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EVALUATION OF DIGITALLY ENHANCED EXPECTANCY CHALLENGE ALCOHOL
LITERACY CURRICULUM (ECALC) FOR USE WITH MANDATED COLLEGE
STUDENTS

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the Department of Psychology
in the College of Sciences
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ABSTRACT

Alcohol use has been a longstanding problem on college campuses. Despite the efforts National Institute on Alcohol Abuse and Alcoholism and the commissioned Task Force on College Drinking (2002), there has been a recent rise in the number of alcohol related arrests and violations on college campuses. Within the high-risk mandated student population, the most successful programs utilize motivational enhancement strategies, such as the Brief Alcohol Screening and Intervention for College Students (BASICS). Likely due to financial constraints, an important issue that has been raised is the limited availability of validated methods for alcohol prevention and intervention on college campuses. The purpose of this study was to examine the effectiveness of the digitally assisted Expectancy Challenge Alcohol Literacy Curriculum (ECALC) by direct comparison of the ECALC to an already well-established treatment (i.e., BASICS) in an effort to reduce problematic alcohol use and related negative consequences among mandated college students. The role of the digital enhancements is to decrease time and resources necessary for training facilitators and aid in widespread implementation. Analyses revealed significant reductions on all four positive alcohol expectancies subscales for those in the ECALC condition and a significant intervening effect for the expectancies of Sociability and Liquid Courage. Results also revealed that for both males and females, those in the ECALC condition demonstrated significantly greater reductions in frequency of alcohol use (i.e., number of drinking days per month) and comparable reductions in typical (i.e., mean BAC, average drinks per sitting, average drinks per week) and heavy alcohol use (i.e., peak BAC, peak drinks per sitting, number of binge episodes) at follow-up when compared to those in the BASICS condition.

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INTRODUCTION

Alcohol Use Among Young Adults

Throughout the past few decades, young adults aged 18 to 25 have consistently reported greater alcohol consumption and alcohol-related problems than any other age group in the United States. Not only do young adults report consuming more alcohol overall, but they are also more likely to drink heavily or engage in binge drinking behavior (SAMHSA; Substance Abuse and Mental Health Services Administration, 2004). SAMHSA defined binge drinking as consuming five or more drinks in a row and heavy drinking as five or more binge drinking episodes within the past month. When asked to report on their drinking behavior within the past month, 41.8% of young adults reported binge drinking on at least one occasion and 14.7% reported heavy alcohol use (SAMHSA, 2007). It is unsurprising that risky drinking behavior often leads to a number of serious negative consequences including alcohol-related fatalities. For example, it is estimated that alcohol is involved in 32% of all traffic-related deaths among those aged 16 to 20 and 51% of those aged 21 to 24 (NHTSA; National Highway Traffic Safety Administration, 2003). It is also estimated that among this age group, 25% of males and 14% of females currently meet or have met diagnostic criteria for alcohol dependence (SAMHSA, 2003) as defined by the DSM-IV-TR (American Psychiatric Association, 2000).

College vs. Noncollege Status

Among young adults, those who attend college have consistently reported higher rates of binge drinking and alcohol-related problems than their same aged noncollege peers. For example, 44.7% of college students reported binge drinking within the past month and 34% reported driving while under the influence compared to 39.9% and 26% of noncollege peers

respectively (Hingson, Zha, & Weitzman, 2009). Further, the trends seen in changes in drinking behavior over time have also differed between college and noncollege young adults. For example, the percentage of college students who reported binge drinking within the past two weeks has remained relatively unchanged at 37% from 1993 to 2010, while the rate of binge drinking among noncollege peers has significantly decreased during that same time period (Johnston, O'Malley, Bachman, & Schulenberg, 2011).

There are several cultural and environmental factors that may contribute to the persistence of problematic drinking on college campuses. Extensive research has shown that the importance of athletics and the presence of Greek life on campuses are positively associated with higher rates of excessive drinking (Leichliter, Meilman, Presley, & Cashin 1998; Wechsler & Nelson, 2008). Further, college students are more likely to engage in high-risk and binge drinking behavior when alcohol outlets surrounding campuses promote drink specials and drinking games (Wechsler & Nelson, 2008).

Not only has college drinking been a consistent problem throughout the years, research now shows the problem may be intensifying. From the year 1999 to 2005, the percentage of college students reporting driving while under the influence increased in frequency by 9% (Hingson & Zha, 2009). Further, from the year 1998 to 2005, the rate of alcohol-related car crash deaths increased by 16% and the number of alcohol related non-traffic deaths increased by 25.6%, with a 66% increase in alcohol poisoning (Substance Abuse and Mental Health Services Administration, 2000, 2006; Hingson & Zha, 2009). Additionally, 19% of college students reported “extreme binge drinking,” consuming 10 or more drinks in a row, within the past two weeks, which appears to be a relatively new phenomena (Johnston et al., 2010).

Young adults attending college also experience a number of negative consequences as a result of high-risk drinking behavior. During a single year, 1,825 students have died from alcohol-related injuries, including motor vehicle crashes and 599,000 students are unintentionally injured as a result of their drinking (Hingson et al., 2009). While alcohol related injury and death is unquestionably the most serious consequence related to drinking, an even higher number of college students experience physical or sexual assaults, lower academic achievement, vandalism, and legal involvement as a result of their own or another student's drinking behavior (Hingson et al., 2009; Wechsler & Nelson, 2008; Wechsler et al., 2002). For example, within a single year 400,000 college students reported having unprotected sex and more than 100,000 college students reported that they were "too intoxicated to know if they consented to having sex" (Hingson et al., 2002). Further, approximately 11% of college students report that they have damaged property and 5% reported that they have been involved with the police as a result of their drinking (Wechsler et al., 2002).

There are also a number of secondhand effects that occur as a result of problematic drinking on college campuses. One survey indicated that 61% of college students living in on-campus housing reported having difficulty sleeping or studying as a result of another student's drinking. Further, 48% of college students reported taking care of a friend who had been intoxicated, 29% reported that they had been insulted or humiliated by someone else who had been drinking, and 10% of females reported experiencing unwanted sexual advances (Wechsler, Dowdall, Maenner, Gledhill-Hoyt & Lee, 1998). Thus, the college environment continues to be a unique risk factor for high-risk drinking behavior and experiencing alcohol-related negative consequences.

High-Risk Mandated Students

Alcohol related incidents are the most common cause for disciplinary measures on campuses (Bergen-Cico, 2000). Thousands of alcohol and drugs arrests occur on college campuses each year and more than one half of all campus violations involve alcohol use (Anderson & Gadaletto, 2001). A review of several studies indicate that anywhere from 5 to 12% of college students report having some involvement with the police or the campus judicial system as direct result of alcohol use (Engs & Hanson, 1994; Presley, Meilman, & Cashin, 1996; Wechsler et al., 2002). A number of behaviors could result in disciplinary action including underage drinking, open container violations, public intoxication, noise violations, harassment, assault, driving while intoxicated, or injury resulting from excessive alcohol consumption (Presley et al., 1996; Cohen & Rogers, 1997; Wechsler et al., 1998). Most concerning is evidence indicating a significant rise in the number of alcohol related arrests and violations on college campuses (Tevyaw, Borsari, Colby, & Monti, 2007; Porter, 2006). It is estimated that 110,000 college students are arrested each year for an alcohol-related violation such as underage drinking, public intoxication, or driving while under the influence (Hingson et al., 2002). Further, a review of current research indicates that compared to nonmandated college students, those that receive mandated sanctions for alcohol violations experience more alcohol related problems, lower academic achievement, and engage in more high-risk and heavy drinking behavior (Barnett et al., 2004; Wray, Simons, & Dvorak, 2011).

Response to College Drinking Problem

In 1999, the National Institute on Alcohol Abuse and Alcoholism (NIAAA) recognized that the high rate of problematic drinking and alcohol-related negative consequences warranted the commission of a task force on college drinking. The role of the task force was to identify

effective alcohol prevention and intervention strategies specific to the college population and encourage college administrators to utilize evidence-based strategies. In 2002, the task force put forth its report and identified three strategies that have been empirically supported within the college population: (1) cognitive behavioral skills training; (2) motivational enhancement interventions; and (3) alcohol expectancy challenges.

Programs that incorporate motivational enhancement techniques (Miller & Rollnick, 1991), alcohol skills training (Kivlahan, Marlatt, Fromme, Coppel & Williams, 1990), and personalized normative feedback (Neighbors, Larimer, & Lewis, 2004; Lewis & Neighbors, 2006; Walters, Vader, & Harris, 2007) have consistently been shown to be effective in reducing alcohol use and negative consequences (Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Larimer & Cronce, 2007). Skills based interventions include self-monitoring of alcohol use and emphasize alcohol moderation while personalized normative feedback interventions provide information regarding current alcohol use, risks associated with use, and typical drinking norms. Research has shown that monitoring alcohol use alone has demonstrated reductions in alcohol consumption at a one-month follow-up (Carey, Carey, Maisto, & Henson, 2006).

Within the high-risk mandated student population, the programs that have been most successful were those that included alcohol skills training, brief motivational interviewing, and personalized normative feedback (Larimer & Cronce, 2007). Motivational enhancement interventions have shown promise with mandated students since the motivational interviewing (MI) component is aimed at enhancing the students' motivation to change their behavior in an emphatic and collaborative manner (Miller & Rollnick, 1991). MI techniques are used to reduce problematic drinking by enhancing the students' motivation to change through nonjudgmental

presentation of alcohol information and basic alcohol skills training. Many successful programs have been developed utilizing motivational enhancement strategies, such as the Brief Alcohol Screening and Intervention for College Students program (BASICS; Dimeff, Baer, Kivlahan, & Marlatt, 1999). The BASICS program is an individually administered brief intervention strategy that incorporates personalized feedback on typical drinking patterns, normative re-education, and behavioral techniques to reduce risky drinking behavior. BASICS has repeatedly been found to be effective in reducing binge drinking, frequency of heavy drinking, and alcohol related negative consequences (Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001; Murphy et al., 2001). As noted above, several individually delivered programs have been developed and shown to be efficacious, yet drinking rates and the prevalence of alcohol-related consequences and arrests continue to rise on college campuses. Consequently, further investigation is needed on the factors contributing to the persistence of the problem and factors limiting the impact of the current programs delineated in the Task Force recommendations (NIAAA, 2002).

