment programs.

## **Conclusions**

This study evaluated the single-session behavioral economic theory informed intervention, SFAS, as an adjunctive treatment for outpatient treatment programs serving adult treatment seekers for AUD. Patients engaged in treatment at various treatment facilities were recruited and randomized to either the SFAS or an active control condition. Participants received four weekly booster contacts after the in-person intervention either via text message or email. Our results indicate that the SFAS was associated with reductions in heavy drinking episodes, lower alcohol demand on the  $P_{max}$  demand metric, and reduction in relative reinforcement ratio to substance-related activities at 3-month follow-up compared to the control condition. However, the nutrition and sleep education control condition was associated with greater reductions in alcohol problems.

Overall, this study suggests the feasibility and acceptability of the SFAS as a supplemental treatment to outpatient treatment programs. Further, the study results provide initial support that targeting enhancing goal-oriented and substance-free activity engagement in the context of AUD treatment has additional benefit above and beyond treatment as usual. Further research to address the significant limitations of this study (short follow up period, small

sample size, absence of a no-intervention control) is necessary to better evaluate the relative efficacy and unique contributions of the SFAS as an adjunctive intervention in outpatient treatment programs.

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Appendix

**Interviewers Manual for the  
Substance-Free Activity Session  
(SFAS)**

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## Theoretical Basis and Overarching Goals of SFAS

### **1) Increase engagement in enjoyable and meaningful alternatives to drinking and drug use.**

Behavioral economic theory suggests that individuals are less likely to drink if they have activities that compete with drinking – both in terms of enjoyable evening activities that directly substitute for drinking and daytime activities that might enhance mood, provide a sense of purpose, and give individuals a reason to get up each morning. The literature suggests that substance-free social activities, exercise, recovery-related activities (12-step meetings), hobbies and recreational activities, and spiritual activities may be especially conducive to recovery.

**2) Identify the participant’s short-term (activities of daily living) and long-term (6 months or longer) goals (i.e. hobbies, family, social, occupational interests, educational, fitness and health, community engagement) goals.** In addition to identifying participant’s goals, clarify what key values are these goals consistent with? This is a way of identifying and highlighting potential alternatives to drinking, which makes them more salient and effective as ways to reduce drinking. The clinician should try to make explicit connections between long term goals and the kinds of short term patterns of behavior that the participant can participate in now (and can be measured as an outcome variable – increased time spent with family, exercising, or volunteering). Ideally we will encourage tangible changes in activity patterns that can be detected at the 3-month follow-up.

**3) Increase the extent to which participant’s behavior is organized around the pursuit of long term goals.** Heavy drinkers tend to devalue (discount) delayed outcomes (health, career, social consequences) in favor of doing something that feels good in the moment (drinking, drug use, idle leisure; Vuchinich & Simpson, 1998). It may be helpful to explicitly discuss and normalize this tendency, and, if the participant is interested, offer strategies to combat this such as a) thinking about their day to day activities in terms of the immediate and long term pros and cons, b) thinking about long-term goals and talking about these goals with friends, family, or coworkers, c) committing to patterns of activities to avoid last minute impulsive choices (committing to going to volunteer Sunday morning to avoid going out late on Saturday night, making plans to exercise with friends), d) recording progress toward goals such as time spent with family or exercising, and e) making a schedule of goals and activities for each week.

**4) Explore the connection between drinking and drug use and the participant’s ability to achieve his/her short and long term goals.** It may be helpful to validate that drinking and drug use offers short term benefits (enjoyment, enhancing social activities, providing a break from pressures or hard work) but encourage the participant to explore the extent to which drinking is consistent with his/her long term goals (e.g., does drinking and drug use impact good health and fitness, financial well being, relationships, educational success, potential employment opportunities or promotions). Illicit the extent to which the participant believes their alcohol use

has impacted their goals (or might impact their goals should the current pattern continue). Have participant generate specific strategies they can use to help them achieve their goals.

**5) Provide some practical advice (when needed and with the participant's permission) related to reducing drinking/abstaining and engaging in substance-free activities.** This might include tips on organization, time management, stress management, and identifying personalized local substance-free activity options that are consistent with goals and interests. Participants should first be encouraged to generate ideas on their own before the clinician suggest other options. This advice should be given judiciously and consistent with Motivational Interview style (e.g., ensure that the participant is interested in receiving the advice and maintain an interactive non-lecturing style). In many cases the short session length will not permit lengthy advice but the clinician can provide handouts and recommendations for additional resources the participant can use to address the issue.

**6) Maintain a Motivational Interviewing Style.** Motivational interviewing (MI) is a therapeutic style that has been used frequently in the context of brief interventions (Miller & Rollnick, 2012). Motivational interviewing has been defined as "a directive, client centered counseling style for eliciting behavior change by helping clients explore and resolve ambivalence" (Rollnick & Miller, 1995, p. 326). It has also been described as an approach that combines both style (empathy) and technique (reflective listening; Miller, 1996). Specifically, the interviewer helps the client explore and resolve ambivalence about changing one's behavior (in this case, increasing engagement in substance free [SF] activities). The interviewer creates an atmosphere of collaboration during the session, adopting the role of a consultant who listens to and gently directs the client towards a greater understanding of his/her problems and options for change. Problems are not assumed; instead, the interviewer explores pros and cons of a particular course of action or behavior pattern, but remains open-minded about the need for change. The client alone is responsible for any changes that are made. Above all, the interviewer avoids being confrontational; a style observed to result in client resistance and even increased drinking (Miller, Benefield & Tonigan, 1993).

The role of values is especially important in motivational interviewing. Specifically, MI is a way of communicating with the participant to identify how current behaviors conflict with values that he or she holds more highly.

“The idea of developing internal discrepancy necessarily raises the question, ‘Discrepancy with what?’ It is the discrepancy with the person's own goals and values. Unless a current ‘problem’ behavior is in conflict with something that the person values more highly, there is no basis for MI to work. The focus is on intrinsic motivation for change. It is irrelevant whether the client's behavior is discrepant with someone else's values, unless it is someone highly regarded and valued by the client, in which case intrinsic value discrepancy is again operating... MI will not induce behavior change

unless the person perceived that such change serves an intrinsic value and is thereby in his or her own best interest.” (Miller & Rollnick, 2012, p. 245).

