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A RANDOMIZED PILOT TRIAL OF A MOBILE-DELIVERED BRIEF BEHAVIORAL
ECONOMIC INTERVENTION TO REDUCE EMERGING ADULT ALCOHOL MISUSE

by

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A Dissertation

Submitted in Partial Fulfillment of the

Requirements for the Degree of

Doctor of Philosophy

Major: Psychology

The University of Memphis

August 2021

Acknowledgements

To my parents, Ed and Terry, who have encouraged and supported me in countless ways throughout my educational career. I truly do not know where I would be without you both.

To my husband, Nick, who has been a steady and calming presence even when things felt most uncertain and scary. You have been the lifeline I did not know I needed. I love you.

To my advisor and mentor, Jim Murphy, who has been an infinite source of support, knowledge, wisdom, and encouragement. It has been a pleasure to be your student, and I look forward to many more years of learning from and collaborating with you.

To all the friends I made along the way, but especially Alex, Amanda, Becky, Cece: You have made this journey incredible. I would do it all over again if I knew I could do it with all of you.

Abstract

Objective. Heavy episodic drinking is a significant social and public health problem that peaks during emerging adulthood. In-person brief motivational interventions have been shown to be efficacious in reducing heavy drinking and problems in college students, but require student effort and personnel resources that may limit dissemination. The current study examined the feasibility, acceptability, and preliminary efficacy of a counselor-administered, synchronous text-message delivered brief motivational intervention aimed to reduce college student alcohol misuse. **Method.** Participants were 66 college students (63.6% identified as cisgender women; 61.9% identified their race as White; $M_{\text{age}} = 19.95$, $SD = 1.66$) who at baseline reported an average of 11.88 ($SD = 8.74$) drinks per week, 4.42 ($SD = 3.59$) heavy drinking episodes, and 8.44 ($SD = 5.62$) alcohol-related problems in the past month. Participants were randomized to receive either alcohol and nutrition education (A + NE) or a brief motivational intervention plus behavioral economic-based Substance-Free Activity Session (BMI + SFAS). Both A + NE sessions each ran 40-50 minutes, and both BMI + SFAS sessions each ran 45-60 minutes. Both groups also received four weeks of booster content consistent with their respective assigned intervention, with once weekly boosters running 20-30 minutes each. All sessions, including boosters, were administered via synchronous text-message. Participants completed feedback measures following the 4 weeks of boosters and a final follow-up assessment 3 months post-boosters. **Results.** Completion rates were high with 90.9% completing both initial sessions and at least two of the four booster sessions with high retention rate at 3-month follow-up (87.9%). Participants found both interventions to be useful, interesting, relevant, and effective. Negative binomial regressions revealed that BMI + SFAS participants reported fewer past-month heavy drinking episodes at follow-up. There were no treatment effects for drinks per week or alcohol-

related problems. **Conclusion.** The use of counselor-administered, synchronous text-messaging to deliver an alcohol brief motivational intervention is feasible and well-received by this predominantly White group of heavy drinking college students. The preliminary efficacy results are less clear but suggest that further investigation is warranted in the application of counselor-administered synchronous text-messaging in brief motivational interventions for heavy drinking emerging adults.

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A Randomized Pilot Trial of a Mobile-Delivered Brief Behavioral Economic Intervention to Reduce Emerging Adult Alcohol Misuse

Heavy episodic alcohol use is a significant public health concern that peaks between the ages of 18 and 25 years old (Johnston et al., 2016; Schulenberg et al., 2018). As of 2017, approximately 33% of college student emerging adults (EAs) reported consuming 5 or more drinks in a row at least once in the last 2 weeks, and roughly 10% reported consuming 10 or more drinks in a row (Schulenberg et al., 2018). Even more concerning, the percentage of EAs engaging in heavy episodic drinking, defined as 4 or more standard drinks in one occasion for women and 5 or more for men, has increased (Schulenberg et al., 2018).

Heavy episodic drinking among EAs is associated with a spectrum of problems, from relatively minor, such as a hangover the day after drinking, to more consequential, such as blackouts or driving while intoxicated. Drinking to excess often leads to acute impairment in motor skills and cognitive abilities, and, as part of a pattern, can lead to long-term social, cognitive, and academic impairment, as well as physical and mental health problems. Approximately 16% of college students drive under the influence of alcohol each year, around 150,000 develop alcohol-related health problems, and around 50% report experiencing an alcohol-induced blackout at least once (Barnett et al., 2014; Blanco et al., 2008; Hingson, Zha, & Smyth, 2017; Wilhite & Fromme, 2015). Further, from 1998-2014, among 18-24 year-olds, the total number of unintentional, non-traffic injury deaths related to alcohol increased by 21% per 100,000 and alcohol-related overdose deaths increased 254% per 100,000 (Hingson et al., 2017). These are unprecedented increases in an already at-risk population.

Beyond the acute effects, heavy episodic drinking has been shown to interfere with important developmental milestones such as graduating college and developing a career (Gotham

et al., 2003; Jennison, 2004; Ligouri & Lonbaken, 2015). This is evident in a substantial body of research demonstrating that college student heavy drinkers tend to be less engaged in academic activities during college and finish with lower grades compared to other students (El Ansari et al., 2013; Piazza-Gardner et al., 2016; Singleton, 2007; Tembo et al., 2017). Heavy alcohol use also disrupts the sleep-wake cycle and has been shown to intensify daytime sleepiness, in turn impairing performance in school for example (Roehrs & Roth, 2001; Van Reen et al., 2016). Failure to complete college has further been associated with myriad health and social problems including increased risk for developing a substance use disorder (Bennett et al., 1999; Jennison, 2004). Indeed, a 2015 national survey study found that emerging adults aged 18 to 29 years had the highest prevalence rate of lifetime AUD (37.0%) and past-year AUD (26.7%) compared to all other age groups examined (Grant et al., 2015). Clearly, efficacious, easily disseminable, and cost-effective interventions are required to address this significant social and public health problem.

Brief Interventions for Emerging Adult Heavy Alcohol Use

Brief Motivational Interventions (BMIs) are a promising and already widely used approach to addressing problematic alcohol misuse, particularly among college student EAs. BMIs typically include one or two 45 to 60 minute in-person sessions that aim to motivate reductions in hazardous drinking through the delivery of personalized normative feedback about drinking patterns, experiences of alcohol-related consequences, risk factors for problematic use, expectancies about the effects of alcohol, and discussion of protective behavioral strategies (Huh et al., 2015). BMIs are also often delivered using Motivational Interviewing (MI) style (Carey et al., 2007; Fachini et al., 2012; Miller & Rollnick, 2013), a therapeutic approach in which the clinician or counselor (a) engages the individual in the change process through empathic

listening and reflection; (b) facilitates focus on a particular desired behavior change or goal; (c) evokes change talk (i.e., the person's own motivation to change) as well as hope and confidence, while developing discrepancy in the individual's current behavior and the desired goal state; and (d) assists in developing and supporting the change plan and strengthening the individual's commitment to change.

Among the most established and robust mechanisms of behavior change for BMIs in college student emerging adult drinkers is the correction of the drinker's overestimates of normative drinking levels through the presentation of descriptive norms for college student drinking frequency and intensity (Reid & Carey, 2015). For example, a heavy drinking college student may be surprised to learn that the typical student at their university on average consumes fewer drinks and on fewer days per week than they expected, and that their level of use actually ranks in the 80th or 90th percentile. Indeed, at this age, peer groups and the social environment can be highly salient when making decisions about how and when to drink, especially if multiple peers are drinking at high or binge levels (Acuff et al., 2020).

Protective behavioral strategies (PBS) is another relevant mechanism that has been extensively utilized and evaluated in the BMI literature (Carey et al., 2012; Huh et al., 2015). Martens and colleagues (2004) defined PBS as cognitive-behavioral skills-based approaches to be used while drinking in order to reduce negative consequences associated with alcohol use. These approaches include avoiding drinking games and taking shots, using a designated sober driver, and alternating alcoholic beverages with water or other non-alcohol drinks. Generally, research has found promising, albeit mixed, support for PBS as a mediator of intervention and alcohol outcomes (Reid & Carey, 2015). This may be due in part to its association with individual-level factors, such as engagement in available alternative substance-free

reinforcement as well as the ability to consider the future consequences or outcomes of a decision (Voss et al., 2018). Relatedly, there is evidence to suggest that level of global self-regulation is associated with the utility of PBS, such that PBS use is greater in those with high self-regulation but use of PBS is more important in reducing alcohol-related consequences in individuals with low or poor global self-regulation (D’Lima et al., 2012).

Numerous clinical trials evaluating BMIs for college student heavy alcohol use have shown an advantage of BMIs in reducing both alcohol consumption and related problems (see meta-analysis by Tanner-Smith & Lipsey, 2015). Despite this, more than one meta-analysis has observed only small effect sizes for BMIs that diminish over time (Carey et al., 2007; Huh et al., 2015). Therefore, it may be necessary to enhance BMIs with additional theoretically grounded content and to increase access to and reach of this content.

Behavioral Economic Mechanisms to Enhance Brief Motivational Intervention Efficacy

Behavioral economic theory proposes that addiction is a *reinforcer pathology*, or a decision-making process characterized by an overvaluation of the immediate reward associated with substance use relative to other available, non-substance rewards and an undervaluation of large non-substance rewards that are temporally delayed (Bickel et al., 2014). This process is often operationalized in behavioral economic literatures as the allocation of resources (e.g., time, money, effort) towards obtaining a substance and is theorized to result in diminished engagement, and ultimately enjoyment, in other enjoyable or constructive, substance-free activities over time. Rachlin (1995, 1997) proposed a vicious cycle of increasing relative valuation of and resource allocation towards substance-related rewards resulting in progressively reduced availability of substance-free environmental rewards. Indeed, experimental studies have shown that high rates of substance use are more likely in environments that are devoid of

substance-free reward (Koob, 2006; Volkow et al., 2003). Pertinent to the development of effective treatments, substance use generally decreases when access to substance-free rewards increases (Carroll et al., 2009; Higgins et al., 2004). Unfortunately, some substance misuse treatments or brief interventions may be missing a crucial opportunity for enhancing the likelihood of enduring treatment response by not considering environmental context or by not facilitating the establishment of sustained patterns of behavior in which the individual can regularly engage in substance-free reinforcing activities (McKay, 2017).

Together, research on reinforcement and substance use has led to and informed multiple efficacious interventions, such as contingency management (CM; Petry, Martin, Cooney, & Kranzler, 2000) and community reinforcement approaches (CRA; Miller, Meyers, & Hiller-Sturmhöfel, 1999) for treatment seeking samples, and BMI approaches that promote rewarding alternative behaviors (i.e., exercise, substance-free leisure/recreation activities) in non-treatment seeking emerging adults (Brown et al., 2014; Correia et al., 2005; Daughters et al., 2016, 2018; Murphy, Dennhardt, et al., 2012; Murphy et al., 2019; Murphy, Skidmore, et al., 2012; Weinstock et al., 2016, 2017). In fact, encouraging increased engagement in exercise and creative behaviors in college students, without explicitly encouraging reducing substance use, has been associated with significant decreases in substance use behaviors, and this decrease was comparable to that found among participants who were asked only to reduce their substance use (Correia et al., 2005).

Time Allocation as a Measure of Engagement in Reinforcing Activities

Engagement in substance-free alternative activities has been shown to be protective against problematic substance use and may also enhance intervention feedback efficacy and predict treatment response (Acuff, Dennhardt, Correia, & Murphy, 2019). Further, proportionate

substance-free reinforcement has been associated with number of past month heavy drinking episodes and drug use, such that proportionately more engagement in substance-free reinforcing activities was associated with fewer heavy drinking episodes and drugs used in the past month (Meshesha et al., 2015; Skidmore & Murphy, 2010). Time allocation measures operate on the principle that the more a substance or non-substance activity is valued the more time will be spent on it relative to other possible options. Proportion of time spent on an activity in a given day or week is a useful and generally objective measure of the reinforcing value of an activity because it is “zero sum”, such that engagement in one activity often precludes simultaneous engagement in another (Baum & Rachlin, 1969; Herrnstein, 1970). Few studies have included measures of time allocation to assess substance-free and substance-related reinforcement; however, extant research suggests that certain types of activities, including religious-, service-, athletic-, and academic-related activities are associated with fewer episodes of heavy drinking among college students and lower rates of substance use (Fenzel, 2005; Meshesha et al., 2015; Vaughan et al., 2009). In particular, Meshesha and colleagues (2015) found that heavy-drinking polysubstance-using young adults tended to report less engagement in academics, extracurriculars, and exercise compared to only heavy drinkers and heavy drinkers who also used cannabis. Time spent in academic-related activities has also been associated with the extent to which an individual values the future and considers the future consequences of their present choices and actions (Acuff et al., 2017). Importantly, individuals who placed less value on the future tended to report spending less of their time in academic-related activities.

Delay Discounting

Discounting processes are another central tenet of behavioral economic theory and are broadly defined as the degree to which a reinforcer loses value as a function of some other

manipulated variable (Bickel et al., 2014). Germane to the current study, delay discounting is the degree to which reinforcers lose value as a function of time. Although the value of all rewards naturally decreases with temporal delay, there are significant individual differences in the degree to which these delayed rewards are discounted, or lose their value, and these individual differences have been associated with substance use disorder severity (Amlung et al., 2017). In addition, studies have shown that substance misusers discount the value of delayed future rewards more steeply than non-substance misusers, and steep delay discounting is predictive of poor response to substance use treatment (MacKillop et al., 2011; 2010).

Steep discounting of delayed rewards has become a central risk factor in behavioral economic models of addiction, and behavioral economic theory proposes several approaches for increasing the value of delayed rewards by expanding the temporal window (e.g., framing, mindfulness, episodic future thinking; Gray & MacKillop, 2015; Rung & Madden, 2018). For the purposes of the current study we focus on three of those approaches. The first is identifying short- and long-term goals, discussing the benefits of achieving these goals, the day-to-day behavior patterns that lead to these long-term goals, and the potential for heavy drinking to jeopardize these goals (Murphy, Dennhardt, et al., 2012). The individual is encouraged to consider their goals and plan out specific steps towards achieving these goals, which are processes that may not occur on a day-to-day or even week-to-week basis for many EAs.

Second, in targeting day-to-day behavioral patterns, aggregating seemingly discrete choices and activities (both substance-free and substance-related) into cumulative, cohesive patterns that relate to personally relevant long-term health or social outcomes is theorized to help increase the salience of long term rewards (i.e., choice bundling; Ainslie & Monterosso, 2003; Monterosso & Ainslie, 2007; Rachlin, 1995). For example, a behavior with low immediate

reward value (e.g., studying, doing homework, exercising) in the short-term may have higher reward value when it is framed as part of a pattern of achieving a valued long-term outcome (e.g., pattern of studying leading to college degree and higher income, pattern of exercise leading to good physical health). Alternatively, a behavior such as frequent heavy drinking or partying, which has high immediate reward value in the short-term, often has a much lower reward value when it is framed as part of a chronic, long-term pattern. Although the efficacy for choice bundling in this manner has been primarily demonstrated in lab studies using animal paradigms (Stein et al., 2013), available research using humans suggests that there is potential for choice bundling to reduce delay discounting and increase aspects of self-control (Kirby & Guastello, 2001; Monterosso & Ainslie, 2007). Indeed, a lab study comparing smokers and non-smokers demonstrated that smokers tended to initially prefer smaller short-term rewards over larger delayed rewards and that this preference appeared to be mitigated after completing tasks that either encouraged or forced the individual to consider each choice as part of a series or sequence (Hofmeyr et al., 2011). This suggests that choice bundling in this way extended smokers' time horizons to a small degree, which could enhance responsiveness to substance use treatment.

Finally, Episodic Future Thinking (EpFT; Atance & O'Neill, 2001) is an experiential intervention that prompts individuals to describe personal, emotional, and situational details of a valued future outcome in great detail (e.g., what it would be like to make the Dean's list, graduate college, or get a career/job). The concept of EpFT was developed from Tulving's conceptualization of episodic memory, in which humans are able to re-experience events in their lives and the capacity to be aware of their existence in time (Tulving, 2001). According to Tulving, similar processes that allow humans to mentally re-experience past events also allow us to project ourselves in to future experiences, potentially contributing to the sense of self which

has been shown to influence behavior (Ajzen, 1991; Fekadu & Kraft, 2001). More specific to alcohol use and drinking behavior, Lindgren and colleagues found that both implicit and explicit measures of drinking identity significantly and consistently predict alcohol consumption and related problems (Lindgren et al., 2013). That is, individuals who strongly identified as “drinkers” tended to report consuming more alcohol, greater alcohol cravings, and more alcohol-related problems. How the self is perceived by the individual seems to influence subsequent behavior akin to a self-fulfilling prophecy or vicious cycle, and EpFT exercises may disrupt this pattern by making an ideal future-self more salient in the present thereby expanding the temporal window. Indeed, experimental studies suggest that 5- to 10-minute EpFT exercises can reduce delay discounting and alcohol demand (i.e. reward value; Stein, Tegge, Turner, & Bickel, 2018), and may also lead to positive changes in health and addictive behaviors (Gray & MacKillop, 2015). Already, clinical research evaluating the functional impact of EpFT on alcohol misuse has found that individuals with alcohol dependency problems reported reduced alcohol demand, as well as reduced delay discounting, after completing an EpFT exercise (Snider et al., 2016), and that there is a cumulative effect on delay discounting when EpFT exercises are repeated over time (Mellis et al., 2019). Together, the literature on EpFT suggests it has a relatively immediate impact on decision-making processes, and there is clear potential for delivery within the context of brief and other interventions for alcohol and substance use.

The Substance-Free Activity Session

The Substance-Free Activity Session (SFAS; see Murphy, Dennhardt, et al., 2012; Murphy, Skidmore, et al., 2012; Murphy et al., 2019; Yurasek, Dennhardt, & Murphy, 2015) is a 50-minute in-person session that is designed to expand time horizon (reduce delay discounting) and encourage engagement in substance-free alternative activities with particular focus on the

student's academic and career goals. SFAS clinicians attempt to highlight the relation between patterns of substance use and substance-free activity and goal accomplishment, drawing attention to the connection between day-to-day patterns of behavior and long-term goal achievement. The SFAS is delivered using motivational interviewing (MI) style and includes personalized feedback on patterns of time allocation and goal-consistent activities. Primary components of the SFAS include discussion of college and academic goals and how alcohol or drug use has interfered or may interfere with the ability to accomplish these goals; information connecting drinking, GPA, college graduation, and average income after college; personalized feedback on (a) requirements for the student's major or intended career, (b) extracurricular and community activities tailored to the student's academic and career goals, (c) time allocation in various activities or life areas (e.g., class, studying/homework, exercise, drinking/drug use), (d) adaptive coping responses for students reporting elevated depressive or stress symptoms, and (e) substance-free recreational and leisure activities tailored to the student's interests and hobbies; and a goal setting and planning exercise. The SFAS serves, in part, as a complement to the standard alcohol BMI by encouraging engagement in activities that do not coexist well with heavy alcohol or drug use (e.g., academics, physical health). In facilitating the connection between current patterns of behavior (e.g., drinking, studying, going to class) and the long-term outcomes of these patterns, the SFAS attempts to broaden the temporal window and reduce delay discounting by enhancing the salience and value of delayed rewards (e.g., college graduation, career development, physical and mental health).

In an initial randomized pilot trial, Murphy and colleagues (2012) compared a standard alcohol BMI + Substance-Free Activity Session (SFAS) to a BMI + Relaxation Training (RT) condition in a sample of college students reporting at least two past-month heavy drinking

episodes. SFAS clinicians delivered the components described above to heavy drinking college students, and the relaxation training session included instruction on and practice of diaphragmatic breathing and guided progressive muscle relaxation (PMR). All research appointments and intervention sessions were delivered in-person by trained study personnel. Participants attended a 2-hour initial appointment in the lab in which they completed a baseline assessment survey and a 50-minute alcohol-focused BMI. Approximately one week later, participants returned to the lab to complete either the SFAS or RT session. Intervention delivery was limited to these two in-person sessions. Compared to those in the BMI + RT group, participants in the BMI + SFAS group demonstrated larger effect size reductions in number of past month heavy drinking episodes and alcohol-related problems. Additionally, these effects were partially mediated by protective behavioral strategies (PBS) such that those in the BMI + SFAS group reported increased use of PBS which in turn was associated with reduced alcohol-related problems. Further, participants who reported low levels of substance-free reinforcement or fewer/less severe depressive symptoms at baseline and were randomized to the BMI + SFAS group demonstrated greater reductions in heavy drinking episodes at follow-up.

Murphy et al.'s (2019) follow-up randomized clinical trial extended the above pilot trial by including a larger sample ($N = 393$), an assessment only condition in which participants did not receive any of the intervention components, and by following participants out to 16 months post-intervention. All participants reported at least two past-month heavy drinking episodes and completed baseline surveys and intervention components, if randomized to an intervention condition, as well as 1-month follow-up, in the fall semesters across four academic years. Telephone booster sessions scheduled for the beginning of the spring semesters were also included for participants randomized to either of the BMI conditions (BMI + RT or BMI +

SFAS). The telephone booster sessions covered content specific to the RT or SFAS, depending on which condition the participant was randomly assigned to at baseline. Although participants in the BMI + SFAS group demonstrated large effect size reductions in alcohol use and related problems out to 16-month follow-up compared to the assessment only condition, these effects were not significantly different from the BMI + RT group. Notably, changes in both PBS and proportional substance-related reinforcement mediated these treatment effects, whereas depressive symptoms demonstrated non-significant but trend level mediation effects. Thus, these two trials suggest that the BMI + SFAS is associated with significant and enduring reductions in alcohol use and problems in college student heavy drinkers.

With disseminability in mind, Yurasek and colleagues sought to test an in-person abbreviated BMI + SFAS intervention, reducing each session to 30 minutes for a 1-hour total intervention time (Yurasek et al., 2015). The abbreviated BMI + SFAS was compared to an abbreviated BMI + Education control in a small pilot trial (final $N = 65$) and included college student participants who reported at least one past-month heavy drinking episode – a less restrictive inclusion criteria than the aforementioned SFAS studies by Murphy and colleagues. A majority of the sample (69%) were also cannabis users, reporting an average of 12 use days in the past month. Participants who received the abbreviated BMI + SFAS reported significantly fewer cannabis use days at six-month follow-up compared to the BMI + Education control. Although there was a significant main effect for time on alcohol use and related problems, no significant differences in alcohol use and related problems were found between the two treatment groups at follow-up. Interestingly, the within subjects effect size for alcohol use from baseline to 6-month in the BMI + SFAS group was more than double the effect size for BMI + Education group; however, the within subjects effect size for alcohol-related problems was larger in the

BMI + Education group than the BMI + SFAS group. Yurasek et al noted that these somewhat unexpected findings may be due to a number of factors including inadequate power with the small sample size, reduced BMI + SFAS intervention dosages, and unanticipated potency of the BMI + education session.

Beyond college student populations, an adaptation of the SFAS was implemented by Meshesha and colleagues (2020) as a brief supplement to an intensive outpatient treatment for adults with alcohol use disorder (AUD). Similar to prior trials, the SFAS was conducted in person; however, it also included four weeks of once-weekly text-message booster content (e.g., reminders about their goals and upcoming substance-free activities consistent with their goals) as a way to extend the SFAS. Although the text-message boosters were minimally interactive (i.e., participants responded with “C” to confirm their receipt of the booster text-message), the average response rate was 74% across the four weeks, providing initial support for the feasibility of mobile-delivered SFAS content. As demonstrated below, widely available technology, such as smartphones and tablets, are promising media for the delivery of efficacious and evidence-based brief interventions for reducing risky alcohol use, and in particular the SFAS given its focus on increasing patterns of substance-free activities over time.

Technology-Based Delivery of Brief Interventions

As of 2017, more than 50% of the populations across 63 developed and developing countries owned and used smartphones (Google, Inc., 2017). Further, it was estimated that by 2014 the global penetration rate of mobile-phone subscriptions worldwide would approach 96% (roughly a subscription per person on Earth; International Telecommunications Union, 2014). Since then, global penetration rate of mobile-phone subscriptions has surpassed the number of people on earth (International Telecommunications Union, 2017), suggesting that this modality

of communication and knowledge transfer is largely ubiquitous. As such, mobile health (mHealth), characterized by the rapid and in some cases immediate transfer of health information due to the mobility, direct communication, and instantaneous access afforded, has the potential to transform the delivery of medical and public health services globally (World Health Organization, 2011). Rapid technological advancement, a wide variety of modalities for delivering intervention content (e.g., voice, text-message or short message service (SMS), multimedia message service (MMS), smartphone apps; World Health Organization, 2011), and ability to extend reach are likely contributing to the rise in technological applications for substance use prevention, intervention, and recovery efforts.

Web-Based and Computer-Delivered Brief Interventions for Emerging Adult Substance Use

Initial technological applications used to intervene with at-risk, heavy drinking EAs were primarily computer software- or web-based with varying levels of interactivity (e.g., reading content or watching videos, answering questions or responding to prompts, games or behavioral tasks, navigating a program or site at their own pace), and included alcohol education and personalized normative feedback (PNF) as key components (see review by Carey, Scott-Sheldon, Elliott, Garey, & Carey, 2012). Several also provided information on protective behavioral strategies (PBS), but fewer included content on alcohol expectancies and high-risk situations or motivational enhancement (e.g., decisional balance, values clarification, goal setting; Carey et al., 2012). Some were delivered through a computer onsite in a laboratory, whereas others took advantage of the potential for transportability of brief interventions by delivering them through a website to be visited remotely (e.g., Bingham et al., 2010; Neighbors, Lee, Lewis, Fossos, & Walter, 2009). Traditional web-based or computer-delivered feedback approaches were fully automated, which can reduce counselor time and cost burdens, but tended to be minimally

interactive (i.e., review personalized feedback based on an assessment, take quizzes or respond to questions, visit different parts of the site or program at their own pace) which may have actually decreased any saliency or potency of the interventions (Fjeldsoe et al., 2009; Hebden et al., 2014). Indeed, a 2012 meta-analytic review found that face-to-face interventions (FTFIs) were associated with greater efficacy than computer-delivered interventions (CDIs; Carey et al., 2012), suggesting that counselor time burden and costs associated with counselor contact may be worth it. Further, participation in “static” interventions (i.e., those with no regular contact with or prompting of the participant) or interventions relying on participant initiative to access content tends to decrease precipitously after just a few weeks (Gonzalez & Dulin, 2015), and are therefore unlikely to have as lasting an impact. As such, although CDI participants have reported significant reductions in drinking-related outcomes at short-term follow-ups, these effects were not maintained long term (Carey et al., 2012). Findings from this body of research suggest that, for technology-delivered BMIs, increased interactivity with key content may be best accomplished with real-time counselor interaction and may be necessary for longer term effects on alcohol use outcomes.

mHealth Interventions for Young Adult Alcohol Misuse

Despite some concern about efficacy, enthusiasm for mHealth interventions stems from their potential to be adapted to be more interactive as well as delivered remotely through the web, smartphone app, or text-message. As a result, a number of barriers, including cost to both the patient and healthcare system, patient convenience and autonomy, reaching isolated groups, delivering timely information, and stigma, may be overcome through the use of mHealth (Griffiths et al., 2006). This is especially significant considering that substance use disorders are highly stigmatized, which has been shown to interfere with seeking substance use treatment

services (Livingston et al., 2012). Among potential mHealth intervention modalities, Short Message Service (SMS) text-messaging is a widely used, quick communication method among emerging and young adults (Pew Research Center, 2015). For example, in the week of November 10-16, 2014, 97% of all smartphone users and 100% of emerging and young adult smartphone users surveyed ($N = 2,188$) reported using SMS text-messaging. Therefore, it comes as no surprise that text-based psychotherapy services have become increasingly popular and widely available in recent years, with resources such as Talkspace (<http://www.talkspace.com>) accruing over 300,000 users as of 2016 (Crook, 2016; Ferguson, 2016). Unlike the traditional software or web-based interventions discussed above, users are able to interact with another person over synchronous text- or instant-messaging (i.e., real-time communication between two people). A recently published study found that, following an in-person alcohol BMI, no incremental improvements of outcomes were gained as a result of static (non-interactive) emailed booster content (Carey, Walsh, et al., 2018). Alternatively, it is possible that enhanced interactivity through human contact, even if in the form of synchronous text-messaging, may play an important role in longer-term mHealth intervention efficacy.

Despite unprecedented growth in the use of mHealth, research suggests that the evidence for its efficacy is still limited (Marcolino et al., 2018). For alcohol and substance use mHealth interventions in particular, support for their efficacy is mixed (Kaner et al., 2017; Kazemi et al., 2017). Roughly half of the studies on mHealth interventions in a recent systematic review by Kazemi and colleagues (2017) demonstrated some efficacy in reducing drinks per drinking day, number of heavy drinking days, likelihood of relapse, or greater abstinence rates (Gonzales et al., 2014; Gustafson et al., 2014; Haug et al., 2013; Suffoletto et al., 2012, 2014; Weitzel et al., 2007). The remaining studies did not indicate any notable or significant changes in substance use

outcomes (Agyapong et al., 2012; Gonzalez & Dulin, 2015; Haug et al., 2015; Lucht et al., 2014; Shrier et al., 2014) or found iatrogenic effects such that the intervention group actually increased heavy drinking episodes per week compared to the control group (Gajecki et al., 2014). Further, though an event-specific, automated text-message brief intervention to reduce estimated blood alcohol content (eBAC) on 21st birthdays was not successful in directly reducing eBAC, it was efficacious in altering perceptions about normative drinking on 21st birthdays, which has been shown to be a robust mediator of intervention and alcohol outcomes (Bernstein et al., 2018). Alternatively, a similar study using a brief automated text-messaging intervention targeting tailgating event-specific drinking did successfully show reductions in eBAC and number of drinks consumed when tailgating, and lower peak eBAC and fewer alcohol-related problems at 1-month follow-up (Cadigan et al., 2018). Similar to Bernstein and colleagues' (2018) study, Cadigan and colleagues' (2018) intervention was efficacious in altering perceptions of tailgating drinking norms which in turn was associated with significant reductions in past-month peak eBAC. Together, this research suggests that automated text-messaging programs may be most appropriate for event-specific or short-term drinking effects.

Notably, the predominant use of text-messaging to intervene with emerging and young adult populations has been largely automated and unidirectional (Bock et al., 2016) or bidirectional with a bank of semi-tailored automated responses (Suffoletto et al., 2013, 2015; Suffoletto, Kristan, et al., 2016; Suffoletto, Merrill, et al., 2016; Witkiewitz et al., 2014), which does not typically include meaningful interaction with another person and actually may require very little active attention compared to in-person interventions. A recent systematic review of mHealth interventions for young adult alcohol and substance use reviewed 12 studies, 10 of which used text-messaging as the primary form of intervention delivery (Kazemi et al., 2017).

Half of the text-message delivered interventions used one-way/unidirectional messaging, whereas the other half allowed for bidirectional communication using large response banks able to provide automated semi-tailored responses to participants' messages (Kazemi et al., 2017). More recently, a study by Merrill and colleagues piloted an entirely automated, semi-interactive (i.e., standardized participant responses and ratings) text-message intervention delivering personalized normative feedback for the purposes of reducing college student problematic alcohol use (Merrill et al., 2018). Although the evidence for mHealth intervention efficacy is still limited, a majority of these studies reported mHealth intervention feasibility, acceptability, and/or accessibility, suggesting the promise of this modality in reaching heavy drinking EA college students.

Important to mHealth intervention feasibility, EAs are more likely to agree to participate in remotely delivered mHealth interventions than face-to-face interventions (Neighbors, Rodriguez, Garey, & Tomkins, 2018), despite their largely non-treatment seeking status. However, research also suggests that many EA participants are not fully attending to remotely delivered interventions, reporting preoccupation with other activities when attention to intervention elements was required (Lewis & Neighbors, 2015). Thus, automated text-messaging interventions may be no better than the traditional "static" software or web-based interventions. Indeed, a review of six studies examining in-person and remote-delivered personalized normative feedback brief interventions found that remote-delivered mHealth interventions were less effective in reducing alcohol-related outcomes than in-person delivered interventions (Rodriguez et al., 2015). A number of factors have been hypothesized to be contributing to this lack of efficacy in computerized remote-delivered interventions including participant distractibility as in Lewis and Neighbors' (2015) study, less perceived "monitoring" outside of a

research lab setting which may diminish diligence and conscientiousness in responding (Rodriguez et al., 2015), and lower levels of trust and/or rapport with research or clinical personnel compared to in-person interventions (Elliott et al., 2008; Taylor & Luce, 2003). Importantly, information retention has been shown to partially mediate the relation between level of intervention interactivity (e.g., reading only, reading and recalling intervention content) and drinking outcomes (Jouriles et al., 2010), suggesting that attention to and interaction with intervention content is one important factor in brief alcohol intervention efficacy and may be influenced by researcher observation and interaction. Together, this research supports the utility of continuous and stimulating interactivity within the mHealth intervention, potentially with another person “present” (i.e., able to directly and instantaneously communicate with), for more sustained mHealth intervention efficacy.

Synchronous Text-Messaging for Delivering Brief Motivational Interventions

Given the ubiquity of smartphone usage among emerging adults, as well as the popularity of mHealth interventions, a next step for alcohol BMIs and the Substance-Free Activity Session (SFAS; Murphy et al., 2012, 2019) is to expand population reach via delivery through technology-based media that both eliminates the need for in-person sessions while also maintaining a meaningful and sustainable level of human interaction to promote attention to key intervention content. Compared to interactive text-messaging interventions in which participant messages are single words or short phrases and/or intervention messages are automated and pulled from a bank of possible responses, counselor-administered synchronous text-messaging (CoAST) is defined as real-time communication between participant and counselor through a text-messaging or instant-messaging platform. To our knowledge, only one other published study has examined a CoAST based intervention for alcohol-related outcomes. This study examined

the preliminary efficacy of a mobile-delivered alcohol-impaired driving intervention with college student EAs ($N = 82$) in a randomized pilot trial (Teeters, Soltis, & Murphy, 2018). Participants in the brief intervention condition ($N = 43$) viewed personalized feedback about their experiences with drinking and driving and, afterward, engaged in a brief text messaging conversation with a study interventionist. As with in-person BMIs, the interventionist texted responses consistent with MI-style and asked open-ended questions. The study focused sessions on alcohol-impaired driving by asking all participants in the texting BMI session the same set of open-ended questions: (1) of the information you just viewed, what was most interesting, (2) how would receiving a DUI impact your future career goals, and (3) what is your plan for driving after drinking in the future? Notably, their results indicated that this brief CoAST intervention was efficacious in reducing drinking and driving incidences at 3-month follow-up compared to an education control condition. Secondary analyses found that interventionist linguistics, particularly their use of positive emotion words as well as their authenticity and clout (high influential status as indicated by first person plural nouns, second person singular pronouns, and a focus on others; Kacewicz, Pennebaker, Davis, Jeon, & Graesser, 2014) conveyed in text-messages, significantly moderated driving after drinking change scores from baseline to 3-month follow-up (Teeters et al., 2019). This suggests there is a uniquely human element that may not otherwise be conveyed in automated and non- or minimally-interactive mobile-delivered brief interventions. Taken together with the broader literature on mHealth interventions, these findings also suggest that a CoAST brief alcohol intervention may be efficacious in reducing alcohol misuse among heavy drinking college student EAs.

The Present Study

Although technological methods for delivering behavioral health interventions are constantly evolving (Kumar et al., 2013), text-messaging appears to be the most consistently used and accessible form of remote interaction among emerging adults. Due to the brief and potentially highly salient nature of text-messaging, short but frequent interactions, as compared to in-person frequency of interaction, may complement well the goal of the BMI + SFAS (Oinas-Kukkonen & Harjuma, 2009). Given that behavioral economic theory emphasizes the importance of understanding behavior in molar patterns connected to delayed rewards, this is ideally translated into an intervention approach that is delivered via repeated brief contacts over time. As such, text-based reminders of personally salient academic, physical health, and other goals that are incompatible with heavy drinking, along with feedback on recent activity patterns associated with these rewards and available substance-free activities, may increase the likelihood that individuals will consider more often the future consequences of present choices and elect to engage in patterns of prosocial activities rather than heavy episodic drinking.

The present study builds off of previous laboratory studies and clinical trials supporting behavioral economic mechanisms as promising alcohol intervention elements by determining whether they can be delivered in a format that could increase the potential for lower-cost dissemination while preserving or even enhancing efficacy. Specifically, using a randomized pilot trial design, the present study compared a counselor-administered, synchronous text-message (CoAST) based alcohol Brief Motivational Intervention (BMI) + Substance-Free Activity Session (SFAS; Murphy et al., 2012) to a CoAST based Alcohol + Nutrition Education (A+NE) active control. An education control condition was selected because although alcohol and health-related information can be useful, it has not been shown to significantly effect

alcohol-related outcomes (Cronce & Larimer, 2011). The education condition also controlled for the mHealth modality, total contact time, and assessment reactivity; however, it was unable to control for the use of Motivational Interviewing style or intervention content.

First, we hypothesized that the text-message delivered BMI + SFAS will be feasible and well-received, such that we expect at least 70% of eligible participants who enroll to complete the study and that enrolled participants will report favorable subjective impressions of the CoAST brief intervention. Second, we hypothesized that college student heavy drinkers who receive the CoAST BMI + SFAS will demonstrate less past-month alcohol consumption, heavy drinking episodes, and alcohol-related problems at follow-up, compared to those who receive the A + NE active control. A secondary goal was to evaluate possible mediators of treatment effects associated with the SFAS, including alcohol demand, future orientation (delay discounting, consideration of future consequences, and self-regulation), protective behavioral strategies, proportional time allocated to academic, physical health (i.e. exercise, sports), and substance using activities, and depressive symptoms. Due to our small final sample size, we were not powered for formal tests of mediation; however, we were able to assess for potential mediators by examining proximal changes in mechanisms of change from baseline to follow-up in the BMI + SFAS condition relative to the A + NE condition.

Method

Participants and Procedure

Participants were college students recruited from several colleges and universities across multiple states in the southeastern United States. Participants were screened for study eligibility using a brief survey. The secure web-link to this survey was included on flyers that were posted on university and college campuses and around the city of Memphis, in research participation

solicitation emails to consenting or publicly available student email addresses, in social media postings on Facebook, Instagram, and Reddit, and included as a study in the psychology research subject pool (SONA) at the University of Memphis. Prior to beginning the screening survey, participants read and e-signed an informed consent form detailing their participation in the brief survey study.

Eligibility Criteria

Participants were considered eligible for the pilot trial if they indicated in the brief screening survey study that they: (a) were between 18 and 25 years of age; (b) were an undergraduate student working towards a bachelor's or associate's degree; (c) were working fewer than 30 hours per week if employed; (d) reported two or more heavy drinking episodes (4/5 or more standard drinks for women/men respectively in an occasion) in the past month; (e) could speak, read, and write in English; (f) had access to the Internet via a smartphone, tablet, laptop, or desktop computer; and (g) provided contact information for study personnel to reach them if deemed eligible for the pilot trial.