Several limitations have been noted within the current research on college alcohol prevention and intervention programs, especially within high-risk drinkers and mandated students. First, a limited number of controlled studies exist that specifically target mandated students and high-risk drinkers (Carey et al., 2007). Second, of the controlled studies that have been implemented, a meta-analytic review indicated that intervention efforts were often less successful in reducing alcohol related problems when targeted to high-risk groups and heavy drinkers such as mandated students (Carey et al., 2007). Third, for even the most successful interventions the positive effects in reduction of alcohol consumption seen post-intervention begin to diminish after six months and few have studied the long-term changes in alcohol related

problems (Carey et al., 2007). Therefore, little is known about long-term effects of interventions on alcohol related problems and the maintenance of reductions in consumption. Fourth, even the most effective interventions with mandated students, such as BASICS, have noted that treatment effects are often moderated by the individual's readiness to change (RTC) (Fromme & Corbin, 2004). Additionally, despite the evidence for the efficacy of brief motivational interventions, there are limited studies that have demonstrated that these interventions increase motivation or readiness to change behavior. Further, those participants who present higher in RTC are the ones that make the most positive behavioral changes (Fromme & Corbin, 2004). The most significant issue that has been raised, however, is the limited availability of validated methods for alcohol prevention and intervention on college campuses.

While most college administrators reported that they were aware of the Task Force recommendations for effective prevention and intervention programming, few have begun implementing many of the delineated programs (Nelson, Toomey, Lenk, Erickson, & Winters, 2010). Likely due to financial constraints, only 50% of college campuses provided empirically supported intervention programs for at-risk students, 22% reported they referred students off campus, but did not provide compensation for treatment, and 11% reported they did not provide any intervention programs (Nelson et al., 2010). Additionally, only 42% of colleges required all undergraduate students to participate in any alcohol education program (Nelson et al., 2010). Unfortunately, the expense of implementing programs individually and/or face-to-face reasonably limits the availability of effective prevention programming. In order to increase cost effectiveness of prevention and intervention programs, (1) computer-delivered and (2) group-delivered programs have been developed.

Computer-Delivered Interventions

Computer or web-based programs such as Alcohol 101 (Century Council, 1998) and AlcoholEdu (Outside the Classroom) are increasingly being used on college campuses as a means of early prevention and often a requirement for mandated students (Anderson & Cohen, 2001; Walters, Miller, & Chiauzzi, 2005). Computer-delivered interventions have the potential to reach larger audiences and are less resource intensive. Moreover, research suggests college aged students prefer computer-delivered interventions due to ease of accessibility and fitting with their lifestyle (Kypri, Saunders, & Gallagher, 2003). However, extant research demonstrates mixed results on the clinical utility of computer-delivered interventions with high-risk populations (Barnett, Murphy, Colby & Monti, 2007; Carey, Carey, Henson, Maisto & DeMartini, 2010; Carey, Scott-Sheldon, Elliott, Garey & Carey, 2012). For example, a meta-analytic review evaluated 48 studies to examine the relative efficacy of face-to-face versus computer-delivered interventions with college students (Carey et al., 2012). Results indicated that collectively face-to-face interventions were more successful at reducing alcohol use and alcohol-related problems at short-term (1-month) and longer-term follow-ups (3-, 6-, and 12-month). Further, effect sizes for face-to-face interventions were significantly stronger when working with mandated college students (Carey et al., 2012). Additionally, very few studies have examined the effectiveness of computer-delivered interventions specifically with mandated students. One exception to this is a study by Carey, Carey, Henson, Maisto, and DeMartini (2010) in which they compared the effectiveness of a brief motivational intervention, two computer-delivered interventions, and a delayed control condition. Results indicated that in comparison to computer-delivered interventions (i.e., Alcohol 101 Plus, Alcohol Edu for Sanctions), male and female students who

received face-to-face brief motivational interventions showed greater reductions in alcohol consumption and alcohol-related problems at the 1-month follow-up (Carey et al., 2010).

Group-Delivered Format

The Lifestyle Management Class (LMC) was a group delivered program that incorporated cognitive behavioral and motivational enhancement techniques and resulted in reductions in the number of drinking and driving incidents for those in the LMC condition. However, results also indicated no significant differences between participants in the treatment and control groups on measures of typical drinking behavior and alcohol-related negative consequences (Fromme & Corbin, 2004). Several limitations were also reported such as high attrition rates at posttest (27%) and follow-up (51%). While the LMC group intervention is advantageous over individually delivered programs, in respect to reaching larger audiences and being more cost effective, it is still limited by the requirement of two, 2-hour group sessions and 16 hours of provider training to deliver the program. Another study examined a single session group-based motivational enhancement program for mandated students and revealed significant reductions in drinks per month, peak drinks, and alcohol-related negative consequences (LaBrie, Lamb, Pedersen, & Quinlan, 2006). The study, however, lacked a control group, which is a significant limitation in determining overall effectiveness of the intervention. Additionally, while a group-delivered intervention may show success with the general college population, the same program may be less effective with high-risk mandated college students. For example, one study compared results of the same alcohol skills training program with high-risk volunteer and high-risk mandated students as well as an assessment only control (Palmer, 2004). While the program demonstrated significant reductions in alcohol use and negative consequences with voluntary

students, mandated students reported no significant reductions in alcohol use or associated negative consequences.

In sum, while many programs have been developed to address risky alcohol use on college campuses, recent literature has identified several possible factors contributing to the persistence of the problem: (a) the cost associated with implementing individually delivered programs is a significant limitation for college administrators in providing empirically validated treatments; (b) there are a limited number of controlled studies that have specifically targeted mandated students and other high-risk drinkers; (c) programs successful with the general college population may be less effective when working with high-risk subgroups (i.e., heavy drinking mandated students); and (d) even effective interventions (e.g., BASICS) are still less successful with individuals lower on RTC.

Alcohol Expectancy Challenges

Of the Task Force's initial recommendations for effective programming, challenging alcohol expectancies was the only one identified that could be delivered in a group format at the time. Challenging alcohol expectancies in order to reduce alcohol consumption is based in expectancy theory and research which relates that individuals have beliefs about the effects of alcohol which in turn influence their drinking behavior (Rather & Goldman, 1994). Research on memory processes and expectancies has described expectancies as being stored in a symbolic, proximity-based network (Rather & Goldman, 1994).

One theory that has evolved utilizes a memory-based model, and related that indirect experiences with alcohol either through observations of family, peers, or the media, and direct experiences with alcohol are stored in the semantic memory system as "nodes". The proximity

between the nodes is determined by inherent meaning placed by the individual and learning history; thus when an alcohol stimuli is presented a “spreading activation” occurs which activates these nodes or expectancies (Rather, Goldman, Roehrich, & Brannick, 1992). Since an individual’s unique experiences shape their memory network and the proximity between the nodes it is understandable that the memory networks vary considerably. There have been two dimensions identified in the network-based memory systems related to alcohol expectancies: (1) beliefs regarding positive and negative outcomes of alcohol; and (2) beliefs regarding the arousing and sedating effects of alcohol (Goldman & Darkes, 1997; Rather & Goldman, 1994) (see figure 1). If an individual has learned that alcohol “will make me feel happy” or “energetic,” the individual’s memory network is represented as a tightly packed cluster of positive and arousing expectancies or beliefs about alcohol. However, if an individual has learned that alcohol “will make me sleepy or tired,” the individual’s memory network is more dispersed and less tightly packed in the area of positive and arousing beliefs about alcohol. When an individual with strong alcohol expectancies encounters an alcohol stimulus, a quick spreading of activation occurs and the individual begins to quickly associate the stimulus with positive and arousing effects as opposed to negative and sedating effects. Many factors influence the development of alcohol expectancies such as peers, parental alcohol use, and the media. Further, individuals form beliefs about the effects of alcohol even before they first begin drinking (Christiansen, Goldman, & Inn, 1982; Brown, 1985). Alcohol expectancies have also been shown to predict drinking initiation (Christiansen, Smith, Roehling, & Goldman, 1989) and changes in drinking behavior (Dunn & Goldman, 1998, 2000; Darkes & Goldman, 1993, 1998). Additionally, alcohol expectancies have been shown to differentiate between high and low-risk drinkers. Heavy and high-risk drinkers hold more positive and arousing beliefs about alcohol, whereas low-risk

drinkers tend to associate alcohol with more negative and sedative effects (Rather & Goldman, 1994).

In the transition from theory to practice the traditional *expectancy challenge* (EC) was designed to modify existing expectancies. The purpose of the EC was to modify an individual's existing alcohol expectancies to be more consistent with actual, pharmacological based expectancies (e.g., negative/sedating expectations of alcohol as a depressant). Further, expectancy theory research indicates that the modification of expectancies can subsequently result in decreases in alcohol use over time (Darkes & Goldman, 1993, 1998; Dunn, Lau, & Cruz, 2000; Goldman, 1999). The traditional EC involved a balanced placebo design in which high-risk, heavy drinkers were told to expect either an alcoholic or nonalcoholic beverage. However, what participants were told and what they actually received was different. Half of the participants who were told to expect an alcoholic beverage actually received a nonalcoholic, placebo drink and half received an alcoholic drink as initially told (same design for participants told to expect a nonalcoholic beverage). At the conclusion of the exercise participants were asked to identify who in the group had consumed alcohol based solely upon their observations of others behavior during the session (Darkes & Goldman, 1993; 1998). Participants could not accurately identify who had consumed alcohol and the failure to accurately identify the individuals who had consumed alcohol challenged their perceptions about the actual pharmacological effects of drinking on behavior. Results have indicated that the traditional EC has been successful in modifying key alcohol expectancies and reducing alcohol consumption in heavy drinking college students (Darkes & Goldman, 1993, 1998; Dunn & Goldman, 2000).

The requirement of a bar-lab setting for implementation, however, reasonably limited the widespread availability of this effective program. While some have attempted to take the core element of the traditional EC (i.e., alcohol/placebo administration) out of the lab and recreate its effectiveness with things like videos of the traditional EC and psychoeducation about expectancies, few have shown successful results in reducing alcohol use (Corbin, McNair, & Carter, 2001; Keillor, Perkins, & Horan, 1999). One study targeted to mandated college students, used a videotape of the traditional EC, but failed to show changes in expectancies or decreases in alcohol use at follow-up (Keillor et al., 1999). Another study included video clips of the traditional EC and required participants to write essays on their inaccurate expectancies. However, results indicated no significant decreases in alcohol consumption and did not report changes in expectancies (Jones, Silvia, & Richman, 1995). Additionally, a study by Corbin and colleagues (2001) implemented a three-session intervention that presented research on expectancies, had participants actively challenge identified expectancies, and then monitor sources of alcohol expectancies in media (e.g., television, radio). While results indicated decreases in positive alcohol expectancies, the study also demonstrated increases in alcohol use at the three-week follow-up (Corbin et al., 2001). A meta-analytic review of 14 studies, that included a total of 19 interventions, investigated whether the expectancy challenge design (i.e., experiential vs. didactic) was related to variability in resulting effect sizes. Results indicated that expectancies challenged experientially (i.e., include alcohol administration) versus didactically did not moderate alcohol expectancies or alcohol consumption (Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012). Results of the meta-analytic review also indicated that risk level (i.e., moderate vs. heavy drinkers) and delivery format (i.e., individual vs. group) did not moderate alcohol expectancies or alcohol consumption at follow-up (Scott-Sheldon et al., 2012).