Therefore, the purpose of the SFAS session is to explore the participant’s personal goals and values, and highlight how the current substance use behaviors may conflict with these goals and values. If such a discrepancy exists, intrinsic motivation to reduce substance use in the service of these life goals will be fostered. If such a discrepancy does not exist, then intrinsic motivation to reduce substance use will not be developed. However, alcohol treatment patients may be motivated to pursue patterns of substance-free behavior that generate reward in order to assist their recovery. This is consistent with both 12-step and behavioral/cognitive-behavioral treatment approaches and may be an important motivating factor for many patients who are highly motivated to pursue their recovery and may benefit from assistance with developing patterns of alternatives to drinking/drug use.

In the SFAS, the interviewer will perform a variety of tasks related to motivational interviewing: providing personalized assessment feedback; listening actively and empathically; and prompting greater self-awareness of how the participant is adjusting to the treatment, developing and working towards their treatment and personal goals, spending his/her time in a variety of activities, and developing substance-free interests. These tasks can be achieved using the *Elicit-Provide-Elicit Process*: (a) the client describes a behavior related to their lifestyle or goals, asks a question, or discloses some information, (b) the interviewer provides a reflection or some informational feedback in nonjudgmental fashion, (c) the client is given the opportunity to reflect on it. In many cases, the interviewer will be able to foster recognition of the benefits of engaging in more constructive activities. Often, specific plans for adopting new activities or reallocating time away from drinking will emerge over the course of the interview, with the participant's active involvement and input. Therefore, the participant’s collaboration should always be encouraged. However, commitment to immediate changes is not a necessary outcome of the interview. It is possible that at the end of the session, despite the best efforts of the interventionist, the participant will not be ready to discuss changing the amount of time he/she devotes to substance-related activities. Consistent with the spirit of MI, the individual will be free to do with the information whatever he or she chooses. Thus, a greater awareness of goals, or the functional role of time allocation in the participant’s life (even without stated intentions to change) can be considered a positive outcome. In sum, MI has its effect through increasing motivation; although many sessions will end with a change plan, the specifics of action are left to the participant.

The majority of participants will enter the session with some curiosity but not know what to expect. The participant will have participated in an intensive outpatient treatment for approximately two weeks. During that times, the participant will have attended group sessions focused on psychoeducation on the impact of alcohol and likely have been heard other patient’s stories and experiences as well as shared their own. However, they most likely will not have

experienced being provided personalized feedback in an MI style. Thus, it may be necessary to orient the participant to the collaborative nature of this motivational intervention.

The introductory script provides the rationale for the session; in short, participants will be asked to review the time they spend in a variety of activities. In addition, the participants will discuss their values and goals, and how these are consistent with their current allocation of time and their decisions to change their drinking. Throughout the session, the interviewer should also check regularly with the participant to make sure he/she understands what is being discussed: *Does this make sense to you? Do you think what I am talking about applies to you? How so? You have gotten quiet -- what are you thinking about?*

If the participant becomes defensive, the interviewer should once again roll with the resistance (refer to Miller & Rollnick, 2012 for specific strategies). A participant may repeatedly say, "I know perfectly well how to manage my time, though," or "I just want to focus on not drinking and I will plan other activities later." These assertions should not be challenged. It may be useful in these circumstances to have the participant give an example of what they think is a reasonable amount of time/effort to devote to family, friends, community, health, and fitness.

Session Overview. Upon beginning the session, the participant will be provided with a summary of the major goals and tasks of the session. Clinicians can begin the session with a brief discussion about why the participant decided to seek treatment. Then, the participant will be encouraged to discuss his/her life goals, which may include hobbies, family, social, occupational, educational, fitness/health, and/or community engagement goals. Clinicians should be open to addressing other goals that might fall outside these domains too. This initial segment will feature open-ended questions designed to facilitate discussion. Participants will be asked to elaborate on the goals they reported, discuss the importance of these goals, and how consistent their actions have been with the stated goals. After a discussion of the relations between alcohol use and these goals, the participant will discuss steps required to pursue their family, occupational, educational, health, and/or community engagement goals and discuss their plans for accomplishing these goals. Then, the participant will be provided with a personalized time allocation feedback, which specifies how much time the participant spends each week in a variety of activities. Subsequently, the participant's engagement in substance-free activities will be discussed, along with a personalized list of substance-free activities related to their interests and available in the community. Finally, the participant and the clinician will formulate specific goals to help the participant re-allocate his or her time and optimize progress towards career, family/social, health/wellness, and other (if applicable) goals. As an extension of goal setting, the participant will be asked to write about a specific positive future event they hope to happen three months into the future. This type of writing called, Episodic Future Thinking, has been shown to reduce impulsivity and enhance future orientation (Daniel, Stanton, & Epstein, 2013).

The interview should take about one hour to complete, depending on the amount of reported information provided during the assessment and the individual's interest in discussing his/her

goals and time allocation. Specific concerns, questions or issues of the participant's goals and current or potential future activities should be addressed, contributing to the individualization of the feedback session. Often, the participant's comments or questions will provide appropriate opportunities for the clinician to present one or more of the major informational parts of the intervention earlier than planned; the clinician should be open to "changing the game plan" in order to take advantage of such opportunities. The perceived relevance of the information should be maximized to the extent that it addresses a current concern. However, the topics listed in the table of contents should be discussed during every intervention, providing a consistent framework for the intervention.

The key goal of the session is to convey to the participant an appreciation for the future and engagements in increased constructive activities. The clinician should use the session to address the key goal of the session. However, it is important that the clinician be flexible in allocating session time to address the specific needs of the participant. For example, for a participant who has been drinking for a long time and is unclear on where to begin with his/her sober life, the SFAS session may be mainly focused on discussing what is important to them and generating potential new life directions. A session with another participant may be more focused on how to pursue a very specific goal, such as going back to school or developing a hobby. Flexibility in session is important to help the participant get a personalized session to meet their needs.

Interviewers should be familiar with basic facts about the substance-free activities available in the surrounding community as well as any other information provided during the session. The interviewer should also be familiar with the content of the feedback to be provided during the SFAS session, taking care to learn how much time the participant devotes to each activity

## Introduction to SFAS (~ 3-5 minutes)

### **Content Overview:**

- 1. Welcome participant to the study and thank them for participating**
- 2. Explain the purpose and format of the session**
- 3. Present SFAS material**

### **Style:**

- 1. Establish rapport**
- 2. Adopt a non-confrontational posture**
- 3. Address any participant resistance**

### **Goals:**

- 1. Get the session started on a good note**
- 2. Enlist participant's participation in session**

The purpose of this initial part of the session is to establish rapport and provide the participant with information regarding the content of the upcoming session. When the participant arrives, the feedback material should be in a folder, off to the side. This is done so the sight of the feedback forms or informational handouts does not put the participant on the defensive, and to allow initial neutral discussion to establish rapport. In addition, the interviewer should seat him or herself at an angle (not in a squared off, face-to-face position with the participant). Finally, the interviewer should keep rapport positive and be genuine.