Study Enrollment Procedures

See Table 1 for study enrollment procedures and participant activity in the study. If considered eligible, the participant was initially contacted by study personnel via the preferred method of communication they indicated in the screening survey to schedule a time to speak over the phone. During the recruitment and enrollment phone call, participants deemed eligible were provided more detailed information about the study and given the opportunity to ask any questions they had about the study. If participants indicated they were willing to participate in the study they were then asked to download and create a private account through the encrypted messaging app *Babelapp* (<https://www.babelapp.com/en/>), which is freely available online as

well as through the Apple App Store and Google Play Store. *Babelapp* is available as a native app for smartphones, tablets, laptops, and desktop computers. Study personnel helped troubleshoot as needed, as well as ensured the participant had successfully logged in to *Babelapp* and connected with study personnel in the messaging app.

Table 1. *Participant Enrollment and Study Activities*

Timeline	Study Activity		Details of Activity
	Screening Survey		Determine eligibility
Week 1	Participant contacted		Via text-message or other preferred method of contact selected in the Screening Survey
	Enrollment		<ul style="list-style-type: none"> • Download <i>Babelapp</i> • Contact study personnel on <i>Babelapp</i> • E-sign informed consent form • Complete baseline survey
Week 2	Session 1		Randomization occurs
	BMI (45-60 mins)	Alcohol Edu (40-50 mins)	
	Session 2		Brief feedback survey immediately follows
	SFAS (45-60 mins)	Nutrition Edu (40-50 mins)	
Week 3	Booster 1 (20-30 mins)	Booster 1 (20-30 mins)	Brief assessment <ul style="list-style-type: none"> • Alcohol Purchase Task (demand) • Delay Discounting • Time Allocation (BMI + SFAS only)
	Booster 2 (20-30 mins)	Booster 2 (20-30 mins)	Brief assessment <ul style="list-style-type: none"> • Alcohol Purchase Task (demand) • Delay Discounting • Time Allocation (BMI + SFAS only)
Week 4	Booster 3 (20-30 mins)	Booster 3 (20-30 mins)	Brief assessment <ul style="list-style-type: none"> • Alcohol Purchase Task (demand) • Delay Discounting • Time Allocation (BMI + SFAS only)
	Booster 4 (20-30 mins)	Booster 4 (20-30 mins)	Brief assessment <ul style="list-style-type: none"> • Time Allocation (both groups)
Week 5	Post-intervention Survey		Immediately following Booster 4
			<ul style="list-style-type: none"> • Includes feedback on interventions and use of text-messaging
Week 6	3-Month Follow-up Survey		Baseline survey structure repeated

Following successful *Babelapp* setup, study personnel sent a secure web-link to the baseline survey along with the participant's study PIN to begin the survey. While on the phone call, study personnel also discussed the informed consent form embedded at the beginning of the baseline survey and strongly encouraged participants to ask any questions or voice any concerns they may have about the study before electronically consenting to participate. Study contact information was also provided within the survey. Participants were encouraged to access and complete the informed consent form and baseline assessment survey the same day, or within 24 hours of the recruitment and enrollment phone call. They were also instructed that they would receive a follow-up text, phone call, or email prompt to complete the survey if they had not done so in that 24-hour timeframe. Once the participant had remotely completed the baseline assessment survey, study personnel scheduled the first session for a time in the next day or two that was most convenient for the participant's and counselor's schedules.

Randomization

Randomization was stratified by gender (man/woman) and drinking level (low binge = 2 to 3 episodes in the past month/ high binge = 4+ episodes in the past month) in order to ensure similar levels of baseline drinking in each study condition. Randomization was also initially equally weighted such that participants had a 50% chance of being randomly assigned to either the BMI + SFAS or A + NE condition. However, due to the primary aims of the study to evaluate feasibility and initial change estimates of the CoAST BMI + SFAS intervention, randomization was weighted such that there was a 70% chance of assignment to the BMI + SFAS condition and 30% to the A + NE control condition.

To reduce the potential for high drop-out or attrition rates post-randomization, randomization did not occur until after contact had been made with the participant at the

scheduled session time and the participant had confirmed their availability to complete the session at that time. As such, counselors prepared materials for the BMI session regardless of whether or not the participant was to be randomized to the BMI + SFAS condition; no preparation time was required for the A + NE condition. It is unlikely that the BMI preparation would have led to session contamination if the student was randomized to the A + NE due to the highly scripted nature of the A + NE sessions (described in more detail in the Interventions section below).

Participant Study Activity Following Randomization

Following the first text session (either BMI or alcohol education), participants received either the SFAS or nutrition education, respectively. Most of the second sessions were administered within a week of the first session ($M = 4.17$ days, $SD = 3.52$, range 1 - 25). All second sessions were administered by the same counselor who delivered the first session. Immediately following the second session, participants were asked to complete a brief 3-item feedback survey regarding their first two CoAST sessions. At this point, participants were compensated (\$25 in cash or Amazon gift card, or 1 SONA credit) for their participation thus far in the study.

Following the initial two sessions, counselors scheduled a standing time over the next four weeks that was convenient for the student to complete the text-message booster sessions. Booster sessions occurred once a week for those four weeks. Content of booster sessions for the BMI + SFAS group covered and extended material primarily included in the SFAS session with some discussion around drinking-related goals identified in the BMI. Booster session content for the A+NE group covered and extended material included in both the alcohol and nutrition education sessions. Each week, participants were also asked to complete a 2- to 3-minute survey.

For the A + NE group, these brief surveys included the 20-item hypothetical Alcohol Purchase Task for calculating behavioral economic demand and the 8-item delay discounting task for calculating the behavioral economic index of impulsivity (see Measures section). The BMI + SFAS group also completed these same brief surveys with the addition of a weekly time allocation measure assessing approximate hours-per-week engaged in various life activities (see Measures section). This measure was not included in the A + NE group's weekly brief surveys because reflection on time allocation is considered an active component in the SFAS session and could have contaminated intervention effects if included in both groups' weekly surveys (see Interventions section below).

Following the four weeks of booster, participants in both groups completed a post-intervention assessment and were compensated for both their participation in the boosters (\$10 in cash or Amazon gift card, or 0.5 SONA credits) as well as the post-intervention assessment (\$10 in cash or Amazon gift card, or 0.5 SONA credits) for a total possible amount of \$20 in cash or Amazon gift card, or 1 SONA credit. Finally, three months after the post-intervention assessment, participants were asked to complete one final assessment similar to the baseline assessment. Participants received \$20 in cash or Amazon gift card for completion of the three-month follow-up assessment. See Figure 1 for a flowchart summary of recruitment and enrollment procedures. All procedures were approved by the University of Memphis Institutional Review Board (IRB Protocol #4324).

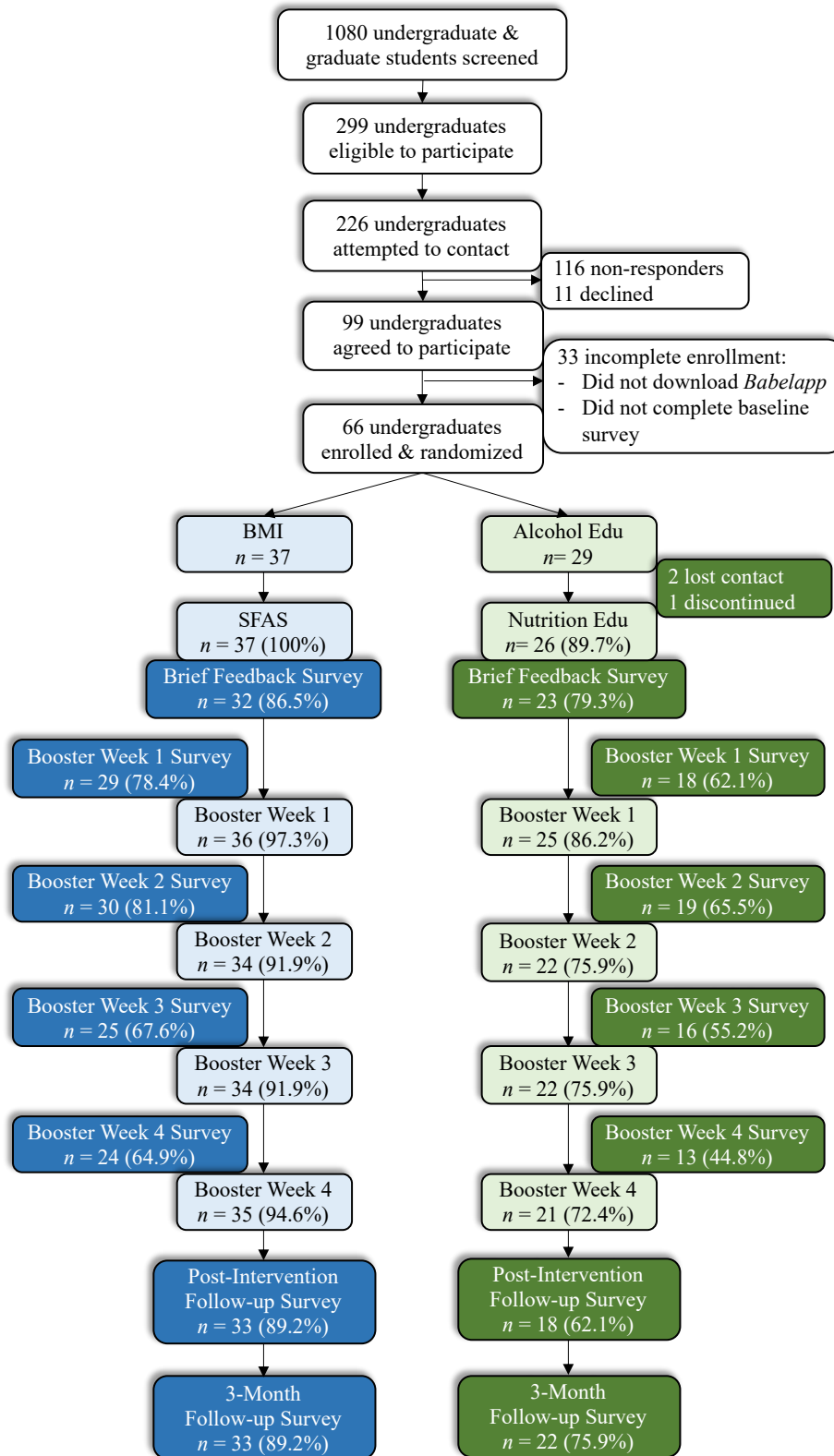


Figure 1. CONSORT Flowchart.

CoAST Interventions

Brief Motivational Intervention and Substance-Free Activity Session (BMI + SFAS)

The BMI + SFAS is a text-message based brief intervention adapted from an in-person/face-to-face brief intervention for emerging adult heavy alcohol use (Murphy, Dennhardt, et al., 2012; Murphy, Skidmore, et al., 2012; Murphy et al., 2019). Both the BMI and SFAS sessions are approximately 45-60 minutes each from first text sent by the counselor to the final text sent by either participant or counselor. The BMI session is designed to precede the SFAS, which typically followed within a week of the BMI session ($M = 4.59$, $SD = 4.15$, range 1 to 25 days). Four weeks of booster content begin the week after the SFAS session, and booster sessions last approximately 20 minutes each, reviewing or revisiting topics from the BMI + SFAS in a circumscribed manner. The full manual for the CoAST based BMI + SFAS, including booster session content, can be found in Appendix A; however, a summary of the primary components and subcomponents of the intervention are presented in Table 2. Counselors utilized motivational interviewing (MI; Miller & Rollnick, 2013) style throughout the initial BMI + SFAS sessions and the boosters.

Table 2. *Primary Components and Subcomponents of the CoAST based Alcohol Brief Motivational Intervention & Substance-Free Activity Session (BMI + SFAS)*

Primary Components	Subcomponents
<i>Alcohol Brief Motivational Intervention (BMI)</i>	
Decisional Balance	<ul style="list-style-type: none"> • Discussion of pros & cons of drinking
Personalized Feedback	<ul style="list-style-type: none"> • Gender-specific^a college student normative feedback on alcohol use (based on national norms) • Monthly expenditure on alcohol/drugs • Recent alcohol-related consequences
Strategies for safer drinking	<ul style="list-style-type: none"> • Discussion of what strategies to use and when/how
Summary & Goal Setting Exercise (if desired)	
<i>Substance-Free Activity Session (SFAS)</i>	
Discussion of College/Career & Personal Goals	<ul style="list-style-type: none"> • Goal importance/relevance • Impact of alcohol/drug use on achievement
Time Allocation Feedback	<ul style="list-style-type: none"> • Alignment with identified goals • Benefits of changing time allocation
Episodic Future Thinking Exercise	<ul style="list-style-type: none"> • Imagine & describe in detail a positive future event related to identified goals • Implications of actually experiencing the positive future event
Summary & Goal Setting Exercise (if desired)	
<i>Boosters (in order by week)</i>	
Substance-Free Recreational & Leisure Activities	<ul style="list-style-type: none"> • Personalized list of local, substance-free, low-cost/free activities relevant to identified goals • Feedback on college major/career requirements
General Goal(s) Progress	
Episodic Future Thinking Exercise	<ul style="list-style-type: none"> • Revisit or identify a new positive future event & implications of actually experiencing it
Changes in Time Allocation	<ul style="list-style-type: none"> • Alignment with identified goals • Benefits of changing time allocation • Summary

^a If a participant identified as gender non-binary, gender queer, transgender, or in any way gender non-conforming, national normative data on alcohol consumption for both women and men were provided due to the lack of normative data on alcohol consumption for groups other than cisgender women and men.

Alcohol and Nutrition Education (A + NE)

Brief intervention research has demonstrated that providing alcohol information in a non-personalized, informational style has no significant effect on alcohol use compared to BMI (Barnett et al., 2004; Borsari & Carey, 2005; Murphy et al., 2001). Further, although poor nutrition is associated with alcohol use, there is no research suggesting that nutrition education is related to significant changes in alcohol use. As such, the A + NE was designed to be the active control condition in the current study in which alcohol and nutrition education were provided via CoAST in an informational or instructional, as opposed to MI, style. Both the alcohol and nutrition education sessions lasted approximately 40 to 50 minutes each. The alcohol education session was also designed to precede the nutrition education session and to provide a session that is matched to the BMI for time and topic (alcohol). Similar to the timing of the BMI + SFAS, the nutrition education session typically occurred within a week of the alcohol education session ($M = 3.58$, $SD = 2.28$, range 1 to 8 days). Four weeks of booster content began the first week after the nutrition education session. Booster sessions occurred once weekly and lasted approximately 20 minutes each. All four boosters reviewed material from both the alcohol and nutrition education sessions and provided opportunities for students to discuss and ask questions about the material. The full manual for the CoAST based A + NE, including booster session content, can be found in Appendix B; however, a summary of the primary components and subcomponents of the intervention are presented in Table 3.

Table 3. *Primary Components and Subcomponents of the CoAST based Alcohol and Nutrition Education Intervention (A + NE)*

Primary Component	Subcomponents
<i>Alcohol Education</i>	
Standard Drinks	<ul style="list-style-type: none"> • Standard drink sizes • Alcohol by volume (ABV)/proof
Blood Alcohol Content (BAC)	<ul style="list-style-type: none"> • Legal limit in all 50 states
Alcohol Poisoning	<ul style="list-style-type: none"> • Signs & Symptoms • If it goes untreated • What to do if it is suspected
Biphasic Effect	<ul style="list-style-type: none"> • Tolerance
Summary	
<i>Nutrition Education</i>	
Five Food Groups from MyPlate.gov	<ul style="list-style-type: none"> • Fruits • Vegetables • Grains • Dairy • Protein
Oils & Fats	<ul style="list-style-type: none"> • Saturated vs. Unsaturated fats • Hydrogenated oils/trans-fats
Recommendations	<ul style="list-style-type: none"> • Increasing essential nutrients (e.g., fiber, protein, potassium) • Reducing certain food components (e.g., sodium, fat)
Summary	

Training of Counselors and Supervision

All CoAST based intervention sessions were delivered by four clinical psychology graduate students who had completed at least 20 hours of training and supervision in motivational interviewing including readings, DVDs, text-based and in-person role-playing, prior experience delivering an alcohol BMI and/or the SFAS, and supervision. All de-identified text-based intervention sessions were transcribed into Word document files from *Babelapp* and reviewed during weekly group supervision with a licensed clinical psychologist with expertise in brief alcohol interventions for emerging adults, the SFAS, and motivational interviewing.

Measures

See Appendix C for all of the measures included in the current study. Table 4 presents a summary of when each measure was administered.

Table 4. *Measure Administration and Data Collection Schedule*

Assessment	Baseline	Post-2nd	Booster Week 1	Booster Week 2	Booster Week 3	Booster Week 4	Post-Intervention	3-M FU	Post data collection
Internal Validity									X
Participant Satisfaction Ratings		X					X		
Drinks Per Week (DDQ)	X						X	X	
Heavy Episodic Drinking	X						X	X	
Alcohol-Related Problems (BYAACQ)	X						X	X	
Alcohol Purchase Task	X		X	X		X	X	X	
Delay Discounting Task	X		X	X		X	X	X	
Future Orientation (CFCS)	X							X	
Self-Regulation (SSRQ)	X						X	X	
Safer Drinking Strategies (PBSS)	X						X	X	
Depressive symptoms (DASS-21)	X							X	
Time Allocation	X		X*	X*	X*	X		X	

Note. Post-2nd participant satisfaction ratings were 3 items rating the 2 initial sessions completed. X* indicates that only BMI + SFAS participants completed this measure.

Evaluation of Intervention Internal Validity

Twenty percent of de-identified intervention session transcriptions from each condition and session ($n = 8$ BMI, $n = 8$ SFAS; $n = 6$ Alcohol Education, $n = 6$ Nutrition Education) were randomly selected and reviewed by three trained independent coders for intervention fidelity coding purposes and integrity across counselors. Independent coders reviewed each session using a brief intervention adherence protocol commonly used in intervention trials (see [Murphy et al., 2019](#)). 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*). Scores of 2 or higher indicate that the intervention component was delivered as prescribed or in a way that is consistent with the intervention protocol. Intervention cross-contamination was rated on a similar scale: 0 (*Didn't do it, N/A*), 1 (*Did it minimally*), 2 (*Did it moderately*), or 3 (*Did it a great amount*). Percentage of key elements included in the texting sessions will be evaluated, with percentages ≥ 80 representing high intervention fidelity.

Further, coding of the mobile BMI + SFAS followed the Motivational Interviewing Treatment Integrity unpublished coding manual (MITI; [Moyers et al., 2014](#)). Typically, a 20-minute segment of an audio-recorded session is selected for coding due to time burden and in-session MI validity; however, given the text-message modality, selecting segments based on time is difficult and may yield inconsistent lengths of dialogue depending on the participant's responsiveness. As such, sessions were divided at the median point of the content based on the treatment protocol, which most often occurred around the 30-minute mark of the session, and either the first or second half of the session was randomly selected for MITI coding purposes. Coding was completed by two of the independent coders mentioned above who were trained in motivational interviewing and the SFAS but were not counselors for this trial. Four global scores

described in the MITI (cultivating change talk, softening sustain talk, partnership, and empathy) were rated on a 5-point Likert-type scale with 1 denoting low and 5 denoting high motivational interviewing adherence. The most recent version of the MITI coding manual also utilizes behavior counts for 10 behaviors including three MI adherent (MIA) and two MI non-adherent (MINA) behaviors: Giving Information, Persuade (MINA), Persuade with Permission, Question, Simple Reflection, Complex Reflection, Affirm (MIA), Seeking Collaboration (MIA), Emphasizing Autonomy (MIA), and Confront (MINA). Total MIA and MINA utterances are calculated by summing the respective behavior counts for each. Four additional summary scores may be calculated from the global scores and behavior counts. The technical global score averages the cultivating change talk and softening sustain talk scores, and the relational global score averages the partnership and empathy global scores. Percent complex reflections (complex reflections / total simple & complex reflections count) and reflection to question ratio (total simple & complex reflections count / total question count) may also be calculated. Though global scores are typically determined first, tallied behavior counts may be used influence final global scores. Summary scores have also shown preliminary reliability and evidence for validity (Moyers et al., 2016).

Evaluation of Participant Satisfaction

At the completion of the fourth booster, participants were asked to provide their feedback on the intervention elements, which included the two initial CoAST sessions and the four weeks of boosters. Question items were a mix of rating scales and open-ended questions that attempted to gauge level of interest, personal relevance, comfort, and perceived effectiveness of the interventions. Scaled items ranged from 0 (*not at all*) to 10 (*very*). Specifically, participants were asked to rate the texting sessions in the following questions: “How would you rate the text-

message sessions overall?”, “Overall, how interesting did you find the first 2 text-message sessions?”, “Overall, how interesting did you find the final 4 weeks of text-message sessions?”, “How personally relevant did you find the sessions?”, “How effective do you think these sessions would be in modifying *college students’* drinking patterns?”, “How effective do you think these sessions will be in modifying *your* drinking patterns?”, “How comfortable were you discussing the topic of alcohol or disclosing information about your drinking patterns *via text-message?*”, and “How comfortable would you be discussing the topic of alcohol or disclosing information about your drinking patterns *in a face-to-face or in-person meeting* (compared to text-messaging)?”. The last question was rated on a scale from 0 *Much less comfortable compared to text-messaging* to 10 *Much more comfortable compared to text-messaging*, with 5 indicating similar comfort between text-messaging and in-person. Participants were also asked to briefly provide their feedback in the following open-ended questions: “What part(s) of the sessions did you think were *most useful* for you?”, “What part(s) of the sessions did you think were *least useful* for you?”, “What did you *like* about using text-messaging for the sessions?”, and “What did you *not* like about using text-messaging for the sessions?”

As a final part of the feedback, participants were asked to rate how these text-messaging sessions might compare to other forms of delivery. In particular, participants were asked, “How do you think these text-message sessions would have compared to getting the same information or feedback from a “bot”, or if it were generated and sent by a computer?” Response options for this question ranged from 1 (*Much worse*) to 5 (*Much better*) with space to provide a reason for their rating. Participants were also asked, “How effective do you think these text message sessions would be if they had been generated and sent by a computer or ‘bot’?”, which was rated on a scale from 0 *Not at all* to 10 *Very*. Finally, participants were asked, “Would you have

preferred to do these sessions in person, face-to-face? Why or why not?”. Response options for this question were either 1 *Yes* or 0 *No* with space to provide a reason for their selection.

Daily Drinking Questionnaire (DDQ)

Alcohol use was assessed using the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). Participants were asked to estimate the number of drinks consumed, as well as the approximate number of hours over which they consumed these drinks, for each day in a typical week over the past month. The DDQ is a commonly used measure to assess for typical drinking patterns and has frequently been used in college student samples (Bravo & Pearson, 2017; Kivlahan et al., 1990; Larimer et al., 2001; Lewis & Neighbors, 2004; MacKillop & Murphy, 2007; Merrill et al., 2018; Murphy, Dennhardt, et al., 2012). Separate items were included to assess for heavy episodic, or binge, drinking over the past month, defined as 4 or more (if a woman) or 5 or more (if a man) standard drinks in one occasion (Wechsler, Dowdall, Davenport, & Castillo, 1995).

Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ)

Problems as a result of alcohol use were assessed using the Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler, Strong, & Read, 2005). The B-YAACQ is a 24-item scale abbreviated from the original 48-item YAACQ and found to have retained similar levels of meaningful variance as the original (Read et al., 2006). Participants were asked to indicate whether or not (1 *Yes* or 0 *No*) they had had a particular experience related to their alcohol use in the past month. Items included, “I have had a hangover (headache, sick stomach) the morning after I had been drinking”, “I’ve not been able to remember large stretches of time while drinking heavily”, and “I have often found it difficult to limit how much I drink.” The B-YAACQ is a frequently used measure of alcohol-related problems among college students

(Carey, Merrill, et al., 2018; Murphy, Dennhardt, et al., 2012; Pearson, Liese, & Dvorak, 2017; Read et al., 2006; Riordan, Flett, Hunter, Scarf, & Conner, 2018; Soltis et al., 2018; Soltis, McDevitt-Murphy, & Murphy, 2017). Internal consistency for the current sample was 0.89.

Alcohol Purchase Task (APT)

A hypothetical Alcohol Purchase Task (APT; Murphy & MacKillop, 2006) was used to assess alcohol demand, or the individual's level of reward value and motivation for alcohol.

Participants read the following brief vignette:

Pretend to purchase and consume alcohol. Imagine that you and your friends are at a party on a Thursday night from 9PM until 2AM to see a band. Imagine that you do not have any obligations the next day (i.e., no work or classes). The following questions ask how many drinks you would purchase at various prices. The available drinks are standard size domestic beers (12 oz.), wine (5 oz.), shots of hard liquor (1.5 oz.), or mixed drinks containing one shot of liquor. Assume that you did not drink alcohol or use drugs before you went to the party, and that you will not drink or use drugs after leaving the party. Also, assume that the alcohol you are about to purchase is for your consumption only during the party (i.e., you can't sell or bring the drinks home).

Participants were then asked how many drinks they would consume at each of the following 20 price points: \$0 (free), \$0.25, \$0.50, \$1.00, \$1.50, \$2.00, \$2.50, \$3.00, \$4.00, \$5.00, \$6.00, \$7.00, \$8.00, \$9.00, \$10.00, \$15.00, and \$20.00. The number of drinks reported at each price point were then plotted as a function of price (demand curve). Five indices extracted from the demand curve: *intensity*, *O_{max}*, *P_{max}*, *breakpoint*, and *elasticity*. *Intensity* is the reported number of drinks an individual would consume if the drinks were free (\$0). That is, when there

was no price constraint on consumption. O_{max} , or maximum expenditure, is calculated by multiplying each price by the number of drinks reportedly purchased at each price point. The largest expenditure is O_{max} , and the price point at which this occurs is P_{max} . *Breakpoint* is the point at which consumption equals 0, and the individual is fully constrained by price. Finally, *elasticity* is a mathematically derived index that represents an individual's sensitivity to changes in price, such that a highly inelastic individual is relatively insensitive to increasing prices and will continue to purchase and consume similar amounts of alcohol across increasingly higher prices. The Demand Curve Analyzer software (Gilroy et al., 2018), which is freely available online at <https://github.com/miyamot0/DemandCalculatorQT>, was used to extract all five indices. Elasticity was calculated using the exponentiated equation and a shared log range K, as recommended by Koffarnus et al. (2015).

Brief Delay Discounting Task

An 8-item hypothetical monetary choice questionnaire was administered to assess the extent to which an individual devalues a larger monetary reward as a function of temporal delay (Gray et al., 2014). Participants were presented with eight choices between two amounts of money and each item asked them to choose between a hypothetical smaller, immediately received amount and a larger delayed amount (e.g., \$10 today vs. \$100 in 1 week). Each item varies in amounts presented and delays in time and contributes to an estimate of the participant's level of delay discounting. The impulsive choice ratio was calculated by dividing the number of choices for the immediate reward by the total number of choices, in this case eight. Hypothetical monetary choice tasks have been shown to be reliable and valid in estimating discounting rates (Johnson & Bickel, 2002; Simpson & Vuchinich, 2000) and are frequently used in college

student and young adult samples (Dennhardt & Murphy, 2011; Kirby et al., 2005; Kollins, 2003; Saville et al., 2010).

Consideration of Future Consequences Scale

This 12-item measure assessed the extent to which individuals consider outcomes of their behavior, as well as how considering these potential outcomes influences their present decision-making (Strathman et al., 1994). Participants were asked to rate how characteristic each item is for them from 1 (*Extremely uncharacteristic*) to 5 (*Extremely characteristic*). Example items included, “I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences” and “I only act to satisfy immediate concerns, figuring the future will take care of itself.” Items are summed to create a total score wherein higher scores indicate greater consideration of future consequences (i.e., greater future orientation). This measure has demonstrated good test-retest reliability (Strathman et al., 1994), as well as convergent and construct validity (Murphy, Dennhardt, et al., 2012). Internal consistency for the CFCS was 0.77.

Short Self-Regulation Questionnaire (SSRQ)

The SSRQ (Neal & Carey, 2005) is a 21-item measure used to assess individual degree of behavioral self-regulation and consists of two subscales: Impulse Control and Goal-Setting. Items are rated on a scale from 1 *Strongly Disagree* to 5 *Strongly Agree*, with higher scores indicating greater self-regulation, impulse control, and goal setting efficacy. Examples of items on the Impulse Control subscale include, “I usually think before I act” and “I learn from my mistakes”. Examples of items from the Goal Setting subscale include, “I usually keep track of progress toward my goals” and “I am able to accomplish goals I set for myself.” Internal

consistency for the total scale in the current sample was 0.92, 0.86 for the Impulse Control subscale, and 0.88 for the Goal Setting subscale.

Protective Behavioral Strategies Scale

Participants were asked to rate the degree to which they engage in 15 protective behavioral strategies using the Protective Behavioral Strategies Survey (PBSS; Martens et al., 2005). This measure assesses the extent to which participants engage in behaviors that have been shown to reduce various risks associated with alcohol use. Examples of items included in the measure were “use a designated driver”, “avoid drinking games”, “leave the bar/party at a predetermined time”, and “drink water while drinking alcohol.” Items are rated on a 6-point scale from 0 (*never*) to 5 (*always*). This measure has demonstrated evidence for good construct and convergent validity (Martens et al., 2005). Internal consistency for the PBSS in the current sample was 0.86.

Depression Subscale of the Depression, Anxiety, and Stress Scale (DASS)

The Depression Subscale is a 7-item subscale of the abbreviated 21-item DASS (Lovibond & Lovibond, 1995). The items for the depression subscale assess depressive symptoms, and examples include, “I found it difficult to work up the initiative to do things” and “I felt down-hearted and blue”. Participants reported the degree to which each statement applied to them in the past two weeks using a 4-point scale (0 *Did not apply to me at all* to 3 *Applied to me very much*). The items are then summed and multiplied by 2 to mimic scoring for the full 42-item DASS (Antony et al., 1998). Scores of 10 or higher on the Depression Subscale indicate greater than “normal” levels of depressive symptoms. The DASS-21 is not a diagnostic measure and takes a dimensional approach, rather than categorical, to symptoms; therefore, scores represent degrees of difference between “normal” populations and clinical populations. Research

supports good validity for the DASS-21 in both clinical and nonclinical samples and has previously been used in college student populations (Mahmoud et al., 2010; Murphy, Dennhardt, et al., 2012; Soltis et al., 2017). Internal consistency for the Depression Subscale was 0.94.

Time Allocation

Participants completed a 14-item time allocation measure in which they were asked to estimate their typical weekly time spent in various academic, extracurricular, and career-related areas. They reported their estimated time spent: in class or lab, studying or doing homework, participating in social fraternity or sorority activities, participating in other university organizations or programs (excluding social fraternities or sororities), participating in an internship or volunteer activity, participating in a community or civic organization, working in paid employment, exercising or playing sports, with their family, engaging in religious or spiritual activities, drinking alcohol, using drugs, using social media (e.g., Facebook, Twitter, Instagram), and using the internet not for social media or academic/work related purposes. All 14 categories were used as part of the time allocation feedback in the BMI + SFAS condition; however, only time spent in class, doing homework, exercising, and drinking were examined in the final analyses.

Data Analysis Plan

All data analytic procedures used SPSS (Statistics for Mac, Version 26.0, Released 2019; IBM Corp., Armonk, NY) and *MPlus* version 8.2 (Muthén & Muthén, 1998-2017). Variables were evaluated for outliers as well as skew and kurtosis. As recommended by Tabachnick and Fidell (2013), values greater than 3.29 standard deviations above the mean were considered outliers and Winsorized to one unit greater than the greatest non-outlier value. In addition, non-normal continuous variables were transformed using standard mathematical procedures.

Baseline Characteristics

Baseline descriptive characteristics of the overall sample, and by study condition, were conducted and included demographic information as well as means and standard deviations for the primary alcohol outcome variables. In addition, *t*-tests and chi-square analyses were conducted to determine if there were significant group differences at baseline on any demographic or alcohol-related variables. Further, attrition effects were evaluated using the Mann-Whitney U, a non-parametric independent samples *t*-test, to determine if there were systematic or non-random differences in baseline alcohol outcomes by (1) intervention completers ($n = 60$) and non-completers ($n = 5$) and (2) intervention completers who completed the 3-month follow-up assessment ($n = 54$) compared to those who did not ($n = 6$).

Feasibility

To evaluate feasibility, we examined enrollment, attrition and, intervention completion rates. Further, we conducted parametric and non-parametric independent samples *t*-tests to test for any significant demographic differences in study group membership and baseline differences in our alcohol use outcome variables of drinks per week, heavy drinking episodes, and alcohol-related problems.

Intervention Internal Validity

Data from independent coders were used to calculate average ratings of counselor protocol adherence for the BMI + SFAS and the A + NE interventions. Percentage of intervention components that coders identified as having met or exceeded expectations was also calculated for both study conditions. Data from the two BMI + SFAS independent coders were pooled. Summary scores as defined by the unpublished MITI Coding manual (Moyers et al., 2014) were calculated. Averages of the global scores and summary scores were calculated.

Participant Satisfaction

To evaluate acceptability, independent samples *t*-tests comparing feedback and ratings by condition were conducted. Ratings and feedback were collected in the post-intervention survey which was administered immediately following the fourth booster (See Table 1 for timeline summary, p. 25). In addition, qualitative feedback was reviewed using grounded theory (Charmaz, 2014) for common themes regarding the utility of the interventions and participants' liking and disliking of CoAST based intervention delivery.

Preliminary Efficacy

It should be noted that pilot trials of this nature are not appropriate for hypothesis testing for efficacy and may not provide reliable effect size estimates for larger trials due to small sample sizes and imprecise data (Eldridge et al., 2016; Leon et al., 2011). Therefore, intent-to-treat analyses, which are primarily used to give an unbiased estimate of treatment effect in randomized clinical trials, are not appropriate for our current data and analyses (Gupta, 2011; McCoy, 2017). However, due to the novelty of the CoAST delivery approach, we were interested in preliminarily examining the effects of the CoAST BMI + SFAS on alcohol use outcomes. As such, a somewhat conservative per-protocol approach was used: participants who completed the initial BMI + SFAS or A + NE sessions and at least two of the 4 booster sessions of the respective intervention were considered to be intervention completers and were included in our preliminary efficacy analyses. To test the preliminary efficacy of the text-message based BMI + SFAS (Hypothesis 2), a series of regression models was conducted to assess for an effect of intervention condition on the primary alcohol-related outcomes of past month drinks per week, heavy drinking episodes, and alcohol-related problems at 3-month follow-up. Taking into consideration the intended purpose of pilot trials and the limitations of our sample size, we

cautiously provide estimates of preliminary efficacy and effect sizes that may inform the viability of evaluating this approach in a larger trial.

Because our alcohol-related outcomes are count data (i.e., non-negative integers), negative binomial regression models were used. These models are better able to handle highly skewed and over-dispersed (i.e., the variable's variance exceeds its mean) count data as compared to linear or Poisson regression models. As such, the skew and variance statistics, as well as the dispersion parameter provided by *Mplus* in negative binomial regression models, were considered when deciding on final models. A significant dispersion parameter indicates that the data is over-dispersed and appropriate for a negative binomial regression model (Muthén et al., 2017). Bayesian Information Criteria (BIC) was also compared across non-nested models and further confirmed the appropriateness and parsimony of negative binomial regression models compared to ordinary least squares (OLS or linear regression), Poisson, or more complex negative binomial models (e.g., hurdle or zero-inflated), as well as the appropriateness of our included covariates (Raftery, 1995).

Based on previous studies that evaluated brief alcohol interventions, initial models included gender (0 = Woman, 1 = Man), race/ethnicity (0 = Person of Color, 1 = white), and counselor (0 = primary, 1 = all other counselors); however, due to increased BIC and non-significant effects for gender and race/ethnicity in each outcome model, these variables were excluded from the final models. Counselor effect was also left out of the final model for drinks per week due to non-significance and increased BIC but was included in the final models for heavy drinking episodes and alcohol-related problems. Finally, class status (0 = Freshman, 1 = upper classes) was included in final models of drinks per week and heavy drinking episodes due to significant baseline group differences. Semester enrolled in the study (0 = Spring, 1 = Fall)

was also included but subsequently removed due to increased BIC and non-significant effects on alcohol related outcomes. All regression models were estimated in *Mplus* using robust maximum likelihood estimation (MLR) which allowed for the analysis of all available non-normal continuous data.

Analysis of Secondary Outcomes

Linear regression models were used to estimate intervention group effects on all five alcohol demand indices (intensity, O_{max} , P_{max} , elasticity, and breakpoint), as well as delay discounting, consideration of future consequences, environmental suppressors of reward, self-regulation total scale and its subscales of impulse control and goal setting, and protective behavioral strategies (PBS) at 3-month follow-up. Negative binomial models were used to estimate intervention effects on weekly time allocation variables at 3-month follow-up (class, homework, exercise/sports, and drinking) and included class level (0 = Freshman, 1 = upperclassmen) and semester enrolled in the study (0 = spring, 1 = fall) as covariates. Finally, a negative binomial hurdle model was used to estimate intervention effects on depressive symptoms at 3-month follow-up. All regression models for behavioral economic and other secondary outcomes included baseline levels of the outcome variable and intervention condition.

Results

Baseline Characteristics

At baseline, all 66 enrolled participants reported having had at least two binge drinking episodes in the past month (4/5+ standard drinks in one occasion for women/men, respectively), with an average of 4.42 episodes ($SD = 3.59$). Participants reported an average of 11.88 ($SD = 8.74$) drinks per week and 8.44 ($SD = 5.62$) alcohol-related problems in the past month. Table 5 presents drinking outcome descriptive statistics for the full randomized sample, as well as by

study condition. There were no significant baseline treatment-group differences in demographic or alcohol-related variables.

Table 5. *Baseline Descriptive Statistics in the Full Sample and by Intervention Condition*

	Full Sample (N = 66)	BMI + SFAS (n = 37)	A + NE (n = 29)	t / χ^2 (df)	p
	<i>M</i> (SD) / % (<i>n</i>)	<i>M</i> (SD) / % (<i>n</i>)	<i>M</i> (SD) / % (<i>n</i>)		
Age	19.95 (1.66)	20.19 (1.63)	19.66 (1.67)	-1.31 (64)	0.20
Gender/Birth Sex (Woman/Female)	63.6% (<i>n</i> = 42)	62.2% (<i>n</i> = 23)	65.5% (<i>n</i> = 19)	0.08 (1)	0.78
Race/Ethnicity					
Black/ African American	20.6% (<i>n</i> = 13)	27.8% (<i>n</i> = 10)	11.1% (<i>n</i> = 3)	2.62 (1)	0.11
White	61.9% (<i>n</i> = 39)	61.1% (<i>n</i> = 22)	63.0% (<i>n</i> = 17)	0.02 (1)	0.88
Asian	1.5% (<i>n</i> = 1)	2.7% (<i>n</i> = 1)	0% (<i>n</i> = 0)	0.80 (1)	0.37
Multiracial	7.6% (<i>n</i> = 5)	2.7% (<i>n</i> = 1)	13.8% (<i>n</i> = 4)	2.86 (1)	0.09
Hispanic/Latino/a/x	12.1% (<i>n</i> = 8)	8.1% (<i>n</i> = 3)	17.2% (<i>n</i> = 5)	1.27 (1)	0.26
Year in School					
Freshman	34.8% (<i>n</i> = 23)	27.0% (<i>n</i> = 10)	44.8% (<i>n</i> = 13)	2.27 (1)	0.13
Sophomore	18.2% (<i>n</i> = 12)	21.6% (<i>n</i> = 8)	13.8% (<i>n</i> = 4)		
Junior	33.3% (<i>n</i> = 22)	29.7% (<i>n</i> = 11)	37.9% (<i>n</i> = 11)		
Senior	13.6% (<i>n</i> = 9)	21.6% (<i>n</i> = 8)	3.4% (<i>n</i> = 1)		
Alcohol Related Outcomes					
Drinks Per Week	11.88 (8.74)	11.86 (8.99)	11.90 (8.57)	0.02 (64)	0.99
HDEs	4.42 (3.59)	4.30 (3.66)	4.59 (3.55)	0.32 (64)	0.75
Alcohol Problems	8.44 (5.62)	8.57 (5.63)	8.28 (5.69)	-0.21 (64)	0.84

Note. HDE = Heavy Drinking Episode. Results of *t*-tests presented for our continuous variables of age, drinks per week, heavy drinking episodes, and alcohol problems. All others are chi-square tests for categorical variables. Chi-square test for year in school is dichotomous: Freshman vs. all other classes.