Further, a recent narrative review of alcohol expectancy challenges indicated that EC's are most efficacious in reducing alcohol use when targeted to male-only groups and less support is seen for female-only and mixed gender groups (Labbe & Maisto, 2011). The narrative review also noted that the variable success seen in expectancy-based programs, evaluated with the context of the review, may be attributed to lack of motivation to change behavior (Labbe & Maisto, 2011). Since motivation to change is such a strong predictor of treatment outcome (Carbonari & DiClemente, 2000), it was noted that future expectancy-based programs should evaluate readiness or motivation to change behavior.

In an effort to translate the traditional EC into a method that does not rely on a bar lab or alcohol administration, an interactive presentation has been created that uses cognitive processing exercises in attempt to modify alcohol expectancies and in turn influence drinking behavior. This method has become known as the *Expectancy Challenge Alcohol Literacy Curriculum* (ECALC).

Preliminary studies. In a series of recent studies, the ECALC program has been found to significantly modify alcohol expectancies and reduce subsequent drinking behavior. The ECALC has been implemented in small and large college classrooms, high school classrooms, and fraternity and sorority chapter houses (Sivasithamparam, 2008; Schriener, 2010; Cruz, 2007; Fried, 2010). The ECALC program resulted in significant changes in alcohol expectancies and reductions in alcohol consumption for high school students (Cruz, 2007) and college students within a small classroom setting (Sivasithamparam, 2008). Further, the ECALC program was subsequently evaluated within large classrooms of 100 or more college students and resulted in significant changes in alcohol expectancies for males and females and significant reductions in

alcohol consumption for heavy drinking males (Schriener, 2010). In another study, the effectiveness of the ECALC was evaluated for use with high-risk, heavy drinking college students who were members of fraternities or sororities. Findings indicated that for both males and females, the ECALC program significantly modified alcohol expectancies and resulted in significant reductions in alcohol consumption on measures of blood alcohol concentration (BAC), quantity, frequency, and heavy episodic drinking. Participants who received the ECALC program demonstrated significant reductions in weekly peak BAC from .11 to .06 and average drinks consumed per sitting from 6.39 to 4.50, while reported alcohol consumption for participants in the control condition remained relatively unchanged (Fried & Dunn, 2012; Fried, 2010). In sum, the current ECALC program has repeatedly demonstrated efficacy in modifying alcohol expectancies and reducing alcohol consumption among high school and college students, including high-risk and heavy drinkers.

In the series of studies described above, the ECALC was delivered by graduate students who were very knowledgeable in the field of expectancy research, a fact that could limit the widespread use of the program. In an effort to ensure standardized delivery of the ECALC regardless of the sophistication of those who deliver the program, the ECALC has been converted into a digital format. The digitized ECALC is comprised of the same fundamental content as the existing ECALC with the addition of user-friendly presentation aids to assist the delivery of crucial components, without expert knowledge of expectancy theory. The role of the digital enhancements is to decrease time and resources necessary for training facilitators and aid in widespread implementation across high school and college campuses.

The purpose of the current study was to measure the effectiveness of the digitally assisted ECALC program in changing alcohol expectancies and reducing alcohol consumption and alcohol-related harms with mandated college students. Mandated students were randomly assigned to condition, and received either the ECALC or a well-established intervention commonly used with this population known as BASICS (Dimeff et al., 1999). The study intended to demonstrate comparable reductions in alcohol use and related problems with the mandated student population. Further, alcohol expectancies assessed following completion of the ECALC program were predicted to significantly mediate the relationship between the intervention and alcohol consumption at follow-up. In order to allow for a direct comparison of the ECALC curriculum with the BASICS program, the ECALC was delivered in an individual, face-to-face format.

METHOD

Participants

Prospective participants were undergraduate students referred to the Alcohol and Other Drug Prevention and Programming Office (AOD) at the University of Central Florida (UCF) for alcohol related violations. Participants were recruited over three academic semesters (Spring 2012, Fall 2012, and Spring 2013). During this time 407 students were referred to the Alcohol and Other Drug Prevention Office from the Office of Student Conduct for violating a campus alcohol policy. Participants were then screened for the following inclusion criteria: (a) at least 18 years old and (b) demonstrate risky drinking behavior (i.e., AUDIT score of 8 to 19, or at least 1 binge episode within the past 30 days; criteria based on O'Hare & Sherrer, 1999). The following students were excluded from participation: (a) AUDIT score ≥ 20 , indicating need for further evaluation for alcohol dependence, (b) CUDIT score ≥ 8 , indicating possible cannabis abuse or dependence, or (c) significant other substance use within the past 3 months indicating the need for higher level of treatment. Of the 407 students, 167 students met inclusion criteria and were recruited to participate in this study. Students were informed that their participation in the research is completely voluntary and their involvement in the study or regular program services would allow them to fulfill their judicial referral obligation. Of the initial 167 students that met inclusion criteria, 151 students were enrolled, consented, and completed baseline data (12 participants did not consent to use of data and four were excluded because of 'no shows'). Of these 151 students, 13 were removed due to possible provider treatment infidelity, 15 were removed due to transfer to a higher level of care during services (BASICS, $n = 7$; ECALC, $n = 8$), and one was referred out for additional treatment. The remaining 122 participants were separately randomized into the BASICS condition or ECALC condition by gender. The purpose

of using a stratified random assignment was to ensure an equal number of male and females in each condition. Of the 122 participants, 59 were assigned to the ECALC (39 male, 19 female) and 64 were assigned to the BASICS condition (41 male, 22 female).

Procedure Overview

Session 1. All students referred for an alcohol violation were invited to participate in the current research study. Those that agreed to participate in the study completed baseline assessment measures. Participants who met inclusion criteria for the study continued to the second phase of the study.

Session 2. All participants meeting inclusion criteria completed an individually administered psychosocial interview. Male and female participants were then separately randomized into the BASICS condition or ECALC condition.

Session 3. Participants randomly assigned to the BASICS condition received an individually delivered feedback session, one to two weeks following session two. The session included motivational interviewing and personalized normative feedback following the BASICS treatment manual (Dimeff et al., 1999). Participants randomly assigned to the ECALC condition received the single session individually delivered ECALC program, one to two weeks following session two. Thus, all participants received the same amount of clinical contact time allowing for direct comparison of the ECALC to BASICS intervention in session three.

Follow-up. All participants were scheduled for a follow-up appointment four weeks after completion of session three. During the follow-up appointment participants completed follow-up assessment measures, which included measures of drinking (i.e., TLFB) and alcohol related

harms (i.e., BYAACQ). Follow-up measures were completed in-person following the same protocol as baseline data collection.

Clinical training. Clinicians were masters or doctoral level students who completed over 20 hours of training in motivational interviewing and BASICS protocol. Clinicians received weekly supervision by a doctoral level clinician who reviewed session notes and tapes. Two graduate research assistants coded 20-minute segments of all recorded sessions using the MITI coding system, to ensure adequate compliance with MI (90%).

Program Content

ECALC. The ECALC is a brief, 50-minute presentation designed to reduce high-risk drinking. The ECALC was provided in an individual, face-to-face format by a masters or doctoral level clinician that assisted in leading the participant through the digital ECALC presentation. The key components and concepts of the program, however, were delivered through a digitalized narrator. The presentation began with common myths associated with alcohol use and a detailed description of a standard drink. The presentation then discussed how alcohol expectancies are formulated and the role alcohol expectancies play in drinking behavior. It then presented a brief summary of the results of experimental research that has identified pharmacological and expectancy effects of alcohol. Students were then presented with alcohol advertisements and commercials and asked to identify positive and arousing alcohol expectancies depicted in each advertisement. The presentation deconstructed alcohol advertisements into elements to be contrasted with scientific information on the pharmacological effects of alcohol previously presented. Participants then discussed the contradictions of positive/arousing expectancies depicted in media advertisements and the pharmacological effects of alcohol. The presentation also included of a series of exercises or games (e.g., word list, brand

recognition) designed to demonstrate effects of media and facilitate cognitive processing of expectancy information.

BASICS. Participants in the BASICS condition received an individually delivered personalized feedback session based on the information provided during assessment sessions (i.e., session 1 and session 2). The BASICS feedback session lasted between 45 and 55 minutes and was also provided by a masters or doctoral level clinician. The personalized feedback session was comprised of five main components: (1) information on the effects of alcohol (e.g., blood alcohol concentration (BAC), tolerance, and effects of different BAC levels) (2) comparison of participant's drinking behavior to drinking norms based on age and gender (3) information regarding the participant's current pattern of alcohol use and their individual risk factors (e.g., history of negative alcohol related consequences, family history of alcohol abuse or dependence); (4) strategies to reduce risk associated with alcohol use (e.g., protective behavioral strategies, pacing and spacing drinks, setting a drinking limit, selecting a designated driver, avoiding hard liquor and drinking games); and (5) increasing motivation to change current drinking behaviors. Throughout the personalized feedback session clinicians utilized MI principles and techniques designed to enhance motivation to change behavior (Miller & Rollnick, 2002). Adherence to MI protocol was monitored throughout implementation with use of the MITI coding system (MITI; Moyers, Martin, Manuel, Hendrickson, & Miller, 2005).

Measures

Demographic information. Participants provided information on demographic characteristics including age, gender, ethnicity, class standing, and living arrangement.

Alcohol Use Disorders Identification Test (AUDIT; Babor, De La Fuente, Saunders, & Grant, 1992). The AUDIT is a brief 10-item screening measure that assesses alcohol use, dependence symptoms, and harmful alcohol use. It demonstrates high internal consistency (Fleming, Barry, & MacDonald, 1991), high test-retest reliability ($r = .86$) (Hays, Merz, & Nicholas, 1995). The AUDIT has been validated for use in a variety of treatment settings and across gender, age, and cultures (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993). An AUDIT cutoff score of 8 demonstrated sensitivities for problematic drinking (mid .90's) and specificities averaged in 0.80's (Saunders et al., 1993). AUDIT score of 8-15 represents moderate level of alcohol problems, 16-19 represents high level, and 20+ represents the need for further evaluation for alcohol dependence (Babor et al., 1992).