### **Start of Substance-Free Activity Session (SFAS)**

#### **Introducing the SFAS Session**

After the initial rapport building, it is time to introduce the purpose and structure of the session. In doing so, the interviewer should attempt to arouse the participant's interest, as well as foster a sense of involvement and collaboration. The following introduction can be used:

**Script:** *Thanks again for taking part in this project. You were invited to participate because you are receiving treatment here at Mental Health Resources (MHR) for alcohol use. Your participation in this study is entirely voluntary and at no cost to you. The purpose of this research study is to help to enhance your alcohol treatment at MHR. Although we are meeting here within the walls of MHR, what we do is different from what you have been doing in the past couple of weeks with your counselors. The counselors at MHR are helping with with HOW to change your drinking, and what we hope to help you with is to identify what you could do INSTEAD of drinking. This session is designed to help you to clarify your goals, decide what sorts of activities you would like to get involved with, and decide how you would like to organize your time now that you have decided to change your alcohol use. Many people who decide to make a change in their drinking find it helpful to develop other*

*ways of having a good time and filling the void left by drinking and drug use, and this can actually be a key part of recovery.*

*I'll be asking you about your hobbies, general interests, and goals. I'm especially interested in hearing your perspectives on these issues. Most of what we are going to talk about is based on the information you provided when you completed the questionnaires for us last time. We put together a feedback sheet based on that information, and one of the things we will do today is to go over that feedback together and get your thoughts about it. Feel free to ask questions about any of the information we discuss, or anything else you would like to talk about. I am not going to tell you how to spend your time. Instead, I will provide you some information and perhaps some suggestions for you to consider, but what you decide to do with it is entirely up to you. [pause] How does that sound to you? Do you have any questions before we get started?*

## **Reasons and Goals for Alcohol Treatment** (~20 minutes)

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### **Content**

1. **Discuss the participant's decision to start treatment**
2. **Discuss the participant's main goals for treatment**
3. **Life Goals and Values**

### **Style**

1. **Non-confrontational**
2. **Establish collaborative relationship with participant**
3. **Use open-ended questions and reflections to obtain as much information regarding the participant's goals and values as possible**

### **Goals**

1. **Have participant discuss in detail his/her goals for the future (record these on goal sheet)**
2. **Establish participant's values regarding why he/she wants to change their alcohol use**

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### **Discuss reasons/motivation for seeking treatment in terms of their values**

In this section, the interventionist will discuss the participant's decision to start treatment, how treatment is going, and goals for the future. This section can be conceptualized as having two components: Past (why the participant decided to seek treatment?) and Future (how would the participant like their life to look after treatment). Although the SFAS is not primarily focused on alcohol and drug use (their treatment program covers this topic thoroughly), asking participants why they are seeking treatment and why now can help to identify core values and goals.

Open-ended questions and reflections may be particularly useful to foster the participant's involvement and participation in the session. Encouraging the participant's active participation at this time has two advantages. First, it establishes a collaborative atmosphere in the session. At MHR, the participant has already attended a few group sessions where they may not have been the focus of attention in the session, and they may have gotten accustomed to having others speak. Thus, having them participate earlier on in session will teach them that he/she is expected to take an active role in the session. Second, much of the information provided during this part of the intervention, especially regarding current behaviors and goals for the future can be referred to in subsequent sections.

## **Why did you decide to start treatment?**

**Script:** *As you have probably have heard from other patients in your group sessions, there are a lot of reasons that bring people into treatment. I'm curious to hear about what led to you coming here? [Wait for answer to that.] What are some of the ways you want your life to be different now that you are in treatment?*

If the participant starts telling long stories about drinking and drug use, without being dismissive, redirect the participant to have a more focused conversation about the things they want to accomplish as a result of being in treatment and having a control over their drinking. Use the following prompts to guide the participant to speak directly to this topic:

- *Why did you seek treatment at this particular time in your life? Why now?*
- *What do you hope treatment will help you accomplish?*
- *What are some of the goals you have for yourself while in treatment?*

**Dealing with Verbose Participants.** Some participants will provide a lengthy/elaborated description of their reasons for seeking treatment or their goals for the future. With long-winded or verbose individuals, it is important to maintain rapport and MI style by expressing a genuine interest in what they tell you, while also being mindful of session pacing and the need to get through the protocol in 60 minutes or less. In these situations, it is critical for the clinician to selectively summarize and redirect the participant by careful use of summary statements and reflections or questions that transition to the next topic:

*Drinking has taken quite a toll on your health and your personal life, and I wonder what is next for you now that you are here?*

**Dealing with Mandated Participants:** If participant states that they do not believe they need to be in treatment and the reason they are in treatment is because someone else (e.g., spouse, employer) is mandating it, the clinician should role with resistance and not be confrontational. The clinician can probe some more by asking the participant to discuss in what ways they imagine their life could improve by taking advantage of what treatment has to offer.

*I understand that you do not want to be here, but given that you are already here, what do you think you can get out of this experience? What is the best way you see your life going after this?*

It is important to note that the SFAS session does not require that participants are motivated to participate in their IOP treatment program or even recognize that they have a problem with drinking, and the clinician should not confront general treatment resistance. They can use the session time generating life goals and coming up with specific plans to pursue those goals and increase engagement in enjoyable and goal-directed substance-free activities even if they are not currently strongly committed to treatment. Behavioral economic theory predicts that increased engagement in substance-free activities will ultimately enhance the likelihood of recovery.

## **What are your goals while in treatment and beyond?**

In this section, the interviewer and the participant discuss long-term goals/plans and start to populate the goal sheet. The interventionist should not be confrontational or push an agenda of behavior change during this part of the session. Instead, this should be a relaxed exploration of the participant's goals and values. If the participant had stated some goals earlier in the session, the clinician should remind the participant those goals and see if he/she wants to explore these goals further. At the end of the session the participant will fill in more specific short term (activities of daily living) goals that will help him/her progress towards these long term goals or update the long-term goals as needed. The information provided during this section is especially important, because it represents what type of person the participant would like to become (the ideal self) once they have alcohol use under control. The rest of the session is going to provide information regarding the participant's current behaviors, and how these behaviors will impact the goals and values discussed here. This process may foster in the participant a dissatisfaction with current lifestyle (discrepancy), thus facilitating motivation to change.