Bivariate correlations were conducted to evaluate initial relationships between our primary drinking variables and the secondary outcomes variables that the literature indicates are mediators and moderators of intervention response. See Table 6. Alcohol outcome variables were all strongly positively associated with each other. Although delay discounting was not associated with any of our alcohol outcome variables, consideration of future consequences, which is also a measure of future orientation, was negatively associated with all three alcohol outcomes variables. Use of protective behavioral strategies was also negatively associated with our alcohol outcomes. Differential relationships were found in alcohol outcomes with demand indices, self-regulation, and depressive symptoms. Alcohol use was most consistently associated with all five demand indices; however, alcohol-related problems was only correlated with demand breakpoint and P_{\max} . Alternatively, alcohol-related problems and heavy drinking episodes were consistently associated with self-regulation and depressive symptoms, but drinks per week was not.

Table 6. *Baseline Bivariate Correlations with Drinking Variables among Intervention Completers (N = 60)*

	<i>M (SD)</i>	Drinks Per Week	Heavy Drinking Episodes	Alcohol Related Problems
<i>Drinking Outcomes</i>				
Drinks Per Week	11.62 (8.73)	-		
Heavy Drinking Episodes	4.35 (3.66)	0.69***	-	
Alcohol Related Problems	8.33 (5.35)	0.40**	0.49***	-
<i>Secondary Outcomes</i>				
Delay Discounting	0.52 (0.20)	0.05	-0.03	0.04
Consideration of Future Consequences Demand	40.37 (6.77)	-0.37**	-0.34**	-0.37**
Intensity	8.27 (3.94)	0.45***	0.28*	0.08
O _{max}	18.57 (11.48)	0.36**	0.44***	0.20
Elasticity	0.016 (0.030)	-0.39**	-0.45***	-0.18
Breakpoint	9.45 (5.32)	0.29*	0.41**	0.42**
P _{max}	5.77 (4.68)	0.28*	0.35**	0.35**
Protective Behavioral Strategies	39.63 (13.61)	-0.49***	-0.46***	-0.43**
Self-Regulation	77.85 (12.84)	-0.20	-0.30*	-0.52***
Impulse Control	39.10 (7.62)	-0.15	-0.29*	-0.57***
Goal Setting	38.75 (6.26)	-0.23	-0.27*	-0.37**
Depressive Symptoms	11.93 (11.08)	0.24	0.38**	0.61***

Note. Means and standard deviations for alcohol outcome variables (drinks per week, heavy drinking episodes, and alcohol-related problems) are presented previously for the full randomized sample and by condition in Table 4. Statistically significant correlations are indicated as: *** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

Feasibility

Of those randomized, 95.4% ($n = 63$) completed the first 2 full-length sessions. Two participants were unable to be contacted for their second session and one withdrew from the study. All three participants had been randomized to the A + NE active control condition. Of the 63 who completed the first two sessions, either BMI + SFAS or A + NE, 95.2% ($n = 60$) completed at least 2 of 4 booster text-message sessions, meaning they were engaged in the 20-30 minute synchronous text-message booster dialogue. Six intervention completers did not complete the 3-month follow-up assessment survey (90% follow-up rate; 3 from the education control condition and 3 from the BMI + SFAS condition)¹. Unfortunately, one participant in the A + NE condition needed to be removed from longitudinal analyses due to cross-contamination of booster three content detected by the counselor during their booster phase.

There were no significant baseline differences between full-intervention completers ($n = 60$) and intervention non-completers ($n = 5$) in past month drinks per week ($U = 103.00$, $p = 0.25$), heavy drinking episodes ($U = 122.00$, $p = 0.48$), or alcohol-related problems ($U = 133.00$, $p = 0.67$). Among intervention completers ($N = 60$), no significant baseline differences were observed between 3-month follow-up assessment completers and non-completers in past month drinks per week ($U = 115.5$, $p = 0.25$), heavy drinking episodes ($U = 97.00$, $p = 0.10$), or alcohol-related problems ($U = 161.00$, $p = 0.98$). Spring semester 2019 versus Fall semester 2019

¹ Several participants were scheduled to complete their 3-month follow-up assessment during March and April 2020. Due to social distancing and “safer at home” executive orders enacted during these months as a result of the COVID-19 pandemic, three dummy coded variables representing pre- and post- these dates were included. Prior to 6 March 2020, 73.7% ($n = 42$) of participants had completed their 3-month follow-up assessment; prior to 23 March 2020, 84.2% ($n = 48$) had completed the follow-up; and prior to 2 April 2020, 94.6% ($n = 53$) had completed the follow-up. Pearson chi-square tests for each date revealed no significant differences in whether 3-month follow-up was completed or not due to COVID-19 “safer at home” executive orders. Notably, all participants had completed intervention components prior to March 2020.

enrollees were also not significantly different in baseline drinks per week ($t(64) = 0.20, p = 0.84$), heavy drinking episodes ($t(64) = -0.92, p = 0.36$), or alcohol-related problems ($t(64) = 0.45, p = 0.65$). Finally, there were statistically significant differences between freshmen and all upper classes in baseline drinks per week (Freshmen $M = 7.89, SD = 5.79$; upper classes $M = 13.34, SD = 9.36$; $t(58) = -2.33, p = 0.02$) and heavy drinking episodes (Freshmen $M = 2.89, SD = 3.18$; upper classes $M = 5.02, SD = 3.70$; $t(58) = -2.16, p = 0.04$). Therefore, class status was considered as a dichotomous covariate (0 = Freshman, 1 = upper classes) in preliminary efficacy models of alcohol use outcomes.

Counselor Effects

Four counselors administered the interventions. One “primary” counselor completed 61.7% of all text intervention sessions ($n = 23$ BMI + SFAS, $n = 14$ A + NE), another completed 21.8% ($n = 8$ BMI + SFAS, $n = 5$ A + NE), a third completed 8.3% ($n = 4$ BMI + SFAS, $n = 1$ A + NE), and a fourth counselor completed 8.3% ($n = 2$ BMI + SFAS, $n = 3$ A + NE). Linear regressions were conducted with intervention completers to test for counselor effects (0 = primary counselor, 1 = all other counselors) on alcohol-related outcomes at 3-month follow-up. Each model controlled for study condition and baseline levels of the dependent variable. Results of these analyses indicated no significant counselor effects on past-month drinks per week ($B(SE) = -1.02 (1.47), p = 0.49, \Delta R^2 = 0.005$), heavy drinking episodes ($B(SE) = -1.34 (0.73), p = 0.07, \Delta R^2 = 0.03$), or alcohol-related problems ($B(SE) = -2.39 (1.25), p = 0.06, \Delta R^2 = 0.06$) at 3-month follow-up. However, there was a non-significant trend-level counselor effect (<0.10) for heavy drinking episodes and alcohol-related problems. Slightly more problems and heavy drinking episodes were reported at 3-month follow-up among intervention completers who received their intervention from the primary counselor. Thus, a dummy-coded variable

representing counselor effects (0 = primary, 1 = all other counselors) was included in preliminary efficacy models of heavy drinking episodes and alcohol-related problems.

Intervention Internal Validity

Three independent coders rated the A + NE (1) and BMI + SFAS (2) sessions for content fidelity. Fidelity was rated on a 4-point scale from 0 to 3 with scores of 2 or higher indicating that elements of the intervention had been delivered as prescribed (i.e., consistent with the intervention manual/protocol). For the BMI + SFAS intervention, the average rating was 1.87 ($SD = 0.11$) with 86.9% of the intervention elements meeting or exceeding expectations. For the A + NE intervention, the average protocol rating was 1.93 with 93.0% of the intervention elements meeting or exceeding expectations. Cross contamination between the BMI + SFAS and A + NE conditions was also assessed. For the BMI + SFAS intervention, the average rating was 0.00 ($SD = 0.00$) with 0% discussing contents of the A + NE protocol. For the A + NE intervention, the average rating was 0.03 ($SD = 0.10$) with 8% of sessions ($n = 1$) minimally discussing contents of the BMI + SFAS protocol.

Coding for motivational interviewing (MI) specific skills followed the Motivational Interviewing Treatment Integrity (MITI) coding manual (Moyers et al., 2014). See Table 7 for MITI ratings for the BMI + SFAS intervention as a whole and by primary session. Ratings for the four global scores and the two global score summaries (technical and relational) were on a scale from 1 to 5 with 5 indicating marked and consistent effort on the part of the counselor in eliciting change talk, softening sustain talk, developing a partnership, and demonstrating empathy. On average, 51% of counselors' reflections were considered complex, and counselors provided proportionally more reflections (simple and complex) over questions. Relational and technical global scores as well as the percentage of complex reflections were considered to meet

the “Good” competency and proficiency threshold (>4 , >4 , $>50\%$, respectively) as specified by Moyers et al. (2014). And the proportion of reflections to questions was considered to meet the “Fair” threshold ($> 1:1$). It should be noted, however, that these thresholds have not yet been empirically validated or normed, and it is recommended that other data be considered in addition to these ratings to inform the assessment of basic competence and proficiency in counselors’ use of MI (T.B. Moyers et al., 2014). The average behavior count of MI adherent (MIA) responses, which are considered to be seeking collaboration, affirming, and emphasizing autonomy, across the BMI + SFAS was approximately 4; whereas the average behavior count of MI non-adherent (MINA) responses was less than 1. To date, there has been no threshold determined for total MIA or MINA responses to assess basic competence and proficiency of using MI; therefore, we considered relatively higher MIA responses and relatively lower MINA responses to be partially indicative of MI competency and proficiency. Overall ratings suggest that study counselors administered elements of the CoAST BMI + SFAS with consistent adherence to an MI style as defined by the MITI version 4.2.1 coding manual.

Table 7. *Motivational Interviewing Treatment Integrity Ratings of the CoAST delivered BMI + SFAS*

	BMI + SFAS <i>M (SD)</i>	BMI <i>M (SD)</i>	SFAS <i>M (SD)</i>
Technical			
Cultivating Change Talk	4.13 (0.61)	4.06 (0.57)	4.19 (0.66)
Softening Sustain Talk	3.97 (0.47)	4.00 (0.52)	3.94 (0.44)
Technical Global	4.05 (0.43)	4.03 (0.43)	4.06 (0.44)
Relational			
Partnership	4.34 (0.55)	4.31 (0.48)	4.38 (0.62)
Empathy	4.13 (0.49)	4.13 (0.50)	4.13 (0.50)
Relational Global	4.23 (0.44)	4.22 (0.41)	4.25 (0.48)
Reflections			
% Complex Reflections	0.51 (0.18)	0.46 (0.22)	0.56 (0.13)
Reflection:Question Ratio	1.46 (0.80)	1.48 (1.10)	1.43 (0.45)
Utterances			
MI-Adherent (MIA)	4.03 (3.28)	4.75 (3.89)	3.31 (2.44)
MI Non-Adherent (MINA)	0.06 (0.35)	0.13 (0.50)	0.00 (0.00)

Participant Intervention Satisfaction

Immediately following the second session, participants provided an overall rating of the utility of the first two sessions, how interesting they found them to be, and an estimate of the percentage of the material they believed they attend to/read. Of the 66 enrolled participants, 55 (83.3%; BMI + SFAS $n = 32$, A + NE $n = 23$) completed these 3 questions. On average, BMI + SFAS participants rated the sessions to be very useful ($M = 8.72$, $SD = 2.02$) and generally interesting ($M = 7.78$, $SD = 2.37$), and that they attended to and read almost all (~90%) of the material ($M = 9.16$, $SD = 1.55$). Education control participants also rated the sessions to be very useful ($M = 9.09$, $SD = 1.28$, $t(53) = 0.77$, $p = 0.45$) and interesting ($M = 8.22$, $SD = 1.86$, $t(53) = 0.74$, $p = 0.47$), and that they attended to and read almost all (~90%) of the material ($M = 9.43$, $SD = 0.90$, $t(52) = 0.76$, $p = 0.45$). These ratings were not statistically significantly different between the two conditions.

Following the 4 weeks of boosters, participants again provided ratings for the entire 5 to 6 weeks of intervention material. Of the 66 enrolled participants, 51 (77.3%) provided feedback at the post-booster follow-up. All 51 participants were also considered intervention completers, and no intervention non-completers completed the post-booster survey and feedback questions. Participants across both conditions continued to rate the first and second sessions overall as highly useful (BMI + SFAS $M = 8.30$, $SD = 2.05$; A + NE $M = 8.44$, $SD = 2.05$; $t(49) = 0.23$, $p = 0.82$) and generally interesting (BMI + SFAS $M = 7.94$, $SD = 1.94$; A + NE $M = 7.47$, $SD = 2.67$; $t(48) = -0.71$, $p = 0.48$). Additionally, participants also found the 4 weeks of text-message booster content to be generally interesting (BMI + SFAS $M = 7.27$, $SD = 2.35$; A + NE $M = 7.00$, $SD = 2.89$; $t(49) = -0.37$, $p = 0.72$). Though not statistically significantly different, participants in the BMI + SFAS condition rated the text-message sessions as slightly more personally relevant ($M =$

8.12, $SD = 2.18$) compared to those in the A + NE condition ($M = 6.94$, $SD = 2.80$; $t(49) = -1.67$, $p = 0.10$). Participants in each condition also rated their respective text-message sessions as similarly effective in modifying their own drinking patterns (BMI + SFAS $M = 6.64$, $SD = 3.52$; A + NE $M = 6.06$, $SD = 3.84$; $t(49) = -0.55$, $p = 0.59$) and the drinking patterns of other college students (BMI + SFAS $M = 6.82$, $SD = 2.76$; A + NE $M = 5.83$, $SD = 3.19$; $t(49) = -1.15$, $p = 0.25$). Participants in the BMI + SFAS condition ($M = 7.21$, $SD = 2.48$) rated their text sessions as slightly more effective in increasing their time spent studying or participating in academic/career-related activities than did those in the A + NE condition ($M = 5.83$, $SD = 3.19$), though this difference was not statistically significant ($t(49) = -1.60$, $p = 0.12$). Conversely, those in the A + NE condition ($M = 7.29$, $SD = 3.10$) rated their text sessions as significantly more effective in modifying their eating and nutrition patterns than those in the BMI + SFAS condition ($M = 5.24$, $SD = 3.48$; $t(48) = 2.05$, $p = 0.046$). See Figure 2.

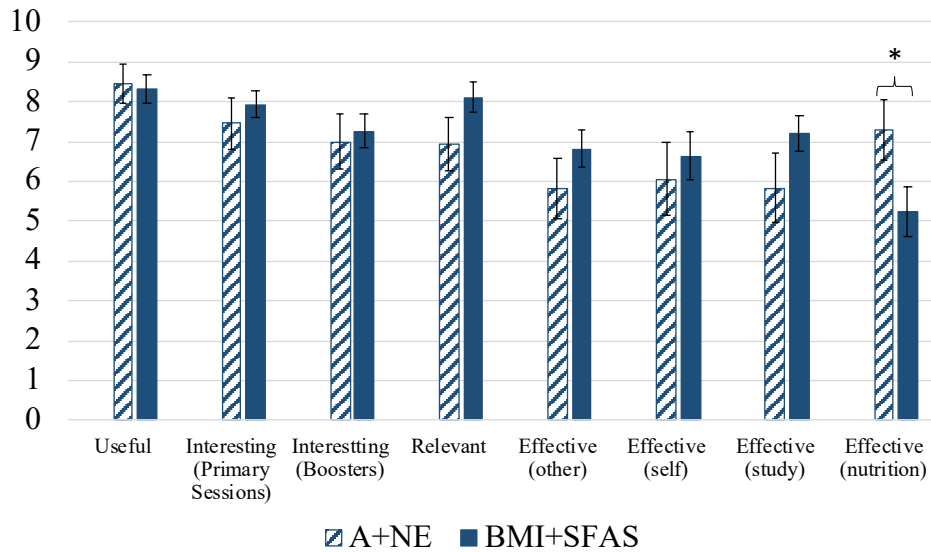


Figure 2. Participant Ratings of the CoAST Delivered Interventions

Note. Effective (other) = participant’s rating of intervention effectiveness in reducing alcohol use in other college students; Effective (self) = participant’s rating of intervention effectiveness in reducing their own alcohol use; Effective (study) = participant’s rating of intervention effectiveness in increasing time spent studying or in other academic related activities; Effective (nutrition) = participant’s rating of intervention effectiveness in improving nutrition and maintaining a balanced diet. * $p < 0.05$.

Participant Ratings of the Text-Message Modality

On average, participants rated *Babelapp* as easy to use ($M = 8.10$, $SD = 2.43$), though some qualitative feedback suggested there were some aspects of the app that were less than ideal including having to log in with their password each time they were responding to a message. Two participants were locked out of their account due to problems with their password and had to create new accounts. Based on ongoing feedback and challenges encountered, study procedures were updated throughout data collection that were designed to improve the participant's *Babelapp* user experience. Though data were not collected on these specific procedure changes, anecdotally, they seemed to enhance participants' *Babelapp* ease of use.

Overall, BMI + SFAS participants reported feeling very comfortable discussing their own drinking patterns via text message (BMI + SFAS condition $M = 9.19$, $SD = 1.47$). They also rated that they thought they would feel similarly comfortable having these discussions face-to-face or in-person (BMI + SFAS condition $M = 4.91$, $SD = 3.50$), suggesting that, in general, this group is as comfortable discussing their own alcohol use patterns in person as they are over text-message. Notably though, a majority of BMI + SFAS participants (87.9%, $n = 29$) indicated they would prefer doing this intervention via text-message than in person or face-to-face.

On average, participants also believed the use of computer-generated texting programs or bots would have been "slightly worse" ($M = 2.07$, $SD = 1.52$; on a scale from 1 *Much worse* to 5 *Much better*) compared to the CoAST sessions they received and that the use of "bots" to deliver these text-message sessions would not be very effective ($M = 3.12$, $SD = 2.34$; on a scale from 0 *Not at all effective* to 10 *Very effective*).

Qualitative Feedback

Qualitative data suggested that a possible preference for CoAST over in-person intervention by a majority of treatment completers ($n = 40, 80.0\%$) emerged out of the convenience of being able to engage in a text-message conversation anywhere they were. One participant summed up this logistical convenience for them in one sentence: “I don’t want to leave my bed.” Notably, several participants indicated a fear of feeling “judged” doing in-person sessions and that text messaging allowed them to “feel more open and comfortable” and “honest”. One participant described feeling “that it is easier for someone to tell the truth over text rather than saying it out loud.” Perhaps related, a few participants also noted that text-messaging allowed them to provide more thought-out and “detailed answers” compared to what an in-person session might. Alternatively, some participants ($n = 10, 20.0\%$) indicated that they would have preferred face-to-face/in-person sessions because they would have been “more personal”; “a physical copy of the information and charts would aid in understanding”; and “there might be more honest answers and less distractions.” One participant mentioned that they simply “don’t like texting.”

Though participants have presumably only experienced CoAST delivery of a brief intervention, one over-arching theme emerged from the qualitative probing of ratings of automated text-based programs (i.e., “bots”): they are “impersonal.” Several participants believed that delivering this same information via generated texts or bots would have been slightly or substantially worse because their experiences with these programs have felt very impersonal. One participant stated that although “the information would be there ... it wouldn’t feel therapeutic like speaking to a real person.” Relatedly, other participants did not believe it would feel as “genuine” coming from a bot, and “advice would have felt fabricated.” In addition,

a few participants mentioned their degree of receptivity to, and even their trust of, the information delivered. One stated that they would be “less inclined to be receptive,” while another said they “wouldn’t have trusted or cared as much about the information” if it had come from a bot. When it comes to discussing alcohol and other health related topics, human connection, even via text-message, seems to be paramount in conveying with authority any sort of important information.

Preliminary Efficacy for Reducing Alcohol Use and Other Related Outcomes

Alcohol Use: Drinks Per Week and Heavy Drinking Episodes

A negative binomial regression model that accounted for baseline drinks per week and class status indicated no intervention group differences in past-month drinks per week at 3-month follow-up ($B (SE) = -0.04 (0.22), p = 0.87$). Conversely, a separate negative binomial regression model that accounted for counselor effect, class status, and baseline heavy drinking episodes found a significant intervention effect on past-month heavy drinking episodes at 3-month follow-up ($B (SE) = -0.55 (0.24), p = 0.02$). See Table 8. Both groups reported fewer drinks per week at 3-month follow-up, relative to baseline, but the BMI + SFAS group demonstrated larger within group effect size reductions in past-month heavy drinking episodes. See Table 9 and Figures 3 and 4.

Alcohol-Related Problems

A negative binomial regression model that accounted for counselor effect, baseline drinks per week, and baseline alcohol-related problems indicated no intervention group differences in past-month alcohol-related problems at 3-month follow-up ($B (SE) = -0.01 (0.27), p = 0.97$). See Table 8. Both groups reported fewer alcohol-related problems at 3-month follow-up with relatively similar effect size reductions. See Table 9 and Figure 5.

Table 8. *Negative Binomial Regression Model Results for Intervention Effect on Alcohol Use and Related Problems at 3-Month Follow-up*

	BMI + SFAS <i>M (SE)</i>	A + NE <i>M (SE)</i>	<i>B (SE)</i>	[95% CI]	<i>p</i>
Drinks per week (N = 51)	7.43 (0.85)	8.11 (1.50)			
Condition (A+NE = 0; BMI+SFAS = 1)			-0.04 (0.22)	[-0.461, 0.390]	0.87
Baseline drinks per week Class (Freshman = 0; Others = 1)			0.05 (0.01)	[0.028, 0.063]	<0.001
			0.64 (0.29)	[0.065, 1.212]	0.03
Heavy Drinking Episodes (HDEs, N = 51)	2.73 (0.54)	4.04 (0.83)			
Condition (A+NE = 0; BMI+SFAS = 1)			-0.55 (0.24)	[-1.011, -0.081]	0.02
Baseline HDEs Counselor (Primary = 0; Others = 1)			0.26 (0.04)	[0.181, 0.332]	<0.001
Class (Freshman = 0; Others = 1)			-0.64 (0.25)	[-1.131, -0.146]	0.01
			0.29 (0.32)	[-0.343, 0.913]	0.37
Alcohol-Related Problems (N = 50)	5.89 (0.89)	5.13 (0.89)			
Condition (A+NE = 0; BMI+SFAS = 1)			-0.01 (0.27)	[-0.534, 0.515]	0.97
Baseline problems Counselor (Primary = 0; Others = 1)			0.06 (0.03)	[0.010, 0.106]	0.02
Class			-0.69 (0.27)	[-1.224, -0.159]	0.01
Baseline drinks per week			0.03 (0.01)	[0.010, 0.053]	0.01

Note. Estimated marginal means and standard errors at 3-month follow-up, accounting for baseline levels and covariates, are presented by intervention condition.

Table 9. *Within Group Effect Size Changes and 95% Confidence Intervals by Intervention Condition*

	BMI + SFAS			A + NE		
	Baseline <i>M (SD)</i>	3-month <i>M (SD)</i>	Cohen's d_{rm} (95% CI)	Baseline <i>M (SD)</i>	3-month <i>M (SD)</i>	Cohen's d_{rm} (95% CI)
Drinks Per Week	12.16 (9.55)	8.00 (6.08)	0.46 (0.263, 1.041)	10.50 (8.83)	7.30 (8.14)	0.38 (-0.024, 0.896)
HDEs	4.26 (3.37)	2.58 (3.30)	0.50 (0.254, 1.029)	3.45 (2.48)	3.30 (4.09)	0.04 (-0.382, 0.495)
Alcohol-Related Problems	8.30 (5.52)	5.77 (5.59)	0.46 (0.136, 0.900)	7.50 (4.51)	4.80 (3.72)	0.65 (-0.006, 0.918)

Note. Cohen's d_{rm} = mean effect size difference controlling for the correlation between repeated measures of the same variable. Effect sizes with confidence intervals that include 0 are considered non-significant.

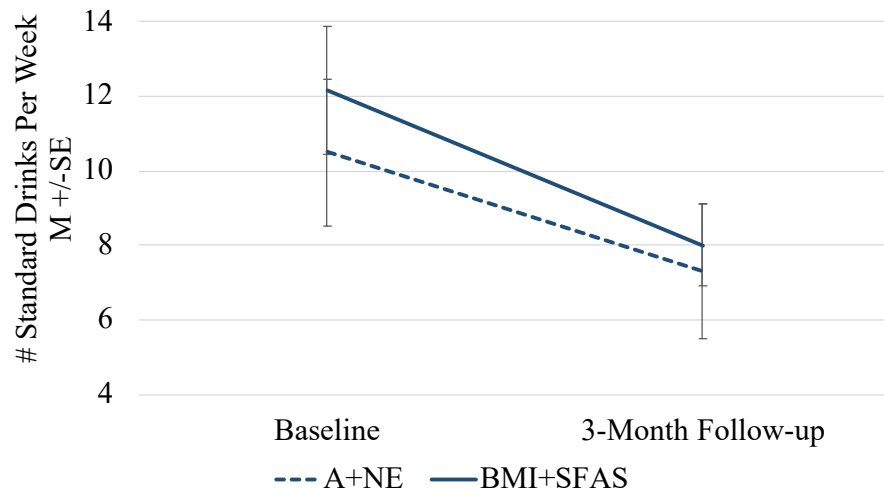


Figure 3. Change in number of drinks per week by intervention condition.

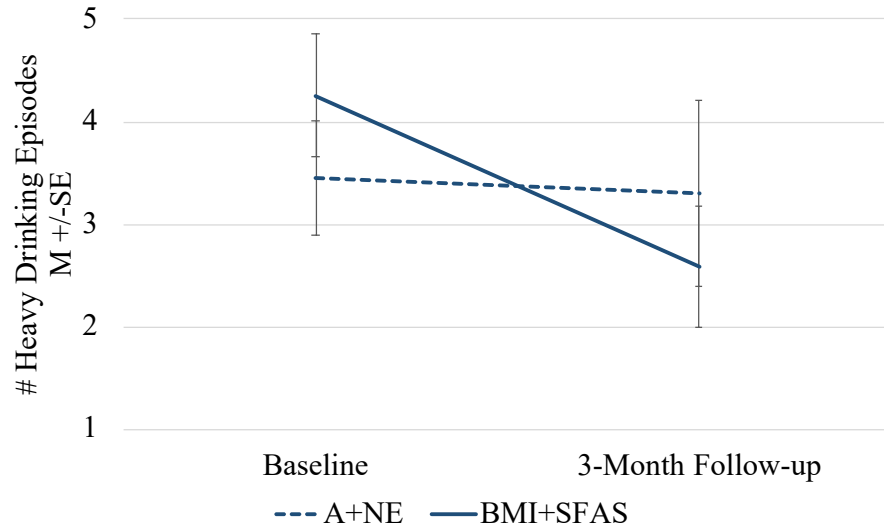


Figure 4. Change in frequency of heavy drinking episodes by intervention condition.

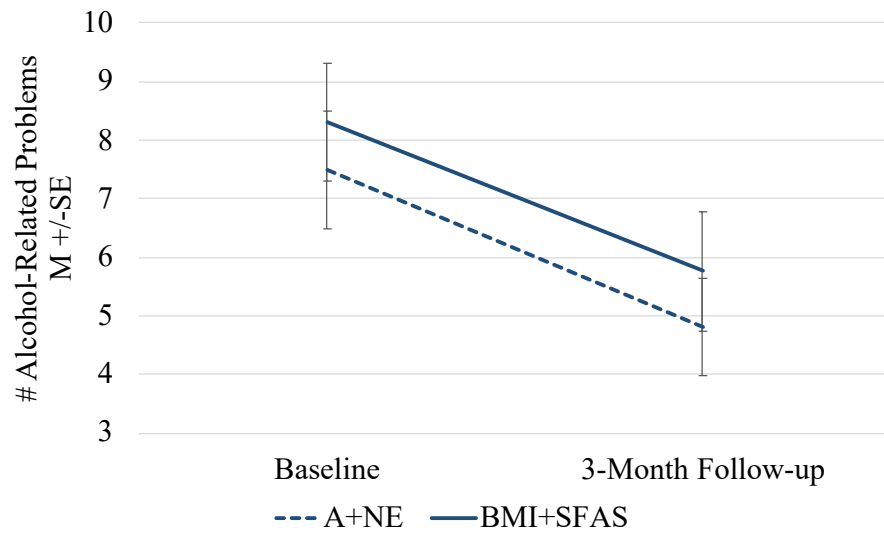


Figure 5. Change in alcohol-related problems by intervention condition.

Behavioral Economic and Other Secondary Outcomes

Alcohol Demand: Alcohol Purchase Task (APT)

As expected, self-reported hypothetical drink purchases for all participants systematically decreased as prices increased. No participants evidenced inconsistent or non-systematic responding, therefore all participants' APT data were retained for calculating demand indices (Stein et al., 2015). The shared log range K for our exponentiated equation at baseline was 1.80, and R^2 values ranging from 0.72 to 0.97 with an average value of 0.90 indicated good fit of the data to the equation (Koffarnus et al., 2015).

Linear regression models that controlled for baseline levels of demand intensity indicated significant intervention group differences in demand intensity at 3-month follow-up ($B (SE) = -1.28 (0.60), p = 0.03$). See Table 10. Though alcohol demand intensity decreased in both groups, the BMI + SFAS ($d_{rm} = 0.55, 95\% \text{ CI } [0.270, 1.022]$) group demonstrated larger within group effect size reductions compared to the A + NE group ($d_{rm} = 0.21, 95\% \text{ CI } [-0.027, 0.893]$). See Table 10 and Figure 6.

Table 10. *Linear Regression Model Results for Intervention Condition on Alcohol Demand Indices*

	BMI + SFAS <i>M (SE)</i>	A + NE <i>M (SE)</i>	B (<i>SE</i>)	[95% CI]	<i>p</i>
APT Demand Intensity	6.06 (0.48)	7.34 (0.60)			
Condition (A+NE = 0; BMI+SFAS = 1)			-1.28 (0.60)	[-2.451, -0.115]	0.03
Baseline Intensity			0.60 (0.10)	[0.403, 0.789]	<0.001
APT Demand O_{max}	16.32 (1.66)	15.00 (1.57)			
Condition (A+NE = 0; BMI+SFAS = 1)			1.31 (1.86)	[-2.334, 4.962]	0.48
Baseline O _{max}			0.62 (0.10)	[0.428, 0.820]	<0.001
APT Demand Elasticity	-1.95 (0.07)	-1.99 (0.07)			
Condition (A+NE = 0; BMI+SFAS = 1)			0.04 (0.07)	[-0.104, 0.182]	0.60
Baseline Elasticity			0.85 (0.07)	[0.709, 0.997]	<0.001
APT Demand Breakpoint	9.22 (0.99)	8.53 (0.99)			
Condition (A+NE = 0; BMI+SFAS = 1)			0.69 (1.36)	[-1.974, 3.352]	0.61
Baseline Breakpoint			0.55 (0.16)	[0.239, 0.860]	0.001
APT Demand P_{max}	2.32 (0.15)	2.11 (0.18)			
Condition (A+NE = 0; BMI+SFAS = 1)			0.20 (0.23)	[-0.252, 0.658]	0.38
Baseline P _{max}			0.42 (0.15)	[0.134, 0.705]	0.004

Note. Prior to linear regression modeling, demand elasticity was log-transformed, therefore 3-month estimated marginal means and standard errors are log-10 values of elasticity. Similarly, P_{max} values were squareroot transformed prior to modeling, therefore 3-month estimated marginal means and standard errors are squareroot values of P_{max}. Estimated marginal means and standard errors at 3-month follow-up accounting for baseline levels and covariates are presented by intervention condition.

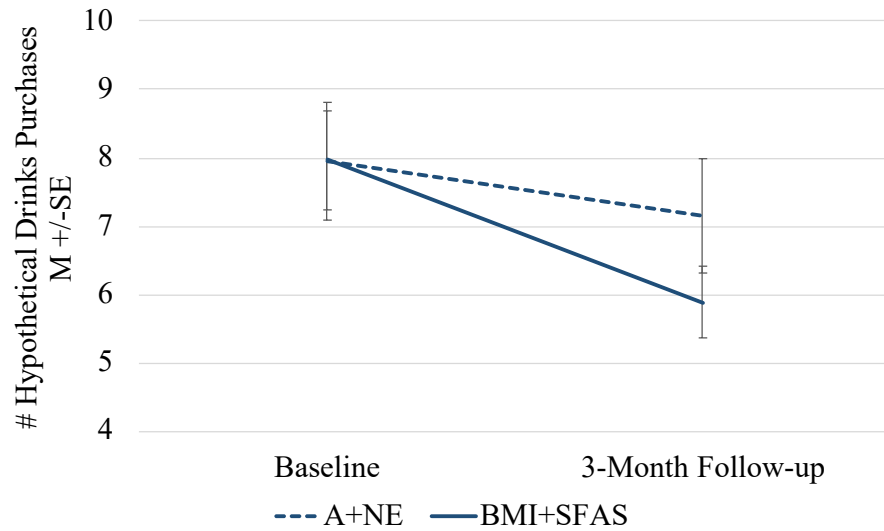


Figure 6. Change in alcohol demand intensity by intervention condition.

Exploratory Analysis of Change in Demand Across Booster Assessments

Alcohol demand was assessed at six time points with five of the time points approximately one week apart (baseline, boosters 1 to 3, and post-booster). Therefore, we were also able to examine, descriptively, change in demand over these time points within the small subset of individuals (A + NE $n = 10$, BMI + SFAS $n = 17$) who completed all five assessments. Although these analyses were not adequately powered, we conducted exploratory t -tests to examine within condition change and between condition treatment effects. Paired samples t -tests by study condition did not indicate significant changes in demand week-to-week in either group; however, Figure 7 suggests a downward linear trend in demand intensity in the BMI + SFAS group and a relatively stable though fluctuating trend in the education control group. Further, among treatment completers who completed all five assessment time points, alcohol demand intensity in the BMI + SFAS group was significantly lower at post-booster ($M = 5.88$, $SD = 3.67$) compared to baseline ($M = 7.59$, $SD = 3.81$; $t(16) = 3.00$, $p = 0.009$). This was not the case for

the education control group (baseline $M = 7.20$, $SD = 2.35$; post-booster $M = 6.60$, $SD = 2.50$; $t(9) = 1.00$, $p = 0.34$).

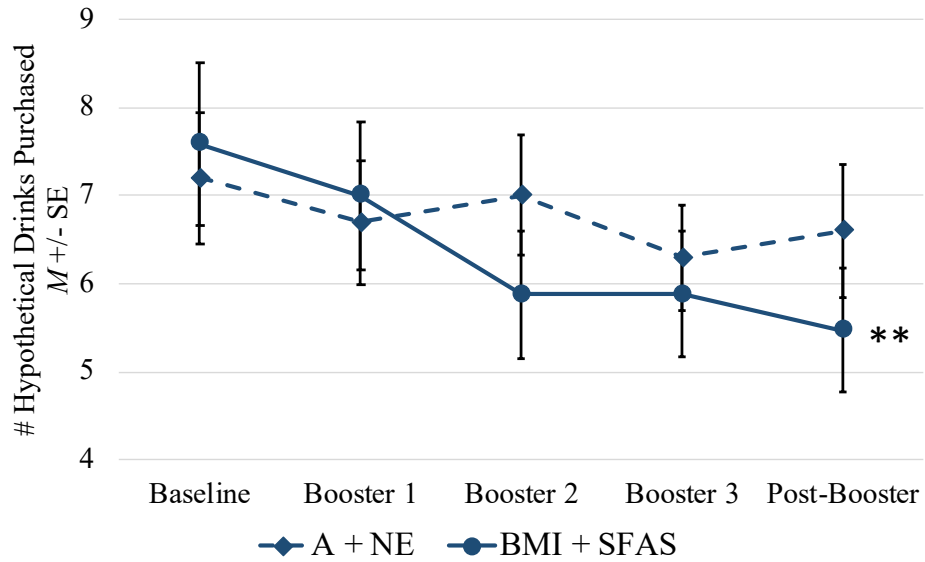


Figure 7. Alcohol Demand Intensity from Baseline to Post-Booster Follow-up

Note. A + NE $n = 10$. BMI + SFAS $n = 17$. ** $p < 0.01$.

In addition, although there was not a significant intervention effect found for demand elasticity in our linear regression models, Figure 8 suggests an upward trend in demand elasticity (increasing price sensitivity) in the BMI + SFAS group, compared to relatively stable elasticity in the education control group. Among treatment completers who completed all five assessment time points, alcohol demand elasticity in the BMI + SFAS group was significantly higher at post-booster ($M = 0.0210$, $SD = 0.0243$) compared to baseline ($M = 0.0098$, $SD = 0.0073$; $t(16) = -2.34$, $p = 0.03$). This was not the case for the education control group (baseline $M = 0.0103$, $SD = 0.0076$; post-booster $M = 0.0121$, $SD = 0.0053$; $t(9) = -0.97$, $p = 0.36$). There were no significant differences by condition in post-booster demand elasticity (Mann-Whitney $U = 75.00$, $p = 0.62$).

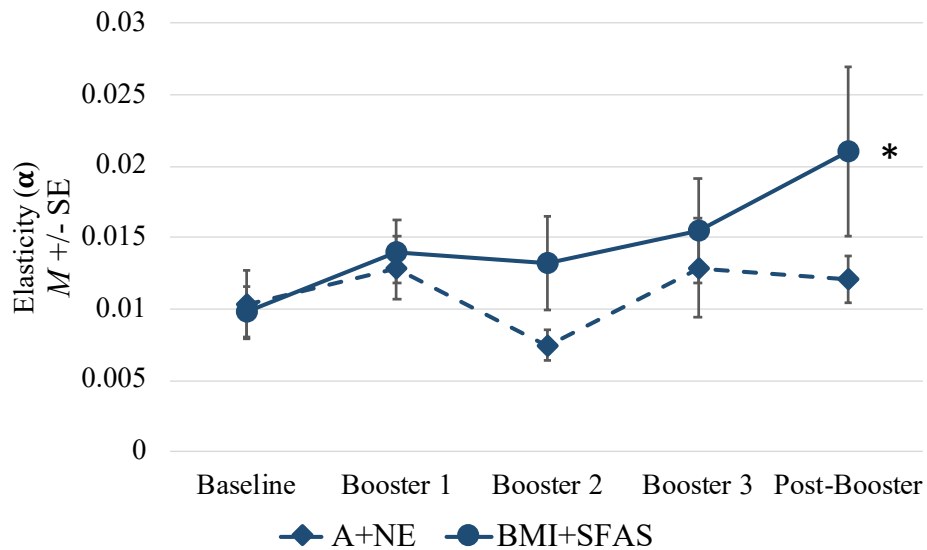


Figure 8. Alcohol Demand Elasticity from Baseline to Post-Booster Follow-up

Note. A + NE $n = 10$. BMI + SFAS $n = 17$. Larger elasticity values = greater sensitivity to price changes and less relative reward derived from alcohol. * $p < 0.05$.

