

RU DRKN 2NITE?: CELLULAR TEXT MESSAGING PROMPTS FOR
ALCOHOL HARM-REDUCTION ON CAMPUS

By:

JOSEPH MIGNOGNA

Bachelor of Science

Texas A&M University

College Station, Texas

2004

Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment
of the requirements for
the degree of
MASTER OF SCIENCE
May, 2007

RU DRKN 2NITE?: CELLULAR TEXT MESSAGING PROMPTS FOR
ALCOHOL HARM-REDUCTION ON CAMPUS

Thesis Approved:

Thad R. Leffingwell, Ph.D.

Thesis Adviser

Frank Collins, Ph.D.

James Grice, Ph.D.

A. Gordon Emslie, Ph.D.

Dean of the Graduate College

ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to my advisor, Dr. Leffingwell, a person that truly leads by example. I would also like to thank my committee members, Dr. James Grice and Dr. Frank Collins, for all of their ideas, direction, and invaluable support through the process. Also, I am very grateful for the funding provided by the Oklahoma Psychological Association's Social Concerns and Action Committee Grant.

Additionally, I would like to thank my fiancée and fellow lab member, Melissa Jackson, for all of her encouragement and support! She is an incredible, caring, beautiful, intelligent, and absolutely fantastic person who helped me every step of the way in the completion of my thesis. Additionally, I would also like to thank another fellow lab member, Rachael Horton, for her invaluable support, encouragement, and humor.

I wish to express my sincere gratitude to my parents, Joe and Theresa Mignogna, for their immeasurable amount of support and encouragement. I can't mention my parents without acknowledging how grateful I am to have three beautiful, caring, and supportive sisters, Kristin, Angelina, and Allison. I would also like to acknowledge my dog, Bella, for providing a companion during many long nights at school. Also, I would like to thank my best friends Joe Harris, Ira Harris, and Chris Johnson! Finally, thank-you G-d!

TABLE OF CONTENTS

I.	INTRODUCTION.....	1
II.	A REVIEW OF THE LITERATURE.....	5
	Intervening with High-Risk College Student Drinking.....	6
	Moderate Drinking.....	7
	Moderate Drinking among College Students.....	9
	ASTP.....	9
	BASICS.....	11
	Behavioral Prompting and Text-Messages.....	13
	Pilot Study.....	15
	Summary.....	17
	Present Study.....	18
III.	METHODS.....	19
	Participants.....	19
	Measures.....	22
	Design and Procedure.....	24
IV.	RESULTS.....	27
	Randomization Check.....	27
	Preliminary Analyses.....	27
	Primary Analyses.....	28
V.	DISCUSSION.....	33
VI.	REFERENCES.....	38
VII.	APPENDIX A (TABLES).....	49
IX.	APPENDIX B.....	48
XI.	APPENDIX C.....	61
XII.	APPENDIX D.....	70
XIII.	APPENDIX E.....	75

LIST OF TABLES

Table		Page
1.	Participant Characteristics.....	71
2.	Means and Tests of Between and Within Group Differences for Total Weekend Drinks.....	73
3.	Means and Tests of Between and Within Group Differences for Drinks Per Drinking Occasion.....	74

LIST OF FIGURES

Figures		Page
1.	Mean Total Drinks Thursday, Friday, and Saturday Evening by Experimental Condition.....	76
2.	Estimated peak BAL on Thursday, Friday, and Saturday Evening by Experimental Condition.....	77
3.	Participant Flow Chart.....	78
4.	Experimental Flow Chart.....	79
5.	Mean (actual) Total Drinks Consumed for Each Group at Each Follow-up.....	80
6.	Mean (actual) Total Drinks Per Drinking Occasion Consumed for Each Group at Each Follow-up.....	81

CHAPTER 1

I. INTRODUCTION

Background

Almost half of all college students engage in hazardous alcohol use (Wechsler, Lee, Kuo, & Lee, 2000). The negative impact of hazardous drinking is felt by college campuses across the nation. Associated consequences include declining academic performance, unsafe sex practices, and accidental injury or death. Moreover, thousands of college students are physically or sexually assaulted every year as a result of this epidemic problem (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002).

While many students during their college years developmentally transition from hazardous drinking practices to more moderate levels by graduation, many still maintain problematic drinking practices and, for a few, consumption rates escalate (Jackson, Sher, Gotham, & Wood, 2001). In comparison to heavy drinking practices, light and moderate drinking are associated with considerably less personal and community risk (Wechsler, Leo, Kuo, & Lee, 2000). Furthermore, moderate levels of drinking are associated with more physical health benefits in comparison to abstinence or heavy consumption levels (de Lorimier, 2000).