- *If it's ok with you, I'll write down your goals on this sheet that we will give you at the end of the session today. [Record 3 long-term goals]*

The interventionist should ask an open ended question about the participant's priorities (these may range from family obligations, parenting, romantic relationships, work, religious activity, or community activities... etc.). It is a way to get to know the participant and what is important to them:

- *Other than successfully completing treatment, what do you hope to accomplish in the next year or so?*
- *What are some things you want to put first? What matters most to you? What are the important activities/ relationships/organizations in your life*

## **The relationship between alcohol/drug use and achieving success in life goals (5 minutes)**

### **Content**

1. **Discuss the extent to which alcohol/drug use has impinged on the participant's goals (or might impinge on their goals should their current (or pre-treatment) pattern continue)**

### **Style**

1. **Non-judgmental**
2. **Relaxed**
3. **Reflections to increase ambivalence about drinking**

### **Goals**

1. **Exploration of the participant's goals and values, and the extent to which alcohol/drug use impinges on those goals**
2. **Avoid prematurely focusing on certain behaviors that could be altered – specific strategies will be discussed later**

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The interventionist should inquire about the role of alcohol/drug use in the participant's lifestyle.

- *Next I wanted to get your thoughts on the relationship between drinking and the goals you have for yourself. How does your alcohol use fit in with your ability to accomplish your goals? If participant mentioned interference with the values/priorities they stated earlier in the session, ask for more details: Can you tell me more about that?*
  - *Are there other ways in which alcohol or drug use impacts your job/education (if applicable) performance? If not mentioned by the participant, you might say: Some people tend to not show up for work or fall behind on their responsibilities in the home, have you had experiences like that?*
  - *To what extent will your current drinking or drug use pattern be compatible with the future you envision for yourself? For example: does the participant anticipate needing to reduce his drinking to be a better example to his children? If the participant will be applying for jobs or returning to an old job soon, ask about concern in regards to drug tests.*

## **Values and Action**

Present to the participant a chart of the Valued Living Questionnaire – a comparison of how they value different aspects of their lives vs. how their actions are consistent with their values.

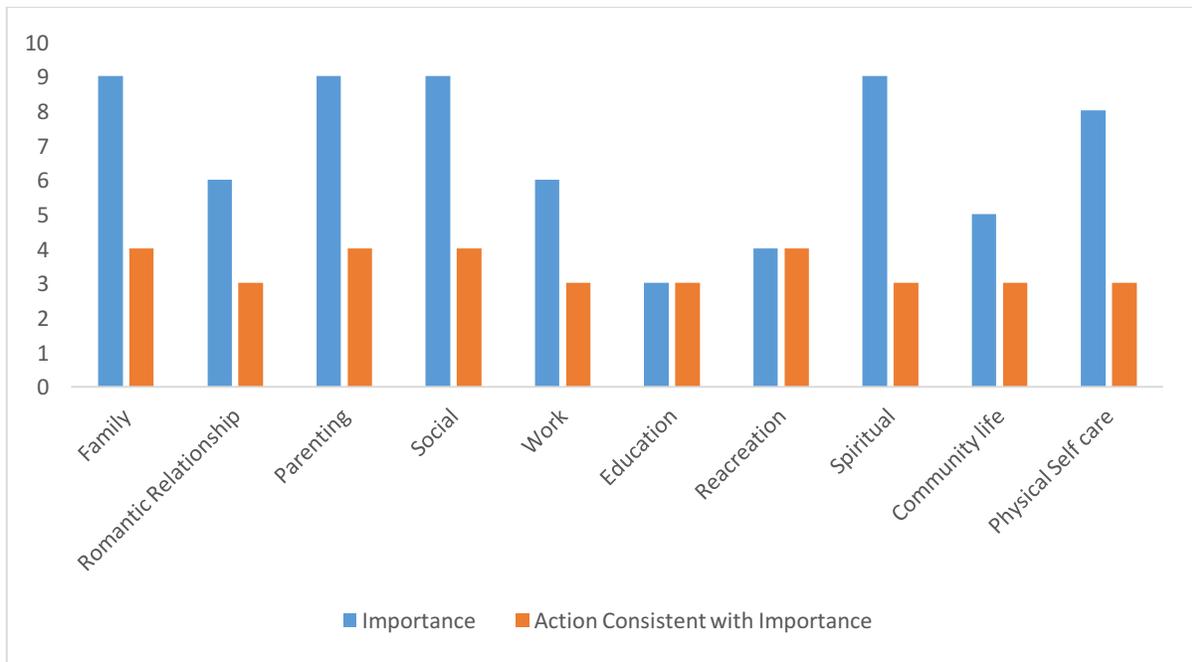
**Script:** Now, if it okay with you, I would like to talk about the importance of different aspects of your life. Everyone is different in how they value various aspects of life. Here is a graph based on the questionnaire you completed last time. The graph shows your ratings of the importance of family, romantic relationships, parenting, friends, work, education, recreational activities, spirituality, community life, and self care (nutrition, exercise, and rest) in your life. Your ratings of how important these activities are to you is represented in blue and in red is how you believe your actions (in the past week) have been consistent with these same values. That is, how you think your recent day-to-day activities reflect the important aspects of your life.

Present the graph, make sure the participant understands the concept, and answer any questions he/she may have about the graph.