Timeline Follow-Back (TLFB; Sobell & Sobell, 1992). Alcohol consumption for the 1-month prior to baseline assessment as well as the one-month period following the completion of treatment will be measured using the retrospective, self-report, timeline follow-back procedure (Sobell & Sobell, 1992). The timeline follow-back procedure is a reliable ($r = 0.76-0.98$) and valid method for obtaining retrospective estimates of daily alcohol use (Sobell & Sobell, 1992). All participants will be given the definition of standard drink equivalents and then asked to identify reference points within each 4-week period to enhance recall of alcohol consumption. This method of recording past alcohol use on a calendar has become the standard method throughout the field because it provides accurate and specific alcohol use data for each drinking occasion, and can be used to calculate BAC when duration of drinking episode is also recorded. The timeline follow-back method provides a wealth of alcohol use data including total number of drinks, mean drinks per week, binge episodes per month, mean BAC per week, and peak BAC

over the time period. Binge episode will be defined as consuming five or more drinks for males and four or more drinks for females during a single drinking occasion (Wechsler & Nelson, 2002). Mean and Peak BAC will be calculated using the following formula: $[(\text{number of drinks}/2 \times (\text{gender constant}/\text{body weight})) - (.016 \times \text{number of hours drinking})]$. The gender constant (male = 7.5; female = 9) accounts for gender differences in synthesizing alcohol (Matthews & Miller, 1979).

Comprehensive Effects of Alcohol Scale (CEOA; Fromme, Stroot, & Kaplan, 1993).

Alcohol expectancies will be assessed before and immediately after the presentation of the ECALC and BASICS session using the CEOA. The CEOA is a factor model-based expectancy measure, which has good internal consistency and temporal stability (range of $r = 0.53-0.81$ for the different factors). The CEOA is a 38-item measure and utilizes a 4-point Likert rating scale (1 = disagree, 2 = slightly disagree, 3 = slightly agree, 4 = agree) and yields four subscales categorized as positive (Sociability, Tension Reduction, Liquid Courage, and Sexuality) and three categorized as negative (Cognitive and Behavioral Impairment, Risk and Aggression, and Self-Perception). Due to time constraints, for the purposes of this study the positive CEOA subscales of Sociability, Tension Reduction, Liquid Courage and Sexuality were alcohol expectancies were examined in mediational analyses. Time constraints restricted the administration all subscales of the CEOA, thus the four positive subscales above were chosen being that positive alcohol expectancies is more highly correlated with heavier drinkers, alcohol related problems (Brown et al., 1987) and changes in positive alcohol expectancies more readily predict success following treatment (Nielsen, 1992). Additionally, a previous study on the

ECALC program demonstrated significant changes only on the positive subscales of the CEOA, which in turn mediated alcohol use at the four-week follow-up (Fried & Dunn, 2012).

The Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler, Strong, & Read, 2005). The BYAACQ assesses 24 consequences of alcohol consumption that participants either endorse or not endorse as having occurred over the past 30 days. Responses to the BYAACQ items are summed to form a total score where positive values indicate the experience of more alcohol-related consequences. This measure has been found to possess high internal consistency (Cronbach's alpha = 0.89), reliability, shows minimal item redundancy, and covers a range of problem severity in use with college students (Kahler, Strong, & Read, 2005; Kahler et al., 2008).

University of Rhode Island Change Assessment (URICA; McConaughy, Prochaska & Velicer, 1983). The URICA is a 12-item questionnaire that utilizing a 5-point Likert scale (-2 = strongly disagree, 0 = neutral, +2 = strongly agree). The URICA assesses the respondent's stage of change according to Prochaska and DiClemente's (1986) stages of change model and is comprised of three subscales (Precontemplation, Contemplation, and Action). Scale scores range from -8 to +8, with a negative scale score reflecting disagreement and a positive scale score reflecting agreement. A respondent's highest scale score represents the Stage of Change classification (i.e., Precontemplation, Contemplation, or Action). This measure has been found to possess high internal consistency (Cronbach's alpha; Precontemplation = 0.73; Contemplation = 0.80; Action = 0.85) and test-retest reliability Precontemplation = 0.82; Contemplation = 0.86; Action = 0.78 (Rollnick, Heather, Gold & Hall, 1992).

Cannabis Use Disorders Identification Test (CUDIT; Adamson & Sellman, 2003).

The CUDIT is a brief 10-item measure to screen for cannabis abuse and dependence. The CUDIT demonstrates good internal consistency (Cronbach's alpha = 0.84) and a cutoff score of 8 demonstrates sensitivity of 73.3% and positive predictive power of 84.6%.

Other Substance Use. Questionnaire assesses for frequency of other substance use within the past three months. Substances include tobacco, marijuana, cocaine, amphetamines, sedatives, hallucinogens, opiates, inhalants, designer drugs (ecstasy, MDMA, GHB), steroids, prescriptions drugs, and over the counter drugs.

Motivational Interviewing Treatment Integrity scale (MITI; Moyers, Martin, Manuel, Hendrickson, & Miller, 2003). The MITI scale assesses fidelity to the motivational interviewing (MI) process using a coding system that is comprised of two global scores (Empathy, MI Spirit) and seven behavior counts (Giving Information, MI Adherent, MI Non-adherent, Open Question, Closed Question, Simple Reflection, Complex Reflection). Global scores are derived by having trained coders assign scores along a seven-point scale (1 = *low*, 7 = *high*) on each dimension. Behaviors such as asking “closed” versus “open” questions and providing “simple” versus “complex” reflections are tallied throughout the duration of a random 20-minute session excerpt. Proficiency in MI is demonstrated by a global rating score of 5 and a behavior count of 90% MI-Adherent (Moyers et al., 2003).

Hypotheses

The purpose of this study was to measure the effectiveness of the digital ECALC, and to compare the effects of the ECALC to BASICS in an effort to reduce high-risk alcohol use and alcohol related negative consequences during the one-month follow-up period. Specific

hypotheses were as follows: (1) Participants in the ECALC condition will demonstrate significant decreases in positive alcohol expectancies following the ECALC presentation. (2) Participants in the ECALC condition will demonstrate comparable or significantly greater reductions in alcohol use at follow-up when compared to those in the BASICS condition. (3) Participants in the ECALC condition will demonstrate comparable or significantly greater reductions in alcohol-related negative consequences at follow-up when compared to those in the BASICS condition. (4) Alcohol expectancies will significantly mediate the relationship between the ECALC condition and alcohol use at follow-up.

Data Analysis Plan

For sample size calculation, separate power analyses were conducted for each of the three primary outcome measures. Based on the most conservative estimate for sample size, a total sample size of 120 (30 in each group) is needed to detect a medium effect size ($d = .25$; Cohen, 1992), with an alpha level of .05 and beta of .80, for all proposed analyses (Faul, Erdfelder, Buchner, & Lang, 2009). All variables were checked for outliers and deviations from normality prior to analysis and outliers greater than 3.29 *SDs* above the mean ($p < .001$) were incrementally recoded to one unit above the next lowest value (Tabachnick & Fidell, 2006; Borsari et al., 2007).

RESULTS

Sample Description

There were 122 undergraduate students that were included as participants in this study. Participants' mean age was 19.42 ($SD = 1.34$) years and 66.4% ($n = 81$) were male while 33.6% ($n = 41$) were female. Approximately 73% identified themselves as Caucasian, 13.9% as Hispanic, 0.8% as Asian American, 6.6% as African-American, and 4.9% as other. Approximately 52.5% identified themselves as freshman, 20.5% as sophomores, 15.6% as juniors, and 10.7% as seniors in class standing. In regards to living situation, 36.9% identified themselves as living in a residence hall, 13.9% in off-campus (University affiliated) housing, 4.9% in a fraternity or sorority, and 43.4% in an independent house or apartment. With respect to stage of change prior to treatment, 41.8% of participants' RTC score fell within the Precontemplation stage, 3.3% within the Contemplation stage, and 54.1% within the Action stage.

Baseline Comparison of Conditions

To demonstrate comparability between ECALC and BASICS conditions, analyses were conducted on demographic variables, baseline drinking behavior, baseline alcohol-related harms, and baseline alcohol expectancies. No significant differences were found based on gender [$\chi^2 (1, N = 122) = .10, p = .75$], class standing [$\chi^2 (3, N = 122) = .99, p = .80$], ethnicity [$\chi^2 (4, N = 122) = 1.91, p = .75$], living situation [$\chi^2 (3, N = 122) = 6.52, p = .09$], or age [$\chi^2 (8, N = 122) = 5.80, p = .67$]. Further no significant differences were found between groups on Readiness to Change [$\chi^2 (2, N = 121) = .36, p = .84$] (see Table 1 for description of participants). No significant differences were found between groups on mean blood alcohol content, $F(1, 119) = .00, p = .99$, peak blood alcohol content, $F(1, 119) = .02, p = .89$, average drinks per sitting,

$F(1, 119) = .397, p = .53$, peak drinks per sitting, $F(1, 119) = .26, p = .61$, number of drinking days over the month, $F(1, 119) = .03, p = .87$, number of binge episodes, $F(1, 119) = .22, p = .64$, and average drinks per week $F(1, 119) = .19, p = .66$ (see Table 2 for means and standard deviations). No significant differences were found between groups at baseline on alcohol-related harms, $F(1, 117) = .21, p = .65$ or alcohol expectancies, $F(4, 115) = .21, p = .93$. Finally, no significant differences were found between groups on total AUDIT, $F(1, 117) = 1.18, p = .28$ or total CUDIT scores, $F(1, 119) = .03, p = .86$ at baseline assessment.

Follow-up Completion

Of the 122 participants who completed baseline measures, 110 (90.2%) completed the 1-month follow-up (ECALC = 91.5%, $n = 54$; BASICS = 87.5%, $n = 56$). Statistical comparisons of those who completed follow-up with those who did not, revealed no significant differences in demographic characteristics, baseline measures of drinking, alcohol expectancies, alcohol-related harms, stage in readiness to change, or treatment assignment.

Evaluation of Internal Validity

Twenty minutes segments of randomly selected videotaped sessions were rated to evaluate the integrity of the intervention and adherence to treatment protocol. For BASICS, proficiency in MI is demonstrated by a global rating score of 5 and a behavior count of 90% MI-Adherent (Moyers et al., 2003). Eighteen (28.1%) of the 64 BASICS feedback sessions were randomly selected and reviewed. The average global rating score for Empathy/Understanding was 6.5 and 5.6 for Spirit. Overall, the reviewed sessions exhibited 86.6% MI adherence, which was calculated using the following equation [MI adherent/MI adherent + MI non-adherent] (Moyers et al., 2003).

Alcohol Expectancy Analysis

Between-group differences in alcohol expectancies at follow-up were assessed using a series of 2 x 2 (Condition x Gender) analyses of covariance (ANCOVA) with baseline expectancy values included as covariates. Dependent variables consisted of subscale scores on each of the four subscales of the CEOA (Sociability, Tension Reduction, Liquid Courage, and Sexuality). Type 1 error was controlled for using the Bonferroni procedure, such that each ANCOVA was tested for significance at the .0125 level (.05 divided by the 4 ANCOVA's conducted). Consistent with the a-priori hypotheses, after controlling for baseline values, significant between groups differences were seen on all four positive CEOA subscales, Sociability, $F(1, 105) = 24.34, p = .000$, Liquid Courage, $F(1, 105) = 8.05, p = .005$, Sexuality, $F(1, 105) = 7.53, p = .007$, and Tension Reduction, $F(1, 105) = 18.05, p = .000$. Participants in the ECALC condition reported significantly lower mean scores on all four positive subscales of the CEOA compared to those of those in the BASICS condition. Further, there were no significant group x gender interactions, indicating the ECALC was equally effective for males and females in the modification of expectancies. Means and standard deviations of changes in alcohol expectancies are provided in Table 3.