Delay Discounting

A linear regression model that controlled for baseline level of delay discounting, as measured by the Impulsive Choice Ratio (ICR), indicated no intervention group differences in level of delay discounting at 3-month follow-up ($B (SE) = 0.03 (0.03), p = 0.40$). See Table 11. Overall, both groups' rates of delay discounting increased from baseline to 3-month follow-up. However, paired samples t -tests by condition indicated that these increases were not statistically significant (BMI + SFAS $t(33) = -1.38, p = 0.18$; A +NE $t(19) = -0.30, p = 0.77$).

Exploratory Analysis of Change in Delay Discounting Across Booster Assessments

Delay discounting was also assessed at six time points with five of the time points approximately one week apart (baseline, boosters 1 to 3, and post-booster). Therefore, we also examined, descriptively, change in delay discounting over these time points among individuals who completed all assessments. Paired samples t -tests by study condition did not indicate significant changes in delay discounting week-to-week, or between baseline and post-booster, in either group. See Figure 9.

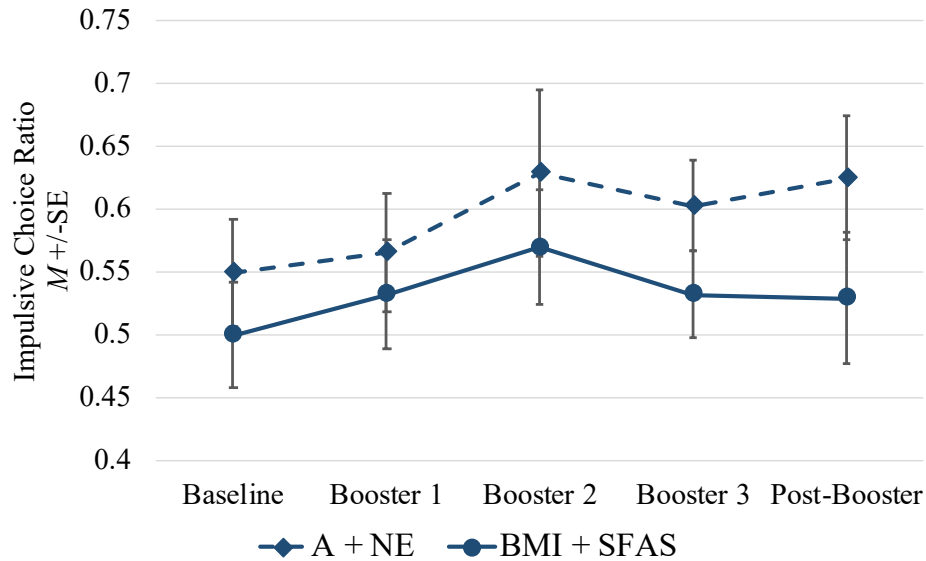


Figure 9. Delay Discounting from Baseline to Post-Booster Follow-up

Note. A + NE $n = 10$. BMI + SFAS $n = 17$.

Consideration of Future Consequences (CFC)

A linear regression model that controlled for baseline score of CFC indicated no intervention group differences in CFC score at 3-month follow-up ($B (SE) = 0.44 (1.41)$, $p = 0.76$). See Table 11.

Self-Regulation, Impulse Control, and Goal Setting

A linear regression model that controlled for baseline score of self-regulation indicated no intervention group differences in global self-regulation at 3-month follow-up ($B (SE) = -1.24 (2.04)$, $p = 0.54$). Additionally, linear regression models examining subscale scores of Impulse Control and Goal Setting indicated no significant intervention group differences in either impulse control ($B (SE) = -0.18 (1.13)$, $p = 0.87$) or goal setting subscale scores ($B (SE) = -0.35 (1.24)$, $p = 0.78$) at 3-month follow-up. See Table 11. Both intervention groups showed small non-significant increases in self-regulation.

Protective Behavioral Strategies (PBS)

A linear regression model that controlled for baseline level of PBS use indicated no significant intervention group differences in use of PBS at 3-month follow-up ($B (SE) = -0.96 (2.33), p = 0.68$). See Table 11. Both the BMI + SFAS and the A + NE groups showed small non-significant increases in their use of PBS.

Depressive Symptoms

A negative binomial hurdle regression model that controlled for baseline level of depressive symptoms did not indicate significant intervention group differences in level of depressive symptoms at 3-month follow-up ($B (SE) = 0.15 (0.24), p = 0.53$), or in whether or not any depressive symptoms were reported ($B (SE) = 0.97 (0.69), p = 0.16$). See Table 11. Both the BMI + SFAS ($t(33) = 1.94, p = 0.06$) and A + NE ($t(19) = 1.40, p = 0.18$) groups reported lower severity of depressive symptoms at 3-month follow-up, and, whereas the reduction was not statistically significant in either group, there was a non-significant trend-level reduction in the BMI + SFAS group.

Table 11. *Linear regression model results for intervention condition on behavioral economic and other secondary outcome variables*

	BMI + SFAS <i>M (SE)</i>	A + NE <i>M (SE)</i>	B (<i>SE</i>)	[95% CI]	<i>p</i>
Delay Discounting (N = 54)	0.56 (0.03)	0.53 (0.03)			
Condition (A + NE = 0; BMI + SFAS = 1)			0.03 (0.03)	[-0.037, 0.091]	0.40
Baseline ICR			0.73 (0.11)	[0.506, 0.948]	<0.001
Future Orientation (N = 54)	41.33 (1.04)	40.89 (1.23)			
Condition (A + NE = 0; BMI + SFAS = 1)			0.44 (1.41)	[-2.320, 3.195]	0.76
Baseline CFC			0.66 (0.09)	[0.479, 0.840]	<0.001
Self-Regulation (n = 53)	78.19 (1.79)	79.43 (1.89)			
Condition (A + NE = 0; BMI + SFAS = 1)			-1.24 (2.04)	[-5.248, 2.766]	0.54
Baseline Self-Regulation			0.71 (0.07)	[0.566, 0.844]	<0.001
Impulse Control Subscale					
Condition (A + NE = 0; BMI + SFAS = 1)			-0.49 (1.18)	[-2.803, 1.822]	0.68
Baseline Impulse Control			0.72 (0.07)	[0.574, 0.859]	<0.001
Goal Setting Subscale					
Condition (A + NE = 0; BMI + SFAS = 1)			-0.78 (1.15)	[-3.037, 1.477]	0.50
Baseline Goal Setting			0.55 (0.09)	[0.380, 0.723]	<0.001
Protective Behavioral Strategies (N = 53)	41.93 (2.19)	42.89 (2.16)			
Condition (A + NE = 0; BMI + SFAS = 1)			-0.96 (2.33)	[-5.518, 3.595]	0.68
Baseline PBS			0.80 (0.10)	[0.613, 0.986]	<0.001
Depressive Symptoms (Sxs) (N = 54)	8.88 (1.53)	8.80 (2.22)			
<i>Negative Binomial Process</i>					
Condition (A + NE = 0; BMI + SFAS = 1)			0.15 (0.24)	[-0.317, 0.620]	0.53
Baseline Depressive Sxs			0.03 (0.01)	[0.018, 0.049]	<0.001
<i>Hurdle Process</i>					
Condition (A + NE = 0; BMI + SFAS = 1)			0.97 (0.69)	[-0.382, 2.322]	0.16
Baseline Depressive Sxs			-0.09 (0.04)	[-0.159, -0.020]	0.01

Note. Estimated marginal means and standard errors at 3-month follow-up accounting for baseline levels and covariates are presented by intervention condition.

Time Allocation

Negative binomial linear regression models that controlled for class level, study enrollment semester, and respective baseline time allocation indicated a significant intervention effect on time spent exercising. Specifically, participants in the BMI + SFAS condition reported spending more time exercising compared to those in the A + NE condition at 3-month follow-up. See Table 12. Indeed, participants in the A + NE group reported a non-significant decrease in time spent exercising (baseline $M = 3.67$, $SD = 2.70$; 3-month $M = 3.00$, $SD = 3.31$; $t(17) = 0.88$, $p = 0.39$), whereas participants in the BMI + SFAS group reported a non-significant trend-level increase in time spent exercising (baseline $M = 3.35$, $SD = 4.19$; 3-month $M = 4.61$, $SD = 3.60$; $t(31) = -1.80$, $p = 0.08$).

There was not a significant effect for intervention condition on time spent doing homework or time spent drinking. Participants in the BMI + SFAS group reported decreased time spent doing homework ($t(31) = 1.75$, $p = 0.09$), whereas A + NE participants reported on average spending more time doing homework at 3-month follow-up ($t(17) = -1.24$, $p = 0.23$), though these changes in time spent doing homework were not significant for the A + NE group there was a non-significant trend-level decrease for the BMI + SFAS group. Further, average time allocated to drinking (BMI + SFAS $t(31) = 1.33$, $p = 0.19$; A + NE $t(17) = 1.64$, $p = 0.12$) reduced in both groups, though not significantly. Notably, there were non-significant trend-level effects for class level and study enrollment semester on time spent drinking, such that upper classmen and spring term enrollees tended to report more time spent drinking at 3-month follow-up compared to freshmen and fall term enrollees.

Table 12. Negative binomial regression model results for intervention condition on time allocation variables

Time Allocation Variables	BMI + SFAS <i>M (SE)</i>	A + NE <i>M (SE)</i>	B (<i>SE</i>)	95% CI	<i>p</i>
HOMEWORK (N = 50)	6.73 (0.95)	10.32 (1.96)			
Condition (A+NE = 0; BMI+SFAS = 1)			-0.42 (0.25)	[-0.913, 0.082]	0.10
Baseline Homework			0.06 (0.01)	[0.030, 0.081]	<0.001
EXERCISE (N = 49)	4.97 (0.62)	2.87 (0.72)			
Condition (A+NE = 0; BMI+SFAS = 1)			0.56 (0.27)	[0.028, 1.081]	0.04
Baseline Exercise			0.11 (0.03)	[0.051, 0.165]	<0.001
Class (Freshman = 0; Upper = 1)			-0.21 (0.28)	[-0.759, 0.343]	0.46
Enroll (Spring = 0; Fall = 1)			-0.29 (0.24)	[-0.758, 0.177]	0.22
DRINKING (N = 50)	4.13 (0.61)	3.74 (0.84)			
Condition (A+NE = 0; BMI+SFAS = 1)			0.21 (0.29)	[-0.351, 0.769]	0.47
Baseline Drinking			0.16 (0.04)	[0.082, 0.240]	<0.001
Class (Freshman = 0; Upper = 1)			0.61 (0.33)	[-0.033, 1.256]	0.06
Enroll (Spring = 0; Fall = 1)			-0.39 (0.23)	[-0.844, 0.063]	0.09

Note. Inclusion of Class and Enroll generally worsened model fit (i.e., increased BIC) for all due to losses in parsimony; however, the increases were by <10 suggesting that the worsened model fit was not substantial. Additionally, in some models the inclusion of these variables provided unique information. Therefore, Class and Enroll were retained in all models except for Homework, in which they were not significant predictors of time spent doing homework at 3-month follow-up above and beyond baseline allocated time. Estimated marginal means and standard errors at 3-month follow-up accounting for baseline levels and covariates are presented by intervention condition.

Discussion

The current pilot trial evaluated the feasibility, acceptability, and preliminary efficacy of a counselor-administered, synchronous text-message (CoAST) based brief motivational intervention (BMI) plus behavioral economic-based substance-free activity session (SFAS) for reducing heavy drinking in emerging adult college students. Originally developed for in-person delivery (Murphy, Dennhardt, et al., 2012; Murphy et al., 2019), the content of the BMI + SFAS was adapted in the current study to be administered remotely via text-message by a trained graduate level counselor. Recruitment and retention rates, intervention fidelity, and motivational interviewing treatment integrity (MITI; specific to the BMI + SFAS) support the initial feasibility of the CoAST delivered BMI + SFAS. Further, high participant ratings of usefulness, interestingness, personal relevance, and effectiveness of the intervention are indicative of the acceptability of and overall participant satisfaction with the CoAST delivered BMI + SFAS. In addition, qualitative analysis suggests that participants may prefer the use of text-messaging to deliver these types of brief interventions compared to in-person or automated text-messaging programs. Fewer heavy drinking episodes and lower alcohol demand intensity were observed at 3-month follow-up in the BMI + SFAS condition compared to the A + NE condition. Both groups reported similar small to moderate reductions in drinks per week and alcohol-related problems at follow-up. More time spent exercising was also observed in the BMI + SFAS group compared to the A + NE group. Initial support for its efficacy is mixed but the positive effects on heavy episodic drinking and demand suggest that this approach merits further study.

Intervention Feasibility, Fidelity, and Acceptability

In light of the entirely remote nature of the current study and intervention, the generally high retention and follow-up rates, as well as participant engagement, support the feasibility of

the remote CoAST delivered BMI + SFAS. Of the 110 undergraduate individuals we were able to contact, 90% agreed to participate with only 10% actively declining. There were over 100 participants who passively declined study participation by not responding to texts, calls, or emails, but this is common in studies offering research participation to large samples of undergraduates and may not reflect participation rates in samples of young adults who voluntarily seek treatment or are mandated to treatment.

Notably, higher rates of participants were engaged in the booster content and sessions themselves compared to the brief surveys. In the BMI + SFAS group, between 64.9% and 81.1% completed a booster survey in a given booster week, whereas between 91.9% and 97.3% engaged in the full 20-30 minute text-message booster dialogue. Similarly, in the A + NE group, between 44.8% and 65.5% completed the booster survey in a given booster week, whereas between 72.4% and 86.2% engaged in the full 20-30 minute education text-message booster dialogue. It is possible this was due to participants understanding the incentive schedule as based on completion of text-message sessions rather than survey completion. However, participants on average rated the interestingness of the boosters highly (7.23/10) suggesting genuine motivation to engage in the text-message booster sessions. It should also be noted that due to the non-treatment seeking nature of the current study sample, study feasibility should be considered within the context of the study's incentive structure, and the fact that most participants participated to satisfy research requirements.

Intervention Fidelity

Internal validity as rated by independent coders largely confirmed that both the CoAST delivered BMI + SFAS and Alcohol + Nutrition Education were delivered as prescribed with largely no cross contamination between the protocols. However, average component ratings of

just under 2.0 suggest that some components' delivery did not meet expectations. Indeed, an examination of time stamps for some sessions indicated that time constraints seemed to preclude certain components from being delivered. In the BMI + SFAS, half of the SFAS sessions coded were unable to include the Episodic Future Thinking (EpFT) exercise due to time constraints; however, all those who did not receive the EpFT in the SFAS ultimately received it in the 3rd booster. Timing issues were recognized during the intervention delivery phase of the study, and due to the pilot nature, adjustments were made to the study protocol in which the EpFT could be delivered in booster 3 when counselors would normally be revisiting the EpFT from the initial SFAS session. All BMI + SFAS participants engaged in an EpFT exercise.

A novel component to the current study was the application of motivational interviewing (MI) style in a text-message based intervention. Although multiple prior automated text-messaging programs have used an MI approach for developing semi-tailored, MI-consistent automated messages (Melissa A. Lewis et al., 2018; Shrier et al., 2014; Suffoletto et al., 2014), to our knowledge, this is the just the second study to utilize MI style in a CoAST format wherein dialogue is akin to in-person speech (see Teeters et al., 2018 for the first study to use a CoAST delivery format). Despite unique challenges inherent in text-message based MI (e.g., absence of tone or ability to read facial expressions or body language), global MI treatment integrity scores were generally high (approximately 4 out of 5), suggesting counselors' implementation of MI style was generally consistent within sessions and across participants. Our results are similar to those in a previous in-person study of the SFAS administered to treatment-seeking adult alcohol use disorder (AUD) outpatients (Meshesha et al., 2020). It is worth noting that due to the CoAST based delivery format, there is substantially more time between counselor and participant responses allowing for fewer "volleys", or counselor responses, within a set period of

time. As such, it is likely that far fewer volleys and counselor behavior counts may be seen compared to transcribed audio-recorded sessions. Still, consistently higher counts of MI-adherent (MIA) behaviors compared to lower or no counts of MI non-adherent (MINA) behaviors, as well as high global scores comparable to in-person MI applications, provide support for the feasibility of using MI style in a CoAST delivery format and maintaining MI treatment integrity. Together, these results are particularly promising for the broader implementation of MI in CoAST delivered interventions, though more research in this area is clearly warranted.

Participant Satisfaction (Acceptability)

Across both conditions, participants rated the sessions highly for usefulness, interestingness, relevance, and effectiveness. Though these ratings were mostly not statistically significantly different by condition, participants who received the BMI + SFAS had slightly higher ratings for interestingness, relevance, and effectiveness in modifying participant drinking patterns and the drinking patterns of other college students compared to education control participants. Given that the BMI + SFAS is meant to be tailored to the individual student's own patterns of behavior and goals, it is not surprising that those randomized to this condition would generally find this intervention to be more relevant to them and likely to perceive it as more interesting and effective. Only effectiveness in modifying behaviors around nutrition and eating patterns was rated significantly higher among those in the A + NE condition, which is similarly predictable and attests to the credibility of the nutrition education component. Although some qualitative feedback was solicited for overall usefulness and liking of the CoAST interventions, specific ratings of each intervention component were not assessed. Future research should solicit feedback on individual intervention components.

Another novel component of the current study was our evaluation of perceptions of this text-messaging modality for brief alcohol interventions. There is significant stigma around problematic alcohol and other substance use (Clark, 2020; Hyman, 2007; James & Jordan, 2018; Racine et al., 2015) and when there is perceived or actual judgment about alcohol or substance use, people may feel unwilling or ashamed to discuss their use or seek help. Indeed, participants in the current sample expressed, in the qualitative feedback, concern and fears about the potential for feeling judged. Whereas “comfort and confidentiality” was found to be an important emerging theme in a focus group of young adult heavy drinkers who evaluated an *automated* interactive text-message intervention (Suffoletto, Kristan, et al., 2016), that participants in the current study reported feeling very comfortable “talking” with a counselor via text about their patterns of alcohol use and problems is especially promising for CoAST delivered brief alcohol interventions. Notably, both of these samples were non-treatment seeking, possibly suggesting the utility of text-messaging for initiating meaningful consideration and discussion of alcohol use patterns and prevention of problems. Overall, our findings suggest that CoAST is appropriate for delivering brief alcohol interventions and applicable to increasing their reach to at-risk individuals and those with fears of judgment or stigma. However, because participants did not receive other modes of delivery in the current study, any interpretation of indicated preferences for CoAST delivery should be done with caution. Thus, it will also be important for future studies to compare participant comfort and perceptions of confidentiality and stigma in interactive automated text-messaging versus CoAST interventions, as well as compared to other intervention modalities such as phone, videoconference, and in-person.

Preliminary Evidence for Intervention Efficacy

Alcohol Use

Among those who received a full dose of the intervention, students who received the BMI + SFAS reported greater effect size reductions in heavy drinking episodes at 3-month follow-up compared to those who received the A + NE content; however, it is important to note that the reliability of these effect sizes is low and that determining preliminary efficacy was not the intended purpose of this trial (see Eldridge et al., 2016; Leon et al., 2011). BMI + SFAS participants reduced their heavy drinking episodes by an average of 1.68 episodes in the past month ($d_{rm} = 0.50$), whereas A + NE participants reduced by an average of 0.15 episodes ($d_{rm} = 0.04$). These results are somewhat consistent with Murphy et al.'s (2012) study which found that, among participants who reported at baseline high levels of depressive symptoms and low levels of substance-free reinforcement, the BMI + SFAS condition was associated with greater reductions in heavy drinking episodes compared to their active control condition (BMI + relaxation training).

Alternatively, consistent with prior randomized pilot trials of the BMI + SFAS (Murphy, Dennhardt, et al., 2012; Yurasek et al., 2015), the current study found no significant differences by study condition in drinks per week at 3-month follow-up. However, within group effect size reductions in the BMI + SFAS group were slightly larger than in the A + NE group. Considering our results for heavy drinking episodes, this may suggest that participants in the CoAST BMI + SFAS generally reduced their drinks per week to the extent that it resulted in fewer heavy drinking episodes; whereas participants in the control group also reduced their drinks per week but not to the same extent. Additionally, with participants across conditions reporting drinking similar amounts per week at follow-up, BMI + SFAS participants may be spreading their drinks

out over the week rather than clustering them into one or two occasions. Considering one of the goals of the BMI + SFAS is harm/risk reduction, for many participants reducing the frequency of heavy drinking episodes but not necessarily the total number of drinks per week may be in line with that goal. Regardless, given that frequent heavy episodic drinking is most often associated with a range of acute and chronic alcohol-related problems (Hingson et al., 2016, 2017), our results suggest a potential increased awareness of drinking patterns and motivation to reduce alcohol-related problems following the CoAST BMI + SFAS.

It should be noted that average baseline drinks per week in the current sample was considerably lower compared to other previous investigations of the BMI + SFAS (Murphy, Dennhardt, et al., 2012; Murphy et al., 2019; Yurasek et al., 2015); therefore, participants may have been less motivated to further reduce the number of drinks consumed per week but were motivated to reduce problems associated with heavy episodic drinking. Further, as noted previously, this pilot trial was not adequately powered to detect changes in drinking. A prior investigation of the efficacy of the in-person BMI + SFAS (Murphy et al., 2019) found significant reductions in drinks per week as compared to an assessment only control condition out to 16 months post intervention. It is therefore possible that with a larger sample and longer follow-up, significantly reduced drinks per week could be observed following a CoAST delivered BMI + SFAS.

Alcohol-Related Problems

Both intervention groups demonstrated reductions in alcohol-related problems at 3-month follow-up with no significant differences by group. Our findings are similar to those of Yurasek et al. (2015) in which no significant differences were found in alcohol-related problems between a brief BMI + SFAS session and a BMI + alcohol education session. It is possible that providing

more detailed information about alcohol as a substance and its effects on the body, even when not tailored to an individual's own experiences, may give students who are novices to drinking substantially more knowledge about alcohol than they had previously received, potentially leading to more informed decisions about their own drinking and ultimately comparable reductions in alcohol-related problems (Hustad et al., 2010). It is also possible that education about nutrition and maintaining a balanced diet, in combination with, though not explicitly connected to alcohol use education, may have indirectly, through more informed decision making around both alcohol and food, provided an impetus for reducing drinking and some physical health problems related to drinking. However, the current study's sample size was small, and results are still preliminary at this point. Future investigations on combined alcohol and nutrition education brief text-message interventions may be warranted.

Behavioral Economic and Other Secondary Outcomes

Alcohol Demand

In partial support of our secondary outcome hypotheses, alcohol demand intensity, or hypothetical drink purchases when there is no price constraint (i.e., price is \$0.00, free), significantly reduced in the BMI + SFAS condition but not in the education control condition. Although both groups reduced their demand intensity, the BMI + SFAS condition showed slightly larger effect size reductions than the education condition by 3-month follow-up. Behavioral economic theory suggests that these reductions in drink purchases partially represents a reduction in relative reward value placed on alcohol and the motivation to purchase and consume it. Our results are somewhat consistent with studies by Dennhardt et al. (2015) and Murphy et al. (2015) that found reductions in demand following a brief motivational intervention. Partially in line with these previous studies, our results suggest that demand

intensity may be a potential intervention mechanism of behavior change. Additionally, considering our inclusion of an Episodic Future Thinking (EpFT) exercise in the SFAS, our results are also in line with previous studies that demonstrated reductions in alcohol demand intensity following a stand-alone EpFT administered to college students (Bulley & Gullo, 2017) and following a single session of the SFAS, which included an EpFT, administered as an adjunct to intensive outpatient treatment for adults with AUD (Meshesha et al., 2020). Though the current study was not powered to test mediation or moderation effects, future research could investigate the extent to which CoAST BMI + SFAS reduces alcohol demand, and if change in demand mediates subsequent changes in drinking (Murphy et al., 2015).

Future Orientation: Delay Discounting, Consideration of Future Consequences, Self-Regulation, and Protective Behavioral Strategies

Although several components of the SFAS, in particular the Episodic Future Thinking (EpFT) exercise, were designed to expand time horizon and reduce delay discounting, there were no intervention effects on these variables. In regards to delay discounting, however, our finding is consistent with two previous studies of the in-person BMI + SFAS that similarly found no intervention effect on delay discounting, though they did not include an EpFT (Dennhardt et al., 2015; Murphy, Dennhardt, et al., 2012). In fact, previous studies that have found an impact of EpFT on delay discounting used a lab-based paradigm in which participants were presented with episodic future cues while they simultaneously completed the impulsive choice or delay discounting task (Bulley & Gullo, 2017; Snider et al., 2016; Stein et al., 2018). This is markedly different from the current study, and another by Meshesha et al. (2020), in which the EpFT exercise was administered within the context of a larger brief intervention, rather than stand-alone, and participants completed the delay discounting task outside of the context of the EpFT

exercise. Likely, these substantive differences in EpFT exercise and delay discounting task administration largely account for the disparate findings of the current study.

In addition, sampling factors such as age and baseline drinking level may have reduced the possible range of substance use severity in the current sample. Considering that delay discounting is positively associated with substance use severity (Amlung et al., 2017), it is possible that the small selected age range and generally high drinking level limited the variability in drinking patterns and, as a result, limited the meaningful variability over time in use severity and delay discounting.

Research also suggests that, in relation to health behaviors, time orientation measures such as the delay discounting task and consideration of future consequences (CFC) scale are ideally measured at the behavior-specific level (Dassen et al., 2015). Indeed, studies of monetary versus commodity (e.g., cigarettes, sex) discounting demonstrate notable differences in discounting rate in both addicted or dependent individuals and healthy controls (Baker et al., 2003; Jarmolowicz et al., 2014). Though money is a construct most ubiquitously understood by and accessible to essentially everyone, its use in delay discounting measures and its subsequent generalization to the broad characteristic of impulsivity may be too narrow an approach to understanding decision-making phenomena. Future intervention research should include both general monetary and behavior-specific delay discounting measures, as they may capture overlapping but distinct decision-making processes.

To our knowledge, only one other brief intervention study has assessed CFC as a possible intervention mechanism and two have evaluated CFC as a moderator (Murphy, Dennhardt, et al., 2012; O'Connor et al., 2009). Murphy et al. (2012) found that higher baseline CFC was predictive of fewer heavy drinking episodes 6 months after an in-person BMI + SFAS; however,

their moderation results were not significant. This study also found a non-significant trend-level time by condition interaction effect for CFC in which BMI + SFAS participants demonstrated a greater increase in CFC compared to their BMI + relaxation training control condition. Similar to delay discounting, research has also found stronger links between specific health behaviors and behavior-specific CFC than with general CFC (see Dassen et al., 2015).

Finally, though our results are inconsistent with prior preliminary research indicating that self-regulation may be a potential BMI + SFAS intervention mechanism for reducing alcohol-related problems (Soltis et al., 2018), they are in line with a larger study that investigated the efficacy of the BMI + SFAS and found no effect for self-regulation as a mediator (Murphy et al., 2019). Alternatively, Murphy et al. (2019) did find a significant partial mediating effect for the use of protective behavioral strategies (PBS), which has previously been conceptualized as a form of drinking-specific self-regulation (Pearson et al., 2013). Considering the BMI session in the current study included a component in which safer drinking strategies were discussed, it is notable that intervention condition appeared to have no impact on the use of PBS. These findings are inconsistent with previous BMI research indicating that PBS appears to be an important mechanism of behavior change (Murphy, Dennhardt, et al., 2012; Murphy et al., 2019; Reid & Carey, 2015); however, the current study was not powered nor designed to examine treatment mechanisms. Larger scale future trials of the CoAST delivered BMI + SFAS should evaluate potential mechanisms, such as PBS.

Depressive Symptoms

Depressive symptoms are also positively associated with alcohol-related problems and alcohol use disorder (Pedrelli et al., 2016; Soltis et al., 2017). Considering the BMI + SFAS utilized a values-based approach and brief activity scheduling similar to Behavioral Activation

for depression (Daughters et al., 2016; Lejuez et al., 2001), we expected to observe some improvement in depressive symptoms. Indeed, the non-significant trend-level reduction in depressive symptoms in the BMI + SFAS condition may suggest that the CoAST BMI + SFAS could be potent enough to affect depressive symptoms. Similarly, previous studies of the in-person BMI + SFAS have also found reductions in depressive symptoms following the brief intervention (Murphy, Dennhardt, et al., 2012; Murphy et al., 2019); however, these reductions were only significantly different from an assessment-only comparison and not from a BMI + relaxation training active control condition, indicating depressive symptoms may not operate as a mechanism of behavior change. Alternatively, there is more substantive evidence to support the role of depressive symptoms as a potential moderator of brief intervention response (Miller et al., 2020; Murphy, Dennhardt, et al., 2012), such that individuals with lower or moderate baseline levels of depressive symptoms are more responsive to the brief intervention. It is clear that including depressive symptoms in our investigation of the CoAST BMI + SFAS is in line with prior brief alcohol intervention research and will be important to incorporate in larger future trials of the CoAST BMI + SFAS, especially considering the rates of depression and alcohol misuse in emerging adults (American College Health Association, 2015; Hingson et al., 2017).

Time Allocation

Though there were no significant differences by intervention condition at 3-month follow-up in time spent doing homework or drinking, there was a significant intervention effect on time spent exercising. Specifically, individuals in the BMI + SFAS condition reported spending more time exercising at 3-month follow-up compared to those in the education control condition. These results are somewhat inconsistent with the overwhelming literature positively linking physical activity and alcohol use (Buscemi et al., 2011; Dunn & Wang, 2003; Lisha et

al., 2011; Musselman & Rutledge, 2010). In fact, alcohol use, heavy episodic drinking, and alcohol-related problems all reduced in the BMI + SFAS group whereas overall time spent exercising increased. Anecdotally, several participants in the BMI + SFAS group indicated interest in increasing physical activity or exercise as one of their personal goals. Whereas Dunn and Wang (2003) warn against using physical activity interventions to address alcohol use in college students due to the strong positive associations between these behaviors, the BMI + SFAS utilizes a values-based approach in which counselors encourage students to consider their long-term goals and how current choices and behaviors in how they spend their time would allow them to reach their goals. Students are also asked to consider how their alcohol use might impact their ability to achieve their goals. Therefore, increased engagement in physical activity is considered within a broader decision-making context with valued long-term goals in mind.

Considering previous brief intervention research that demonstrated reductions in substance use following prompts to increase time spent in exercise (Correia et al., 2005), it is possible that increases in time spent engaged in physical activity could potentially mediate the effect of the BMI + SFAS on heavy episodic drinking. Research by Meshesha et al. (2015) further suggests the possibility that time allocated to exercise, as well as homework/studying, could provide a buffer against heavy drinking and cannabis co-use and polysubstance use. Indeed, behavioral economic theory proposes, in part, that the proportion of an individual's time spent in a particular activity may be a useful quantitative proxy for the reward value or reinforcement provided by that particular activity (Baum & Rachlin, 1969; Heinz et al., 2012; Herrnstein, 1970). Thus, our time allocation results would suggest that participants in the BMI + SFAS condition placed an increased value on exercise and physical activity, and possibly

reduced value in heavy drinking related activities, following the intervention compared to the control condition. Undoubtedly, more research is needed to better contextualize our results.

Implications

Overall, the results of the current study indicate that the counselor-administered, synchronous text-message (CoAST) delivered BMI + SFAS is feasible, acceptable, and has the potential to reduce heavy drinking episodes and alcohol demand intensity in heavy drinking, non-treatment seeking, college student emerging adults. To our knowledge, this is only the second study to utilize synchronous text-messaging for remote delivery of an alcohol brief intervention by a counselor, as well as to employ Motivational Interviewing (MI) style in a CoAST delivery format. The previous CoAST study by Teeters et al. (2018) demonstrated preliminary efficacy of a brief single-session text-message intervention for reducing alcohol-impaired driving in college student drinkers. Otherwise, studies of brief alcohol interventions using text messaging have primarily used automated unidirectional or bidirectional programs (Bock et al., 2015; Merrill et al., 2018; Suffoletto et al., 2014, 2015; Witkiewitz et al., 2014), and previous investigations of the BMI + SFAS in samples similar to the current study have only used an in-person format (Murphy, Dennhardt, et al., 2012; Murphy et al., 2019; Yurasek et al., 2015). The current study was the first to adapt the in-person BMI + SFAS to a CoAST delivery format.

Whereas the in-person BMI + SFAS is an easily disseminable and efficacious intervention (Murphy et al., 2019), its scope of reach may be limited, potentially missing high risk individuals who may be less likely to attend in-person sessions (Livingston et al., 2012; Neighbors et al., 2018) and individuals who do not have time, transportation, or finances to travel to sessions. Automated interactive text-message and web-based alcohol BMI programs,

such as e-CHUG (Walters et al., 2007), are able to address many of these barriers or challenges typically facing participants (Griffiths et al., 2006), and substantially reduce or eliminate entirely counselor burden in terms of training and actual intervention contact hours. Whereas in-person BMIs require travel and time related costs that can be significant for some, automated text-message and web-based interventions are designed to eliminate travel costs and reduce time related costs. In fact, automated text-message interventions are often brief, requiring no or very short responses (Bernstein et al., 2018; Bock et al., 2016; Merrill et al., 2018; Suffoletto et al., 2014; Witkiewitz et al., 2014), and web-based interventions may be done at the participant's pace and when it is most convenient for them (Bingham et al., 2010; Neighbors et al., 2009).

Despite the motivational, logistical, and stigma related barriers that may be addressed using automated interactive text-message and web-based interventions, there are concerns about the efficacy and effectiveness of these modalities likely due in part to a lack of sustained attention to and retention of the intervention content (Lewis & Neighbors, 2015). Lewis and Neighbors found that participants were generally inattentive to a remotely delivered web-based personalized normative feedback (PNF) intervention, often multi-tasking or distracted by their surroundings, whereas participants completing the same intervention in a lab setting, under some observation of study personnel, were generally more attentive. Importantly, retention of this information, which is related to attentiveness and some level of interaction with the intervention material, is associated with drinking outcomes in college student populations (Jouriles et al., 2010). Face-to-face brief interventions, which are inherently more interactive than computer-delivered interventions, demonstrate more long-term efficacious outcomes (Reid & Carey, 2015). Further, despite the convenience of self-paced automated or web-based brief interventions, interaction with intervention material and traffic in these self-guided interventions

decreases rapidly after just a few weeks (Gonzalez & Dulin, 2015), undermining any efficacy the intervention may have. As Jouriles et al. (2010) indicates, capturing attentiveness, and thereby increasing retention of intervention information, may be a key mechanism to target in remote delivered brief interventions.

The results of the current study suggest that CoAST delivered brief alcohol interventions have the potential to address some important barriers and challenges confronting both in-person and remote delivered (i.e., automated text-message, self-paced web-based) brief interventions. CoAST interventions provide similar logistical benefits to other remotely delivered brief interventions in reducing participant travel and time-related costs of participation. Qualitative data from the current study suggested that stigma-related barriers may also be addressed using a CoAST delivery format because of the perceived anonymity. In fact, research in social psychology seems to suggest that anonymity may be considered a form of privacy that offers opportunities for recovery, catharsis, and autonomy (Pedersen, 1997). Discussing alcohol use in this context of privacy and without the fear of judgment or stigma may increase openness to less-desirable feedback, reduce the desire to maintain a status quo, and even enhance a sense of autonomy towards prosocial behavior change. Paradoxically, participants also described liking the high levels of personalization and personal relevance of the intervention content, which could contribute to greater attentiveness, information retention, and ultimately drinking outcomes. CoAST interventions such as the BMI + SFAS are able to provide tailored feedback and personalized discussion of patterns of behavior while simultaneously affording the participant a sense of privacy. Due to the novelty of this format, however, it is not clear how any of these “features” might impact responsiveness to the CoAST based BMI + SFAS. Therefore, future research specifically evaluating mechanisms of remote delivery formats is warranted.

A related key mechanism may also be social interaction or some form of human connection, even via text-message and under perceived anonymity; however, person-to-person remote delivery introduces potentially important drawbacks or limitations of CoAST interventions compared to automated text-message, self-paced web-based, and even in-person interventions. Among the more costly limitations, whereas automated or web-based interventions require little to no training of counselors, CoAST interventions do still require counselors to undergo training in intervention content and both standard and remote delivery practices. Although it is expected to be more costly and time consuming on the front end, it is likely that initial training in CoAST and other remote delivery formats (e.g., videoconferencing) could be applied across various interventions adapted for remote delivery. Further, whereas telehealth and telebehavioral health have been steadily growing over the past decade (Barnett et al., 2018), the COVID-19 pandemic and “safer at home” executive orders instituted, essentially overnight, an all but ubiquitous need for these services. Given this sudden and permeating need for remote service delivery, it is possible that training in telehealth, telebehavioral health, and other forms of remote intervention delivery, such as CoAST, could become a standard practice throughout the field. Indeed, access to smart phones is increasingly widespread (Google, Inc., 2017; International Telecommunications Union, 2014, 2017) and generally the preferred method for remote interaction among adolescents and emerging adults (Pew Research Center, 2015).

Associated with counselor training costs are the concomitant limitations in the delivery of CoAST interventions. Considering that both in-person and CoAST interventions require participant contact with a counselor, CoAST interventions do not carry the same benefits and conveniences as automated interactive text-message and self-paced web-based interventions. Although some CoAST BMI + SFAS sessions in the current study were delivered in the

evenings and on weekends, they were predominantly delivered during normal business hours between 8AM and 6PM Monday through Friday, thereby reducing participant convenience and increasing counselor burden. Additionally, four weeks of booster sessions were also conducted by counselors, creating further time burden for counselors and participants. With some evidence to suggest that these weeks of booster cumulatively reduced alcohol demand beyond the initial two sessions, however, it is possible that additional booster contact may be worthwhile. A cost-benefit analysis of the incremental efficacy of the booster contact may be warranted.

It is clear that in-person, CoAST, automated interactive text-messaging, and web-based brief interventions each likely fall on continua of costs and conveniences to counselors and participants, as well as on continua of engagement and efficacy. Whereas in-person delivery may be the least convenient and cost-effective comparatively, it appears to be the most engaging and ultimately the most efficacious brief intervention delivery format to date (Carey et al., 2012). Alternatively, automated text-message and web-based formats are far more convenient and cost-effective; however, their efficacy is mixed and does not appear to be as long-lasting as in-person brief interventions (Carey et al., 2012; Kazemi et al., 2017; Marcolino et al., 2018). Finally, although CoAST has the potential to address certain barriers to in-person brief interventions (e.g., stigma-related issues, travel-related costs) and automated or web-based interventions (e.g., engagement with and retention of intervention material), it has its own unique challenges, including additional counselor training and time burden. Future research should seek to understand the impact of these various modes of delivery on intervention outcomes by comparing, to the extent that it is possible, equivalent in-person, CoAST, automated text-messaging interventions, and self-paced web-based intervention. In addition, important mixed-

methods research might include studies in which participants are able to experience multiple modalities and provide their ratings and feedback for each.