*What do you make of this information?*

*Based on this graph, it looks like \_\_\_\_\_ is important to you and has been most impacted by alcohol – can you tell me a little more about that?*

*How do you plan to address \_\_\_\_\_ going forward?*



## **Time Allocation** (~10 minutes)

### **Content**

1. **Discuss participant's time allocation**
2. **Provide personalized feedback form regarding time allocation**

### **Style**

1. **Reflect/discuss participant's satisfaction with current time allocation**
2. **Querying extremes – imagine consequences and benefits of choosing to re-allocate time**
3. **Collaborative – explore participant's time allocation form together**
4. **Enhance self-efficacy for change**
5. **Emphasize personal responsibility**

### **Goals**

1. **Develop discrepancy between current time allocation and ideal time allocation**
2. **Create ambivalence regarding the amount of time spent in substance-related activities**
3. **Have participant consider the benefits of allocating his/her time in a different way**

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In this section, the interviewer will provide the participant with personalized feedback regarding his/her time allocation. This feedback will focus on the amount of time the participant spends using or recovering from alcohol or other drugs, compared with the amount of time spent on several other constructive activity categories (e.g., hobbies, family/social, occupational interests/goals, educational goals, fitness/health, community engagement). Consistent with the motivational interviewing approach, this information should be presented in an empathetic, nonjudgmental manner. Resistance will likely occur if the participant feels that the interventionist is accusing him/her of spending too much time using or recovering from substances. Therefore, the interventionist should guide the participant through the personalized feedback, explore the participant's reaction, and facilitate the participant's exploration of the difference between his/her current and ideal time allocation. This section will also be used to review some more general time management issues and recommendations. The clinician will stress the importance of maintaining a structured daily schedule. This section occurs right after the goals and values exercise and clinicians should link the participant's recent time allocation to their goals/values.

**Script:** *If it is okay with you, I'd like to talk a bit about how you spend your time. Now I want to mention that we are not trying to tell you that there is any correct way to structure your time; people have different responsibilities and schedules so this is not a one-size fits all approach; we recognize that you likely have a lot of obligations such as work and maintaining a home that are not flexible and I am most interested in learning about how you decide to spend the time that is more flexible. One of the reasons we summarize this information is because people rarely think about how they spend their time, even though it is something precious and says a lot about what you find important. Therefore, I put together this chart of how you spend your time during the week based on the calendar measure you completed last week. Would you like to go over this information with me? As you can see on the chart, you spent X hours at work. You also spent X hours with your family, X hours volunteering in your community, X hours using the internet, watching TV or playing video games, and X hours exercising. Finally, you spent X hours using alcohol/drugs or recovering from their effects.”*

Below is the list of categories in the time allocation graph. The interventionist should make sure the participant understands each category, and answer any questions he/she has regarding the handout. Then, the interventionist can use open-ended questions or reflections to explore the ambivalence the participant may have regarding his/her current time allocation.

- Family: time spent with family, talking on the phone, or writing or responding to emails
- Significant other: time spent with your spouse or a romantic partner
- Volunteer: time spent engaging in volunteer activities such as community social service agencies, blood drives, or shelters.
- Exercise: time spent working out, playing sports, or any other physical activity.
- Work: time spent at work or doing work related activities
- Education activities: time spent in class, studying, or doing other school-related activities
- Drink/drugs: time spent using or recovering from alcohol or other substance use. As noted in the feedback form, one hour has been added for each hour using substances, in order to account for recovery time.
- Leisure activities such as watching TV or reading or hanging out with friends.
  - Leisure activities like social media, surfing the internet, emailing, instant messaging

*What do you make of this?*

**KEY QUESTION:** *To what extent is this information consistent with the goals and importance of activities we just discussed?* [Wait for answer] *How do you think the way you spend your time now will influence you in the future?*

*OTHER POSSIBLE FOLLOW-UP QUESTIONS*

- *What do you think about the amount of time you spend drinking or using drugs and recovering from the effects of alcohol or drugs?*
- *Are there certain activities that you would like to devote more time to?*
- *What would be the benefits of changing how you spend your time?*
- *What would keep you from changing how you spend your time?*

The interventionist should reflect and act upon any expressed desire by the participant to re-allocate his/her time. If the participant has openly expressed a desire to change the amount of time he/she devotes to substance use and/or other aspects of their lives, the interventionist can discuss the benefits of using a schedule to plan time for exercising, volunteering, family activities, pursuing hobbies, etc. The interventionist can also provide handouts on time management and tips on ways to organize a daily schedule.

It is important not to discuss strategies to change time allocation unless the participant has expressed a desire to change. Resistance is likely to occur if the interventionist advocates for change when the participant has not expressed any ambivalence about his/her current time allocation. To foster the exploration of ambivalence, the interventionist can discuss the pros and cons of continuing to allocate the participant's time in this way. The interventionist should always emphasize the participant's personal choice and control about making changes to his/her schedule.

### **Money**

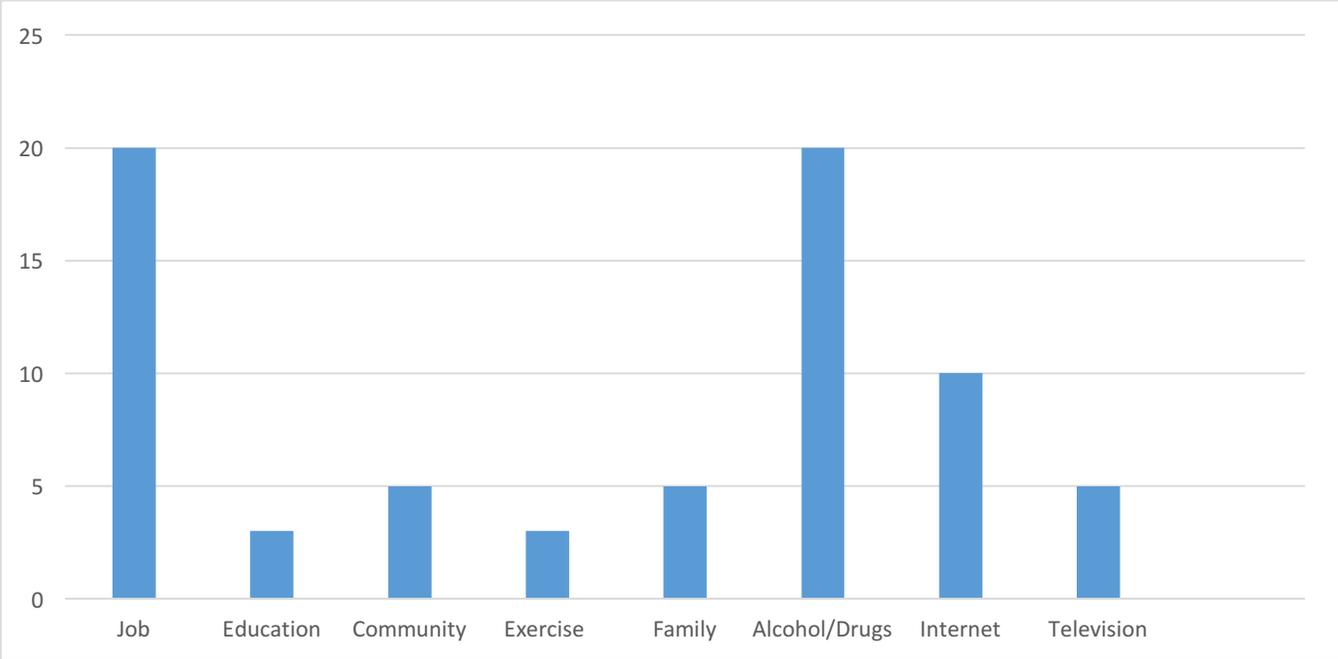
This next section looks at the money you spent on alcohol and drugs. You spent about \$\_\_\_\_\_ each month on alcohol and drugs. This adds up to \$\_\_\_\_\_ over the course of a year.