Alcohol Use Analysis

A series of 2 x 2 (Condition x Gender) analyses of covariance (ANCOVA) were used to demonstrate significant differences between conditions on follow-up drinking measures with the baseline value as the covariate, and gender and treatment condition as the between-subjects factors. Dependent variables included mean BAC, peak BAC, average drinks per sitting, peak drinks per sitting, number of drinking days per month, average drinks per week, and number of binge episodes per month (all data derived from the TLFB calendar). After controlling for

baseline alcohol values, results revealed significant differences in means at follow-up for number of drinking days per month $F(1,105) = 4.07, p = .046$, with participants in the ECALC condition reporting significantly fewer drinking days per month compared to those in the BASICS condition. There were no significant differences between groups at follow-up on measures of mean BAC $F(1,105) = 1.04, p = .31$, peak BAC $F(1,105) = 1.49, p = .23$, average drinks per sitting $F(1,105) = 2.01, p = .16$; peak drinks per sitting $F(1,105) = 2.77, p = .10$, average drinks per week $F(1,105) = 1.15, p = .29$, or number of binge episodes per month $F(1,105) = .42, p = .52$. Results indicate that participants in the ECALC condition demonstrated comparable reductions in mean BAC, peak BAC, average drinks per sitting, peak drinks per sitting, average drinks per week, and number of binge episodes per month at follow-up when compared to those in the BASICS condition (see Table 4 for means and standard deviations).

To allow for direct comparison of the effectiveness the ECALC and BASICS conditions, between-subjects (d_b) and within-subjects (d_w) effect sizes were calculated on alcohol measures of quantity (mean and peak BAC, average and peak drinks per sitting, average drinks per week) and frequency (number of binge episodes, number of drinking days per month). To evaluate the change observed in each treatment condition (i.e., ECALC, BASICS), within-subjects effect sizes d_w were calculated as the difference between the baseline and 1-month follow-up score, divided by the pooled standard deviation (Cohen, 1988; Morris & DeShon, 2002; Scott-Sheldon et al. 2012). Cohen (1988) identified a small effect size as $d = .2$, medium as $d = .5$, and large as $d = .8$. Participants in the ECALC condition showed greater reductions in mean BAC ($d_w = .48$) and peak BAC ($d_w = .62$) relative to those in the BASICS condition ($d_w = .25$ and $d_w = .37$ respectively). Within the ECALC condition, greater reductions were also seen on measures of

average drinks per sitting ($d_w = .48$), peak drinks per sitting ($d_w = .62$), and average drinks per week ($d_w = .28$), relative to those in the BASICS condition ($d_w = .32$, $d_w = .34$, and $d_w = .10$ respectively). Participants in the ECALC condition also demonstrated greater reductions in frequency of heavy drinking in measures of number of binge episodes ($d_w = .23$) and number of drinking days per month ($d_w = .41$) relative to those in the BASICS condition ($d_w = .18$ and $d_w = .13$ respectively; see Table 4).

Given the use of an active control condition (i.e., BASICS) between subjects effect sizes (d_b) were also calculated as the difference between change scores of the ECALC and BASICS condition, divided by the pooled standard deviation at baseline between the two groups (Rosenthal, 1994). A positive effect size demonstrates changes in the intended direction favoring the ECALC condition when compared to the BASICS condition. Participants in the ECALC condition demonstrated reductions in mean BAC ($d_b = .22$), peak BAC ($d_b = .21$), average drinks per sitting ($d_b = .17$), peak drinks per sitting ($d_b = .29$), average drinks per week ($d_b = .17$), number of binge episodes ($d_b = .03$), and number of drinking days per month ($d_b = .24$), relative to those in the BASICS condition.

Alcohol Related Harms Analysis

A 2 x 2 (Condition x Gender) ANCOVA was used to assess significant differences in alcohol related harms between conditions at follow-up with the baseline value as the covariate, and gender and treatment condition as between-subjects factors. The dependent variable was the sum total score of all items endorsed on the BYAACQ. After controlling for total harms score at baseline, results revealed no significant differences in means between groups at follow-up $F(1,102) = .16, p = .69$ (ECALC, $d_w = .48$; BASICS, $d_w = .62$). Participants in the ECALC

condition demonstrated comparable reductions in alcohol related harms relative to those in the BASICS condition (see Table 4 for means, standard deviations, and effect sizes).

Mediation Analyses

Regression analyses were used to examine if (1) alcohol expectancies significantly mediated the relationship between the ECALC condition and alcohol use at follow-up (2) readiness to change score significantly mediated the relationship between the BASICS condition and alcohol use at follow-up. Evidence of mediation or an indirect effect is present when both Path A, the condition to the expectancies relation, and Path B, the expectancies and alcohol use relation are statistically significant (MacKinnon, Fairchild, & Fritz, 2007). Mediation analyses were conducted for each subscale of the CEOA. Results indicated that the ECALC condition was significantly associated with expectancies of Sexual Enhancement ($\beta = .19, p = .042$), Sociability ($\beta = .41, p = .000$), Tension Reduction ($\beta = .43, p = .000$), and Liquid Courage ($\beta = .23, p = .01$), assessed immediately following session three. The expectancy of Sociability was in turn significantly associated with mean BAC ($\beta = .22, p = .03$), peak BAC ($\beta = .20, p = .05$), number of binge episodes ($\beta = .22, p = .03$), and average drinks per week ($\beta = .21, p = .03$) at follow-up. Further, the M.E. Sobel test (1982) indicated that Sociability produced a significant intervening effect for mean BAC ($z = 1.99, p = .046$), number of binge episodes ($z = 1.99, p = .046$), and average drinks per week ($z = 1.96, p = .049$). Additionally, the expectancy of Liquid Courage was significantly associated with mean BAC ($\beta = .32, p = .001$), peak BAC ($\beta = .27, p = .007$), number of binge episodes ($\beta = .33, p = .001$), average drinks per sitting ($\beta = .35, p = .000$), peak drinks per sitting ($\beta = .37, p = .000$), and average drinks per week ($\beta = .30, p = .002$) at follow-up. The M.E. Sobel test (1982) indicated that Liquid Courage produced a significant intervening effect for mean BAC ($z = 2.02, p = .043$), number of binge episodes ($z = 2.02, p = .043$), average

drinks per sitting ($z = 2.08, p = .04$), peak drinks per sitting ($z = 2.12, p = .03$), and average drinks per week ($z = 2.08, p = .04$). Finally, Sexual Enhancement was significantly associated with mean BAC ($\beta = .25, p = .014$), peak BAC ($\beta = .23, p = .021$), number of binge episodes ($\beta = .22, p = .030$), average drinks per sitting ($\beta = .29, p = .004$), peak drinks per sitting ($\beta = .32, p = .001$), and average drinks per week ($\beta = .21, p = .037$) at follow-up. However, the M.E. Sobel test (1982) indicated that Sexual Enhancement did not produce a significant intervening effect for mean BAC, peak BAC, number of binge episodes, average drinks per sitting, peak drinks per sitting, or average drinks per week.

DISCUSSION

The purpose of this study was to examine the effectiveness of the digital ECALC by direct comparison of the ECALC to an already well-established treatment (i.e., BASICS; Dimeff et al., 1999) in an effort to reduce heavy and high-risk alcohol use and related negative consequences among mandated college students. According to the American Psychological Association, Division 12 Task Force on Psychological Interventions, in order to be identified as a ‘Well-Established Treatment’ one must demonstrate “at least two good between group design experiments” and demonstrate the intervention is (1) superior to ‘psychological placebo’ or another treatment, OR (2) “equivalent to an already established treatment in experiments with adequate statistical power (about 30 per group; Kazdin & Bass, 1989)” (American Psychological Association, 1995). Consistent with a priori hypotheses, results indicate that for both males and females, those in the ECALC condition demonstrated significantly greater reductions in frequency of alcohol use (i.e., number of drinking days per month) and comparable reductions in typical (i.e., mean BAC, average drinks per sitting, average drinks per week) and heavy alcohol use (i.e., peak BAC, peak drinks per sitting, number of binge episodes) at follow-up when compared to those in the BASICS condition. After controlling for baseline differences, while follow-up differences were not statistically significant, participants in the ECALC condition demonstrated larger effect size reductions in measures of typical (i.e., mean BAC, average drinks per sitting, average drinks per week) and heavy drinking behavior (i.e., peak BAC, peak drinks per sitting, number of binge episodes). For example, those in the ECALC condition demonstrated reductions in mean BAC from .05 (.04) to .03 (.04) with an associated effect size of $d_w = .48$ [compared to BASICS .05 (.04) to .04 (.04), $d_w = .25$] and peak BAC from .09 (.07) to .05 (.05)

with an effect size of $d_w = .62$ [compared to BASICS $.09 (.06)$ to $.07 (.07)$, $d_w = .37$]. Overall, effect sizes for changes in alcohol use within the ECALC condition were moderate ($d_w = .23$ to $.62$) compared to those in the BASICS condition ($d_w = .10$ to $.37$). Participants in the ECALC condition also demonstrated comparable reductions in total harms reported from baseline to follow-up (8.91 to 3.96) compared to those in the BASICS condition (11.3 to 4.9).

Consistent with a priori hypotheses, participants in the ECALC condition demonstrated significant decreases on all four positive alcohol expectancy subscales of the CEOA (Sociability, Tension Reduction, Sexuality, and Liquid Courage) while alcohol expectancy scores of those in the BASICS condition remained relatively unchanged. This indicates that the ECALC intervention successfully modified alcohol expectancies to be more in line with the pharmacological effects of alcohol. Also consistent with a priori hypotheses, results of mediation analyses revealed that the expectancies of Sociability and Liquid Courage significantly mediated the intervention to outcome relationship. This supports the theoretically driven hypothesis that expectancy challenge strategies affect drinking behavior through manipulation of key alcohol expectancies. Sociability and Liquid Courage expectancies were critical in modification of drinking changes for participants in the ECALC condition.