Strengths, Limitations, and Future Directions

The current study evaluated the feasibility and acceptability of the novel text-message delivery format, CoAST, of a brief alcohol intervention developed from behavioral economic theory. In addition, preliminary efficacy was examined by comparing the CoAST delivered BMI + SFAS to CoAST delivered alcohol and nutrition education using a randomized controlled pilot trial design. Despite the popularity of mHealth and text-messaging as a delivery format, only one other study has evaluated person-to-person text-message brief interventions for addressing alcohol use outcomes in a sample of risky drinking emerging adults (see Teeters et al., 2018). Four weeks of brief surveys coinciding with booster contact also afforded the ability to examine changes in behavioral economic variables at a more fine-grained level than in previous BMI + SFAS studies. Lastly, the study included investigations of the internal validity and motivational interviewing treatment integrity of the CoAST delivered BMI + SFAS which allowed for a narrative comparison of these treatment delivery variables to in-person iterations of the BMI + SFAS.

Despite some notable strengths of the current study, several limitations should be considered when interpreting our results. First and foremost, our sample size was small and, therefore, not powered to detect intervention effects or to estimate reliable effect sizes to be used later for sample size determination in a larger scale CoAST BMI + SFAS trial (Leon et al., 2011). Thus, our tests of preliminary efficacy and secondary outcomes should be considered within the context of this important limitation and interpreted with caution. However, in line with the purpose of pilot trials outlined by Leon et al (2011), the current study is appropriately

designed and sized for the assessment of feasibility and acceptability, which our results largely confirm.

Our sample was also relatively homogenous, which limited both the racial and cultural diversity of the sample as well as the range and variability of drinking patterns and alcohol problem severity observed. The majority of our participants identified as White and as cisgender women, thereby limiting the generalizability of our results. Larger trials powered to evaluate the efficacy of the CoAST BMI + SFAS should be intentional in their recruitment and enrollment of more racially and culturally diverse participants, including higher representations of Black, Indigenous, and People of Color (BIPOC) and individuals identifying as LGBT+.

In addition, baseline alcohol use and alcohol-related problems were relatively low in the current sample compared to previous trials of the BMI + SFAS (Murphy, Dennhardt, et al., 2012; Murphy et al., 2019; Yurasek et al., 2015) and other brief intervention studies for heavy drinking emerging adults (Cadigan et al., 2018). Considering that cisgender-identifying men, particularly white men, tend to engage in heavy episodic drinking and high intensity drinking (8+/10+ standard drinks in one occasion for women/men respectively) more than women (Schulenberg et al., 2018) and their BIPOC counterparts, larger future trials may also attempt to include a more representative proportion of men. Notably though, the gender gap in past 30 day prevalence of heavy episodic and high intensity drinking is shrinking, and, therefore, it will be important to more intentionally involve more representative proportions of all genders, races, and ethnicities. It is also possible that, given the predominantly non-traditional nature of the student body (i.e., students who commute, work part or full time, participate in a federal work study program) and the minimal emphasis on social Greek life, students at the University of Memphis generally tend to drink at lower rates compared to students at more traditional 4-year residential universities.

Therefore, it will be important to broaden the sample to include students from multiple types of higher education institutions, as well as non-student emerging adults whose work schedules may afford less flexibility for in-person sessions, in replication studies and future iterations of the CoAST BMI + SFAS.

Our assessments of alcohol use outcomes and secondary behavioral outcomes were retrospective self-report measures which are subject to recall bias. Despite these measures demonstrating psychometric validity and reliability, it is worth noting this as a plausible limitation considering the lower than expected levels of alcohol use and related problems. Further, the extent to which remote assessment may have influenced retrospective self-reporting is also unclear. Given prior research on participants' low level of attentiveness to remote interventions (Lewis & Neighbors, 2015; Rodriguez et al., 2015), assessment or questionnaire attentiveness and consistency should be closely examined in future studies.

The current study included four booster assessments, a post-booster or post-intervention assessment, and a single follow-up assessment 3 months later. Although most booster and post-booster assessments took place within the academic year, almost all spring enrolled participants completed their 3-month follow-up assessments outside of the academic year. To account for this, we included a dummy coded variable representing the two possible semesters in which participants could enroll; however, it is possible that enrollment early versus late in either semester could be still be impacting time allocation data, particularly academic-related life areas, and likely alcohol use outcomes as well (Del Boca et al., 2004; Dierker et al., 2008). Some spring-enrolled students may have been enrolled in summer or online courses, which we did not assess in the current study, and alcohol use may have been affected in different directions due to change in availability and/or environment during the summer. Future studies should carefully

consider semester of study enrollment and timing of follow-up assessments, in addition to including more frequent follow-up assessments following post-booster, such as a 1-, 3-, and 6-month post-booster assessment which may better capture some longer-term change processes.

Finally, although several components of the BMI + SFAS intervention may have contributed to the current study's outcomes, we were unable to identify which elements of the BMI, SFAS, and booster contacts contributed to these outcomes. Our exploratory analyses of alcohol demand over the 4 weeks of boosters tentatively suggest there may be increasing gain with the booster content; however, it is still largely unclear at this time what, if any, incremental utility is provided by each component. Previous research has shown larger effects were generated for the pairing of the BMI + SFAS compared to BMI-only studies (Murphy, Dennhardt, et al., 2012; Murphy et al., 2019; Yurasek et al., 2015), though these effects cannot be directly translated to the CoAST delivery format and are not sufficient to accurately describe the unique contributions of the SFAS to alcohol-related outcomes. It is also important to note that the effects of the SFAS in both previous trials were larger than in the current study. This may be due to the in-person nature of the previous trials, suggesting there is some benefit to in-person interventions. It is also possible that it may be due to the reduced nature of the CoAST SFAS session and the extension of its content into the booster contacts, such as the discussion of participant-specific substance-free recreational/leisure activities. Undoubtedly, it will be important in future iterations and dismantling studies of the CoAST BMI + SFAS to assess the effects of the BMI and SFAS sessions separately as well as the individual and cumulative effects of the booster content and contact. Finally, qualitative feedback in the form of focus groups may be useful in further informing the structure of and content included in the boosters.

Conclusions

Overall, the current study demonstrated the feasibility and acceptability of a CoAST delivered BMI + SFAS for risky drinking college student emerging adults. Rates of enrollment, retention, and level of engagement in the text-message sessions indicated the feasibility of a CoAST delivered brief alcohol intervention with non-treatment seeking emerging adults, and high ratings of participant satisfaction indicated its acceptability to the target population. Further, our preliminary efficacy results indicated that the BMI + SFAS, compared to an education control condition, was associated with fewer past-month heavy drinking episodes, lower alcohol demand intensity, and more time spent exercising at 3-month follow-up. Additionally, both CoAST delivered interventions were associated with fewer drinks per week and alcohol-related problems at follow-up. Future research to address the significant limitations of this study, as well as to expand knowledge regarding the CoAST delivery format, is necessary to evaluate the efficacy and unique effects of CoAST delivered brief interventions on alcohol use and related problems, as well as other behavioral health outcomes.

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Appendix A

A Mobile-Based Behavioral Economic Intervention to
Reduce Young Adult Alcohol Misuse

Interventionist's Manual for the
MOBILE-DELIVERED ALCOHOL BRIEF MOTIVATIONAL INTERVENTION
AND SUBSTANCE-FREE ACTIVITY SESSION

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Based on the Interviewer's BMI and SFAS Manuals from Project BLUE

- Murphy, J. G., Skidmore, J. R., Dennhardt, A. A., Martens, M. P., Borsari, B., Barnett, N. P., & Colby, S. M. (2012). A behavioral economic supplement to brief motivational interventions for college drinking. *Addiction Research & Theory*, *20*(6), 456-465. doi:10.3109/16066359.2012.665965
- Murphy, J. G., Dennhardt, A. A., Skidmore, J. R., Borsari, B., Barnett, N. P., Colby, S. M., & Martens, M. P. (2012). A randomized controlled trial of a behavioral economic supplement to brief motivational interventions for college drinking. *Journal of Consulting and Clinical Psychology*, *80*, 876-886. doi:10.1037/a0028763

Mobile-delivered BMI (mBMI)

Following the remotely administered baseline assessment, clinicians will schedule with the participant a time within the next week to complete the mobile-based BMI. Personalized feedback will be provided with information on how the participant's drinking compares to that of other students, along with information on strategies for safer drinking.

Clinicians will use the following materials as an outline for the mobile-delivered BMI feedback session. Each session must include each of the major sections and feedback elements. Consistent with the principles and spirit of motivational interviewing (MI), clinicians should react flexibly to the unique characteristics and experiences of each student participant. Clinicians should be familiar with the questions and follow-up prompts detailed below, and should use questions and prompts strategically based on the individual's substance use pattern and motivation to change. Key questions will be underlined and should be included in each session with each participant.

Session Format. The intervention will take place entirely via text messaging and should take approximately 50 minutes, though this may vary slightly by participant (in part based on participant response latency). *Clinicians should note that in-person or phone call session formats cannot be accommodated within the context and goals of the current research study.* Following the session, clinicians will schedule the next session (mSFAS) for the next day or as soon as possible. The session will begin with the orientation/rapport building, followed by the decisional balance exercise regarding alcohol use. Then, the clinician will present the personalized feedback (sent as a PDF or JPEG file) and review it with the participant. Finally, the clinician will conclude the session by assessing the participant's reaction to the feedback and elicit their goals related to drinking reduction.

A Note about Motivational Interviewing Style from the in-person Interviewer's Manual for Project BLUE:

Motivational interviewing (MI) is a therapeutic style that has been used frequently in the context of brief interventions (Miller, Sovereign & Kreege, 1988; Miller 1983, 1996; Bien, Miller & Boroughs, 1993). Motivational interviewing is defined as "a collaborative conversation style for strengthening a person's own motivation and commitment to change" (Rollnick & Miller, 2013, p. 12). It is an approach that uses "interrelated elements" that capture the "spirit" of MI: partnership, acceptance, compassion, and evocation. Specifically, the interviewer helps the client explore and resolve ambivalence about reducing alcohol use by attuning to both their own and the client's aspirations and acknowledging the client knows him/herself best, trusting the client with empathy and encouraging self-sufficiency, prioritizing the client's well-being and needs, and focusing on understanding the client's strengths. The interviewer creates a sense of collaboration, 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; the interviewer explores risks and consequences, 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). Overall, this gently guided self-evaluation of personal drinking and college/career/personal goals fosters a greater awareness of the client's relationship with alcohol and the potential value of change (Miller, 1989). Resources describing the motivational interviewing style include Miller and Rollnick (2013).

The interviewer will perform a variety of tasks during the brief text-message intervention: provide personalized normative feedback, serve as an active and empathetic listener/presence, prompt greater self-awareness of the potential risks and actual costs of a current drinking pattern, and help to resolve ambivalence about potentially harmful drinking behaviors. These tasks can be achieved using the Elicit- Provide-Elicit Process: (a) the client describes a behavior, 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 problem recognition (if appropriate) and the desirability of reducing some of the riskier aspects of the students' drinking. Often options for change will emerge over the course of the interview, with the participant's active involvement and input. However, this is not a necessary outcome of the interview. It is possible that at the end of the session, the student will not be ready to discuss reducing personal alcohol use. 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 the functional role of alcohol in the student's life (even without stated intentions to change) can be considered a positive outcome. In sum, MI has its effect through increasing motivation; the volition (or specifics of action) is left to the client.

Handling resistance. The majority of students enter the session with some curiosity but not knowing what to expect. Occasionally you may suspect that a student may not be very interested in attending to the session. One way to limit the degree of suspected opposition in the student is to check in with the participant throughout to make sure he/she understands what is being discussed:

- *Does this make sense to you?*
- *Do you think this has ever applied to you? How so?*
- *What do you think about that?*

In addition, the use of loaded words such as "alcoholism", "abuse" and "alcohol/drug problem" should be avoided throughout the text exchange.

If the participant becomes defensive, the interviewer should once again roll with the resistance. A participant may repeatedly say, "I'm not an alcoholic/problem drinker, though," or "I don't have a problem." These assertions should not be challenged. It may be useful in these circumstances to have the participant give an example of what their definition of a problem drinker/alcoholic is: *People often have different ideas about what "problem" drinking is. How do you define problem drinking?* Often, extreme examples will be given: "Someone who drinks every

day"; "Someone who drinks alone all the time"; "Someone whose liver is shot from drinking so much." The interviewer can then observe: *Well, it's good that you are not experiencing those things. And you've also described some not so good consequences of drinking that you've experienced. Would you be interested in learning some ways to avoid some of these consequences?* The interviewer has not labeled the participant; instead, the focus has been shifted to the actual, concrete consequences that the participant has listed.

Barriers & Challenges of Text-based Modality. Clinicians should be aware that the text-message modality inherently precludes “reading” the body language, facial expression, or tone of voice of the participant for clues about the understanding of and feelings about the material presented. This barrier may be challenging with some participants, and clinicians are encouraged to check in frequently with the participant in an attempt to ensure understanding of how the participant is receiving the material. The text-message modality presents a stark difference in the standard way in which MI is delivered and received. For example, reflection statements made in-person or face-to-face are more likely to be met with a response by the participant than via text-message. Alternatively, reflection statements by themselves may be met with confusion on the participant’s part about whether or not they should respond. Additionally, consideration of time will be an important factor in the overall length of the session, and providing only reflection statements will substantially lengthen the time spent in the session. As such, we recommend clinicians use reflections effectively but judiciously, and always followed with a prompting question that will move the session forward. For example:

Clinician: What is your reaction to thinking about these consequences?

Participant: I should probably be more careful when drinking

Clinician: It seems like some of these might bother you a bit [*Reflection*]. Which of these would you like to avoid in the future? [*Prompting Question*]

Participant: Having to drink more alcohol is the one that really hit me.

Clinician: Noticing that you felt you needed to drink more to kind of get the same affect really hit you [*Reflection*]. How might you avoid that in the future? [*Prompting Question*]

Participant: I guess I could probably try to drink slower so that I can feel the alcohol kicking in.

The clinician does not need to wait for a reaction from the client in these instances. While reflections are important and demonstrate a sense of understanding on the clinician’s part, the goal will be to continue to move the session forward, developing discrepancy, and eliciting and encouraging change talk by the participant. Clinicians should include **Key Questions** as much as possible in conjunction with their personalized reflections. (Remember, **Key Questions** will be bold and underlined throughout the manual and are questions that should be asked of each participant at some point during the session.)

Non-responding presents a unique challenge to the text-messaging modality of MI delivery because it is unclear *why* the participant is not responding. Ask participants at the outset to set aside 50 minutes (for the initial session) to fully attend to the text messages and materials presented rather than attempting to complete this while doing something else. If the clinician suspects during

a session that the participant is engaged in another attention-grabbing activity they may note this and suggest continuing or finishing the session at another time. For example:

10:07AM – Clinician: Our goal for today is to give you a chance to think about your college/career goals and how you can maximize your time. What are your goals for college?

10:10AM – Clinician: Take your time if you're still thinking, just let me know that you're still there. *[Use this or a similar prompt after 3 minutes]*

10:12AM – Clinician: It seems like you might be busy with other things. If now isn't a good time for you, we can schedule another time. *[Use this or a similar prompt after 5 minutes]*

10:31AM – Participant: No now is fine. I just got stuck outside waiting for a train & I didn't really feel like texting in the cold. Graduate in May with a degree in political science, work as a courier in a law office, take the LSAT and go to law school

After 20 minutes of no response from the participant, the clinician noted that now may not be the best time for the participant to fully attend to the session and offered to re-schedule for another time. The clinician did not assume that the participant was put off by what would be discussed in the session and allowed the participant to “save face”, if that were the case, by suggesting that the person may simply be busy. In this instance the participant was interested in continuing with the session, although their attention may have been on other things. This clinician handled the situation well, however, they may have avoided it altogether if they had been explicit with the client on the front end about what was expected for their text message sessions.

It is strongly suggested to wait no more than 2-3 minutes to prompt the participant for their response, especially if the clinician has explicitly stated and re-iterated at the start of each session that full attention is recommended in order to complete the session in a timely fashion. At the end of the allotted hour, the clinician will need to end the session regardless of whether or not all material was covered. The clinician will need to ensure that missed material from the previous session is covered in the following session or booster contact.

Participant response latency, or the time it takes the participant to respond to the clinician, will be an important in-session indicator of the level of attention the participant is giving the session. Encouraging the participant to set aside private time and space to attend to these sessions fully will be the best way to reduce that time. On the other end, clinician response latency, or the time it takes the clinician to respond to the participant, is equally important. Clinicians are encouraged to be well-versed in general MI principles and techniques, as well as the specifics of the text-message delivered Brief Motivational Intervention and Substance-Free Activities Sessions. Strong familiarity with these will have the greatest influence on reducing clinician response latency and may model, for some participants, the level of responsiveness that is expected in order to cover all of the material required in the time allotted. Clinicians should also respond to all texts within 1-2 minutes. If there is an unexpected delay resulting in a longer latency, please let your participant know.

Preparing for the mBMI Session

Prior to the BMI session, the clinician will need to prepare personalized feedback for each participant. To prepare the personalized feedback, the clinician will need the following information:

1. College Student Norms
2. Typical Drinks Per Week in the Past Month
3. Alcohol-related Consequences in the Past Month
4. Money Spent on Alcohol in the Past Month
5. Protective Behavioral Strategies Used

Clinicians should use the pre-generated Excel file and input individual data to create tailored feedback handouts. These feedback handouts will be used throughout the mBMI session.

In preparing for the mBMI session, clinicians should schedule a specific time with the participant to attempt to ensure that the participant has set aside time and will be in a place that enables them to fully attend to the material and discussion. Scheduling should be done as soon as possible after the baseline assessment survey has been completed in order to reduce attrition.

Getting Started

Content Overview:

1. **Briefly explain the purpose and format of the session**
2. **Present feedback form (via secure link or email attachment)**

Style:

1. **Establish rapport**
2. **Adopt a non-confrontational messaging style**
3. **Address as best you can any participant questions or resistance**

Goals

1. **Learn about the participant's views of the positive & negative effects of drinking**
2. **Correct faulty normative perceptions of drinking**
3. **Assist in strategizing means for avoiding future consequences of drinking**

Text Script: *Hi there! Thanks again for taking part in this project! How are you today? Are you still free right now to participate in this text exchange for the next 45-50 minutes?*

[Wait for response from participant, then]

Text for all participants: *I'd like to spend some time talking about your experiences with drinking, and provide some info that may be helpful in making future decisions about drinking. As a reminder, these texts are encrypted and confidential. What we talk about stays within the study. You're not in any trouble, so feel free to ask questions about any of the info we discuss and provide your own experiences. Ultimately, what you decide to do with all of this is entirely up to you. How does that sound to you?*

[**OPTIONAL TEXTS:** If the participant expresses concern about confidentiality, who will see this information, how the texts are stored, you may provide any of the following information:

- *Everything discussed here is not shared with anyone outside the study, including parents and the university.*
- *Everything discussed here is saved under a random number and is not connected to your name or other potentially identifying information.*
- *These text messages are saved for supervisory and research purposes and are not connected to you.*
- *Your participation in this study does not mean you're in trouble in any way.]*

[Wait for response from participant, then] The clinician should reiterate from the scheduling text exchange that the participant should be in a quiet and private place.

Text for all participants: *To ensure your privacy and that we stay on track and finish within the hour, please find a quiet and/or private place with few distractions. Do you have any questions before we get started?*

[No questions, move into Decisional Balance]

Decisional Balance

The primary goal of the decisional balance is to begin to open up a conversation about drinking that is non-judgmental, encouraging the participant to speak openly about their experiences with drinking. Although the clinician will receive useful information from this discussion, the clinician should not spend too much time on this section. It should not seem like the clinician is “pulling teeth” to understand positive and negative experiences of drinking. Consequences related to alcohol use will ultimately be discussed in more detail later on in the feedback.

Text for all participants: *The overall goal for the project is to help you figure out what you want most from college and how to maximize your goals. Specifically today we'll talk about alcohol. What are some things you like about drinking?*

[**Reflect**] Reflections here should BRIEFLY summarize the participant's positive views about alcohol use.

Sample reflection: For you, alcohol is a way to be social and to have a good time. What about the flip side? What are some things that are not so good about drinking?

[Reflect] Reflections here should probe for additional “cons” (up to 2 if none are initially mentioned). Clinicians may also ask the participant to elaborate on a recent example of a “con”. Clinicians should not belabor elicitation of “cons” if after an additional probe the participant is adamant there are no cons.

Sample reflection: What else is not so good about drinking?

Sample reflection: Feeling sick from drinking too much can be an unpleasant experience. When it has happened most recently, what was that experience like for you?

Sample reflection if the participant denies any “cons” to drinking: Your experience with drinking has only been 100% positive and you have not had any experiences in which you did not like the effects of alcohol.

[Transition into the next section on Drinking Pattern in the same text.]

[Reflect] Reflections here should BRIEFLY note both the positives and negatives of alcohol use, emphasizing the negatives listed.

Sample reflection if the participant provides both positive and negative aspects of drinking: Drinking can be a positive outlet for you, but you’ve experienced some noticeable consequences as a result of drinking, like [*reflect what participant stated were negatives of drinking*]. One goal of this session is to encourage you to think about these pros and cons as you make decisions about whether and how much to drink. And again, what you decide to do with all of this information is entirely up to you.

[Transition into the next section on Drinking Pattern in the same text.]

Personalized Feedback

The clinician will use the personalized feedback section as a way to develop discrepancy in how the participant views their alcohol or substance use and what they actually experience. The decisional balance has set the stage that the clinician is not here to challenge the participant on their drinking, rather that they are on the participant’s side with the desire to maximize the positive aspects of drinking while minimizing the negative aspects. Feedback Elements:

- College Drinking Norms
- Alcohol-Related Consequences
- Money Spent on Alcohol/Drugs
- Protective Behavioral Strategies for Safer Drinking

The clinician should save in a word document or PDF under the participant’s study ID number or other number that is not personal identifying information (PII) the information to be included in the personalized feedback section.

The clinician should also keep each feedback handout separate and only send once the clinician is ready to discuss the material with the participant. This will ensure that the clinician and participant are on the same page throughout the session and that the participant does not move ahead too quickly or jump around.

1. Drinking Pattern

Text for all participants:

I put together some info on how you said you typically drink and compared that to how much other students drink. Many people are surprised to learn that about 40% of college students don't drink. Based on the survey you completed for us, you said you typically drink 4 drinks per week. This is actually more than 77% of female college students. That means 23% of female college students drink more than you.

What is your reaction to that?

Clinicians do not need to include percentages out to decimal places. Whole number percentages are fine. Clinicians tailor the highlighted parts of this feedback text based on their responses to the initial survey.

[Reflect] Reflections here should BRIEFLY attempt to capture the participant's response. Although the clinician will be unable to actually see the participant's facial expression or reaction, the clinician should carefully consider the participant's text and the language and punctuation used.

Sample reflection: That number seems a bit high to you. What number do you think would be more accurate?

Sample reflection: It's hard for you to believe. We don't really think about our life in numbers like this, so seeing it written out like that is surprising. It sounds like this is making you think you'd like to cut back. I'm curious to get your ideas about what that might look like in a minute, but first [transition to money section]

Sample reflection: You're surprised that so many people don't drink, but recognize you drink more than all of your friends, how do you feel about that?

Sample reflection: You're a bit surprised by this. It is surprising. Sometimes we only have our group of friends as a point of reference, and it makes it hard to really know what other students are actually doing.

Sample reflection: This actually isn't too surprising for you. It seems like you're pretty aware of what your drinking pattern is like, or like you pay pretty close attention to others around you who drink.

Tip: Depending on the participant's response to their drinking pattern feedback and response latency, the clinician may choose to reflect and immediately move to the next section, providing feedback on the amount of money the participant reports spending.

Sample reflection: It's hard to believe! Sometimes we only have our group of friends as a point of reference, and it makes it hard to really know what other students are actually doing.

[Transition into the next section on Money in the same text.]

2. Money

***Text for all participants:** *I also estimated how much you reported spending on alcohol in the last month. Over the course of a year, this adds up to about \$600. How does this fit in with your overall budget and financial goals?*

Clinicians tailor the highlighted parts of this feedback text based on their responses to the initial survey.

***If the participant has already reacted a bit defensively to the feedback thus far,** it may be better to soften (or “titrate”) this part. Instead of asking how this monetary value fits in with their financial/budget goals, the clinician may introduce the money section by asking if the participant is aware of their spending patterns related to alcohol, and softening the language.

Sample text: I also estimated how much you reported spending on alcohol in the last month. Over the course of a year, this adds up to about \$600. What thoughts do you have?

OR

Sample text: We may not always pay attention to smaller, day-to-day occurrences because they don't necessarily capture our attention. In the moment, it can seem small and insignificant. However, over time some small things can add up. How much do you feel you are aware of your spending patterns when it comes to alcohol?

Clinicians tailor the highlighted parts of this feedback text based on their responses to the initial survey.

Text for participants who do not complete the money questions: Over the course of a year, money spent on alcohol can add up. For example, spending even \$50 a month adds up to \$600 over the course of a year. For that amount, you could purchase a brand new Apple Watch and have some money left over. Considering your own expenses, how does money spent on alcohol fit in with your overall budget or financial goals?

[Reflect]

Sample reflection: For some college students, money can be tight! It sounds like that amount is really high for you, and you're trying to save up for *[note what they said they are saving for, OR say "You are focused on saving money."]*.

Sample reflection: For you, money isn't a big issue, and this number is about what you expected.

Sample reflection: This number is about what you expected, but that's a bit too high and may be interfering with your budget goals.

Tip: Although this section can be very salient for some participants, the clinician should not spend too much time here and should simply reflect the participant’s response and/or feeling/value indicated in the response, and then move on to the next section within the same text message.

Sample reflection: For some college students, money can be tight! It sounds like that amount is really high for you, and you’re trying to save up for something big.

Sample reflection: You have a lot of things other than alcohol that are very important to you, and when you think about your goals and see how much you spend on alcohol, it seems like it’s too much.

[Transition into the next section on alcohol-related consequences in the same text.]

3. Alcohol-Related Consequences/Experiences

Text for all participants: *We also asked you about experiences that have happened to you as a result of your drinking. Here is a list of what you told us. What is your reaction to thinking about these experiences?* [attach PDF/image]

[Reflect] Reflections here should again attempt to capture the participant’s response to viewing the feedback. Although the clinician will be unable to actually see the participant’s facial expression or reaction, the clinician should carefully consider the participant’s text and the language and punctuation used and attempt to reflect any affective reaction.

Tip: This is great opportunity to elicit and facilitate change talk (language indicating readiness, willingness, and ability to change current problematic drinking behaviors), as well as provide a reflection and then elicit a response in the service of moving the session forward. Probing comments/questions you might use to do this:

Sample reflection: It feels strange for you to see them all written out. The number of consequences seems a lot bigger when they’re all put together on one page like that. It so

Sample reflection if the participant is dismissive of consequences: So even though, for you right now, the benefits outweigh the negatives of drinking, I’m curious which of these experiences sticks out the most to you or is the most significant to you?

Sample reflection: Tell me why *X [experience]* stands out to you.

[Reflect] Reflections here should BRIEFLY summarize the participant’s experiences with consequences related to their alcohol use, and if possible, the underlying feelings or values the participant indicates in their experiences with these consequences. Again, the clinician will want to end their text with a question that in some way keeps the session going and does not leave the discussion stagnant.

Sample reflection: And that recent blackout you talked about earlier sounds like it was kind of a “wake up call” for you. **How might you avoid blacking out [or other named consequence] in the future?**

Sample reflection: Okay, so these consequences generally aren't a big deal for you, but it would also be nice to lose some weight and not feel as hungover the day after drinking. **In the future, how might you avoid feeling very hungover the day after drinking [or other named consequence]?**

▲ If the participant endorsed alcohol-impaired driving, address that here if it has not already been addressed.

Text: Drinking more slowly or drinking water in between alcoholic drinks is a great idea! And one way to reduce the likelihood that you will blackout because of drinking.

You also marked that you had driven after drinking. Research shows driving after any drinking reduces your reaction times and increases risk of a car accident. Plus, a DUI can cost upwards of \$6400 altogether. How would receiving a DUI impact your future goals?

Sample reflection: It could have a huge impact on you and really get in the way of achieving your most important goals for yourself. **How might you avoid drinking and driving, which would put you at risk for receiving a DUI, in the future?**

OPTIONAL: Clinicians may choose to only present an estimate of the total cost of a first offense DUI (~\$6400) as exemplified above; however, if a participant is skeptical or inquisitive about the breakdown of the cost, the clinician should be transparent and provide the above tables in a PDF file for the participant.

Breakdown of Possible Fees for a DUI:

Fine (1 st Conviction)	\$350.00
Towing Fee – Car Storage	\$100.00
Bail	\$150.00
Defense Attorney	\$2,000.00
Court Costs	\$200.00
Reinstatement Fee	\$153.00
Proof of Liability insurance in effect at time of violation or pay additional	\$65.00
Additional charge if fails to surrender driver license within specified time	\$75.00
SR-22 Form (proof of insurance Required for a minimum of 3 years) Results in higher insurance rate	\$3,000.00

Driver License Examination and Driver License Fee (Class D)	\$19.50
Alcohol Education Program	\$300.00
Total	\$6,412.50

Facts about drinking and driving:

- Alcohol-related accidents and violence are the most frequent cause of death for persons 16-24 yearsold
- a driver is 10 times more likely to cause a fatal accident if he/she has a BAC of .10.

statistics from the US Department of Transportation

By now, the clinician should have elicited ideas from the participant on how they might avoid in the future one or more of the consequences they listed.

[Reflect]

Sample reflection for participants who are indicating a readiness to change their drinking: That's a great idea. It seems like you've noticed certain behaviors that end up leading to these consequences and already have some ideas about how to change that.

Sample reflection for participants who do not identify a strategy: Right now you're not so sure how you might do that. And that's okay!

Sample reflection for participants who identify several strategies: It sounds like you've really thought about this and have already come up with several ideas to help [lower the risk of something bad happening to you/ reduce the not so good experiences of drinking/ whatever their stated/implied value(s) are here].

[Transition into the next section on Protective Behavioral Strategies in the same text.]

4. Protective Behavioral Strategies

Text for all participants: *If you're interested, something I provide to everyone are some strategies for safer drinking. Some of these you may already use to prevent some of the not-so-good parts of drinking. Which of these do you find most useful, or maybe hadn't heard of before and would be interested in trying?*

[Reflect] Reflections here should BRIEFLY reinforce the use of strategies participants already report using and encourage them to consider different or new strategies that might be helpful. The clinician should also help problem solve around barriers to using certain strategies and why some strategies did not work well in the past.

Sample reflection for participants who report using a strategy ineffectively: It sounds like in the past that strategy hasn't worked well for you. What ways can you think of to make this strategy work better for you in the future?

Sample reflection for participants who indicate wanting to try a new strategy: That's a really good point! What do you think might get in the way of you trying to alternate alcoholic and non-alcoholic drinks like that? Can you foresee any problems with that strategy?

Sample reflection for participants who indicate wanting to try a new strategy or one that has been used ineffectively in the past: Thinking about barriers to our plans ahead of time can be really helpful in making sure we know how to deal with them when we get to that point. What or who do you think could get in the way of you using that strategy?

Sample reflection to help a participant consider possible barriers that may prevent them from using a particular named strategy: How could you handle that issue/barrier? Is there anyone who would be supportive of your using this strategy?

At this point, the clinician may note that the participant is using change talk indicating a readiness, willingness, and ability to make a change and establish a goal. The clinician should seize this opportunity to help the participant flesh out a specific goal and see if the client is willing to commit to their goal. See the section → IF YES: *What do you think might be your next step?* below in Establishing Goals for next steps.

[OPTIONAL – ADVICE WITH PERMISSION SHOULD BE USED JUDICIOUSLY]

▲ [Advise with permission] The clinician may provide advice under the participant's expressed permission. This can work well if permission has been granted AND when it is clear that the clinician has been listening/attending closely to the participant and is suggesting things that the clinician thinks might work for the participant's particular situation or circumstances.

Sample text: *Would it be ok if I shared some thoughts?*

(When person says yes):

Sample text: *From what you have said I wonder if you would consider trying X or Y strategies? The reason I thought these might be ones to consider is that... [fill in reasons tailored to the individual student's particular situation]*

Establishing Goals

The goal for the clinician in this section is to facilitate the participant in committing to a specific goal. This will require the clinician to probe for specific details around the goal, gauge the participant's level of commitment to the goal, and problem solve any additional barriers around readiness, willingness, and/or ability to make this change and commit to their goal.

Many participants will likely have already offered a goal for themselves in the sections discussing alcohol consequences and strategies for safer drinking. Below is a text message the clinician might

use if the participant has not stated any goals around drinking, or if the participant was not specific in how they might implement their identified strategies for safer drinking. Have the participant consider all of the information discussed thus far and how they plan to use this information going forward, as well as whether or not they are interested in setting and committing to a goal.

Text for all participants: *We have covered quite a bit of information today talking about ways in which alcohol affects you and strategies you have used or would consider using to avoid certain negative experiences as a result of drinking. With all of this information in mind, what are your plans related to drinking going forward? Or How do you see yourself making use of all of it?*

[Reflect] Reflections here should highlight the participant’s readiness, willingness, and/or ability to change, and “roll with resistance” if the participant does not indicate a readiness or willingness to change.

Sample reflection for participant who is ready to make a change in their drinking: It sounds like you’ve already spent some time considering reducing your drinking, and our chat today was helpful in giving you tips/strategies to do that. What is your plan for how many times to drink each week, and how many standard drinks to have when you do drink?

Sample reflection for participant who is unsure about a change to their drinking: It sounds like you’re not quite sure if you’re ready to change how you drink. How would you know when it is time to make a change?

Sample reflection for participant who is not ready to change their drinking: It sounds like you’re okay with your current drinking experiences and have no desire to change them at this time. How do you see your drinking changing, if at all, in the future?

IF READY TO MAKE A CHANGE:

Text: *What do you think might be your next step?*

[Reflect] Reflections here should highlight the participant’s sense of self-efficacy or ability to make changes to their drinking pattern, and provide any assistance in helping to establish this sense of ability or self-efficacy.

Sample reflection for a participant who provides a very specific strategy for reaching their stated goal: That’s a great idea! Sometimes it can be helpful to start small and work your way up towards a larger goal. Starting by drinking one less day a week sounds like it makes sense for you and your goals.

What barriers or issues can you foresee getting in the way of you achieving that first step this week?

Sample reflection for a participant who wants to abstain: We want to set you up for success in your goals, and you have decided that cutting out drinking makes the most sense for you right now. I wonder if you’ve tried this before and been successful? If not, sometimes it can be helpful to start small and work your way toward a larger goal.

Sample reflection for a participant who is unsure of their next step: It sounds like you're ready to make a change, but just aren't sure how you might do it. Sometimes I can be helpful to start small and work your way toward a larger goal if you're feeling overwhelmed. What is a small step you could take over the next week towards your goal of reducing your drinking?

[If participant has not yet indicated an interest in setting a goal around drinking ask]

Text: *Are you interested in setting a goal to reduce future drinking or to avoid [specific consequences of drinking]?*

IF NOT READY TO MAKE A CHANGE:

Text: *What do you think might happen if you continue to drink the same way you have been? AND/OR What would be some advantages of cutting down on your drinking?*

[Reflect] Reflections here should “roll with resistance”. That is, the clinician should meet the participant where they're at while also attempting to create more ambivalence about continuing to drink in the same way.

Sample reflection: Right now, you don't feel like your drinking is causing any major problems for you. What would be some advantages of cutting down on your drinking?

[Reflect] Reflections should again roll with resistance if the participant is adamant that there are no advantages to cutting down at this point.

Sample reflection: Right now, you don't feel like your drinking is causing any problems for you. So at this point in time, you don't feel there are advantages for cutting down. What would it look like if your drinking did become a problem for you? OR What do you think might happen if you continue to drink the same way you have been?

[Reflect] The clinician should continue to roll with any resistance, and help to establish and specify a goal if the participant changes direction and indicates a readiness or willingness, but difficulty in feeling capable. The clinician may problem-solve as described above in the section on Protective Behavioral Strategies.

Session Wrap-Up

Remind them of the other brief conversation they will have with you later in the week to complete the Mobile-based SFAS:

Text for all participants: *As I mentioned before, we'll text one more time this week. But instead of drinking, we'll text about your college and career goals and steps you can take towards achieving those goals. So let's plan on texting again from ____ - ____ AM/PM on __/__/2019. [e.g., 3:00-3:50PM on Tuesday 1/15/19.]*

Work out a time to schedule the SFAS. Ideally, the clinician will schedule this next session for within the next 1 to 2 days; however, depending on the participant's and clinician's schedules, this may not be possible. In those instances, it is perfectly acceptable to schedule the session within the next 7 days.

Mobile-delivered Substance-Free Activity Session (mSFAS)

Participants will complete the mSFAS within a day or two of the mBMI. This session will have similar components to an in-person SFAS intervention and will last approximately 50-minutes hour . As in the in-person SFAS, a personalized feedback will be provided with information on their time allocation, as well as substance-free recreation and leisure activities based on their interests they indicated in the baseline assessment survey. Participants will also be asked to engage in a brief Episodic Future Thinking task, or EpFT, to help the participant begin to connect current behaviors with long-term outcomes. Participants will also work collaboratively with the clinician to identify and set personalized goals for college, career, or other meaningful areas.

Clinicians will use the following materials as an outline for the mobile-delivered SFAS. Each session must include each of the major sections and feedback elements. Consistent with the principles and spirit of motivational interviewing (MI), clinicians should react flexibility to the unique characteristics and experiences of each student participant, allocating session time accordingly. Clinicians should be familiar with the questions and follow-up prompts detailed below, and should use questions and prompts strategically based on the individual's time allocation, personal experiences, and motivation to change. **Key questions will be bold and underlined and are questions that should be included in each session with each participant.**

Session Format. The intervention should take approximately 50-minutes, though this may vary slightly by student participant. Following the session, clinicians will schedule the first booster session for approximately 1 week later. The session will begin with the orientation/rapport building, followed by a discussion on college, career, or other personal goals and how alcohol and drug use fits in with these goals. Then, the clinician will send the personalized feedback on time allocation and review it with the participant. The clinician will engage the participant in an Episodic Future Thinking task and discuss the experience. Finally, the clinician will conclude the session by assessing the participant's reaction to the session and facilitate goal-setting, discussing the participant's plans for staying on track towards reaching their goals.

Preparing for the mSFAS Session

The clinician will have scheduled the mSFAS session at the end of the mBMI session the day or two before. The clinician who administered the mBMI will also administer the mSFAS and boosters.

Clinicians should again attempt to ensure that the participant has set aside time and will be in a place that enables them to fully attend to the material and discussion.

To prepare for the mSFAS, the clinician will need to prepare the following information based on the baseline assessment survey:

1. Frequency of marijuana use and/or any other illicit drug use
2. Past month typical weekly time allocation
3. Substance-free recreational/leisure activities
4. Substance-free constructive activities relevant to their college major and career goals

Clinicians should use the pre-generated Excel file and input individual data to create tailored feedback handouts. These feedback handouts will be used throughout the mSFAS session.