*Now that you have decided to make these changes, what else can you do with this money?*

# How You Spend Your Time

This is a graph showing how many hours you spend each week doing a variety of activities including drinking and using drugs. It takes at least one hour to recover from each drink, so we added this to the estimate of time spent drinking. Although you may be asleep for much of the time you spend “recovering,” alcohol and drugs prevent deep sleep.

**Note how you spend your time and how it compares to things that are important to you.** Many drinkers experience problems in life areas (e.g., hobbies, relationships, health/fitness) that are neglected due to time spent drinking/using drugs.



# Money Spent on Alcohol & Drugs

AVERAGE MONTHLY	WHAT THIS ADDS UP TO
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AMOUNT SPENT	FOR THE YEAR
<b>\$200</b>	<b>\$2400</b>

## **Future Oriented Writing Prompt: (~10 minutes)**

**Script:** *Next, we are going to do a short writing exercise. I am going to ask you to think specifically about the future. If you are comfortable, you may close your eyes for a moment so that you can focus. Visualize your life 3 months into the future. Think about aspects of your life that matter to you, it could be how you want to grow mentally, spiritually, or physically. Think about how you would want your body and physical fitness to be, or what new skills or hobbies you may want to learn, or what new career building skills you would want to develop, or anything that gives you a sense of meaning, mission, or purpose. Pick any of these categories that matter to you and are important in your life and take a minute to visualize and imagine what this could look and feel like in your life 3 months from today. Take the next 5 minutes to write about a **specific** type of **positive** experience you are looking forward to have in your life.*

Provide the participant with a pen and paper and allow them time to write. Have a watch or timer to know how long the participant has been writing. When the 5 minutes is up, if the participant is still writing – do not rush them, give them another minute to finish and ask them to start wrapping up: *I will give you another minute to finish writing.*

If the participant is having difficulty generating writing ideas – the clinician can suggest the following:

*Include in your writing what you will be doing, who you will be with, how you imagine this one experience will feel, the types of thoughts and emotions you expect to have when this event takes place.*

Once they are done writing:

*If you prefer to keep what you wrote private, that is okay because you are not required to share it. But, if you are comfortable with talking about it, I would like to hear what you wrote about. Some people find it as a good opportunity to talk about their hope and goals for the near future.*

If participant agrees to share: *Great! Thanks for your willingness, would you mind reading out loud what you just wrote? And it might be helpful for you to record yourself on your phone as you read it aloud so that you can have it with you anytime you wish to listen to it again.*

Whether or not they decided to share their writing, check in with the participant about their experience with this exercise:

*What was it like for you to do this type of exercise?*

*How vividly did you imagine yourself in that situation?*

*What would it be like for you to be able to see this event come true in 3-months time?*

*What steps would you take to make this event take place in 3 months?*

If participant agreed to share their writing – ask them for permission to make a copy and keep it in their file. We will use their writing to remind them of their goals in an email or text message over the next month.

## **Substance-Free Recreational Activities** (~5 minutes)

### **Content**

1. **Discuss substance-free activities identified by the participant**
2. **Provide participant with information about substance-free activities available in the community**

### **Style**

1. **Affirm current engagement of substance-free activities**
2. **Encourage brainstorming about other activities the participant can do**
3. **Non-confrontational**
4. **Avoid lecturing the participant**

### **Goals**

1. **Create ambivalence about current substance-related time allocation**
  2. **Increase participant's awareness of other substance-free activities**
  3. **Formulate specific strategies for increased involvement in substance-free activities**
- 

In this section, the interventionist will discuss the substance-free activities that the participant currently engages in. Note: use the term “activities that do not involve drinking (or doing drugs)” rather than the more technical sounding “substance-free activities”

**Script:** *“During the questionnaire you completed for us, you had provided a list of activities that you enjoyed. We asked specifically about activities that did not involve drinking or using drugs. We also listed some hobbies and volunteer activities that you mentioned you had participated in previously, or would potentially get involved with. Lastly, you told us about different aspects of your life which you may want to focus on or make changes to. I have them listed here, and would like to go over each of them with you. Does that sound OK?”*

It is important for the interventionist to have the participant discuss these activities at length in order to identify activities that he/she enjoys and might be interested in participating in more often.

- *Which of these activities/hobbies do you enjoy most?*
- *What do you like about X?*
- *What are some of the reasons you want to focus on/makes changes to X?*
- *Are there certain activities that you would like to do more often?*
- *What are some things that could get in the way of participating in these activities?*

If the participant exhibits a lack of awareness of substance-free activities, then it would be very useful for the interventionist to provide him/her with substance-free activities available

in the community. All participants will receive a brochure listing substance-free activities available in Memphis.

*“You mentioned that you would like to engage in more activities that do not involve drinking or drug use, but you haven’t been able to for the past few years. To help you learn about some of these activities, I have put together some information on how you can get involved in some of these activities in the community. For example, you mentioned that you enjoy the theatre, and performed in several plays in the past. Did you know that there is an active community theatre group in midtown? Here is some information on how you can audition and here is a list of upcoming plays. Do you think you would enjoy that?”*

*“You mentioned that you were involved in the volunteering at animal shelters. Did you know that the Humane Society of Memphis is always looking for volunteers? Here is the person to contact and ask questions about how you can get involved.”*

*What would be some of the benefits of getting involved in \_\_\_\_\_ activity? How might this benefit your recovery?*

If the participant does not express any motivation to incorporate substance-free activities into his/her life, the interventionist should focus on fostering ambivalence in the participant about his/her current time allocation. To do so, the interventionist should explore with the participant the pros and cons of continuing to allocate his/her time in this manner. It may be useful for the participant to know that people who successfully recover from AUD are those who find new sources of substance-free hobbies, seek out substance-free social networks, develop goals to achieve, and have alcohol/drug free sources of leisure activities.