Further, a meta-analytic review of 19 expectancy challenge interventions indicates that the ECALC intervention resulted in stronger effect sizes (d_w) for frequency of heavy drinking ($k = 4$, $d_w = .36$) and quantity of alcohol use ($k = 10$, $d_w = .13$) (Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012). Results of the ECALC intervention also demonstrate comparable and often larger effect sizes for many drinking variables when compared to existing efficacy research on BASICS and other brief motivational interventions. For example, participants in a BMI reduced

typical BAC ($d_w = .37$), peak BAC ($d_w = .46$), and number of binge episodes per month ($d_w = .18$) at the 1-month follow-up (Borsari & Carey, 2005) compared to reductions seen from the ECALC intervention of $d_w = .48$, $d_w = .62$, and $d_w = .23$, respectively. Additional studies evaluating the effectiveness of BASICS and other brief motivational interventions demonstrated reductions in number of drinks per week ($d_w = .47$, Borsari & Carey, 2005; $d_w = .28$; White, Mun, Pugh, & Morgan, 2007) and peak BAC ($d_w = .37$; Schaus et al., 2009; $d_w = .36$; White et al. 2007) compared to changes seen in the ECALC treatment condition of average drinks per week ($d_w = .28$), average drinks per sitting ($d_w = .48$), and peak BAC ($d_w = .62$).

Limitations of the Present Study

There are limitations to the current study that must be noted. The lack of wait-list control group, which limits the ability to determine if changes would have occurred naturally, without any intervention. However, we were constrained by an ethical obligation and university requirement to provide quick access to effective treatments. Further, alcohol use and alcohol related harms were only assessed 1-month post intervention. Future studies should assess the durability of the ECALC's positive results through longer-term follow-up periods. Additionally, there were some eligible participants that declined to participate in the study; thus findings may not generalize to all mandated college students. Finally, due to time constraints the negative subscales of the CEOA were unable to be administered as part of the baseline assessment protocol. Thus, the effect of the current ECALC program on negative alcohol expectancies remains unknown. Future ECALC studies should include the negative subscales of the CEOA within the assessment measures to evaluate its impact.

Conclusions and Future Prospects

There are several important implications resulting from the findings of this study. First, exposure to the expectancy challenge condition resulted in decreases in positive and arousing alcohol expectancies in both males and females. Computer-delivered or digitally facilitated interventions may be advantageous due to their ability to increase accessibility, reduce overall cost (e.g., cost to student, health care system, university, etc.), reach larger audiences, and are less resource intensive. However, to date extant research has indicated that face-to-face interventions were more successful at reducing alcohol use and related negative consequence with mandated college students (Carey, Carey, Henson, Maisto, & DeMartini, 2011; Carey et al., 2012). Thus, the present study is unique in that it demonstrates comparable effectiveness to an already established face-to-face delivered treatment program (BASICS; Dimeff et al., 1999). The ECALC program is also valuable in that it eliminates the necessity of a highly trained health care provider and reduces overall cost without compromising treatment effectiveness through the assistance of digitalized narrator.

APPENDIX A. INFORMED CONSENT

Dear Research Participant,

You have been invited to participate in a research study conducted by a faculty member in the UCF Psychology Department. Your participation will involve anonymously completing survey measures before and after receiving a presentation on media literacy and a summary of related research findings focused on the effects of alcohol. Questions will ask about alcohol use and related attitudes and behaviors. Your identity and all of your responses will be kept **anonymous**. Information gathered will only be used anonymously to improve the education students like you receive. ***Your honesty is essential to the study, which is why we guarantee complete anonymity.***

You can withdraw from the study at any time without penalty. Only those individuals who are at least 18 years of age will be included in this study. Although there are no foreseeable risks from your participation in this investigation, should you have an emotional reaction to any of the material presented, please notify the leader in your session or any of the primary investigators listed below:

Project Coordinator:
Abigail Fried
Dept. of Psychology
afried@mail.uf.edu
(407) 823-2522

Principal Investigator:
Michael Dunn, Ph.D.
Dept. of Psychology
mdunn@mail.ucf.edu

Co-Investigator:
Tom Hall, MSW, LCSW
SDES
tvhall@mail.ucf.edu
(407) 823-0869

In addition, the University requires that we inform every research participant of the following: You acknowledge that the University of Central Florida is an agency of the State of Florida and that the University of Central Florida's operations and liabilities are regulated by Florida law, including the University of Central Florida's ability to indemnify any person, firm or corporation for injury or loss caused by the University of Central Florida; that the State of Florida is self-insured to the extent of its liability under law; and that liability in excess of that specified in statute may be awarded only through special legislative action. Accordingly, the University of Central Florida's ability to compensate you for any injury suffered during this research study is very limited.

Information regarding your rights as a research volunteer may be obtained from:

Barbara Ward, CIM
University of Central Florida (UCF)
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, FL 32826-3246
Telephone: 407-823-2901

If you have no objections to participating in this study, **please print and sign your name below.** Please include your email address and phone number if you wish to be contacted to complete the online follow-up surveys and receive your compensation. If you feel you need additional information, please contact Abigail Fried at 407-823-2522.

I want to participate in this study.

I do not want to participate in this study.

Your Name (Please print clearly)

Your Signature (Please Sign)

APPENDIX B. TIMELINE FOLLOW-BACK CALENDAR

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
August 16 Drinking Occasion: # Drinks: ____ Over ____ hours	17 Drinking Occasion: # Drinks: ____ Over ____ hours	18 <i>Sorority</i> <i>Recruitment</i> Drinking Occasion: # Drinks: ____ Over ____ hours	19 Drinking Occasion: # Drinks: ____ Over ____ hours	20 Drinking Occasion: # Drinks: ____ Over ____ hours	21 Drinking Occasion: # Drinks: ____ Over ____ hours	22 <i>Bid Day!!!</i> Drinking Occasion: # Drinks: ____ Over ____ hours
23 <i>Frat Recruitment</i> Drinking Occasion: # Drinks: ____ Over ____ hours	24 <i>Classes begin</i> Drinking Occasion: # Drinks: ____ Over ____ hours	25 Drinking Occasion: # Drinks: ____ Over ____ hours	26 Drinking Occasion: # Drinks: ____ Over ____ hours	27 Drinking Occasion: # Drinks: ____ Over ____ hours	28 Drinking Occasion: # Drinks: ____ Over ____ hours	29 Drinking Occasion: # Drinks: ____ Over ____ hours
30 Drinking Occasion: # Drinks: ____ Over ____ hours	31 Drinking Occasion: # Drinks: ____ Over ____ hours	September 1 Drinking Occasion: # Drinks: ____ Over ____ hours	2 Drinking Occasion: # Drinks: ____ Over ____ hours	3 Drinking Occasion: # Drinks: ____ Over ____ hours	4 Drinking Occasion: # Drinks: ____ Over ____ hours	5 <i>UCF vs.</i> <i>Samford</i> Drinking Occasion: # Drinks: ____ Over ____ hours
6 Drinking Occasion: # Drinks: ____ Over ____ hours	7 <i>Labor Day</i> Drinking Occasion: # Drinks: ____ Over ____ hours	8 Drinking Occasion: # Drinks: ____ Over ____ hours	9 Drinking Occasion: # Drinks: ____ Over ____ hours	10 Drinking Occasion: # Drinks: ____ Over ____ hours	11 Drinking Occasion: # Drinks: ____ Over ____ hours	12 <i>UCF vs.</i> <i>Southern Miss</i> Drinking Occasion: # Drinks: ____ Over ____ hours
13 Drinking Occasion: # Drinks: ____ Over ____ hours	14 Drinking Occasion: # Drinks: ____ Over ____ hours	15 Drinking Occasion: # Drinks: ____ Over ____ hours	16 Drinking Occasion: # Drinks: ____ Over ____ hours	17 Drinking Occasion: # Drinks: ____ Over ____ hours	18 Drinking Occasion: # Drinks: ____ Over ____ hours	19 <i>UCF vs.</i> <i>Buffalo</i> Drinking Occasion: # Drinks: ____ Over ____ hours

APPENDIX C. AUDIT

1. How often do you have a drink containing alcohol?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. How many standard drinks do you have on a typical day when you are drinking?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3. How often do you have five or more standard drinks on one occasion?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
4. How often during the last year have you found that you were not able to stop drinking once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
5. How often during the last years have you failed to do what was normally expected of you because of your drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
6. How often during the last year have you had a feeling of guilt or remorse after drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
7. How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
8. How often during the last year have you been unable to remember what happened the night before because you had been drinking?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
9. Have you or someone else been injured because of your drinking?	No	Yes, but not in the last year		Yes, during the last year	
10. Has a relative, friend, doctor, or other health care worker been concerned about your drinking or suggested you cut down?	No	Yes, but not in the last year		Yes, during the last year	

APPENDIX D. COMPREHENSIVE EFFECTS OF ALCOHOL MEASURE

The following section assesses what you would expect to happen if you were under the influence of alcohol.

If you do not drink alcohol, please answer questions based on your beliefs, knowledge, and understanding of the effects of alcohol.

Circle one option from disagree to agree – depending on whether you expect the effect to happen to you if you were under the influence of alcohol. These effects will vary, depending upon the amount of alcohol you typically consume.

This is not a personality assessment. We want to know what you expect to happen if you were to drink alcohol, not how you are when you are sober. Example: If you are always emotional, you would not circle agree as your answer unless you expected to become MORE EMOTIONAL if you drank.

If I were under the influence of alcohol:

1. I would be outgoing.....	Disagree	Slightly Disagree	Slightly Agree	Agree
2. My senses would be dulled.....	Disagree	Slightly Disagree	Slightly Agree	Agree
3. I would be humorous.....	Disagree	Slightly Disagree	Slightly Agree	Agree
4. My problems would seem worse.....	Disagree	Slightly Disagree	Slightly Agree	Agree
5. It would be easier to express my feelings.....	Disagree	Slightly Disagree	Slightly Agree	Agree
6. My writing would be impaired.....	Disagree	Slightly Disagree	Slightly Agree	Agree
7. I would feel sexy.....	Disagree	Slightly Disagree	Slightly Agree	Agree
8. I would have difficulty thinking.....	Disagree	Slightly Disagree	Slightly Agree	Agree
9. I would neglect my obligations.....	Disagree	Slightly Disagree	Slightly Agree	Agree
10. I would be dominant.....	Disagree	Slightly Disagree	Slightly Agree	Agree
11. My head would feel fuzzy.....	Disagree	Slightly Disagree	Slightly Agree	Agree
12. I would enjoy sex more.....	Disagree	Slightly Disagree	Slightly Agree	Agree

If I were under the influence of alcohol:

13. I would feel dizzy.....	Disagree	Slightly Disagree	Slightly Agree	Agree
14. I would be friendly.....	Disagree	Slightly Disagree	Slightly Agree	Agree
15. I would be clumsy.....	Disagree	Slightly Disagree	Slightly Agree	Agree
16. It would be easier to act out my fantasies.....	Disagree	Slightly Disagree	Slightly Agree	Agree
17. I would be loud, boisterous, or noisy.....	Disagree	Slightly Disagree	Slightly Agree	Agree
18. I would feel peaceful.....	Disagree	Slightly Disagree	Slightly Agree	Agree
19. I would be brave and daring.....	Disagree	Slightly Disagree	Slightly Agree	Agree
20. I would feel unafraid.....	Disagree	Slightly Disagree	Slightly Agree	Agree
21. I would feel creative.....	Disagree	Slightly Disagree	Slightly Agree	Agree
22. I would be courageous.....	Disagree	Slightly Disagree	Slightly Agree	Agree
23. I would feel shaky or jittery the next day.....	Disagree	Slightly Disagree	Slightly Agree	Agree
24. I would feel energetic.....	Disagree	Slightly Disagree	Slightly Agree	Agree
25. I would act aggressively.....	Disagree	Slightly Disagree	Slightly Agree	Agree
26. My responses would be slow.....	Disagree	Slightly Disagree	Slightly Agree	Agree
27. My body will be relaxed.....	Disagree	Slightly Disagree	Slightly Agree	Agree
28. I would feel guilty.....	Disagree	Slightly Disagree	Slightly Agree	Agree
29. I would feel calm.....	Disagree	Slightly Disagree	Slightly Agree	Agree
30. I would feel moody.....	Disagree	Slightly Disagree	Slightly Agree	Agree
31. It would be easier to talk to people.....	Disagree	Slightly Disagree	Slightly Agree	Agree
32. I would be a better lover.....	Disagree	Slightly Disagree	Slightly Agree	Agree
33. I would feel self-critical.....	Disagree	Slightly Disagree	Slightly Agree	Agree
34. I would be talkative.....	Disagree	Slightly Disagree	Slightly Agree	Agree
35. I would act tough.....	Disagree	Slightly Disagree	Slightly Agree	Agree
36. I would take risks.....	Disagree	Slightly Disagree	Slightly Agree	Agree
37. I would feel powerful.....	Disagree	Slightly Disagree	Slightly Agree	Agree
38. I would act sociable.....	Disagree	Slightly Disagree	Slightly Agree	Agree

APPENDIX E. ALCOHOL RELATED HARMS MEASURE

Different things happen to people while they are drinking alcohol or as a result of their alcohol use. Some of these things are listed below. **Please indicate whether each has happened to you during the last 30 days while you were drinking alcohol or as the result of your alcohol use.**

Has this happened to you over the last 30 days?	(circle one)	
While drinking, I have said or done embarrassing things	Yes	No
I have had a hangover (headache, sick stomach) the morning after I had been drinking	Yes	No
I have often found it difficult to limit how much I drink	Yes	No
I have spent too much time drinking	Yes	No
I have felt very sick to my stomach or thrown up after drinking	Yes	No
I have not gone to work because of drinking, a hangover, or illness caused by drinking	Yes	No
I have missed classes at school because of drinking, a hangover, or illness caused by drinking	Yes	No
I have taken foolish risks when I have been drinking	Yes	No
I have been overweight because of my drinking	Yes	No
I have felt badly about myself because of my drinking	Yes	No
I have driven a car when I knew I had too much to drink to drive safely	Yes	No
I often have ended up drinking on nights when I had planned not to drink	Yes	No
I have passed out from drinking	Yes	No
My physical appearance has been harmed by my drinking	Yes	No

I have woken up in an unexpected place after heavy drinking	Yes	No
Has this happened to you over the last 30 days?	(circle one)	
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	Yes	No
When drinking, I have done impulsive things I regretted later	Yes	No
My drinking has created problems between myself and my boyfriend/girlfriend/spouse, parents, or other near relatives	Yes	No
I've not been able to remember large stretches of time while drinking heavily	Yes	No
My drinking has gotten me into sexual situations I later regretted	Yes	No
I have become very rude, obnoxious, or insulting after drinking	Yes	No
I have performed poorly on a test or important project because of my drinking	Yes	No
I have had memory loss because of my drinking	Yes	No
I have had less energy or felt tired because of my drinking	Yes	No
I have felt like I needed a drink after I'd gotten up (that is, before breakfast)	Yes	No
The quality of my school work has suffered because of my drinking	Yes	No
I have neglected my obligations to family, or work because of drinking	Yes	No
I have neglected my obligations to school because of drinking	Yes	No
I have thought I might have a drinking problem	Yes	No

**APPENDIX F. UNIVERSITY OF RHODE ISLAND CHANGE
ASSESSMENT SCALE (URICA)**

University of Rhode Island Change Assessment Scale - URICA

INSTRUCTIONS: This questionnaire is to help us improve services. Each statement describes how a person might feel when starting therapy or approaching problems in their lives. Please indicate the extent to which you tend to agree or disagree with each statement. In each case, make your choice in terms of how you feel right now, not what you have felt in the past or would like to feel. For all the statements that refer to your "problem", answer in terms of problems related to your drinking. The words "here" and "this place" refer to treatment or the program. Please read the following statements carefully. For each statement, circle the number that best describes how much you agree or disagree with each statement

Key: SD = No Strongly Disagree D = No Disagree U = Undecided or Unsure A = Yes Agree SA = Yes Strongly Agree

Problem:	SD	D	U	A	SA
1. As far as I'm concerned, I don't have any problems that need changing.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 5
2. I think I might be ready for some self-improvement.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input checked="" type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
3. I am doing something about the problems that had been bothering me.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
4. It might be worthwhile to work on my problem.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
5. I'm not the problem one. It doesn't make much sense for me to be here.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 5
6. It worries me that I might slip back on a problem I have already changed, so I am here to seek help.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
7. I am finally doing some work on my problem.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
8. I've been thinking that I might want to change something about myself.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
9. I have been successful in working on my problem but I'm not sure I can keep up the effort on my own.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
10. At times my problem is difficult, but I'm working on it.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
11. Being here is pretty much a waste of time for me because the problem doesn't have to do with me.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 5
12. I'm hoping this place will help me to better understand myself.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
13. I guess I have faults, but there's nothing that I really need to change.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 5
14. I am really working hard to change.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
15. I have a problem and I really think I should work at it.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
16. I'm not following through with what I had already changed as well as I had hoped, and I'm here to prevent a relapse of the problem.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
17. Even though I'm not always successful in changing, I am at least working on my problem.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
18. I thought once I had resolved my problem I would be free of it, but sometimes I still find myself struggling with it.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
19. I wish I had more ideas on how to solve the problem.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
20. I have started working on my problems but I would like help.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
21. Maybe this place will be able to help me.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
22. I may need a boost right now to help me maintain the changes I've already made.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
23. I may be part of the problem, but I don't really think I am.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 5
24. I hope that someone here will have some good advice for me.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

25.	Anyone can talk about changing; I'm actually doing something about it.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
26.	All this talk about psychology is boring. Why can't people just forget about their problems?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 5
27.	I'm here to prevent myself from having a relapse of my problem.	<input checked="" type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
28.	It is frustrating, but I feel I might be having a recurrence of a problem I thought I had resolved.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
29.	I have worries but so does the next guy. Why spend time thinking about them?	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input checked="" type="checkbox"/> 5
30.	I am actively working on my problem.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5
31.	I would rather cope with my faults than try to change them.	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input checked="" type="checkbox"/> 4	<input type="checkbox"/> 5
32.	After all I had done to try to change my problem, every now and again it comes back to haunt me.	<input type="checkbox"/> 1	<input checked="" type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> 5

APPENDIX G. CUDIT

Have you used cannabis over the past 6 months? **Yes** **No**

If **YES**, please answer the following questions about your cannabis use.

Please circle the response that is most correct for you in relation to your cannabis use *over the past 6 months*.

1. How often do you use cannabis?	Never	Monthly or less	2-4 times a month	2-3 times a week	4 or more times a week
2. How many hours were you “stoned” on a typical day when you had been using cannabis?	1 or 2	3 or 4	5 or 6	7 to 9	10 or more
3. How often were you “stoned” for 6 or more hours?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
4. How often during the past 6 months have you found that you were not able to stop using cannabis once you had started?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
5. How often during the past 6 months have you failed to do what was normally expected of you because of using cannabis?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
6. How often during the past 6 months have you had a feeling of guilt or remorse after using cannabis?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
7. How often during the past 6 months did you need to use cannabis in the morning to get yourself going after a heavy session?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
8. How often during the past 6 months have you had a problem with your memory or concentration after using cannabis?	Never	Less than monthly	Monthly	Weekly	Daily or almost daily
9. Have you or someone else been injured as a result of your cannabis use over the past 6 months?	No Yes				
10. Has a relative, friend, doctor, or other health care worker been concerned about your use of cannabis or suggested you cut down over the past 6 months?	No Yes				

APPENDIX H. OTHER SUBSTANCE USE

Within the last year, about how often have you used each of the following:

	Did not use	1 to 6 times	Once a month	Twice a month	Once a week	3 times per week	5 times per week	Daily
Tobacco								
Marijuana								
Cocaine (powder, crack, rock, freebase)								
Amphetamines (diet pills, speed, crystal meth)								
Sedatives (Xanax, Valium, downers)								
Hallucinogens (LSD, PCP, mushrooms)								
Opiates (Percocet, Oxycontin, heroin)								
Inhalants (whippets, glue, solvents)								
Designer Drugs (ecstasy, MDMA, GHB, Ketamine)								
Steroids								
Prescription drugs to "get high"								
Over the counter drugs to "get high" (e.g., cough syrup)								

**APPENDIX I. MOTIVATIONAL INTERVIEWING TREATMENT
INTEGRITY CODE (MITI)**

Tape # _____

Coder: _____

Time: _____

Global Ratings

Empathy/ Understanding		1	2	3	4	5	6	7
		Low						High
Spirit		1	2	3	4	5	6	7
		Low						High

Behavior Counts

Giving Information			
MI Adherent			
MI Non-Adherent			
Question	Closed Question		
	Open Question		
Reflect	Simple		
	Complex		
	Total Reflections:		

List of MITI Codes

- EMPATHY (Global rating of empathy)
- SPIRIT (Global rating of MI spirit)
- GI (Giving Information)
- MiA (MI Adherent)
- MiNa (MI Non-adherent)
- OQ (Open Question)
- CQ (Closed Question)
- Rs (Reflection simple)
- Rc (Reflection complex)

APPENDIX J. IRB HUMAN SUBJECTS PERMISSION LETTER

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Approval of Human Research

From: **UCF Institutional Review Board #1**

FWA00000351, IRB00001138

To: **Michael E. Dunn** and Co-PI: **Thomas V. Hall**

Date: **November 17, 2011**

Dear Researcher:

On 11/17/2011, the IRB approved the following minor modification to human participant research until 03/21/2012 inclusive:

Type of Review: IRB Addendum and Modification Request Form

Modification Type: A new study population is being added: participants will be recruited through the UCF Alcohol and Other Drug Prevention Office. Eligible participants will include college students referred from the office of judicial affairs for alcohol violations and they will be informed that their participation is completely voluntary.

Whether or not they choose to take part, participants will receive the same treatment at AOD and their consent is solely to provide permission for their information. A plan is in place to protect against breach of confidentiality.