Getting Started

Content Overview:

1. Explain the purpose and format of the session

Style:

1. Establish rapport
2. Adopt a non-confrontive messaging style
3. Address as best you can any participant questions or resistance

Goals

1. Get the session started on a good note
 2. Enlist student's participation in session
 3. Briefly revisit session 1
-

The total contact time for the SFAS will be approximately 50 minutes.

Text for all participants: *Hi again! How are you today? Is now still a good time for us to text for about 45-50 minutes?*

[Wait for response from participant, then]

College & Career Goals

Text for all participants: *As a reminder, today's text chat will be about 45-50 minutes again, so please make sure you're in a quiet/private place with few distractions. That way we'll stay on track and finish within the hour. Our goal for today is to give you a chance to think about your college goals and how you can maximize your time in college. **What are your goals for college?***

Text for all participants: [Reflect as appropriate and ask] *And what are some personal goals you have for yourself?*

[If the participant has difficulty understanding what we mean by personal goals, ask What are your other priorities right now? OR How do you hope to develop and grow as a person over the next few years?

[Reflect] Reflections in this section should highlight how the participant came to set their college and personal goals for themselves, underlining their personal values. Use reflections to dig deeper inward (value) and to get the participant to project forward (consider the future) towards specific alternatives. Clinicians should consider tailoring this to the participant's year in school: goals for freshmen/sophomores may be different than for juniors.

Text: [Reflect as appropriate and ask] **What would that allow you to do?**

Sample text: You're really committed to your education, in particular a degree in business administration, and getting good grades. What would these things allow you to do in the future?

Text: [Reflect as appropriate and ask] **Why are these goals important to you?**

Sample reflection: It sounds like you've seen how competitive the business world is, so having good grades and going to lots of networking events is a way to help you do well in your career. **What are some things you could do right now and over the next few months to a year to achieve these goals?**

Sample reflection: It also sounds like family is very important to you, and one way to show that is by having enough money to be able to support a family. **What are some things you could do right now and over the next few months to a year to achieve these goals?**

[Reflect as appropriate] Reflections in this section should be used to acknowledge the participant's goals and reasons for their goals. They can be brief, and should begin to develop discrepancy in how they are related or inhibited by alcohol/drug use.

Sample reflection: It can be hard to find the time to go to all these networking events, especially after a long week of classes and work. **Considering the steps you'd like to take in order to reach your goals, how does your alcohol use fit in with your ability to accomplish your goals?**

Sample reflection: Getting a tutor to help with your Spanish class will help you to do well in that class and graduate with a good GPA, which you pointed out is helpful in getting a good job. **How does your alcohol and drug* use fit in with your ability to reach this goal you have for yourself?**

- ▲ Clinician should only include drug use here if participant indicated 4 or more instances of cannabis use in the past month, or ANY other illicit drug use in the past month.

Sample reflection: With the steps you could take now towards reaching your goals, you're really seeing how alcohol [and drug if applicable] use could get in the way of you reaching your goals.

[Transition to Time Allocation] *With your college/career/personal goals in mind, it can be helpful to take a look at how you spend your time. I pulled some info from the survey you completed about how you spend your time. People rarely think about how they spend their time, even though it is a valuable resource and says a lot about your priorities and goals. **What is your reaction to seeing your weekly time allocation chart?***

Sample reflection: With the steps you could take towards reaching your goals, you don't see your current alcohol [and drug if applicable] use getting in the way of these goals at all. That's great that you haven't let it affect your ability to reach your goals.

[Transition to Time Allocation] *With your college/career/personal goals in mind, it can be helpful to take a look at how you spend your time. I pulled some info from the survey you completed about how you spend your time. It looks like you typically spend X hours studying and X hours drinking. [include drug use if relevant] **What is your reaction to seeing your weekly time allocation chart?***

OR

Sample reflection: Right now, how and when you drink doesn't seem to be affecting your ability to reach your goals. And it also sounds like maybe you could be getting higher grades if it weren't for some of your time spent drinking. What types of grades do you need in order to be competitive in your field? / to be admitted to graduate school? *[or whatever is most relevant to the participant]*

[Reflect as appropriate]

Sample reflection for the participant who is able to articulate major/career requirements: It sounds like you've thought a lot about your college/career goals and have a pretty good sense for all the steps you need to take in order to achieve these goals. One thing people rarely think about is how they spend their time, even though it is a valuable resource and says a lot about your priorities and goals.

[Transition to Time Allocation] *With your college/career/personal goals in mind, it can be helpful to take a look at how you spend your time. I pulled some info from the survey you completed about how you spend your time. **What is your reaction to seeing your weekly time allocation chart?***

Sample reflection for the participant who is/seems unaware of what their goals require: Becoming a _____ is something you've decided you'd like to do, and it sounds like beyond that there is a lot you're unsure of, including just what steps to take to get there. That's okay! That is part of what today's session is for, to help you start to think about your goals and how to get there.

[Transition to Time Allocation] One thing people rarely think about is how they spend their time, even though it is a valuable resource and says a lot about your priorities and goals. So *with your college/career/personal goals in mind, let's take a look at how you spend your time. I pulled some info from the survey you completed about how you spend your time. It looks like you typically spend X hours studying and X hours drinking. [include drug use if relevant] **What is your reaction to seeing your weekly time allocation chart?***

Time Allocation

[Reflect] Reflections here should attempt to capture the participant's response as well as their feelings and beliefs about this feedback, if possible.

Sample reflection: For you 15 hours of drinking feels like not a lot of time, but seeing that you spend the same amount of time in class makes it seem like a lot more. *People rarely think about how they spend their time, even though it is a*

valuable resource and says a lot about your priorities and goals. **How does this map on to your goals we talked about earlier?**

Sample reflection: A lot of the time, watching TV and drinking overlap, so it's not 10 hours of TV that is separate from 10 hours of drinking. And it's the same thing for spending time with friends and extracurricular activities like intramural soccer. That sounds like a nice way to spend time with friends AND get some physical exercise in. **How does this map on to your goals we talked about earlier?**

[**Reflect**] Reflections here should acknowledge the extent to which the participant's time allocation does or does not map on to their goals.

Sample reflection: At least recently, how you spend your time has not matched your goals as much as you would like it to. Particularly, you mentioned wanting to raise your GPA but you've found it hard to find time to study for your classes. **What would your time allocation chart look like if it were perfectly aligned with your goals?**

Sample reflection: For the most part, you feel like your time allocation maps on pretty well to your goals, but it seems like you might be interested in spending a bit more time with your family. **What would be the benefits of changing how you spend your time?**

Sample reflection: It sounds like how you spend your time doesn't exactly map on to your big goals right now, but it's mapping on to your short term goal of making money so that you are able to purchase a new car. **What would your time allocation chart look like if it were perfectly aligned with your goals?**

Sample reflection: It sounds like how you spend your time doesn't exactly map on to your big goals right now, and you feel okay with it now because you have time and don't feel rushed to start working towards these goals just yet. **How will you know when it is time to start spending more time on your goals? OR What would be the benefits of starting to change how you spend your time now versus later?**

[**Reflect**] Reflections here should acknowledge the extent to which the participant sees benefit in changing their time allocation.

Sample reflection: You can definitely see the benefits of increasing your time volunteering or interning at a hospital because med schools look for that sort of thing on applications. **Is your time studying and attending class allowing you to get the grades you need to achieve your college goals?**

Sample reflection: You feel like you're doing the best you can with your time at this point, and just looking forward to the time that you don't have to work so much every week and can spend more time studying and hanging out with friends. **Is your time studying and attending class allowing you to get the grades you need to achieve your college goals?**

[Reflect as appropriate and ask how many hours they would like to increase by]

Text for all participants: *What activities would you like to devote more time to?*
Sample reflection: So if you were to go out drinking one night less, that would give you about 6 hours more to do things like catch up on the book you're reading or spend more time with your partner.

[If relevant] What would be some barriers to changing how you spend your time?

[Reflect as appropriate]

Sample reflection: It sounds like you have some really influential friends that you always have a good time going out with that it's hard to say no sometimes! How might you remind yourself of your goals so that it makes it a little easier to stay in on one of those occasions?

Episodic Future Thinking (EpFT) Task

Text: Just like it can be helpful to look back at how we spend our time, it can also be helpful to think about the future, especially a positive event like achieving or making progress toward an important **academic or personal** goal. What is a positive event related to your goals that you could imagine happening in the next 3 months?

[Once the participant has identified the positive event:]

Text: See if you can bring this event really clearly into your mind, and imagine it as if it were happening right now. Who will you be with and what will you be doing?

Tip: If the participant has difficulty identifying a positive event, the clinician might offer suggestions based on a goal the participant has already mentioned. Positive events don't have to be big. They can be as small as passing an exam on a particular topic in a class, or as big as graduating from college. The clinician should encourage that the positive event be related to an academic goal first, and if none come to mind, then may encourage a positive event around a personal goal. ***Clinicians should be careful that the positive event most likely will not include the use or consumption of alcohol or other drugs.** If the positive event generated clearly is a drinking-related event, the clinicians should pull from the participant's academic or personal health/growth related goals provided at the start of the session.

[Once the participant has identified what they'll be doing and with who:]

Text: You're celebrating getting all A's this semester with your family. How are you feeling? What are you thinking about?

***Text if the participant generates a drinking-related positive event:** *Although this may be a very rewarding positive experience you're looking forward to, for this exercise, what is a positive experience you're looking forward to that is relevant or related to your academic or career-related goals, or even a personal health/growth related goal?*

[Once the participant has provided further detail]

Sample reflection: You would feel a sense of accomplishment and pride. What would it be like for you to see this event actually happen in a few months from now? Or What would it mean for you to see this event actually happen in a few months from now?

[Reflect] Reflections here should attempt to capture the participant's experience, feelings, and beliefs if their positive future experience were to come true.

Sample reflection: Actually having this positive future experience happen would be really exciting for you! And it would show how hard you worked towards your goal.

[Transition to Summary and Goal Setting]

Sample reflection: Actually having this positive future experience happen would be a really big deal for you. It sounds like it would mean you would be doing well in college and on track to be the first in your family to graduate from college. That is a big deal!

[Transition to Summary and Goal Setting]

Summary and Goal Setting

The goal of this section is to summarize the participants goals and plan for achieving their goals if the participant has already explicitly stated at least one or two academic and personal goals. In this case, the clinician may skip to summarizing the highlights of the session around plans for reaching their goals. If the clinician is unclear about the participant's plan for next steps in achieving their goals, the clinician should begin making this explicit as these steps and goals will be referred back to in the booster sessions over the following 4 weeks.

If discussion on specific steps has not yet been discussed:

Text: We've talked about a lot of ways for you to be able to get the most out of your college experience and help put you in a good position to achieve your college/career goals. What are some specific things you can do this semester or this year to make progress towards the goals we discussed earlier?
What would be the benefits of achieving these goals?

[Reflect as appropriate]

Sample reflection: So like you were saying earlier, even just spending a couple more hours each week could really improve your grades and overall GPA, which would look really good on your transcript when you go to apply for graduate school. How will you know your plan is working?

[Reflect] Reflections in this section should acknowledge the participant’s plan to self-monitor and self-evaluate. The clinician may provide suggestions if the participant is open to it.

Sample reflection: You’ll know pretty clearly if your plan is working if you see your grades improving and also if your parents aren’t getting on you about your grades as much.

How will you know if you are getting off track?

Sample reflection: If you start to see your grades slipping again, or if your parents start getting on you about your grades more frequently, you’ll know it’s time to re-evaluate what’s working and what’s not.

What steps would you take to get back on track?

Sample reflection: It sounds like it might kind of depend on what’s going wrong, but at the very least you think it will be helpful to do something like what we did today: checking in on how much time you are spending in different areas. It seems like you’ve got a pretty good plan for yourself!

OPTIONAL: Summarizing

If there is not enough time left in the session, it is okay to skip the summarizing piece and go straight to the Wrap Up below.

Text: *To wrap up, I want to thank you for chatting with me again today! Just to summarize,...* [Goals, Plan, Self-efficacy, Drinking/drug use and their goals].

Sample summary: Your goal is to become a veterinarian, and a some things you can do in the next few months is increase your time studying by 2-3 hours each week and volunteer at local animal shelters and hospitals. You found a couple of other students in your biology major that also want to go to vet school and can be a support system to hold you accountable. And you really don’t see how going out most nights drinking fits in with all your goals. You also want to make sure you spend more time with your family, which includes your senior dog Buddy, and this will be easy for you because your family doesn’t live too far away.

How does all of that sound?

Wrap Up

Text for all participants: *That’s all I have for us today. I want to thank you again for taking part in this project, and I appreciate your openness in discussing all this information. It’s easy to see how motivated you are to pursure your goals! Over the next 4 weeks, we’ll chat briefly once a week (~20 minutes) to check-in and see how things are going related to your goals. I’ll also ask that you complete a short survey each week as well. As a reminder, you’ll receive \$10 for completing at least 3 of those 4 appointments. Do [e.g. Wednesdays at 1PM] typically work for you over the next 4 weeks?*

Set regular booster session times, and send post-baseline survey:

Text for all participants: Okay [Wednesdays at 1PM] it is. I'll also send out that brief 5-minute survey some time before that short session, so please be sure to complete it before we text each week.

One last thing before we sign off today, please take a moment to complete this very brief survey (3-questions):

https://memphis.co1.qualtrics.com/jfe/form/SV_0CIBbzeICVxUyvb

Your PIN is 70__. Once you've completed that, you'll have earned \$25 or 1 SONA credit. Would you prefer the SONA credit, an Amazon gift card, or cash?

MESSAGE-BASED SFAS BOOSTERS

Either the day before, or morning of, each booster session send the link to the brief booster survey which will ask about past week time allocation. Prior to the booster contact, review the participant's initial mSFAS feedback, as well as the past week reported time allocation. Update the SFAS feedback with any new activities that are relevant based on the interests the participants identified in the SFAS session. Provide the updated information to the student during the booster session.

Session time management will be important. The boosters should each last ~20 minutes which does not leave a lot of time to cover many topics. Try to focus on addressing progress towards the specific goals set in the SFAS, and gaining a renewed commitment towards those goals (or any new goals). Consistent with the initial SFAS session, the primary goal of the booster is to increase the salience of delayed substance-free rewards (why did the student identify those goals originally, what do they stand to gain from pursuing them), to recognize the role alcohol might play in goal progress, and to increase time allocation towards constructive and/or enjoyable alternatives to drinking.

These topics do not need to be covered in any particular order within the booster session, however, the clinician should make every effort to cover them within the time allotted. Although there is not particular order in which they should be covered, we recommend opening with academic or personal goal progress and moving into drinking goal progress, finishing with a discussion on any new goals the participant has and planning substance-free leisure/recreational activities for the coming week. Booster 4 is unique in that the clinician will present an updated time allocation chart to discuss with the participant. We recommend discussing the time allocation chart alongside the discussion on goals progress.

Booster 1 : Leisure Activities

Hi! This is _____ from Project BLUEM. How are things going? Are you still available to chat for about 20 minutes today?

Substance-Free Recreational Activities

Text: *Okay, great! Today is a bit shorter than last week, but we'll kind of pick up where we left off at. Many people are happiest when they have a good balance of work or school-related and enjoyable leisure activities. In the survey, we asked you about some activities you enjoy that don't involve drinking, and some activities you'd like to do more of. What thoughts do you have about this list of activities?*

[Provide PDF/image of list of Substance-free Leisure/Recreational Activities.]

OR What activities/hobbies would you like to do more often? Why would you enjoy doing X [hobby/activity]? What are some things you like about X [hobby/activity]?

[Reflect] Reflections here should attempt to capture the participant's values and interests outside of school or work, and the meaning to the participant, if possible.

Sample reflection: It seems like you really enjoyed running in high school. I found lots of running groups around Memphis that I thought you might be interested in. What do you think?

Sample reflection: Sounds like that was something you really enjoyed doing! How might you get back into that again?

When might you be able to do X [hobby/activity]?

What are some barriers/problems you have encountered? What are some things you can see getting in the way?

[Reflect as appropriate]

Sample reflection if a barrier(s) is identified: Finding the time can be really tricky! College has so many things to offer that some people want to try everything and end up with not enough hours in the week. How do you think you might get around this barrier in order to get back in to _____?

[Ask about drinking goal from session 1 and how this may or may not be impacting academic goal. This could include goals related to drinks per week, avoiding problems, or using protective behavior strategies for safer drinking. Clinician can remind student about the drinking goal, check in on their progress, and ask if there is a new or updated drinking goal.]

Text: *In our first session, you set a goal for yourself to X. How has your progress been in reaching that goal?*

[If participant was not successful] Again remain positive and encouraging. Ask about if they'd like to update their drinking goal or set a new one. The clinician might consider problem-solving any barriers if the participant is interested.

Text: Progress on your goal didn't go as well as you would've liked. What do you think got in the way?

Would it be helpful update that goal so that it's more manageable? Or set a new goal?

[Wrap up the session.]

Text for all participants: *That's all I have for us today! Thanks for chatting with me and telling me more about your goals. We'll chat again next week for about 20 minutes.*

And if you haven't already, please be sure to complete the brief survey some time today that we sent you earlier this week. It takes just a minute or 2.

Here is the link again:

https://memphis.co1.qualtrics.com/jfe/form/SV_exMDFJStQMipxdP

Your PIN is the same as before. If you have already completed that survey, feel free to ignore!

Booster 2: SFAS Goal Progress

Hi! This is _____ from Project BLUEM. How are things going?

Review specific personal goal progress: [Repeat for each personal goal discussed in SFAS.]

Text for all participants: *One of the things we talked about a couple weeks ago was your desire to _____. How is that going?*

[If student was generally successful with goal] Reflections here should attempt to capture the participant's beliefs, attitudes, and/or feelings about their success and what this short-term success might mean for their longer-term goals.

*That's awesome! I'm glad to hear you're making good progress towards your goals! **How did you manage to accomplish that?**
What benefits have there been to making this change?*

[If participant was not successful] Remain positive and encouraging. A few options the clinician might consider in order to help boost the participant's probability for success in the coming week:

- Re-establish motivation: *What were some of the reasons you had for wanting to _____ [e.g., improve your grades, get involved with X internship]?*
- Problem solve around barriers: *What are some things that have gotten in your way?*
- [ONLY IF RELEVANT] *How has your alcohol use fit in with that goal?*
 - o [if student noted that alcohol impacted their goal pursuit in the original session, remind them of that and ask whether that is still the case]. *You mentioned that drinking sometimes got in the way of **exercising and playing sports with friends**, and that you planned to drink less in order to do those things more. What is your plan related to drinking the rest of this semester?*

[Ask about drinking goal from session 1 and how this may or may not be impacting academic goal. This could include goals related to drinks per week, avoiding problems, or using protective behavior strategies for safer drinking. Clinician can remind student about the drinking goal, check in on their progress, and ask if there is a new or updated drinking goal.]

Text: **In our first session, you set a goal for yourself to X. How has your progress been in reaching that goal?**

[If participant was not successful] Again remain positive and encouraging. Ask about if they'd like to update their drinking goal or set a new one. The clinician might consider problem-solving any barriers if the participant is interested.

Text: *Progress on your goal didn't go as well as you would've liked. What do you think got in the way?*

Would it be helpful update that goal so that it's more manageable? Or set a new goal?

[If participant did not set a drinking goal from session 1]

Sample Text: In our first session, you were hesitant to change how you drink, feeling that the positives outweighed the negatives at this point. Given that you mentioned still experiencing some negative aspects of drinking, I'm wondering if you've given any more thought to possibly setting a goal around drinking?

Text for participants who report substantial goal progress in other areas: It seems like you're able to accomplish anything you set your mind to. In our first session, you were hesitant to change your how you drink, feeling that the positives outweighed the negatives at this point. I'm wondering if you've given any more thought to possibly setting a goal around drinking?

[Reflect]

Sample reflection if unwilling to set a goal: Changing your drinking really isn't in the cards for your right now. It sounds like you're still able to accomplish everything you set your mind to and keep the negative aspects of drinking you mentioned to a minimum. How would you know if those negative aspects start to interfere with your goal progress?

Sample reflection if willing to set a goal: It sounds like it's been on your mind a bit over the past couple of weeks. What ideas do you have for setting a goal to reduce your drinking?

[Spend just a few texts encouraging any change talk by having the participant describe specifically how they might reach this goal and why it is important for them.]

[Wrap up the session.]

Text for all participants: *That's all I have for us today! Thanks for chatting with me and telling me more about your goals. We'll chat again next week for about 20 minutes.*

And if you haven't already, please be sure to complete the brief survey some time today that we sent you earlier this week. It takes just a minute or 2.

Here is the link again:

https://memphis.coi.qualtrics.com/jfe/form/SV_0VggMgg172SWYKh

Your PIN is the same as before. If you have already completed that survey, feel free to ignore!

Booster 3: EpFT Review

Text for all participants: *Hi! This is _____ from Project BLUEM. How are things going?*

Review EpFT Exercise from SFAS:

Text for all participants: *So over the past few weeks, we've spent much of our sessions talking about how you spend your time and ways in which you'd like to change how you spend your time in the service of reaching your goals. Today, I'd like for us to spend a little bit of time thinking about the future and what it would be like to accomplish your goals.*

[Ask about any new behavior or goals related to the EpFT task, or reinforce the saliency of the EpFT task].

Text for all participants: *You described really looking forward to having X experience within the next semester, and that you would feel X and be thinking X. How has imagining that positive future experience been for you this past week?*

[Reflect as appropriate and ask]

Text for all participants: *Take a moment now to imagine yourself experiencing that positive event. And see how vividly you can imagine it. You mentioned feeling _____ and _____ and thinking _____. What do you notice now as you imagine yourself _____? Do you notice any new feelings or thoughts? Do you notice the experience feeling stronger or more vivid?*

[Reflect as appropriate and ask]

Text for all participants: *How has this future thinking exercise affected you or your progress towards your goals?*

[Reflect as appropriate and ask about any additional goals or additional clubs/activities they would like to join]

Text for all participants: *Since the last time we spoke, have you added any new goals for yourself, or found any additional clubs or activities that you would like to join?*

If these have changed, make sure you provide participant with updated information, links, contacts etc. Clinicians should provide reassurance that it is okay if the participant has not, we just want to provide them with resources if there is anything new. Clinicians should also be sure to send participants specific information related to their interests, major, career goals, etc. and update as needed throughout the booster sessions.

[Make note of new goals or interests in clubs/activities, and provide any new information obtained since the previous booster. Then wrap up the booster.]

Text for all participants: *That's all I have for us today! Thanks for chatting with me and telling me more about your goals. We'll chat again next week for about 20 minutes.*

And if you haven't already, please be sure to complete the brief survey some time today that we sent you earlier this week. It takes just a minute or 2.

Here is the link again:

https://memphis.col.qualtrics.com/jfe/form/SV_ekCPQyXJtmrhWrr

Your PIN is the same as before. If you have already completed that survey, feel free to ignore!

Booster 4: Time Allocation Update

Booster 4 will be different in that the clinician will actually provide another PDF of the time allocation feedback from the past week. Without presenting the participant's baseline time allocation, the clinician will encourage the participant to talk about in what ways they've seen a change in how they spend their time, and how any change has had an effect on their progress towards goals.

Text for all participants: *Hi! How are things going?*

Text for all participants: *Since this is our last session, we'll wrap up by thinking about some of the things we've talked about over the past few weeks. In one of our first sessions, we talked a bit about how you were spending your time. In this week's survey, we asked you again. How do you feel about how you are spending your time now?*

[send updated time allocation chart]

[Reflect] The clinician should attempt to capture any feelings or values stated or implied and facilitate change talk in how they would like to continue to change the way they spend their time to be in line with their goals.

Sample reflection: You're happy with how you managed to decrease your time spent drinking and scrolling through social media. And now you'd like to see yourself increase your time spent involved in professional activities, like getting an internship next semester. What would be your next step in achieving that goal to get an internship next semester?

Sample reflection: What have been the benefits of changing how you spend your time over the past few weeks?

Sample reflection for participants who have not changed how they spend their time: You had mentioned in one of our first sessions a desire to increase/reduce your time spent _____. What would be the benefits of changing how you spend your time?

[Reflect]

Sample reflection for participants describing benefits of changing their time allocation: You your mind set on a task and [changing how you spent your time] really had an impact on your ability to complete that task. **How can you see yourself using this weekly time allocation exercise to help you achieve your goals in the future?**

Sample reflection for participants who have not changed how they spend their time: It sounds like a lot of your schedule is inflexible, making it really hard to drastically change how you spend your time. One hour may not seem like a lot, but, if it's possible, what area would you like to devote 1 hour more to a week, and what area would you like to reduce by one hour a week?

[Reflect as appropriate and help problem solve if needed. Then summarize the intervention take-aways with the participant and wrap up.

Sample summary: **We've talked a lot about how to make the most of your college experience and provided you with some ways to set yourself up to achieve any goals you set for yourself. You've already made quite a bit of progress on your goals in just a few short weeks. You're considering a career in psychiatry and want to increase your time spent studying/doing homework. For you, that means preparing to do well on the MCAT and reducing your alcohol use because you also decided that alcohol use, especially overconsumption, doesn't really fit with these longer-term goals. It's easy to see how important it is to you to do well in college and maintain a balanced lifestyle as an undergraduate and beyond!**

Is there anything I've missed?

[Correct and/or wrap up with...

Text for all participants: *That's all I have for us! Thank you so much for participating in this project. Please take a moment now to complete this survey.*

Here is the link:

https://memphis.co1.qualtrics.com/jfe/form/SV_6EI94LCRgnFwTlh

It should only take 15-20 minutes. We'll be in touch with you in about 3-months to complete one final survey for which you'll receive \$20. As a reminder, you'll be paid \$10 for the survey you complete today, plus another \$10 for completing all of the booster.

Appendix B

A Mobile-Based Behavioral Economic Intervention to
Reduce Young Adult Alcohol Misuse

Interventionist's Manual for the
MOBILE-BASED ALCOHOL + NUTRITION EDUCATION (A+NE)

Kathryn S. Gex, M.S., Lidia Meshesha, M.A., and James Murphy, Ph.D.

USER'S NOTE

This manual was designed for the user to quickly copy and paste exact text message content. However, there are points at which a participant may ask a question or offer content that is beyond the “Correct”/“Incorrect” logic. At those points, it is important in the context of Project BLUEM to respond to these questions or comments in an instructional or informational manner. This is in contrast to Motivational Interviewing style used in the text-based BMI+SFAS intervention condition. It is perfectly okay, and within the scope of the educational intervention, to provide a list of outside resources or additional information on alcohol (e.g., metabolism, overdose) and nutrition facts. It is also okay to answer questions if you know the answer, but keeping your response in an instructional tone. If you do not know the answer to their question at that time, it is okay to say you don't know and to offer to find out that information for them.

It is NOT okay to utilize MI-style when responding to questions about alcohol use or nutrition, which would include eliciting some information from the participant, providing further information, and then eliciting reactions/responses to the information provided. There should NOT be any discussion on their changing their specific alcohol or nutrition behaviors, or eliciting pros/cons of changing or maintaining these behaviors. If a participant indicates or implies a desire or willingness to reduce their alcohol use, the clinician SHOULD respond in an instructional/informational manner. For example:

Participant: [after learning standard drink sizes] Wow. That means I drank like 9 or 10 drinks this past Friday night. I thought I'd only had 5.

OKAY: *Clinician:* If you're concerned with how much you're drinking, here is a list of resources we provide to everyone in our project and that you might find useful. Let me know if you have any questions about those resources. I'm happy to help you find something that will best fit your needs.

NOT OKAY: *Clinician:* You're surprised by how much you've actually been drinking. Tell me more about that.

Participant: [after learning about alcohol poisoning/overdose] My friends said I passed out once after drinking a lot and they couldn't wake me up. I ended up being okay, but it's scary to think I probably had overdosed and could have died.

OKAY: *Clinician:* That is a scary thing to think about. Here is a list of resources we provide to everyone in the project, so if you're concerned with how much you're drinking or the consequences of drinking a lot, you might find some of these resources useful. Let me know if you have any questions, I'm happy to help you find something that will best fit your needs.

NOT OKAY: *Clinician:* That is a scary thing to think about. It sounds like you're concerned about this happening again. Tell me more about what that night of drinking was like for you.

ALCOHOL EDUCATION

Text: *Hi! Thanks again for taking part in this project! How are you today? Are you still free right now to participate in this text exchange for the next 45-50 minutes?*

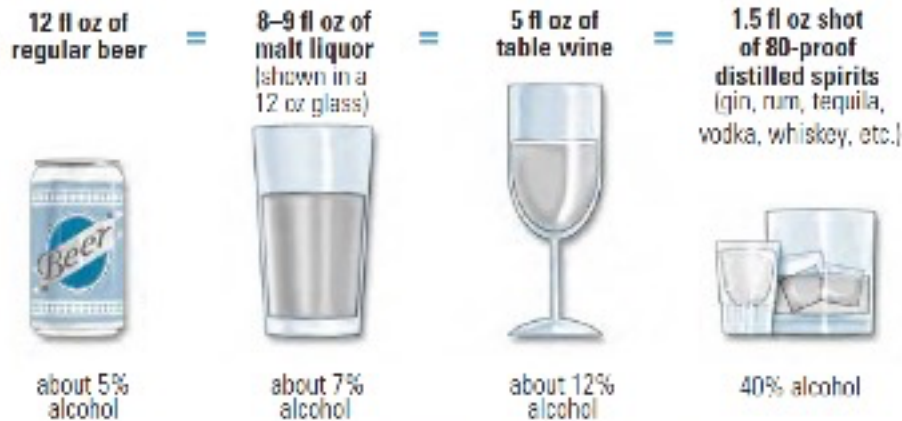
[Wait for participant response, then:]

Text: *To ensure your privacy and that we stay on track and finish within the hour, please find a quiet and/or private place with few distractions. Do you have any questions before we get started?*

[Wait for response from participant, then provide the following informational texts]

Handout 1: What is a Standard Drink?

A standard drink is considered to be 12 fl oz of beer, 8-9 fl oz of malt liquor, 5 fl oz of table wine, or 1.5 fl oz of 80-proof distilled spirits (about a shot of gin, rum, tequila, vodka, whiskey).



The percent of "pure" alcohol, expressed here as alcohol by volume (alc/vol), varies by beverage. Although the "standard" drink amounts are helpful for following health guidelines, they may not reflect customary serving sizes. In addition, while the alcohol concentrations listed are "typical," there is considerable variability in alcohol content within each type of beverage (e.g., beer, wine, distilled spirits).

Want to know how much alcohol is in your cocktail or mixed drink?
[Click here*](#) for the Cocktail Calculator.

*Link to <https://www.rethinkingdrinking.niaaa.nih.gov/Tools/Calculators/Cocktail-Calculator.aspx>

Information from: <https://pubs.niaaa.nih.gov/publications/Hangovers/beyondHangovers.htm>

Informational Texts to [Handout 1](#)

Tip: Clinicians should try to provide this information in a conversational manner, encouraging the participant to engage with the material as much as possible. Providing educational texts can be quite dry, so the clinician should attempt to present the information in an interesting way, being sure to check in with the participant throughout.

Text: Great! Today will focus primarily on providing you with some information and education about alcohol. I want this to be more of a conversation/discussion, so please feel free to ask questions and provide your own experiences as we go through the information today.

So that we're on the same page for all the information that we talk about today, I'd like us to go over what a standard drink is. Knowing how much alcohol is in a "standard" drink can help you determine how much alcohol you are actually drinking. How many ounces do you think are in a standard size drink of regular beer?

[Wait for participant response, then:]

If Correct → *Text: That's right! A standard drink is considered to be 12 fl oz of beer, 8-9 fl oz of malt liquor, 5 fl oz of table wine, or 1.5 fl oz of 80-proof distilled spirits (about a shot of gin, rum, tequila, vodka, whiskey). Here's a handout for more information on standard drinks.*

You might notice there are percentages below each standard size drink. What do you think these percentages mean?

SEND FILENAME: Standard drinks.jpg

If Incorrect → *Text: Not quite. A standard drink is considered to be 12 fl oz of beer, 8-9 fl oz of malt liquor, 5 fl oz of table wine, or 1.5 fl oz of 80-proof distilled spirits (about a shot of gin, rum, tequila, vodka, whiskey). Here's a handout for more information on standard drinks.*

You might notice there are percentages below each standard size drink. What do you think these percentages mean?

SEND FILENAME: Standard drinks.jpg

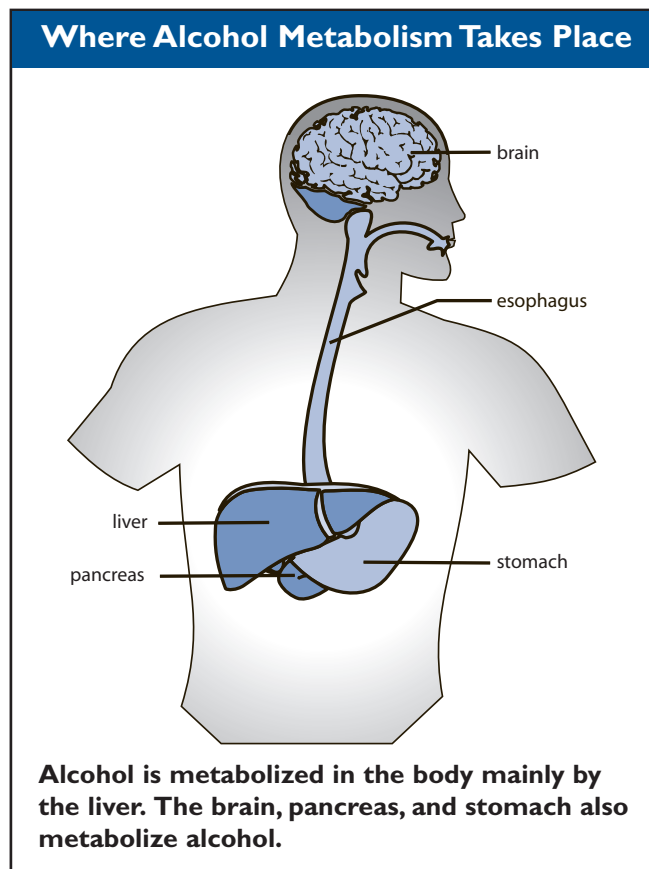
[Wait for participant response, then:]

If Correct → *Text: You got it! It's the percentage of alcohol in each standard drink. However, not all standard drinks are actually the same. For example, 1.5 oz of 80-proof liquor is not quite the same as 1.5 oz of 100 proof liquor. "Proof" is just another way to talk about alcohol percentage or alcohol by volume (ABV). So, if a 12 oz craft beer from a local brewery says it is 6.5% alcohol or ABV, is this more*

or less alcohol than a standard size regular beer? (Hint: You'll find the answer in the Standard drinks picture).

If Incorrect → Text: Actually, it's the percentage of alcohol in each standard drink. However, not all standard drinks are actually the same. For example, 1.5 oz of 80-proof liquor is not the same as 1.5 oz of 100-proof liquor. "Proof" is just another way to talk about alcohol percentage or alcohol by volume (ABV). So, if a 12 oz craft beer from a local brewery says it is 6.5% alcohol or ABV, is this more or less alcohol than a standard size regular beer? (Hint: You'll find the answer in Standard drinks picture).

Handout 2: Where Alcohol Metabolism Takes Place



Information from: National Institute on Alcohol Abuse and Alcoholism (NIAAA). *Alcohol Alert*, July 2007. Available at <https://pubs.niaaa.nih.gov/publications/aa72/aa72.htm>

Informational Texts to Handout 2

[Wait for participant response, then:]
[Answer: More.]

If Correct → Text: *Correct! A 12 oz beer with 6.5% ABV is **more** alcohol than a standard size regular beer which contains about 5% ABV. You're actually consuming more alcohol. Have you ever noticed that the same amount or type of alcohol can affect people differently?*

If Incorrect → Text: *Actually, a 12 oz beer with 6.5% ABV is **more** alcohol than a standard size regular beer which contains about 5% ABV. You're actually consuming more alcohol. Have you ever noticed that the same amount or type of alcohol can affect people differently?*

[Wait for participant response, then:]

Text: *Part of the reason for that has to do with how the body metabolizes alcohol. There are 5 organs in the body that metabolize alcohol. Can you think of what 1 of them might be?*

[Wait for participant response, then:]

If Correct → Text: *Exactly right! The liver is the organ most frequently cited as responsible for breaking down the alcohol. The esophagus, stomach, and pancreas are also responsible for the metabolism of alcohol, but you might be surprised to learn that the brain metabolizes alcohol as well.*

All of these organs are connected by one important system: the circulatory system, which is responsible for moving blood through your body. It also circulates alcohol in your body once it has started to be metabolized. Have you ever heard of BAC before?

SEND FILENAME: [Alcohol Metabolism.jpg](#)

If Incorrect → Text: *The liver is the organ most frequently cited as responsible for breaking down the alcohol. The esophagus, stomach, and pancreas are also responsible for the metabolism of alcohol, but you might be surprised to learn that the brain metabolizes alcohol as well.*

All of these organs are connected by one important system: the circulatory system, which is responsible for moving blood through your body. It also circulates alcohol in your body once it has started to be metabolized. Have you ever heard of BAC before?

SEND FILENAME: [Alcohol Metabolism.jpg](#)

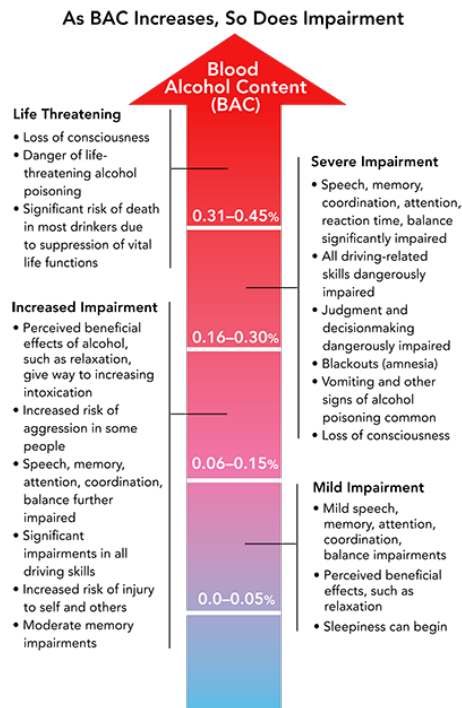
[Wait for participant response, then:]

Informational Texts for [Handout 3](#)

Text: *BAC is blood alcohol content or blood alcohol concentration. It is the percentage of alcohol in your blood, and it is often used in the legal system to identify someone's level of intoxication. Remember, people metabolize alcohol differently, so it's not really a measure of how much someone has had to drink, but how much alcohol is in their blood. Do you know the legal limit to drive in all 50 states?*

SEND FILENAME: Blood Alcohol Content.jpg

Handout 3: Blood Alcohol Content (or BAC)



Please note that the BAC ranges depicted in this graph are not absolute and vary by individual.

BAC may be affected by: weight, sex/gender, whether or not there is food in your stomach, how much alcohol is consumed, how quickly alcohol is consumed.

[Wait for participant response, then:]

If Correct → Text: *Yep! The legal limit for driving a vehicle is .08% in all 50 states. This means that your blood is .08% alcohol. However, if you're under 21, you could receive a DUI if there is any alcohol in your system.*

.08% might not seem like a lot. But even at this percentage, you can see on the chart that some impairment can occur. And at much higher percentages, something called alcohol poisoning can occur. What do you know about alcohol poisoning?