It is possible that the participant has a variety of sensible reasons for being unable to participate in the suggested substance-free activities. It is important for the interventionist to understand these issues before promoting the adoption of substance-free activities. If specific barriers are identified, the interventionist can help the participant problem solve and find ways to get involved in said substance-free activities. If participant is ambivalent about substance-free activities, “Looking ahead” is another technique that can foster discussion about the risks and benefits of changing the participant’s time allocation. The interventionist can ask the participant what his/her life will be like in 1 year, 2 years, if he/she continues to allocate his/her time this way. This will permit the interventionist to assess whether the participant has considered the long-term risks associated with devoting a large percentage of his/her time to substance-related activities. Care should be taken to not be judgmental or confrontational with the participant.

Instead, an open, collaborative and empathic line of questioning and reflections can be implemented to have the participant discuss his/her current time allocation.

# Recreational or Leisure activities:

Some activities that you report doing:

- Exercising
- Intramural sports
- Performing in a play

Other activities that you may enjoy:

- Going to movies
  - Paradiso – 584 S. Mendenhall, Memphis, TN Phone: 901-682-1754
  - Malco Studio on the Square – 2105 Court St., Memphis, TN Phone: 901-725-7151
- Community theater
  - o Theater Memphis [www.theathermemphis.org](http://www.theathermemphis.org)
  - o Leslie Barker [lbarker@theatrememphis.org](mailto:lbarker@theatrememphis.org) 901-682-5261
- Volunteering
  - Humane Society of Memphis & Shelby County – 935 Farm Rd. Memphis, TN
    - o Phone 901-937-3900
    - o [llarrabee@memphishumane.org](mailto:llarrabee@memphishumane.org)

## **Summary and Goal Setting** (~10 minutes)

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### **Content**

1. **Summary of information provided during the session**
2. **Review goals and strategies to achieve goals**
3. **Complete goal sheet**
4. **Present/describe session handouts**

### **Style**

1. **Collaborative**
2. **Use summary statement(s)**
3. **Encourage self-efficacy**

### **Goals**

1. **Establish personalized strategies for increasing substance-free activities**
  2. **Address any final questions or concerns of the participant**
- 

At the end of the session, the interventionist can provide a detailed summary statement which includes the main topics previously discussed. It is up to the interventionist to decide which information to include. However, the information should reflect the participant's ambivalence about his/her current time allocation and/or the desire to adjust his/her time allocation in order to increase engagement in constructive, goal directed activities. If the participant noted that alcohol interfered with his/her goals, the summary should also include some statement to that effect.

**Script:** *"We've talked about a number of ways that you would like to be different and things you would like to do once you are through with treatment at MHR. It seemed like you were really surprised at how little you were engaging in activities that were in line with your priorities. You mentioned that you would like to spend more time with your children, exercise more, and make friends who don't drink as much. You also seemed like you wanted to get involved in theater performance again. From all the information we covered today, I'm curious about what stands out most for you?"*

This summary statement allows the participant to hear the main points of the session, as well as share with the interventionist what he/she thought was the most notable information provided during the session. Once these topics have been discussed, and all questions answered, the interventionist can then complete the goal-setting exercise that was started earlier in the session.

**Script:** *"As the final part of the session, I'd like to work with you on a goal setting exercise. Earlier in the session, you mentioned that these are your primary goals. Now, from the*

*information that we talked about during the session, what are some things that you can do to make progress towards those goals?”*

As the participant provides a list of ways that he/she can attain his/her goals, the interventionist writes down short term goals (day to day activities). If the participant is having a difficult time generating ways to attain his/her goals, the interventionist can prompt him/her to identify time allocation goals and activity participation goals.

**\*\*\*Interventionist should TRY TO GET AS SPECIFIC AS POSSIBLE in encouraging the participant to develop a plan to achieve their goals. Ideally the plan will involve tangible changes in how they spend their time, with increased time dedicated to constructive pursuits\*\*\***

It can also be useful to use opened ended questions to discuss the benefits and potential barriers to attaining these goals. A goal that may seem completely appropriate may have some unforeseen barriers (for example, the participant may want to get involved with an organization that is a driving distance away but does not have transportation). Ideally, the goals will be generated by the participant, goals generated by the interventionist will be less likely to be attained.

*What would be the benefits of achieving these goals?*

*What do you think might get in the way?*

**After participants have identified a fairly specific plan to achieve their goals, follow-up with potential problem solving solution:**

*How will you know if your plan is working?*

*How will you know if you are getting off track in your plan?*

*What steps would you take to get back on track?*

**Organizing your activities:**

*Finally, I would like to ask you how you keep track of what activities you have planned? [Wait for their answer.] Do you use any sort of calendar? If they use a written calendar – It will be*

*helpful if you write down these activities in your calendar ahead of time. If using a smart phone – Do you have any interest in a free app for your phone that could give you a way to better organize your schedule?*

The interventionist should then ask whether the participant has any final questions or comments, and end the SFAS session. At the end of the session, clinician should inform the participant of the upcoming booster messages.

***Script:** Over the next 4 weeks we will be either texting or emailing you short reminders (once a week – 4 messages total) of some of the things we discussed today. You are not expected to respond to the messages but we want you to keep in mind some of the things we discussed in this session. These reminders may include any activities related to your interests that are happening around the city, reminding you of the goals you set for yourself today, and encouraging you to continue monitoring how you spend your time on a regular basis. Would you prefer to receive these brief reminder messages via email or text messages?*

Record the email address or phone number the participant wants the booster information to be sent to. Thank the participant for being a part of the study. Pay them for their time, give them their 3 month follow up appointment date and end the session.

## **Post-SFAS Intervention Booster Elements**

**Booster Contents:** During the first four weeks after the intervention session, participants will receive weekly email or text message based booster material. This booster will remind the participant the goals they established in the initial session, including goals related to alcohol use, time allocation, and engagement in constructive substance-free activities. Participants will also be provided with additional information or links to community resources based on their substance-free goals.

### **Email/Text Message Booster**

Prior to writing out the message – Review the participant’s SFAS feedback as well as the copy of their goals sheet. Generate any new activities available in the community that are relevant based on the interests the participants identified in the SFAS session. Check in their folder to see if they prefer to get an email or text message for their booster. Consistent with the initial SFAS session, the primary goal of the booster is to increase the salience of delayed substance-free rewards and to increase time allocation towards constructive and/or enjoyable alternatives to drinking.