Project Title: The Digital Generation: Leveraging Technology to Reduce High Risk Drinking

Investigator: Michael E Dunn

IRB Number: SBE-11-07534

Funding Agency: U.S. Department of Education/TRIO(USDOE)

Grant Title:

Research ID: 1050947

The Continuing Review Application must be submitted 30days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at <https://iris.research.ucf.edu> .

If continuing review approval is not granted before the expiration date of 03/21/2012, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate. Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s). In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

University of Central Florida Institutional Review Board

Office of Research & Commercialization

12201 Research Parkway, Suite 501

Orlando, Florida 32826-3246

Telephone: 407-823-2901 or 407-882-2276

www.research.ucf.edu/compliance/irb.html

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On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., CF IRB Chair, this letter is signed by:
Signature applied by Joanne Muratori on 11/17/2011 01:17:02 PM EST
IRB Coordinator

APPENDIX K. FIGURES

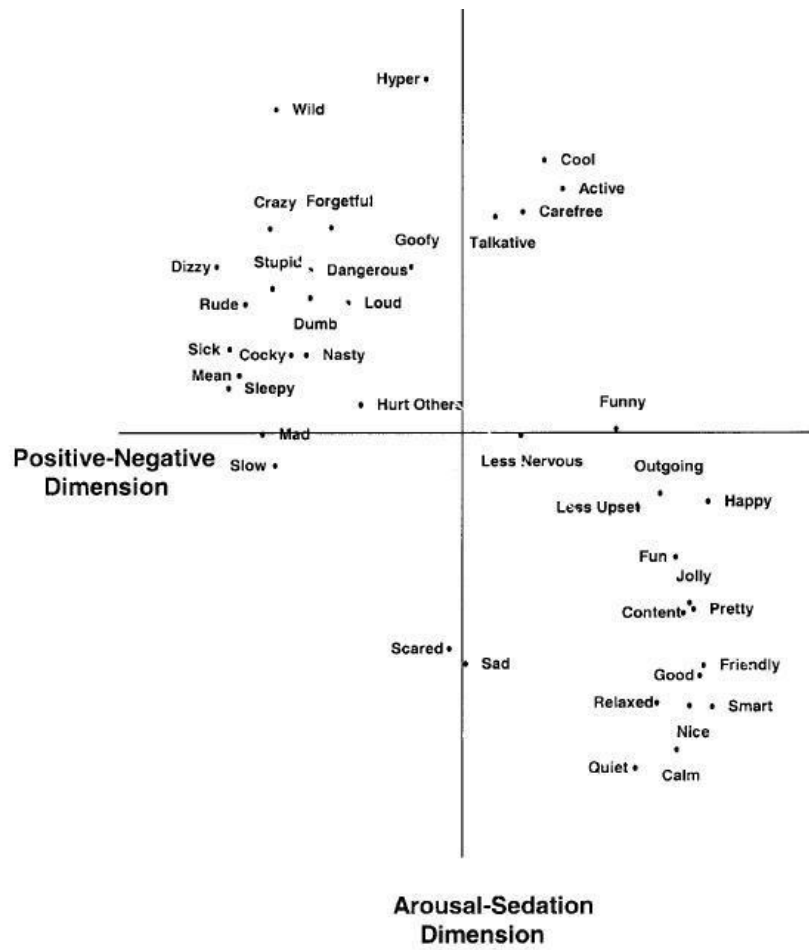


Figure 1. *Alcohol Expectancy Memory Network*

APPENDIX L. TABLES

Table 1. *Baseline Demographic Characteristics by Condition*

Variable	BASICS		ECALC	
	Frequency	Percentage	Frequency	Percentage
Gender				
Male	41	65.1%	40	67.8
Female	22	34.9%	19	32.2
Class Standing				
Freshman	33	52.4%	31	52.5
Sophomore	15	23.8	10	16.9
Junior	9	14.3	10	16.9
Senior	6	9.5	7	11.9
Living Situation				
Residence Hall	22	34.9	23	40.0
UA off-campus	10	15.9	7	11.9
Greek house	6	9.5	0	0
Independent	25	39.7	28	47.5
Race/Ethnicity				
Caucasian	48	76.2	41	69.5
Black (AA)	4	4.8	5	8.5
Hispanic	8	12.7	9	15.3
Asian-	1	1.6	0	0
American				
Other	3	4.8	3	5.1
Stage of Change				
Precontemplation	25	39.7	26	44.1
Contemplation	2	3.2	2	3.4
Action	36	57.1	30	50.8
	Mean	SD	Mean	SD
Age	19.30	1.64	19.55	1.85

Table 2. *Baseline Drinking Variable by Condition and Gender*

Variable	Gender	BASICS		ECALC	
		Mean	SD	Mean	SD
Mean BAC	Male	.052	.047	.054	.046
	Female	.055	.039	.050	.037
Peak BAC	Male	.095	.074	.095	.071
	Female	.093	.065	.088	.062
AVDPS	Male	5.06	2.79	4.95	2.41
	Female	3.55	1.12	2.84	1.41
PDPS	Male	7.27	3.66	7.13	3.61
	Female	5.14	1.93	4.32	2.29
Binge	Male	3.10	2.88	2.79	2.90
	Female	2.00	1.93	1.84	2.43
DDPM	Male	5.49	4.03	4.94	3.34
	Female	4.27	2.78	5.00	4.37
ADPW	Male	5.65	4.47	4.95	3.94
	Female	3.12	2.25	3.43	3.64
BYAACQ	Male	9.90	12.96	12.38	17.18
	Female	13.00	12.33	4.11	5.00
AUDIT score	Male	8.37	3.88	8.18	3.94
	Female	7.66	3.48	5.53	2.37
CUDIT score	Male	2.56	3.19	3.58	4.80
	Female	2.14	3.17	0.22	0.65

Note. AVDPS= average drinks per sitting, PDPS= peak drinks per sitting, DDPM= drinking days per month, ADPW=average drinks per week

Table 3. Mean scores and Standard Deviations for Changes in CEOA Subscales from baseline to immediately following session three

	ECALC		BASICS		<i>F</i> (group)	<i>p</i>
	M (<i>SD</i>)		M (<i>SD</i>)			
	Pretest	Posttest	Pretest	Posttest		
Sociability					24.34	.000
Male	3.13 (0.51)	2.51 (0.79)	2.97 (0.60)	3.00 (0.49)		
Female	2.89 (0.49)	2.22 (0.87)	3.27 (0.49)	3.06 (0.47)		
Tension Reduction					18.05	.000
Male	2.34 (0.85)	2.15 (0.66)	2.38 (0.65)	2.85 (0.52)		
Female	2.24 (0.68)	2.31 (0.85)	2.33 (0.44)	2.65 (0.33)		
Liquid Courage					8.05	.005
Male	2.54 (0.56)	2.17 (0.80)	2.41 (0.63)	2.38 (0.64)		
Female	1.97 (0.41)	1.67 (0.64)	2.34 (0.67)	2.33 (0.76)		
Sexuality					7.53	.007
Male	2.14 (0.61)	1.93 (0.71)	2.02 (0.71)	2.09 (0.72)		
Female	1.63 (0.56)	1.40 (0.38)	1.81 (0.73)	1.89 (0.68)		

Table 4. *Baseline to follow-up changes in alcohol use by group*

Variable	Group	Baseline <i>M (SD)</i>	Follow-up <i>M (SD)</i>	<i>F (group)</i>	<i>p-value</i>	Effect Size (<i>d_w</i>)
Mean BAC	ECALC	.053 (.044)	.034 (.035)	1.04	.31	.48
	Male	.055 (.048)	.034 (.035)			
	Female	.053 (.044)	.034 (.038)			
	BASICS	.049 (.044)	.039 (.039)			
	Male	.047 (.041)	.037 (.037)			
	Female	.052 (.037)	.044 (.041)			
Peak BAC	ECALC	.093 (.070)	.055 (.052)	1.49	.23	.62
	Male	.095 (.074)	.055 (.051)			
	Female	.088 (.062)	.054 (.056)			
	BASICS	.089 (.064)	.066 (.061)			
	Male	.088 (.063)	.064 (.058)			
	Female	.092 (.066)	.069 (.067)			
AVDPS	ECALC	4.23 (2.43)	3.08 (2.32)	2.01	.16	.48
	Male	4.99 (2.54)	3.51 (2.41)			
	Female	2.84 (1.41)	2.28 (1.97)			
	BASICS	4.39 (2.44)	3.65 (2.23)			
	Male	4.93 (2.84)	3.84 (2.39)			
	Female	3.48 (1.10)	3.33 (1.95)			
PDPS	ECALC	6.19 (3.60)	4.04 (3.36)	2.77	.10	.62
	Male	7.20 (3.79)	4.46 (3.55)			
	Female	4.32 (2.89)	3.26 (2.92)			
	BASICS	6.38 (3.26)	5.24 (3.47)			
	Male	7.11 (3.66)	5.83 (3.85)			
	Female	5.14 (1.98)	4.26 (2.52)			
Binge	ECALC	2.46 (2.85)	1.81 (2.73)	.42	.52	.23
	Male	2.80 (3.03)	2.20 (3.13)			
	Female	1.84 (2.43)	1.11 (1.59)			
	BASICS	2.77 (2.70)	2.20 (3.20)			
	Male	3.20 (3.00)	2.31 (3.52)			
	Female	2.05 (1.96)	2.00 (2.63)			
AVDPW	ECALC	4.43 (3.97)	3.28 (4.35)	1.15	.29	.28
	Male	4.97 (4.08)	3.91 (5.02)			
	Female	3.43 (3.64)	2.10 (2.40)			
	BASICS	4.76 (4.03)	4.27 (5.75)			
	Male	5.69 (4.57)	4.96 (6.71)			
	Female	3.22 (2.26)	3.12 (3.49)			
DDPM	ECALC	4.95 (3.77)	3.08 (2.32)	4.07*	.046	.41
	Male	4.93 (3.47)	3.51 (2.41)			
	Female	5.00 (4.37)	2.28 (1.97)			
	BASICS	5.20 (3.76)	4.64 (3.82)			
	Male	5.66 (4.23)	5.09 (4.24)			
	Female	4.43 (2.75)	3.90 (2.93)			
Harms Total	ECALC	8.91 (13.17)	3.96 (7.80)	.16	.688	.48
	Male	11.31(15.24)	4.89 (8.78)			
	Female	4.11 (5.00)	2.11 (5.06)			
	BASICS	11.32(12.98)	4.92 (7.59)			
	Male	9.91 (13.38)	4.82 (6.93)			
	Female	13.65(12.28)	5.10 (8.77)			

Note: AVPS = average drinks per sitting; PDPS = peak drinks per sitting; AVPW = average drinks per week; DDPM= number of drinking days per month

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