If Incorrect → Text: Not quite right. The legal limit for driving a vehicle is .08% in all 50 states. This means that your blood is .08% alcohol. However, if you're under 21, you could receive a DUI if there is any alcohol in your system.

.08% might not seem like a lot. But even at this percentage, you can see on the chart that some impairment can occur. And at much higher percentages, something called alcohol poisoning can occur. What do you know about alcohol poisoning?

Handout 4: How to Identify Alcohol Poisoning

The image contains three blue informational cards with white text. The first card on the left is titled 'Identifying Alcohol Poisoning' and lists 'Critical Signs and Symptoms of Alcohol Poisoning' with six bullet points: Mental confusion, stupor, coma, or inability to wake up; Vomiting; Seizures; Slow breathing (fewer than 8 breaths per minute); Irregular breathing (10 seconds or more between breaths); and Hypothermia (low body temperature), bluish skin color, paleness. The middle card is titled 'What Can Happen to Someone With Alcohol Poisoning That Goes Untreated?' and lists five bullet points: Choking on his or her own vomit; Breathing that slows, becomes irregular, or stops; Heart that beats irregularly or stops; Hypothermia (low body temperature); and Hypoglycemia (too little blood sugar), which leads to seizures. The third card on the right is titled 'What Should I Do If I Suspect Someone Has Alcohol Poisoning?' and lists four bullet points: Know the danger signals; Do not wait for someone to have all the symptoms; Be aware that a person who has passed out may die; and If you suspect an alcohol overdose, call 911 for help.

*Link to: <https://pubs.niaaa.nih.gov/publications/AlcoholOverdoseFactsheet/Overdosefact.htm>

Informational Texts to Handout 4

If [mostly] Correct → Text: Sounds like you've heard of this before. Alcohol poisoning, or alcohol overdose, occurs when BAC is so high that areas of the brain that control basic life-support functions begins to shut down. What are some signs or symptoms of alcohol poisoning?

SEND FILENAME: **Alcohol Poisoning Signs.jpg**

If Incorrect → Text: Actually, alcohol poisoning, or alcohol overdose, occurs when BAC is so high that areas of the brain that control basic life-support functions begins to shut down. Knowing the critical signs and symptoms could save a life. What are some signs or symptoms of alcohol poisoning?

SEND FILENAME: Alcohol Poisoning Signs.jpg

[Wait for participant response, then:]

If [mostly] Correct → Text: *Spot on! Visible signs of alcohol poisoning can include vomiting, seizures, slow or irregular breathing, and a bluish or pale skin color indicating hypothermia (low body temperature). The person might also seem confused, in a stupor, unable to wake up, or even in a coma. What do you think could happen to someone experiencing these symptoms if they were to go untreated?*

SEND FILENAME: Alcohol Poisoning Untreated.jpg

If Incorrect → Text: *This is another tricky one! Visible signs of alcohol poisoning can include vomiting, seizures, slow or irregular breathing, and a bluish or pale skin color indicating hypothermia (low body temperature). The person might also seem confused, in a stupor, unable to wake up, or even in a coma. What do you think could happen to someone experiencing these symptoms if they were to go untreated?*

SEND FILENAME: Alcohol Poisoning Untreated.jpg

[Wait for participant response, then:]

If [mostly] Correct → Text: *That's right. The heart and breathing can slow or stop altogether, hypothermia can set in, and vomiting may cause the person to choke or become severely dehydrated which can result in seizures, permanent brain damage, or death. Pretty scary stuff. What do you think you should do if you suspect someone has alcohol poisoning?*

SEND FILENAME: Suspect Alcohol Poisoning.jpg

If Incorrect → Text: *Not quite. Actually, the heart and breathing can slow or stop altogether, hypothermia can set in, and vomiting may cause the person to choke or become severely dehydrated which can result in seizures, brain damage, or death. What do you think you should do if you suspect someone has alcohol poisoning?*

SEND FILENAME: Suspect Alcohol Poisoning.jpg

[Wait for participant response, then:]

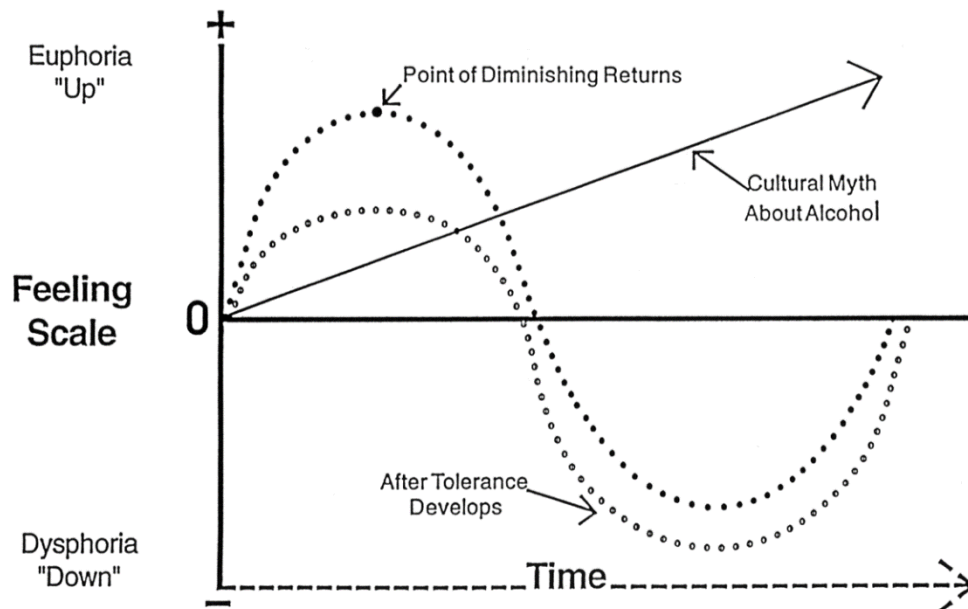
If Correct → Text: *That's right! As with any medical emergency, the best thing to do if you suspect someone has alcohol poisoning is to call 911 for help.*

Here is some trivia for you! Fact or Myth: Alcohol targets the gamma-aminobutyric acid type A receptor (or GABAA) which depresses the central nervous system creating effects similar to that of sedatives, hypnotics, and anesthetic agents.

If Incorrect → Text: *Not exactly. As with any medical emergency, the best thing to do if you suspect someone has alcohol poisoning is to call 911 for help.*

Here is some trivia for you! Fact or Myth: Alcohol targets the gamma-aminobutyric acid type A receptor (or GABAA) which depresses the central nervous system creating effects similar to that of sedatives, hypnotics, and anesthetic agents.

Handout 5: The Biphasic Effect



Informational Texts to [Handout 5](#)

[Wait for participant response, then:]

If Correct → Text: *Correct! This is a fact. Alcohol is a depressant or sedative, meaning that it ultimately leaves the drinker feeling tired, slowed down, and drowsy or sleepy. GABAA is an inhibitory neurotransmitter, meaning that when it is*

activated, it actually slows or stops a particular function. Basically, when GABAA receptors are maxed out by alcohol exposure, functions begin to slow or stop. This process can be seen very simply in something called the Biphasic Effect.

You might notice the word “tolerance” in the chart. What do you think tolerance means here?

SEND FILENAME: Biphasic Effect.jpg

If Incorrect → *Text: Actually this is a fact. Alcohol is a depressant or sedative, meaning that it ultimately leaves the drinker feeling tired, slowed down, and drowsy or sleepy. GABAA is an inhibitory neurotransmitter, meaning that when it is activated, it actually slows or stops a particular function. Basically, when GABAA receptors are maxed out by alcohol exposure, certain functions begin to slow or stop. This process can be seen very simply in something called the Biphasic Effect.*

You might notice the word “tolerance” in the chart. What do you think tolerance means here?

SEND FILENAME: Biphasic Effect.jpg

[Wait for participant response, then:]

If [mostly] Correct → *Text: It sounds like you’ve heard of alcohol tolerance before! Tolerance is, after continued drinking, consumption of the same amount of alcohol over time produces less effect than before OR increasing the amount of alcohol is necessary to feel the same effect received when a person first started drinking. Basically, humans (and animals) develop tolerance when brain functions adapt to compensate for the disruption caused by alcohol.*

True or False: Tolerance reduces alcohol induced euphoria (feeling “up”) and enhances alcohol-induced dysphoria (feeling “down”). (Hint: You’ll find the correct answer in the picture on the Biphasic Effect).

If Incorrect → *Text: This one is tricky! Tolerance is, after continued drinking, consumption of the same amount of alcohol over time produces less effect than before OR increasing the amount of alcohol is necessary to feel the same effect received when a person first started drinking. Basically, humans (and animals) develop tolerance when brain functions adapt to compensate for the disruption caused by alcohol.*

True or False: Tolerance reduces alcohol induced euphoria (feeling “up”) and enhances alcohol-induced dysphoria (feeling “down”). (Hint: You’ll find the correct answer in the picture on the Biphasic Effect).

[Wait for participant response, then:]
[Answer is True.]

If Correct → Text: *You got it! People who have developed a tolerance to alcohol feel less euphoric with the same amount of alcohol as before, and tend to feel more dysphoric or down as they continue to drink, compared to people who have not developed this tolerance.*

We've covered a lot of information today. What questions do you have?

If Incorrect → Text: *Actually, people who have developed a tolerance to alcohol feel less euphoric with the same amount of alcohol as before, and tend to feel more dysphoric or down as they continue to drink, compared to people who have not developed this tolerance.*

We've covered a lot of information today. What questions do you have?

If Questions → Answer and then transition to Summary

If NO Questions → Transition to Summary

Informational Texts to [Handout 6](#)

Summary Text: *So, let's put all of this information together! **True or False:** A standard drink is 12 oz of regular beer, 5 oz of table wine, and 1.5 oz of liquor in a shot or mixed drink. And ABV or "proof" refer to the percentage of alcohol in any given alcohol drink.*

[Wait for participant response, then:]
[Answer is TRUE.]

If Correct → Text: *Excellent! Next up: **True or False:** The body metabolizes alcohol in 5 different organs: the esophagus, stomach, liver, pancreas, and brain.*

If Incorrect → Text: *Not quite. When you get a chance, check out the Standard Drinks picture for the correct answer.*

*Next up: **True or False:** The body metabolizes alcohol in 5 different organs: the esophagus, stomach, liver, pancreas, and brain.*

[Wait for participant response, then:]
[Answer is TRUE.]

If Correct → Text: *Correct! Finally, **True or False:** When your BAC climbs too high, areas of the brain that control basic life-support functions will start to shut down, resulting in alcohol poisoning or overdose. Alcohol is a depressant, so the more you drink, the more the initial feeling of euphoria will wear off.*

If Incorrect → Text: *Unfortunately that is not correct. Check out the Alcohol Metabolism picture for the correct answer.*

*Finally, **True or False:** When your BAC climbs too high, areas of the brain that control basic life-support functions will start to shut down, resulting in alcohol poisoning or overdose. Alcohol is a depressant, so the more you drink, the more the initial feeling of euphoria will wear off.*

[Wait for participant response, then:]
[Answer is TRUE.]

If Correct → Text: *Awesome! That's correct! That is all I have for us today, so thank you for chatting with me and answering some questions. Before we end today, do you have any questions?*

SEND FILENAME: **Alcohol Edu Summary.jpg**

If Incorrect → Text: *Not exactly. Be sure to checkout the pictures on Blood Alcohol Content, the Biphasic Effect, and Alcohol Poisoning for help with the answer.*

That is all I have for us today, so thank you for chatting with me and answering some questions. Before we end today, do you have any questions?

SEND FILENAME: **Alcohol Edu Summary.jpg**

Answer any questions the participant has and schedule the [Nutrition Education](#) session for the next day, or soonest available day.

Handout 6: Summary

- What is a Standard Drink?
 - Standard drink sizes = 12oz regular beer, 5oz regular wine, or 1.5 oz liquor in a shot or mixed drink
 - ABV = Alcohol By Volume or the percent alcohol in a drink
 - Proof = ABV x 2
- Where Alcohol Metabolism Takes Place:
 - Esophagus, Stomach, Liver, Pancreas, and Brain
- Blood Alcohol Content (BAC)
 - BAC of .08% or lower is the legal limit in most states, including Tennessee

- The higher the BAC, the more alcohol acts as a depressant rather than a stimulant (aka the Biphasic Effect)
- Alcohol Poisoning or overdose results when BAC gets too high
 - Alcohol poisoning can lead to serious physical health problems, even death, and requires professional medical help
 - Call 911 if you suspect someone is experiencing alcohol poisoning
- Tolerance develops when brain functions adapt to compensate for the disruption of alcohol. This may result in:
 - Consumption of a constant amount of alcohol producing less effect AND/OR
 - Increasing amounts of alcohol to produce the same effect

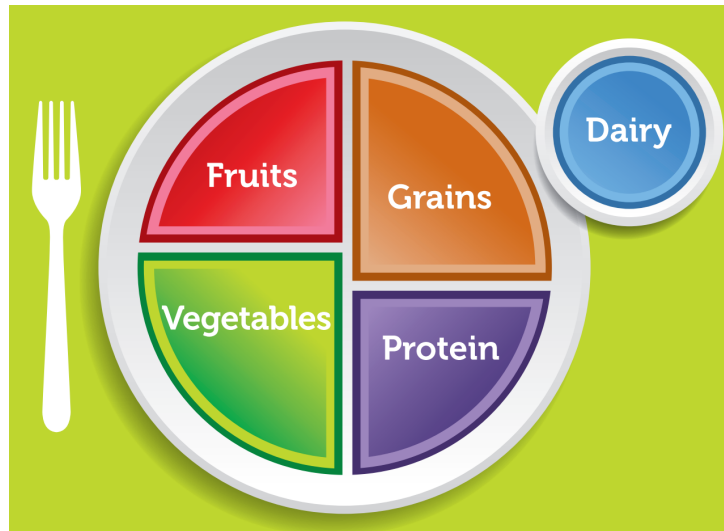
[24 total text messages]

NUTRITION EDUCATION

Text: *Hi again! How are you today? Are you still free right now to participate in this text exchange for the next 45-50 minutes?*

[Wait for response from participant, then provide the following informational texts]

Handout 1: What is a Balanced Diet?



Informational Texts to [Handout 1](#)

Tip: Clinicians should try to provide this information in a conversational manner, encouraging the participant to engage with the material as much as possible. Providing educational texts can be quite dry, so the clinician should attempt to present the information in an interesting way, being sure to check in with the participant throughout.

Text: *Again, I want us to have more of a conversation, so again please feel free to share your own knowledge and experiences or ask any questions you might have.*

So that we're on the same page for all the information that we talk about today, I'd like us to go over some information and tips for maintaining a balanced diet. Food is not only enjoyable, but it's also important in providing us with essential nutrients our bodies need to stay healthy. What have you heard a balanced diet is supposed to look like?

[Wait for participant response, then:]

Text: *A balanced diet consists of fruits, vegetables, grains, protein, and dairy.*

Why don't we start our discussion today with the Fruits & Vegetables section. When you think of fruits, you probably think apples, grapes, bananas, berries, pineapples, and so on. Why do you think fruit is an important part of a balanced diet?

SEND FILENAME: [Balanced Diet Plate.jpg](#)

Handout 2a: Fruits & Vegetables

FOOD GROUP	FOODS IN THE FOOD GROUP	
<p>FRUITS</p> <p>Any fruit or 100% fruit juice counts as part of the Fruit Group. Fruits may be fresh, canned, frozen, or dried; and may be whole, cut-up, or puréed.</p>	<p>Apples Apricots Bananas Cherries Grapefruit Grapes Kiwi fruit Mangoes Oranges Papaya Peaches Pears Pineapple Plums Raisins</p>	<p>BERRIES Blackberries Blueberries Raspberries Strawberries</p> <p>MELONS Cantaloupe Honeydew Watermelon</p>

FOOD GROUP	FOODS IN THE FOOD GROUP	
<p>VEGETABLES</p> <p>Any vegetable or 100% vegetable juice counts as a member of the Vegetable Group. Vegetables may be raw or cooked; fresh, frozen, canned, or dried/dehydrated; and may be whole, cut-up, or mashed. There are five Vegetable Subgroups: Beans and Peas, Dark Green, Red and Orange, Starchy, and Other Vegetables.</p>	<p>BEANS AND PEAS Black beans Black-eyed peas Chickpeas (garbanzo beans) Lentils Red beans Soy beans Split peas White beans</p> <p>DARK-GREEN VEGETABLES Bok choy Broccoli Collard greens Dark-green leaf lettuce Kale Romaine lettuce Spinach</p> <p>RED AND ORANGE VEGETABLES Butternut squash Carrots Red/orange bell peppers Pumpkin Sweet potatoes Tomatoes</p>	<p>STARCHY VEGETABLES Corn Green peas Plantains Potatoes Taro</p> <p>OTHER VEGETABLES Asparagus Avocado Beets Cauliflower Celery Cucumber Eggplant Green beans Iceberg lettuce Mushrooms Radicchio Sugar snap peas Yellow bell pepper Zucchini</p>

Informational Texts for [Handout 2a](#)

Fruits

[Wait for participant response, then:]

If [mostly] Accurate → Text: *You got it! Most fruits are naturally low in fat, sodium, and calories, and more importantly they are rich in nutrients like potassium, dietary fiber, vitamin C, and folate (folic acid). A diet rich in a nutrient like potassium is helpful in maintaining health blood pressure. The fruit group includes any fruit or 100% fruit juice. The majority of the fruit recommended should come from whole fruits or fruit juices.*

Which of the following nutrients can you get from eating whole fruit that isn't usually found in juice?

- a. Sugar
- b. Vitamins
- c. Fiber
- d. Minerals

If Inaccurate → Text: *Actually, fruits are important because most are naturally low in fat, sodium, and calories, and more importantly they are rich in nutrients like potassium, dietary fiber, vitamin C, and folate (folic acid). A diet rich in a nutrient like potassium is helpful in maintaining health blood pressure. The fruit group includes any fruit or 100% fruit juice. The majority of the fruit recommended should come from whole fruits or fruit juices.*

Which of the following nutrients can you get from eating whole fruit that isn't usually found in juice?

- a. Sugar
- b. Vitamins
- c. Fiber
- d. Minerals

[Wait for participant response, then:]

[Answer: C. Fiber]

If Correct → Text: *Exactly right! Fiber is found in the pulp of fruit, and often times the process of juicing (either at home or when purchased at the store) removes the pulp and along with it the fiber. Fiber is important to our digestive health, and often helps you to feel fuller longer, and can improve cholesterol and blood sugar levels. This can help prevent heart disease, diabetes, and bowel cancer.*

Let's turn our attention now to the vegetable group. When we think of vegetables, many of us think about spinach, kale, corn, peas, potatoes, green beans, and onions. Why do you think vegetables are such an important part of a balanced diet?

If Incorrect → Text: *Not quite. It's actually fiber. Fiber is found in the pulp of fruit, and often times the process of juicing (either at home or when purchased at the store) removes the pulp and along with it the fiber. Fiber is important to our digestive health, and often helps you to feel fuller longer, and can improve cholesterol and blood sugar levels. This can help prevent heart disease, diabetes, and bowel cancer.*

Let's turn our attention now to the vegetable group. When we think of vegetables, many of us think about spinach, kale, corn, peas, potatoes, green beans, and onions. Why do you think vegetables are such an important part of a balanced diet?

Vegetables

[Wait for participant response, then:]

If [mostly] Accurate → Text: *Yep! Like with fruits, most vegetables are good sources of fiber, potassium, folate (folic acid), and vitamins C and A. The vegetable group includes any vegetable or 100% vegetable juice. Vegetables are organized into 5 subgroups: dark green vegetables, red and orange vegetables, beans and peas, starchy vegetables, and other vegetables.*

Which of the following nutrients is helpful in regulating blood pressure and can be found in a wide variety of foods, like spinach, potatoes, bananas, and orange juice, and is also one of the most underconsumed nutrients by Americans?

- a. Vitamin C
- b. Potassium
- c. Folate (folic acid)
- d. Iron

SEND FILENAME: Fruits & Vegetables.jpg

If Inaccurate → Text: *Actually, like with fruits, most vegetables are good sources of fiber, potassium, folate (folic acid), and vitamins C and A. The vegetable group includes any vegetable or 100% vegetable juice. Vegetables are organized into 5 subgroups: dark green vegetables, red and orange vegetables, beans and peas, starchy vegetables, and other vegetables.*

Which of the following nutrients is helpful in regulating blood pressure and can be found in a wide variety of foods, like spinach, potatoes, bananas, and orange juice, and is also one of the most underconsumed nutrients by Americans?

- a. Vitamin C
- b. Potassium
- c. Folate (folic acid)
- d. Iron

Handout 2b: Grains

FOOD GROUP	FOODS IN THE FOOD GROUP	
<p style="text-align: center;">GRAINS</p> <p>Any food made from wheat, rice, oats, cornmeal, barley, or another cereal grain is a grain product. Bread, pasta, oatmeal, breakfast cereals, tortillas, and grits are examples of grain products. Grains are divided into two subgroups:</p> <ul style="list-style-type: none"> • Whole Grains contain the entire grain kernel — the bran, germ, and endosperm. • Refined Grains have been milled, a process that removes the bran and germ. This is done to give grains a finer texture and improve their shelf life, but it also removes dietary fiber, iron, and many B vitamins. 	<p style="text-align: center;">WHOLE GRAINS</p> <p>Bread products made primarily from 100% whole grains (such as whole-wheat breads, buns, rolls, and pitas)</p> <p>Amaranth Brown rice Buckwheat Bulgur Millet Muesli Oatmeal Popcorn Quinoa Rolled oats Whole-grain barley Whole rye Whole-wheat crackers Whole-wheat pasta Whole-wheat tortilla Wild rice</p>	<p style="text-align: center;">REFINED GRAINS*</p> <p>Bread products made with refined “white” flour (such as white rolls, buns, pitas, etc.)</p> <p>Cornbread Corn tortillas Couscous Flour tortillas Grits Noodles Pastas (spaghetti, macaroni) Pretzels Some ready-to-eat breakfast cereals White rice</p> <p><small>* Most of these products are made from refined grains. Some are made from whole grains. Check the ingredients list for the words “whole grain” or “whole wheat” to decide if they are made from a whole grain. Some foods are made from a mixture of whole and refined grains.</small></p>

Informational Texts to [Handout 2b](#)

[Answer: B. Potassium]

If Correct → Text: Yep! Even though potassium can be found in a variety of foods, it is one of the most underconsumed nutrients by many Americans. Easy ways to consume enough potassium for good health is to include whole fruits and vegetables, or 100% fruit or vegetable juices, in your diet.

We learned in the previous section that vegetables are organized into 5 subgroups. Our next section on Grains also divides up the Grains group into subgroups with important differences. If you had to guess, how many Grains subgroups do you think there are?

If Incorrect → Text: This one is tricky! It’s actually potassium. Even though potassium can be found in a variety of foods, it is one of the most underconsumed nutrients by many Americans. Easy ways to consume enough potassium for good

health is to include whole fruits and vegetables, or 100% fruit or vegetable juices, in your diet.

We learned in the previous section that vegetables are organized into 5 subgroups. Our next section on Grains also divides up the Grains group into subgroups with important differences. If you had to guess, how many Grains subgroups do you think there are?

[Wait for participant response, then:]

If Correct → Text: *Nailed it! Grains are divided into 2 subgroups: whole grains and enriched or refined grains. The grain group overall consists of foods made from wheat, rice, oats, cornmeal, barley or another cereal grain.*

Pop quiz time! In just a sentence or two: What makes a whole grain different from an enriched/refined grain? (Hint: You'll find the answer in the attached picture.)

SEND FILENAME: Grains Food Group.jpg

If Incorrect → Text: *This one is a little tricky! Grains are actually divided into 2 subgroups: whole grains and enriched or refined grains. The grain group overall consists of foods made from wheat, rice, oats, cornmeal, barley or another cereal grain.*

In just a sentence or two: What makes a whole grain different from an enriched/refined grain? (Hint: You'll find the answer in the attached picture.)

SEND FILENAME: Grains Food Group.jpg

[Wait for participant response, then:]

If Correct → Text: *Exactly right! Whole grains mean they retain the entire grain kernel: bran, germ, and endosperm. Enriched grains have the bran and germ removed through a milling process, which gives this sort of a grain a longer shelf life, but doesn't leave it with much nutrients like fiber, iron, and B vitamins.*

Speaking of nutrients, the next food group we'll talk about is the Dairy food group. What do you think is the most commonly cited nutrient in dairy products?

If Incorrect → Text: *Not quite. Whole grains mean they retain the entire grain kernel: bran, germ, and endosperm. Enriched grains have the bran and germ removed through a milling process, which gives this sort of a grain a longer shelf life, but doesn't leave it with much nutrients like fiber, iron, and B vitamins.*

Speaking of nutrients, the next food group we'll talk about is the Dairy food group. What do you think is the most commonly cited nutrient in dairy products?

[Wait for participant response, then:]

Handout 2c: Dairy Products

FOOD GROUP	FOODS IN THE FOOD GROUP	
<p>DAIRY</p> <p>All fluid milk products and many foods made from milk are considered part of this food group. Most Dairy Group choices should be fat-free or low-fat. Foods made from milk that retain their calcium content are part of the group.</p> <p>Foods made from milk that have little to no calcium, such as cream cheese, cream, and butter, are not considered to be in the Dairy Group. Calcium-fortified soymilk (soy beverage) is also part of the Dairy Group.</p>	<p>Fluid milks (flavored or unflavored)</p> <p>Lactose-reduced milks Lactose-free milks</p> <p>Calcium-fortified soy beverages (soymilk)</p> <p>CHEESE Cheddar Mozzarella American Cottage cheese</p>	<p>Yogurts</p> <p>MILK-BASED DESSERTS Puddings Ice cream Frozen yogurt Ice milks</p>

Informational Texts for [Handout 2c](#) Dairy Products

If Correct → Text: *Spot on! Foods made from milk that retain their calcium content are considered to be part of the Dairy and dairy products food group. This includes all fluid milk products and foods made from milk like cheese, yogurt, and ice cream based foods.*

How about another pop quiz! True or False: Cream cheese, cream, and butter are still in the dairy food group, even though they contain little to no calcium. (Hint: You'll find the answer in the attached picture).

SEND FILENAME: Dairy Food Group.jpg

If Incorrect → Text: *Good guess! Actually it is calcium. Foods made from milk that retain their calcium content are considered to be part of the Dairy and dairy products food group. This includes all fluid milk products and foods made from milk like cheese, yogurt, and ice cream based foods.*

How about another pop quiz! True or False: Cream cheese, cream, and butter are still in the dairy food group, even though they contain little to no calcium. (Hint: You'll find the answer in the attached picture).

SEND FILENAME: Dairy Food Group.jpg

[Wait for participant response, then:]
[Answer: False.]

If Correct → Text: *Correct! Even though these food items are made from milk, they are not considered to be part of the dairy food group because of their low calcium content. Calcium is important for building and maintaining strong bones and teeth as well as regulating blood pressure. It's also important for a healthy nervous system too.*

The next group we'll talk about is the Protein group. Similar to the dairy group, foods in this group must contain some level of protein. Why do you think protein is important for a balanced diet?

If Incorrect → Text: *Not quite. Even though these food items are made from milk, they are not considered to be part of the dairy food group because of their low calcium content. Calcium is important for building and maintaining strong bones and teeth as well as regulating blood pressure. It's also important for a healthy nervous system too.*

The next group we'll talk about is the Protein group. Similar to the dairy group, foods in this group must contain some level of protein. Why do you think protein is important for a balanced diet?

Handout 2d: Protein

FOOD GROUP	FOODS IN THE FOOD GROUP	
<p>PROTEIN FOODS</p> <p>All foods made from meat, poultry, seafood, beans and peas, eggs, processed soy products, nuts, and seeds are considered part of the Protein Foods Group.</p> <p>Beans and peas are also part of the Vegetable Group.</p>	<p>BEANS AND PEAS</p> <p>Black beans Black-eyed peas Chickpeas (garbanzo beans) Lentils Red beans Soy beans Split peas White beans</p> <p>SEAFOOD</p> <p>Anchovies Catfish Clams Cod Crab Crawfish Flounder Lobster Oysters Salmon Sardines Shrimp Squid (Calamari) Tilapia Tuna</p> <p>NUTS AND SEEDS (AND BUTTERS)</p> <p>Almonds Peanuts Pumpkin seeds Sunflower seeds Walnuts</p>	<p>PROCESSED SOY PRODUCTS</p> <p>Tofu Tempeh Texturized Vegetable Protein (TVP) “Veggie Burgers”</p> <p>POULTRY</p> <p>Chicken Duck Turkey</p> <p>EGGS</p> <p>MEATS (LEAN CUTS AND GROUND MEATS)</p> <p>Beef Ham Lamb Pork Veal</p>

Informational Texts for [Handout 2d](#) Proteins

[Wait for participant response, then:]

If [mostly] Accurate → Text: *You got it! Protein is used by the body to build and repair tissues. Your body also uses it to make enzymes, hormones, and other body chemicals, and is an important building block in bones, muscles, cartilage, skin, and blood.*

Here’s another pop quiz question for you! True or False: Most Americans get enough protein in their diets.

SEND FILENAME: **Protein Food Group.jpg**

If Inaccurate → Text: *This one is a little tricky. Protein is used by the body to build and repair tissues. Your body also uses it to make enzymes, hormones, and*

other body chemicals, and is an important building block in bones, muscles, cartilage, skin, and blood.

Here's another pop quiz question for you! True or False: Most Americans get enough protein in their diets.

SEND FILENAME: Protein Food Group.jpg

[Wait for participant response, then:]

[Answer: True.]

If Correct → Text: *Nailed it! Most Americans do get enough protein in their diet, however, they may not be making the recommended choices for protein. Protein can be found in foods higher in fat too, so choosing lean and more varied selections is recommended. This includes lean meats like grilled or baked chicken, seafood, or plant-based proteins like beans, peas, and nuts.*

Now that we've covered all of the major food groups, what questions do you have?

If Incorrect → Text: *This one was tough! Most Americans do actually get enough protein in their diet, however, they may not be making the recommended choices for protein. Protein can be found in foods higher in fat too, so choosing lean and more varied selections is recommended. This includes lean meats like grilled or baked chicken, seafood, or plant-based proteins like beans, peas, and nuts.*

Now that we've covered all of the major food groups, what questions do you have?

If Questions → Answer any questions and transition to Oils.

If NO Questions → Transition to Oils.

Oils

Text: Before we talk about ways to increase essential nutrients in your diet, we should talk about oils. Oils are not a food group, but they do contribute essential fatty acids and vitamin E to your diet. Oils are fats that are **liquid** at room temperature. What is an example of a common oil that you have heard of or already use?

If Correct → Text: Great example! Some commonly used oils are vegetable, canola, cottonseed, soybean, corn, safflower, and olive oil. Solid fats, on the other hand, are fats that are solid at room temperature, like butter and shortening. Solid

fats mostly come from animal foods but can also be made from vegetable oils through a process called hydrogenation.

Here is some trivia for you: There are 3 (sometimes 4) types of fats that are often listed on nutrition labels. Name one of those 4 types of fats.

If Incorrect → Text: Not exactly. Some of the more commonly used oils are vegetable, canola, cottonseed, soybean, corn, safflower, and olive oil. Solid fats, on the other hand, are fats that are solid at room temperature, like butter and shortening. Solid fats mostly come from animal foods but can also be made from vegetable oils through a process called hydrogenation.

Here is some trivia for you: There are 3 (sometimes 4) types of fats that are often listed on nutrition labels. Name one of those 4 types of fats.

[Wait for participant response, then:]

[Answer: any 1 of the following: saturated, monounsaturated, polyunsaturated]

If Correct → Text: *Genius! The 3 types of fats are saturated, monounsaturated, and polyunsaturated. A 4th you might see is trans fat, which is a solid fat that can be found naturally in meat and dairy but can also be made from vegetable oils through hydrogenation.*

Now that we've covered the food groups and talked about oils and fats, what are some tips that you've heard to increase essential nutrients for a balanced diet?

If Incorrect → Text: *Good guess! This was a tricky one. The 3 types of fats are saturated, monounsaturated, and polyunsaturated. A 4th you might see is trans fat, which is a solid fat that can be found naturally in meat and dairy but can also be made from vegetable oils through hydrogenation.*

Now that we've covered the food groups and talked about oils and fats, what are some tips that you've heard to increase essential nutrients for a balanced diet?

[Wait for participant response, then:]

Handout 3: Strategies to Increase Essential Nutrients in Your Diet

Handout 3: Strategies to Increase Essential Nutrients in Your Diet

- Increase vegetable and fruit intake.
 - Choose whole or cut-up fruits more often than fruit juice.
 - Select 100% fruit juice when choosing juices.
 - Choose fruits as snacks, salads, or desserts.
- Eat a variety of vegetables, especially dark green, red, and orange vegetables and beans and peas.
 - Fresh, frozen, and canned vegetables all count. If canned choose ones with reduced sodium or no salt-added.
- Consume at least half of all grains as whole grains. Increase whole-grain intake by replacing refined grains with whole grains in breakfast cereals, breads, crackers, rice, and pasta.
- Increase intake of fat-free or low-fat milk and dairy products, such as milk, yogurt, or cheese.
- Choose a variety of protein foods, which include seafood, lean meat and poultry, eggs, beans and peas, and unsalted nuts and seeds.
- Increase the amount and variety of seafood consumed by choosing seafood in place of some meat and poultry.
- Replace protein foods that are higher in solid fats with choices that are lower in solid fats and calories and/or are sources of oils.
 - Select lean meats and poultry; trim or drain fat from meat and remove poultry skin before cooking and eating.
 - Try grilling, broiling, poaching, or roasting (will not add extra fat)
- Use oils to replace solid fats where possible.
 - When using spreads, choose soft margarines with zero trans fats made from liquid vegetable oil, rather than stick margarine or butter.
 - When cooking, use vegetable oils such as olive, canola, corn, safflower, or sunflower oil rather than solid fats (butter, stick margarine, shortening, lard).

Informational Texts for [Handout 3](#)

Text: *Generally, it's recommended to consume more of foods such as fruits, vegetables, whole grains, fat-free or low-fat dairy products, and seafood. Foods rich in potassium, dietary fiber, calcium, and vitamin D are also recommended. Here are some strategies to consume more foods high in these and other essential nutrients.*

Pop quiz time! True or False: Eating a variety of vegetables is recommended for a balanced diet, and fresh, frozen, and canned all count towards your daily vegetable serving. (Hint: You'll find the answer in the attached picture.)

SEND FILENAME: Increase Nutrients.jpg

[Wait for participant response, then:]

[Answer: True]

If Correct → Text: *Nailed it! Fresh, frozen, and canned vegetables all count towards your daily vegetable serving. However, if you choose canned, it is recommended to choose ones with reduced sodium or no salt added.*

Now let's think about food components to reduce for a balanced diet. What are some tips that you've heard about reducing certain food components in your diet?

If Incorrect → Text: *Actually fresh, frozen, and canned vegetables all count towards your daily vegetable serving! However, if you choose canned, it is recommended to choose ones with reduced sodium or no salt added.*

Now let's think about food components to reduce for a balanced diet. What are some tips that you've heard about reducing certain food components in your diet?

Handout 4: Strategies to Reduce Certain Food Components

Handout 4: Strategies to Reduce Certain Food Components

- Reduce daily sodium intake to less than 2,300 milligrams (mg).
 - If over the age of 51; if African American; or if have hypertension, diabetes, or chronic kidney disease: reduce intake to 1,500 mg.
- The 1,500 mg recommendation applies to about half of the U.S. population, 15 including children, and the majority of adults.
- Consume less than 10 percent of calories from saturated fatty acids by replacing them with monounsaturated and polyunsaturated fatty acids.
- Consume less than 300 mg per day of dietary cholesterol.
- Keep *trans* fatty acid consumption as low as possible, especially by limiting foods that contain synthetic sources of *trans* fats, such as partially hydrogenated oils, and by limiting other solid fats.
- Reduce the intake of calories from solid fats and added sugars.
- Major sources for solid fats are cakes, cookies, ice cream, and other desserts; pizza, cheese, processed and fatty meats (e.g., sausages, hot dogs, bacon, ribs).
- Drink few or no regular sodas, sports drinks, energy drinks, sweet teas, and fruit drinks.
- Limit the consumption of foods that contain refined grains, especially refined grain foods that contain solid fats, added sugars, and sodium.
- Reduce sodium intake – select canned foods labeled reduced or low sodium or so salt added. Use little or no salt when cooking or eating. Gradually reduce amount of sodium in foods – your taste for salt will change over time.
- If drinking alcohol, it should be in moderation – 1 drink/day for women, 2 drinks/day for men.

Informational Texts for [Handout 4](#)

[Wait for participant response, then:]

Text: It is recommended to consume fewer foods with sodium (salt), saturated fats, trans fats (or hydrogenated oils), cholesterol, added sugars, and refined grains. Here are some strategies on how to reduce your consumption of foods high in those food components.

Now for another pop quiz! True or False: It is recommended to reduce intake of trans fatty acids, which are typically found in foods containing partially hydrogenated oils or other solid fats. (Hint: You'll find the answer in the attached picture.)

SEND FILENAME: Reduce Food Components.jpg

[Wait for participant response, then:]

If Correct → *Text: Exactly right! Synthetic trans fats are frequently found in partially hydrogenated oils, or oils that are typically liquid at room temperature but have been chemically changed to be solid at room temperature.*

Building a healthy eating pattern can mean different things to different people, especially if you have certain food allergies or dietary restrictions set by a medical professional. So let's put all of this together! Not including oils, what were the 5 major food groups that we talked about today?

If Incorrect → *Text: This one was tricky! It's actually True. Synthetic trans fats are frequently found in partially hydrogenated oils, or oils that are typically liquid at room temperature but have been chemically changed to be solid at room temperature.*

Building a healthy eating pattern can mean different things to different people, especially if you have certain food allergies or dietary restrictions set by a medical professional. So let's put all of this together! Not including oils, what were the 5 major food groups that we talked about today?

[Wait for participant response, then:]

[Answer: Fruits, Vegetables, Grain, Protein, Dairy]

If [mostly] Correct → *Text: Great job! Next up: True or False: Beans and peas are considered to be part of both the protein group AND the vegetable group.*

If Incorrect → Text: Not quite. Check out the Balanced Diet Plate picture for the correct answer. Next up: True or False: Beans and peas are considered to be part of both the protein group AND the vegetable group.

[Wait for participant response, then:]
[Answer: True.]

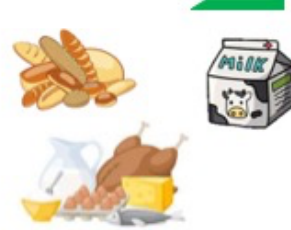
If Correct → Text: Correct! Finally: True or False: It is recommended to increase daily fruit and vegetable intake, as well as lean protein and whole grain foods, and reduce sodium, sugar, and fat intake for a balanced diet.

If Incorrect → Text: Unfortunately, that is incorrect. Check out the Protein Food Group picture for the correct answer. Finally: True or False: It is recommended to increase daily fruit and vegetable intake, as well as lean protein and whole grain foods, and reduce sodium, sugar, and fat intake for a balanced diet.