Hi PARTICIPANT,

This is the ReACT study reminding you of the goals you set for yourself.

You wanted to do more of X and Y, and less of Z to reach your goal(s) of

\_\_\_\_\_.

Here is an activity in Memphis that will be in line with your

interests: XXX XXX at LOCATION.

## **Addendum**

### Information for working with patients in treatment for alcohol use disorder.

Prolonged heavy alcohol use is associated with a myriad of health consequences as well as comorbid psychiatric disorders. As a clinician working with AUD patients, it is useful to be familiar with these consequences. Many may be inconsistent with the participants goals and may thus provide a source of motivation if carefully addressed by the clinician.

Physical health: <http://www.niaaa.nih.gov/alcohol-health/alphabets-effects-body>

Heart - Although drinking moderate amounts of alcohol has been shown to protect healthy adults from developing coronary heart disease, prolonged and heavy alcohol use can cause heart problems including: Cardiomyopathy – Stretching and drooping of heart muscle, arrhythmias – irregular heart beat, stroke, and high blood pressure.

Liver - Heavy drinking can lead to a variety of problems and liver inflammations including: steatosis or fatty liver – infiltration of the liver cells with fat created disturbance with metabolism, Alcoholic hepatitis – liver inflammation, Fibrosis – thickening or scarring of connecting tissue, or Cirrhosis – late stage of scarring of the liver.

Pancreas - Alcohol causes the pancreas to produce toxic substances that can eventually lead to pancreatitis, a dangerous inflammation and swelling of the blood vessels in the pancreas that prevents proper digestion.

Cancer - Heavy alcohol use is associated with increased risk of developing certain cancers, including cancers of the mouth, esophagus, throat, liver, and breast.

Immune System – Heavy alcohol use can weaken the immune system, making the body susceptible to disease. Chronic drinkers are more liable to contract diseases like pneumonia and tuberculosis. Binge drinking is also associated with decreases in the body's ability to ward off infections – even up to 24 hours after getting drunk.

Psychiatric co-morbidities: <http://www.pcrm.org/research/resch/alcohol/alcoholism-and-mental-illness-overlapping>

Individuals with an alcohol use disorder are three times more likely to suffer from an anxiety disorder (Anthenelli, 2010) and about four times more likely to suffer from a major depressive episode (Agosti & Levin, 2006). PTSD is also highly comorbid with AUD (Foa et al., 2013). Comorbid psychiatric disorders complicate AUD treatment as participants may be less likely to seek out treatment or remain engaged in treatment compared to those without comorbid disorders. Research also shows that patients with comorbid diagnoses are also more likely to relapse faster after treatment.

More likely than not, this is not the first time the patients in this study have sought AUD treatment. They may have tried other modes of treatment in the past and it is useful to be familiar with the different types of AUD treatments available.

**Detoxification:** For patients with acute alcohol use, it is often necessary to control the uncomfortable

and at times dangerous symptoms associated with alcohol withdrawals. The initial step toward abstinence from alcohol use often begins with detoxification and involves the use of medications to establish a baseline of temporary abstinence. Naltrexone, acamprosate, and disulfiram are among the most widely used medications for prevention of relapse of alcohol use, as well as being used along with benzodiazepines for initial treatment during detoxification. Naltrexone (oral and extended-release injectable) is an opiate antagonist that may be used in the long-term treatment of alcohol dependence. It decreases cravings and blocks associated feelings of euphoria. Acamprosate reduces the severity of the symptoms of alcohol withdrawal and alcohol craving. Disulfiram impedes the metabolic processes that break down alcohol in the body. As such, an aversive physiological reaction occurs when alcohol is consumed.

**Inpatient:** Inpatient or residential care involves a more intensive level of care for individuals who have

had unsuccessful outpatient treatment. Inpatient care has the added benefit of removing the patient from their environment, which assists in avoiding triggers and subsequent relapse while incorporating psychosocial treatments to help regulate alcohol consumption. Inpatient treatment often views AUD/SUD in the medical disease model and may provide pharmacological treatment paired with a variety of psychosocial and family interventions during hospital or residential treatment.

**Twelve Step:** Twelve Step (TS) programs such as Alcoholics Anonymous (AA) or Narcotics Anonymous (NA) view substance use disorders as a disease rather than a condition that can be reduced and eliminated through modification. These approaches emphasize avoidance of alcohol and substance use through regular meeting attendance, requesting assistance, finding a senior member to be a sponsor and mentor through the process, engaging in sober social groups, and focusing on physical health. AA and other TS programs provide peer support for those with substance use disorders through a cooperative fellowship, while encouraging healing through identification with the inner addict and submitting oneself to a “higher power.”

**Brief Interventions:** Brief alcohol interventions (BAI) are intended to encourage harm reduction in

individuals who have problematic drinking. Traditional therapy and counselling is a long-term process; however, BAI are short “one-on-one” sessions (five or less, but often just one) that focus on reduction of alcohol consumption rather than abstinence as the primary goal. BAI is an opportunity to motivate patients to move along the stages of change from contemplating to developing an action plan by educating them on the harms associated with alcohol consumption.

**Aftercare:** Most residential treatment programs encourage involvements in aftercare, which are weekly groups run by the treatment organization. Aftercare programs have both therapeutic and supportive functions. Problems and challenges to maintaining sobriety are discussed, with problem solving.

It is important for the clinician to be aware of various predictors of treatment success among individuals in treatment for alcohol use disorder. These predictors include having higher education, employment, greater involvement in treatment, social network of non problem drinkers and individuals who supporter the participant’s recovery, history of successful recovery period, alcohol related self-efficacy, participation in support groups such as AA, and better health and financial resources (McAweeney, Zucker, Fitzgerald, Puttler, & Wong, 2004; Moos & Moos, 2007).

## Goal Setting Worksheet

Please use the spaces provided to list **3 primary goals** (can be personal, health, social, family, career, or education related). Under each primary goal, please use the bullet points to list some **short-term specific goals** that would help you to reach your primary goals.

### Primary Goals

1. \_\_\_\_\_  
\_\_\_\_\_  
  - \_\_\_\_\_
  - \_\_\_\_\_
  - \_\_\_\_\_
  
2. \_\_\_\_\_  
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3. \_\_\_\_\_  
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