Handout 5: Building a Healthier Eating Pattern

Handout 5: Building a Healthy Eating Pattern

- Select an eating pattern that meets nutrient needs over time at an appropriate caloric level.
- Reduce portions, especially of high-calorie foods (use smaller plates, substitute high-calorie foods with lower calorie foods like vegetables and fruits).
- Account for all foods and beverages consumed (keep track of the food you eat) and assess how they fit within a total healthy eating pattern.
- Prepare and pack healthy meals at home for yourself and family.
- Have healthy snacks available at home and bring nutrient-dense snacks to eat when on-the-go.
- Cook and eat more meals at home (include: vegetables, fruits, whole grains, fat-free or low-fat dairy products, and low calorie proteins) instead of eating out.
- When eating out, think about choosing healthy options (smaller options or share a plate; avoid choosing foods described as creamy, fried, breaded, battered, or buttered).



Informational Texts for [Handout 5](#)

[Answer: True.]

If Correct → Text: *You got it! That is all I have for us today, so thank you for chatting with me and answering some questions. Before we end today, do you have any questions?*

SEND FILENAME: [Healthier Eating Pattern.jpg](#)

If Incorrect → Text: *Not exactly. Check out the pictures on Increasing Nutrients and Reducing Food Components for the correct answer. That is all I have for us today, so thank you for chatting with me and answering some questions. Before we end today, do you have any questions?*

SEND FILENAME: [Healthier Eating Pattern.jpg](#)

Answer any questions the participant has and remind them of the boosters over the next 4 weeks.

Send post-baseline survey link: Last thing I'll ask you to do for me today is complete this very short survey (3-items): https://memphis.coi.qualtrics.com/jfe/form/SV_0CIBbzeICVxUyvb

Once you've completed that, you'll have earned the \$25 for your participation in the study so far. Would you prefer an Amazon gift card or cash payment?

Boosters

Booster Week 1

Text: *Hi there! How are you today? Are you still available to chat for about 20 minutes?*

[Wait for participant response, then:]

Text: *Great! As a reminder, if we are both able to read each other's texts and respond quickly, we will likely not even need the full time.*

Last week we covered a lot of information on alcohol and nutrition. And you learned that not all drinks are created equal. Do you remember what ABV stands for?

If Correct → Text: *Great memory! ABV stands for Alcohol By Volume, and it is the percent alcohol in any given drink. We also talked about the word "proof", which is basically the same thing as ABV. It tells you how much alcohol is in a liquor.*

Fun fact: Did you know that the word proof comes from 16th century England? It refers to when liquor was taxed based on the alcohol content. Liquors were tested by soaking a pellet of gunpowder in them, and if the gunpowder still burned, it was said to have 100 degrees proof. And, 100 proof liquor is about 50% alcohol. Let's do some quick math! Most liquors are 80 proof, so about what percent alcohol do these liquors contain?

If Incorrect → Text: *Good try! Actually, ABV stands for Alcohol By Volume, and it is the percent alcohol in any given drink. We also talked about the word "proof", which is basically the same thing as ABV. It tells you how much alcohol is in a liquor.*

Fun fact: Did you know that the word proof comes from 16th century England? It refers to when liquor was taxed based on the alcohol content. Liquors were tested by soaking a pellet of gunpowder in them, and if the gunpowder still burned, it was said to have 100 degrees proof. And, 100 proof liquor is about 50% alcohol. Let's do some quick math! Most liquors are 80 proof, so about what percent alcohol do these liquors contain?

[Wait for participant response, then:]

[Answer is 40%]

If Correct → Text: *Nice job! 80 proof liquors are about 40% alcohol by volume. That's quite a bit more than your standard size beer with only about 5% alcohol, or even wine with about 12% alcohol.*

You also learned last week that people don't all metabolize alcohol quite the same for a number of different reasons. Can you name 1 of the organs in the human body that metabolizes alcohol?

If Incorrect → Text: *That was a little tricky! 80 proof liquors are about 40% alcohol by volume. That's quite a bit more than your standard size beer with only about 5% alcohol, or even wine with about 12% alcohol.*

You also learned last week that people don't all metabolize alcohol quite the same for a number of different reasons. Can you name 1 of the 5 major organs in the human body that metabolizes alcohol?

[Wait for participant response, then:]

[Answer: Any of the following: (1) Liver (2) Stomach (3) Esophagus (4) Pancreas (5) Brain.]

If Correct → Text: *Nailed it! The liver, stomach, esophagus, pancreas, and brain all play a role in metabolizing alcohol. As alcohol is metabolized, it targets the gamma-aminobutyric acid type A (or GABA-A) receptor. Can you guess what GABA-A does?*

- a. It activates the central nervous system creating effects similar to stimulants*
- b. It depresses the central nervous system creating effects similar to sedatives, hypnotics, and anesthetic agents*
- c. It doesn't do anything to the central nervous system.*

If Incorrect → Text: *Not quite. Actually, the liver, stomach, esophagus, pancreas, and brain all play a role in metabolizing alcohol. As alcohol is metabolized, it targets the gamma-aminobutyric acid type A (or GABA-A) receptor. Can you guess what GABA-A does?*

- a. It activates the central nervous system creating effects similar to stimulants*
- b. It depresses the central nervous system creating effects similar to sedatives, hypnotics, and anesthetic agents*
- c. It doesn't do anything to the central nervous system.*

[Wait for participant response, then:]

[Answer: B. It depresses the CNS creating effects similar to sedatives, hypnotics, and anesthetic agents.]

If Correct → Text: *Exactly. Although we may feel a sense of euphoria or high at first, continued targeting of the GABA-A receptor depresses the central nervous system. Too much can result in the signs and symptoms of alcohol poisoning or overdose.*

As with alcohol, people metabolize food differently too. Thinking about the nutrition recommendations we talked about last week: what is one recommendation that you remember about reducing certain food components for a balanced diet?

If Incorrect → Text: *Actually, although we may feel a sense of euphoria or high at first, continued targeting of the GABAA receptor depresses the central nervous system. Too much can result in the signs and symptoms of alcohol poisoning or overdose.*

As with alcohol, people metabolize food differently too. Thinking about the nutrition recommendations we talked about last week: what is one recommendation that you remember about reducing certain food components for a balanced diet?

[Wait for participant response, then:]

[Appropriate answer: anything listed on the Reduce Food Components.jpg.]

If Correct → Text: *Exactly! It's generally recommended to reduce the intake of calories from foods containing solid fats and added sugars. Continuing to think about nutrition recommendations, True or False: when selecting canned food items, it is recommended to choose those labeled as reduced or low sodium, and in general to use little or no salt when cooking and eating.*

If Incorrect → Text: *Not exactly. It's generally recommended to reduce the intake of calories from foods containing solid fats and added sugars. Continuing to think about nutrition recommendations, True or False: when selecting canned food items, it is recommended to choose those labeled as reduced or low sodium, and in general to use little or no salt when cooking and eating.*

[Wait for participant response, then:]

[Answer: True]

If Correct → Text: *Nice job! It's recommended that most calories should come from things like whole grain foods, fruits and vegetables, fat-free or low-fat dairy products, and lean meat. It's also recommended to reduce daily sodium intake to less than 2300 milligrams (mg) as higher levels of sodium are associated with health problems such as hypertension.*

This was just a quick review of some of the material from our chats from last week. That's all I have for us today! We'll chat again briefly next week for about 20 minutes.

And if you have not completed the survey we sent to you earlier this week, please be sure to do that sometime today.

Here is the link again:

https://memphis.co1.qualtrics.com/jfe/form/SV_57m8D1ZvwAIKssZ

It takes just a minute or two. Your PIN is the same as before. If you have already completed this, then feel free to ignore!

If Incorrect → Text: *Actually, the answer is true. It's recommended that most calories should come from things like whole grain foods, fruits and vegetables, fat-free or low-fat dairy products, and lean meat. It's also recommended to reduce daily sodium intake to less than 2300 milligrams (mg) as higher levels of sodium are associated with health problems such as hypertension.*

This was just a quick review of some of the material from our chats from last week. That's all I have for us today! We'll chat again briefly next week for about 20 minutes.

And if you have not completed the survey we sent to you earlier this week, please be sure to do that sometime today.

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[8 therapist text messages]

Booster Week 2

Text: *Hi again! How are you today? Are you still available to chat for about 20 minutes?*

[Wait for participant response, then:]

Text: *Awesome! Last week we reviewed a few things about alcohol and nutrition from a couple of weeks ago. Now that you have had some time to “digest” it all (terrible dad joke, I know), have you had any questions or thoughts come up about the material that you wanted to ask/share?*

[Wait for participant response, then:]

If Questions → Answer any questions and transition in to Booster 2 material.

If Not Questions → Transition to Booster 2 material.

Text: *We talked a bit about alcohol tolerance in the first session. What do you remember about tolerance?*

[Wait for participant response, then:]

If [mostly] Correct → Text: *That’s right! Alcohol tolerance has to do with how much the brain has begun to compensate for alcohol disruption, and typically feels like a reduced effect from alcohol with continued use of the same amount and/or increased amounts of alcohol necessary to feel the same effect as when first starting drinking.*

Although not true for everyone, tolerance can result in severe alcohol problems and even organ damage. It also can reduce that feeling of euphoria (“up”) that alcohol initially gives, and strengthens that feeling of dysphoria (“down”). Do you remember what this 2-phase process is called?

If Incorrect → Text: *Actually, alcohol tolerance has to do with how much the brain has begun to compensate for alcohol disruption, and typically feels like a reduced effect from alcohol with continued use of the same amount and/or increased amounts of alcohol necessary to feel the same effect as when first starting drinking.*

Although not true for everyone, tolerance can result in severe alcohol problems and even organ damage. It also can reduce that feeling of euphoria (“up”) that alcohol initially gives, and strengthens that feeling of dysphoria (“down”). Do you remember what this 2-phase process is called?

[Wait for participant response, then:]

If [mostly] Correct → Text: *Nailed it! This 2-phase process is called the Biphasic Effect. The first phase is that euphoric or up feeling after consuming alcohol, and the second phase is the dysphoric or down feeling after continuing to consume alcohol.*

We also talked about nutrition last week. We started off by talking about all the different food groups. The Office of Disease Prevention and Health Promotion defines 5 major food groups. What are the names of a few of those food groups that we talked about?

If Incorrect → Text: *Not exactly. This 2-phase process is called the Biphasic Effect. The first phase is that euphoric or up feeling after consuming alcohol, and the second phase is the dysphoric or down feeling after continuing to consume alcohol.*

We also talked about nutrition last week. We started off by talking about all the different food groups. The Office of Disease Prevention and Health Promotion defines 5 major food groups. What are the names of a few of those food groups that we talked about?

[Wait for participant response, then:]

If [mostly] Correct → Text: *Exactly right! The 5 major food groups are fruits, vegetables, dairy, proteins, and grains. We also talked about oils, but they aren't considered a major food group. Remember, oils are fats that are liquid at room temperature and contribute essential fatty acids and Vitamin E to your diet. What is the difference between oils and solid fats like butter or margarine?*

If Incorrect → Text: *Actually, the 5 major food groups are fruits, vegetables, dairy, proteins, and grains. We also talked about oils, but they aren't considered a major food group. Remember, oils are fats that are liquid at room temperature and contribute essential fatty acids and Vitamin E to your diet. What is the difference between oils and solid fats like butter or margarine?*

[Wait for participant response, then:]

If [mostly] Correct → Text: *Spot on! Oils are liquid at room temperature and solid fats are solid at room temperature. Simple enough! Dietary guidelines suggest replacing solid fats with oils and reducing or cutting out trans fatty acids, which are oils that have been hydrogenated so that they are solid at room temperature.*

Oils and fat are also often found in certain protein rich foods like meat and nuts. Why is protein considered an important nutrient in a balanced diet?

- a. *It's used to make enzymes, hormones, and other body chemicals.*
- b. *It's used to build and repair tissues in the body.*
- c. *It's a building block in bones, muscles, cartilage, skin, and blood.*
- d. *All of the above.*

If Incorrect → Text: *Not quite. Oils are liquid at room temperature and solid fats are solid at room temperature. Dietary guidelines suggest replacing solid fats with oils and reducing or cutting out trans fatty acids, which are oils that have been hydrogenated so that they are solid at room temperature.*

Oils and fat are also often found in certain protein rich foods like meat and nuts. Why is protein considered an important nutrient in a balanced diet?

- a. *It's used to make enzymes, hormones, and other body chemicals.*
- b. *It's used to build and repair tissues in the body.*
- c. *It's a building block in bones, muscles, cartilage, skin, and blood.*
- d. *All of the above.*

[Wait for participant response, then:]
[Answer D. All of the above.]

If Correct → Text: *You got it! Protein is important for all of those reasons. Diets rich in lean protein can also boost healthy skin, hair, and nails. The recommended amount of protein in a healthy diet varies between 5 to 7 ounces per day, and depends on age, sex, and level of physical activity.*

That is all I have for us today! We'll check in again with you this time next week with more content on alcohol and nutrition education!

And if you have not completed the survey we sent to you earlier this week, please be sure to do that sometime today.

Here is the link again:

https://memphis.col.qualtrics.com/jfe/form/SV_6nVfLwZo2avHUcB

It takes just a minute or two. Your PIN is the same as before. If you have already completed this, then feel free to ignore!

If Incorrect → Text: *Actually, it's D. All of the above. Protein is important for all of those reasons. Diets rich in lean protein can also boost healthy skin, hair, and nails. The recommended amount of protein in a healthy diet varies between 5 to 7 ounces per day, and depends on age, sex, and level of physical activity.*

That is all I have for us today! We'll check in again with you this time next week with more content on alcohol and nutrition education!

And if you have not completed the survey we sent to you earlier this week, please be sure to do that sometime today.

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It takes just a minute or two. Your PIN is the same as before. If you have already completed this, then feel free to ignore!

[8 text messages]

Booster Week 3

Text: *Hi again! How are you today? Are you still available to chat for about 20 minutes?*

[Wait for participant response, then:]

Text: *Awesome! As a reminder, if we are both able read each other's texts and respond quickly, we will likely not need to go the full 30 minutes.*

Today will be similar to the last couple of weeks. A few weeks ago, we talked about something called alcohol poisoning, or alcohol overdose. What do you remember about alcohol poisoning?

[Wait for participant response, then:]

If [mostly] Correct → Text: *You got it. Alcohol poisoning, or alcohol overdose, occurs when BAC is so high that areas of the brain that control basic life-support functions begins to shut down. It could save someones life if you are able to recognize the signs and symptoms of alcohol poisoning. What signs or symptoms of alcohol poisoning do you remember?*

If Incorrect → Text: *Not exactly. Alcohol poisoning, or alcohol overdose, occurs when BAC is so high that areas of the brain that control basic life-support functions begins to shut down. It could save someones life if you are able to recognize the signs and symptoms of alcohol poisoning. What signs or symptoms of alcohol poisoning do you remember?*

[Wait for participant response, then:]

If [mostly] Correct → Text: *Yep. Signs and symptoms of alcohol poisoning include vomiting, seizures, slow and/or irregular breathing, bluish skin color or paleness, mental confusion, stupor, or an inability to wake up.*

What is the most important thing someone could do if they see someone experiencing these signs/symptoms?

If Incorrect → Text: *Actually, signs and symptoms of alcohol poisoning include vomiting, seizures, slow and/or irregular breathing, bluish skin color or paleness, mental confusion, stupor, or an inability to wake up.*

What is the most important thing someone could do if they see someone experiencing these signs/symptoms?

[Wait for participant response, then:]

If [mostly] Correct → Text: *Exactly! Calling 911 for help is the best thing someone can do in that situation. It's also recommended to not wait for someone to experience all of the signs/symptoms of alcohol poisoning. Remember, people metabolize alcohol differently, so someone may have alcohol poisoning even if they are not showing all of the signs/symptoms.*

People also metabolize food differently and may have different dietary restrictions when it comes to food. Foods like chicken, beans & peas, seafood, and nuts can all be good sources of lean protein. While protein is an important nutrient for our bodies, some protein foods contribute additional fat and what other food component that is recommended to reduce?

- a. Vitamin D
- b. Sodium
- c. Iron
- d. Fiber

If Incorrect → Text: *Not quite. Calling 911 for help is the best thing someone can do in that situation. It's also recommended to not wait for someone to experience all of the signs/symptoms of alcohol poisoning. Remember, people metabolize alcohol differently, so someone may have alcohol poisoning even if they are not showing all of the signs/symptoms.*

People also metabolize food differently and may have different dietary restrictions when it comes to food. Foods like chicken, beans & peas, seafood, and nuts can all be good sources of lean protein. While protein is an important nutrient for our bodies, some protein foods contribute additional fat and what other food component that is recommended to reduce?

- a. Vitamin D
- b. Sodium
- c. Iron
- d. Fiber

[Wait for participant response, then:]
[Answer: B. Sodium]

If Correct → Text: *Nailed it! The answer is sodium. Packaged and prepared meat, poultry, and seafood products are common sources of sodium (salt). Sodium is added to packaged foods during processing such as in curing meat, enhancing flavor, or as a preservative.*

Just like protein is the key nutrient in foods that make up the Protein Food Group, Calcium is the key nutrient in foods that make up the Dairy Food Group. Which of the following is NOT a good source of calcium?

- a. Spinach
- b. Edamame (or green soybeans)
- c. Yogurt
- d. Cream

If Incorrect → Text: *Actually, the answer is sodium. Packaged and prepared meat, poultry, and seafood products are common sources of sodium (salt). Sodium is added to packaged foods during processing such as in curing meat, enhancing flavor, or as a preservative.*

Just like protein is the key nutrient in foods that make up the Protein Food Group, calcium is the key nutrient in foods that make up the Dairy Food Group. Which of the following is NOT a good source of calcium?

- a. Spinach
- b. Edamame (or green soybeans)
- c. Yogurt
- d. Cream

[Wait for participant response, then:]

If Correct → Text: *You got it! The answer is D. Cream. Even though cream is made from milk, it actually does not contain significant amounts of calcium. Yogurt, cheese, spinach & collards, soybeans & edamame, and calcium fortified foods and drinks like soymilk, other plant-based “milks”, orange juice, and cereals are all sources of calcium.*

That is all I have for us today! We’ll check in again with you this time next week with more content on alcohol and nutrition education!

And if you have not completed the survey we sent to you earlier this week, please be sure to do that sometime today.

Here is the link again:

https://memphis.col.qualtrics.com/jfe/form/SV_6tiYH1ppEOzt4d7

It takes just a minute or two. Your PIN is the same as before. If you have already completed this, then feel free to ignore!

If Incorrect → Text: *Not quite. Actually, the answer is D. Cream. Even though cream is made from milk, it actually does not contain significant amounts of calcium. Yogurt, cheese, spinach & collards, soybeans & edamame, and calcium fortified foods and drinks like soymilk, other plant-based “milks”, orange juice, and cereals are all sources of calcium.*

That is all I have for us today! We’ll check in again with you this time next week with more content on alcohol and nutrition education!

And if you have not completed the survey we sent to you earlier this week, please be sure to do that sometime today.

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It takes just a minute or two. Your PIN is the same as before. If you have already completed this, then feel free to ignore!

[8 text messages]

Booster Week 4

Text: *Hi again! This is _____ from Project BLUEM. How are you today? Are you still available to chat for about 20 minutes?*

[Wait for participant response, then:]

Text: *Great! As a reminder, if we are both able to read each others texts and respond quickly, we will likely not need the full 30 minutes. This will also be our last text-message session. I want to thank you again for participating in this project!*

We've talked a lot about alcohol over the past few weeks, so today we'll focus primarily on nutrition education. You learned about the 5 major food groups: fruits, vegetables, grains, protein, and dairy. Grains and vegetables both have subgroups. What are the two grains subgroups?

[Wait for participant response, then:]

If Correct → Text: *Nailed it! The grains subgroups are whole grain and enriched grains. Whole grains include the entire grain kernel including the bran, germ, and endosperm. Enriched grains have had the bran and germ removed through a milling process. This process makes for a longer shelf-life at the store, but it also removes some key nutrients like fiber, iron, and many B vitamins. Did you know an iron deficiency can lead to a condition called anemia that leaves you feeling tired all the time?*

Green leafy vegetables are another good source of iron, fiber, and lots of other essential nutrients. Can you name any of the other 4 subgroups of vegetables?

If Incorrect → Text: *Not exactly. The grains subgroups are whole grain and enriched grains. Whole grains include the entire grain kernel including the bran, germ, and endosperm. Enriched grains have had the bran and germ removed through a milling process. This process makes for a longer shelf-life at the store, but it also removes some key nutrients like fiber, iron, and many B vitamins. Did you know an iron deficiency can lead to a condition called anemia that leaves you feeling tired all the time?*

Dark green vegetables are another good source of iron, fiber, and lots of other essential nutrients. Can you name any of the other 4 subgroups of vegetables?

[Wait for participant response, then:]

[Answer: Beans and Peas, Red and Orange, Starchy, Other]

If [mostly] Correct → Text: *Exactly right! The vegetable group is made up of dark green vegetables, beans and peas, red and orange vegetables, starchy vegetables, and “other”.*

Carrots are part of the red and orange vegetables subgroup (no surprise there!). But do you know what vitamin gives carrots their orange color?

- a. *Vitamin A*
- b. *Vitamin B*
- c. *Vitamin C*
- d. *Vitamin D*

If Incorrect → Text: *Actually, the vegetable group is made up of dark green vegetables, beans and peas, red and orange vegetables, starchy vegetables, and “other”.*

Carrots are part of the red and orange vegetables subgroup (no surprise there!). But do you know what vitamin gives carrots their orange color?

- a. *Vitamin A*
- b. *Vitamin B*
- c. *Vitamin C*
- d. *Vitaming D*

[Wait for participant response, then:]

[Answer: A. Vitamin A.]

If Correct → Text: *Spot on! Beta-carotene, a form of Vitamin A, gives foods like carrots and sweet potatoes their orange color. Beta-carotene is also good for the immune system, reproduction, and eye health. It’s why you’ll never see a rabbit wearing glasses!*

Speaking of vegetables... True or False: It’s recommended you should only eat raw vegetables because if you cook vegetables, all of the nutrients are “cooked away.”

If Incorrect → Text: *Not quite. It’s actually Vitamin A. Beta-carotene, a form of Vitamin A, gives foods like carrots and sweet potatoes their orange color. Beta-carotene is also good for the immune system, reproduction, and eye health. It’s why you’ll never see a rabbit wearing glasses!*

Speaking of vegetables... True or False: It’s recommended you should only eat raw vegetables because if you cook vegetables, all of the nutrients are “cooked away.”

[Wait for participant response, then:]
[Answer: False.]

If Correct → Text: *Exactly right! Cooked vegetables still contain vitamins, minerals, and fiber and can be very nutritious – but keep in mind that sauces or seasonings used in cooking can add calories, saturated fat, and/or sodium to vegetables.*

Food components like saturated fat and sodium are ones that are typically recommended we reduce in our diet. Alternatively, it's recommended that we increase whole fruits, vegetables, and grains in our diet. What is the best way to know that the bread you're buying is a whole-grain bread?

- a. *The bread is brown in color, not white.*
- b. *The label says "wheat bread", "multigrain", or "stone ground."*
- c. *The person putting out the bread says so.*
- d. *Any ingredient listed on the nutrition label includes the word "whole."*

If Incorrect → Text: *Actually, it's false. Cooked vegetables still contain vitamins, minerals, and fiber and can be very nutritious – but keep in mind that sauces or seasonings used in cooking can add calories, saturated fat, and/or sodium to vegetables.*

Food components like saturated fat and sodium are ones that are typically recommended we reduce in our diet. Alternatively, it's recommended that we increase whole fruits, vegetables, and grains in our diet. What is the best way to know that the bread you're buying is a whole-grain bread?

- a. *The bread is brown in color, not white.*
- b. *The label says "wheat bread", "multigrain", or "stone ground."*
- c. *The person putting out the bread says so.*
- d. *Any ingredient listed on the nutrition label includes the word "whole."*

[Wait for participant response, then:]
[Answer: D. *Any ingredient listed on the nutrition label includes the word "whole."*]

If Correct → Text: *Nice job! The answer is D. You can't rely on the color or texture of a bread to show that it is a whole grain. Look for the word "whole" in the ingredient list. Even breads labeled as "multi-grain," "stone-ground," "100% wheat," "cracked wheat," "seven-grain," or "bran" are not usually whole-grain products. Whole grain examples (for grain products in general, not necessarily bread) include brown rice, oatmeal, popcorn, quinoa, rolled oats, whole-grain barley, whole-grain corn, whole oats, whole rye, whole wheat, and wild rice.*

That's all I have for us! Thank you again for participating in Project BLUEM! Before we sign off today, I'll ask that you complete another survey for us. This

takes about 15-20 minutes and is very important because it asks you to provide feedback on the project and how we can improve it!

Here is the link: https://memphis.col.qualtrics.com/jfe/form/SV_6EI94LCRgnFwTlh

Your PIN is the same as before. Once you've completed that survey, you'll have earned another \$20 (cash or Amazon gift card) or 1 SONA credit. Please let me know which you'd prefer.

If Incorrect → *Text: This one was tough! Actually, the answer is D. You can't rely on the color or texture of a bread to show that it is a whole grain. Look for the word "whole" in the ingredient list. Even breads labeled as "multi-grain," "stone-ground," "100% wheat," "cracked wheat," "seven-grain," or "bran" are not usually whole-grain products. Whole grain examples (for grain products in general, not necessarily bread) include brown rice, oatmeal, popcorn, quinoa, rolled oats, whole-grain barley, whole-grain corn, whole oats, whole rye, whole wheat, and wild rice*

That's all I have for us! Thank you again for participating in Project BLUEM! Before we sign off today, I'll ask that you complete another survey for us. This takes about 15-20 minutes and is very important because it asks you to provide feedback on the project and how we can improve it!

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Your PIN is the same as before. Once you've completed that survey, you'll have earned another \$20 (cash or Amazon gift card) or 1 SONA credit. Please let me know which you'd prefer.

[8 text messages]

Appendix C

Measures

I. Daily Drinking Questionnaire (DDQ)

Please note: Your answers to the following questions are kept confidential and will only be used for research purposes. Your answers will not be shared with your teachers, parents, employers, or anyone else outside the research study.

Think of a **typical week** during the past month.

Considering **STANDARD DRINK SIZES**: 12 ounces of beer in a can or bottle, 5 ounces of wine, 1.5 ounces of hard liquor (e.g., rum, vodka, whiskey) as a shot or "neat" or in a mixed drink.

Number of drinks usually consumed on:

Sunday _____
Monday _____
Tuesday _____
Wednesday _____
Thursday _____
Friday _____
Saturday _____

Number of hours over which drinks usually consumed:

Sunday _____
Monday _____
Tuesday _____
Wednesday _____
Thursday _____
Friday _____
Saturday _____

II. Past Month Binge Episodes

What is your current weight? _____

What is your height (feet and inches)? _____

(males only) IN THE PAST MONTH how many times have you had 5 or more standard drinks (in one occasion)?

(males only) How many times IN THE PAST MONTH have you had 5 or more standard drinks in 2 hours or less?

(males only) IN THE PAST MONTH how many times have you had 10 or more standard drinks (in one occasion)?

(females only) IN THE PAST MONTH how many times have you had 4 or more standard drinks (in one occasion)?

(females only) How many times IN THE PAST MONTH have you had 4 or more standard drinks in 2 hours or less?

(females only) IN THE PAST MONTH how many times have you had 8 or more standard drinks (in one occasion)?

III. Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ)

Below is a list of things that sometimes happen to people either during, or after they have been drinking alcohol. Next to each item below, please mark an “X” in either the YES or NO column to indicate whether that item describes something that has happened to you **IN THE PAST MONTH.**

In the **past month...**

		NO	YES
1.	While drinking, I have said or done embarrassing things.		
2.	I have had a hangover (headache, sick stomach) the morning after I had been drinking.		
3.	I have felt very sick to my stomach or thrown up after drinking.		
4.	I often have ended up drinking on nights when I had planned not to drink.		
5.	I have taken foolish risks when I have been drinking.		
6.	I have passed out from drinking.		
7.	I have found that I needed larger amounts of alcohol to feel any effect, or that I could no longer get high or drunk on the amount that used to get me high or drunk.		
8.	When drinking, I have done impulsive things that I regretted later.		
9.	I've not been able to remember large stretches of time while drinking heavily.		

10.	I have driven a car when I knew I had too much to drink to drive safely.		
11.	I have not gone to work or missed classes at school because of drinking, a hangover, or illness caused by drinking.		
12.	My drinking has gotten me into sexual situations I later regretted.		
13.	I have often found it difficult to limit how much I drink.		
14.	I have become very rude, obnoxious or insulting after drinking.		
15.	I have woken up in an unexpected place after heavy drinking.		
16.	I have felt badly about myself because of my drinking.		
17.	I have had less energy or felt tired because of my drinking.		
18.	The quality of my work or schoolwork has suffered because of my drinking.		
19.	I have spent too much time drinking.		
20.	I have neglected my obligations to family, work, or school because of drinking.		
21.	My drinking has created problems between myself and my boyfriend/girlfriend/spouse, parents , or other near relatives.		
22.	I have been overweight because of drinking.		

23.	My physical appearance has been harmed by my drinking.		
24.	I have felt like I needed a drink after I'd gotten up (that is, before breakfast).		

IV. Delay Discounting (Monetary Choice Questionnaire)

Please select the amount you would prefer in the following questions. Please answer the questions quickly and honestly.

If you were given the option, would you rather have:

1.	\$50 today	OR	\$100 in 1 year
2.	\$70 today	OR	\$100 in 1 month
3.	\$100 in 6 months	OR	\$10 today
4.	\$80 today	OR	\$100 in 6 months
5.	\$100 in 1 month	OR	\$40 today
6.	\$100 in 2 weeks	OR	\$30 today
7.	\$100 in 1 month	OR	\$99 today
8.	\$100 in 1 month	OR	\$80 today

V. Depression Subscale of the DASS-21

Please read each statement and select the option that indicates how much the statement applied to you **over the past week**. There are no right or wrong answers. Do not spend too much time on any statement.

	Did not apply to me at all	Applied to me to some degree, or some of the time	Applied to me to a considerable degree, or a good part of the time	Applied to me very much, or most of the time
1. I couldn't seem to experience any positive feeling at all.	0	1	2	3
2. I found it difficult to work up the initiative to do things.	0	1	2	3
3. I felt that I had nothing to look forward to.	0	1	2	3
4. I felt down-hearted and blue.	0	1	2	3
5. I was unable to become enthusiastic about anything.	0	1	2	3
6. I felt I wasn't worth much as a person.	0	1	2	3
7. I felt that life was meaningless.	0	1	2	3

VI. Alcohol Purchase Task (APT)

In the questionnaire that follows we would like you to pretend to purchase and consume alcohol. Imagine that you and your friends are at a party on a Thursday night from 9:00 PM until 2:00 AM to see a band. Imagine that you do not have any obligations the next day (i.e., no work or classes). The following questions ask how many drinks you would purchase at various prices. The available drinks are standard size domestic beers (12 oz.), wine (5 oz.), shots of hard liquor (1.5 oz.), or mixed drinks containing one shot of liquor. Assume that you did not drink alcohol or use drugs before you went to the party, and that you will not drink or use drugs after leaving the party. Also, assume that the alcohol you are about to purchase is for your consumption only during the party (you can't sell or bring the drinks home). **Please respond to these questions honestly, as if you were actually in this situation.**

1. How many drinks would you have if they were free? _____
2. How many drinks would you have if they were \$.25 each? _____
3. How many drinks would you have if they were \$.50 each? _____
4. How many drinks would you have if they were \$1.00 each? _____
5. How many drinks would you have if they were \$1.50 each? _____
6. How many drinks would you have if they were \$2.00 each? _____
7. How many drinks would you have if they were \$2.50 each? _____
8. How many drinks would you have if they were \$3.00 each? _____
9. How many drinks would you have if they were \$3.50 each? _____
10. How many drinks would you have if they were \$4.00 each? _____
11. How many drinks would you have if they were \$4.50 each? _____
12. How many drinks would you have if they were \$5.00 each? _____
13. How many drinks would you have if they were \$5.50 each? _____
14. How many drinks would you have if they were \$6.00 each? _____
15. How many drinks would you have if they were \$7.00 each? _____

16. How many drinks would you have if they were \$8.00 each? _____
17. How many drinks would you have if they were \$9.00 each? _____
18. How many drinks would you have if they were \$10.00 each? _____
19. How many drinks would you have if they were \$15.00 each? _____
20. How many drinks would you have if they were \$20.00 each? _____

VII. Consideration of Future Consequences (CFC) Scale

For each of the statements below, please indicate whether or not the statement is characteristic of you. If the statement is extremely uncharacteristic of you (not at all like you) please circle a “1” from the choices given; if the statement is extremely characteristic of you (very much like you) please circle a “5”.

		Extremely uncharacteristic	Somewhat uncharacteristic	Uncertain	Somewhat characteristic	Extremely characteristic
1.	I consider how things might be in the future, and try to influence those things with my day to day behavior.	1	2	3	4	5
2.	Often I engage in a particular behavior in order to achieve outcomes that may not result for many years.	1	2	3	4	5
3.	I only act to satisfy immediate concerns, figuring the future will take care of itself.	1	2	3	4	5
4.	My behavior is only influenced by the immediate (i.e., a matter of days or weeks) outcomes of my actions.	1	2	3	4	5
5.	My convenience is a big factor in the decisions I make or the actions I take.	1	2	3	4	5
6.	I am willing to sacrifice my immediate happiness or well-being in order to achieve future outcomes.	1	2	3	4	5
7.	I think it is important to take warnings	1	2	3	4	5

	about negative outcomes seriously even if the negative outcome will not occur for many years.					
8.	I think it is more important to perform a behavior with important distant consequences than a behavior with less-important immediate consequences.	1	2	3	4	5
9.	I generally ignore warnings about possible future problems because I think the problems will be resolved before they reach crisis level.	1	2	3	4	5
10.	I think that sacrificing now is usually unnecessary since future outcomes can be dealt with at a later time.	1	2	3	4	5
11.	I only act to satisfy immediate concerns, figuring that I will take care of future problems that may occur at a later date.	1	2	3	4	5
12.	Since my day to day work has specific outcomes, it is more important to me than behavior that has distant outcomes.	1	2	3	4	5

VIII. Protective Behavioral Strategies Scale (PBSS)

	Never	Rarely	Occasionally	Sometimes	Usually	Always
Use a designated driver	0	1	2	3	4	5
Determine not to exceed a set number of drinks	0	1	2	3	4	5
Alternate alcoholic and non-alcoholic drinks	0	1	2	3	4	5
Have a friend let you know when you have had enough to drink	0	1	2	3	4	5
Avoid drinking games	0	1	2	3	4	5
Leave the bar/party at a predetermined time	0	1	2	3	4	5
Make sure that you go home with a friend	0	1	2	3	4	5
Know where your drink has been at all times	0	1	2	3	4	5
Drink shots of liquor	0	1	2	3	4	5
Stop drinking at a predetermined time	0	1	2	3	4	5
Drink water while drinking alcohol	0	1	2	3	4	5
Put extra ice in your drink	0	1	2	3	4	5
Avoid mixing different types of alcohol	0	1	2	3	4	5
Drink slowly, rather than gulp or chug	0	1	2	3	4	5
Avoid trying to “keep up” or “out-drink” others	0	1	2	3	4	5

IX. Short Self-Regulation Questionnaire (SSRQ-31)

	Strongly Disagree	Disagree	Uncertain or unsure	Agree	Strongly Agree
I usually keep track of my progress toward my goals	1	2	3	4	5
I don't notice the effects of my actions until it's too late	1	2	3	4	5
I am able to accomplish goals I set for myself	1	2	3	4	5
I put off making decisions	1	2	3	4	5
It's hard for me to notices when I've "had enough" (alcohol, food, sweets)	1	2	3	4	5
I have trouble following through with things once I've made up my mind to do something	1	2	3	4	5
I don't seem to learn from my mistakes	1	2	3	4	5
I usually only have to make a mistake one time in order to learn from it	1	2	3	4	5
I have personal standards, and try to live up to them	1	2	3	4	5
As soon as I see a problem or challenge, I start looking for possible solutions	1	2	3	4	5
I have a hard time setting goals for myself	1	2	3	4	5
When I'm trying to change something, I pay a lot of attention to how I'm doing	1	2	3	4	5
I have trouble making plans to help me reach my goals	1	2	3	4	5
I set goals for myself and keep track of progress	1	2	3	4	5

I can usually find several different possibilities when I want to change something	1	2	3	4	5
If I make a resolution to change something, I pay a lot of attention to how I'm doing	1	2	3	4	5
Often I don't notice what I'm doing until someone calls it to my attention	1	2	3	4	5
I usually think before I act	1	2	3	4	5
I learn from my mistakes	1	2	3	4	5
I know how I want to be	1	2	3	4	5
I give up quickly	1	2	3	4	5

X. Time Allocation

Please indicate the number of **hours per week** you spend in various activities.

	Hours per Week
Attending class or required labs/research hours (hours <u>actually attended</u> , not just what you are registered for)	
Doing homework, studying, reading, going to the library, or any other schoolwork <u>outside of class</u>	
Participating in social fraternity or sorority activities	
Participating in other university organizations or programs (attending meetings, volunteering, etc.) <u>excluding fraternities or sororities</u>	
Participating in an internship or volunteer activity related to your major or possible career	
Participating in a community or civic organization or activity	
Paid employment	
Exercise or sports	
Family time (e.g., talking with parents, siblings, children, etc., in person or over phone)	
Religious activity (e.g., church services, bible study, scripture reading, etc.)	
Time spent drinking	
Time spent using drugs	
Time spent using Facebook, Twitter, or other social media sites	
Time spent using the Internet (web-browsing, etc.) NOT including social media or using the internet for academic or work activities	

Appendix D
IRB Approval Letter

From: Jessica McMorris (jmcmmrris) **On Behalf Of** Institutional Review Board
Sent: Thursday, August 25, 2016 5:52 PM
To: James Murphy (jgmurphy) <jgmurphy@memphis.edu>
Subject: IRB Approval #4324

Hello,

The University of Memphis Institutional Review Board, FWA00006815, has reviewed and approved your submission in accordance with all applicable statuses and regulations as well as ethical principles.

PI NAME: James Murphy

CO-PI:

PROJECT TITLE: Mobile-based Balanced Lifestyle for Undergraduate Excellence (MoBLUE)

FACULTY ADVISOR NAME (if applicable):

IRB ID: #4324

APPROVAL DATE: 8/19/2016

EXPIRATION DATE: 8/19/2017

LEVEL OF REVIEW: Full Board Revision

Please Note: Modifications do not extend the expiration of the original approval

Approval of this project is given with the following obligations:

- 1. If this IRB approval has an expiration date, an approved renewal must be in effect to continue the project prior to that date. If approval is not obtained, the human consent form(s) and recruiting material(s) are no longer valid and any research activities involving human subjects must stop.**
- 2. When the project is finished or terminated, a completion form must be completed and sent to the board.**
- 3. No change may be made in the approved protocol without prior board approval, whether the approved protocol was reviewed at the Exempt, Expedited or Full Board level.**
- 4. Exempt approval are considered to have no expiration date and no further review is necessary unless the protocol needs modification.**

Approval of this project is given with the following special obligations:

Thank you,

James P. Whelan, Ph.D.

Institutional Review Board Chair

The University of Memphis.

Note: Review outcomes will be communicated to the email address on file. This email should be considered an official communication from the UM IRB.