Efforts aimed at reducing college student drinking to safer, more moderate levels have been somewhat successful (Baer, Kivlahan, Blume, McKnight, & Marlatt, 2001; Marlatt, et al., 1998; Baer, Marlatt, Kivlahan, & Fromme, 1992; Kivlahan, Marlatt, Fromme, & Coppel, 1990). Specifically, methods of intervening from a harm reduction

approach to college drinking have evidence of efficacy. A harm reduction approach views excessive alcohol consumption as a maladaptive behavior, as opposed to a moral or biological weakness (Jellinek, 1960), encouraging any change that minimizes the negative consequences felt by heavy drinkers (Marlatt, 1998). Moreover, harm reduction approaches contend that moderate drinking is not only a common route to recovery for many non-treatment seeking excessive drinkers (Sobell, Ellingstad, & Sobell, 2000), but also a viable (Sobell, 1973; Sobell & Sobell, 1973, 1976) and preferred treatment goal (Sanchez-Craig, et al., 1984) for many in formal treatment.

Both individual (Baer, et al, 2001; Borsari & Carey, 2000; Marlatt, et al., 1998; Dimeff, Baer, Kivlahan, & Marlatt, 1999; Murphy, et al., 2001; Roberts, Neal, Kivlahan, Baer, & Marlatt, 2000) and group (Baer, et al., 1992; Kivlahan, et al., 1990) harm reduction methods applied to alcohol use among college students have received empirical support. Two basic approaches have been evaluated. In one approach, brief assessment and feedback have been used (sometimes combined with an interpersonal interaction borrowing principles from Motivational Interviewing (Miller & Rollnick, 2001)) to enhance motivation for adaptive changes in alcohol use (Brief Alcohol Screening and Intervention for College Students (BASICS); Dimeff, et. al, 1999). In the second approach, students are taught skills for moderating drinking behavior (Alcohol Skills Training Program (ASTP); Baer, et. al, 1992; Kivlahan, et. al, 1990). Both approaches seek to reduce the negative consequences of excessive consumption by providing students with skills that allow them to drink more moderately, while seeking to increase their interest in using these skills through motivational enhancement strategies (Dimeff, et al., 1999; Fromme, Marlatt, Baer, and Kivlahan, 1994).

The Problem

Despite their encouraging success, the effectiveness of programs involving moderation skills training might be limited by a student's ability to recall and implement newly acquired strategies in the drinking context. Attempting to prompt students to implement their skills prior to, and during a drinking episode, could increase the effectiveness of such programs. One readily available modality that has proven its usefulness in prompting behavior is text-messaging technology via cellular telephone technology (Bachen, 2001; Forrester, 2004). Prompting college students with text-messages to use moderation strategies might increase the efficacy of harm reduction interventions. Support for prompting behavior with text-messages has been demonstrated in smoking cessation interventions (Obermayer, Riley, Asif, & Jean-Mary, 2004; Rodgers et al., 2006), and recently in an attempt at moderating high-risk drinking practices of college students (Jackson, Mignogna, & Leffingwell, 2005).

Pilot Study

In fall of 2005, Jackson and colleagues conducted the RU DRKN 2NITE? pilot study. In this study, students ($N = 28$) were screened from a large undergraduate sample and invited to attend a brief didactic Moderation Skills Training Session (MSTS). Following this brief session, half of the participants ($n = 13$) were prompted to implement moderation skills during high-frequency drinking nights using text-message technology, while other participants served as a control ($n = 15$). While statistical significance did not emerge, greater reductions were exhibited in both peak blood alcohol level (BAL) and number of drinks for the group receiving text-messages than for the control group. Given the emergence of the predicted trends, and acknowledgement of the

small sample and substantial amount of within group variability, the results of this pilot study are encouraging. Moreover, participants in the text-message condition responded favorably to the novelty and usefulness of receiving the text-messages.

The Purpose

The purpose of this study is to further investigate the efficacy of behaviorally prompting hazardous college drinkers using text-message technology with moderation skills taught during a MSTS. Modifications to the pilot study include a design that allows for the investigation of exposure effects in addition to the immediate effect that prompting drinking moderation skills has on their implementation.

CHAPTER II

II. REVIEW OF THE LITERATURE

Alcohol misuse among U.S. college students is a major concern. To describe the magnitude of the concern, it is important to first characterize what is considered problematic drinking. Since 1994, the media has widely adopted the notion of “binge drinking” to describe problematic drinking practices (Wechsler & Austin, 1998). Men who consume five or more drinks (or women four or more) during a single drinking episode in the past two weeks meet criteria for a pattern of alcohol use known as binge drinking (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1994). More recently, the term “hazardous drinking” has been offered as a replacement for “binge drinking,” as some healthcare professionals and university officials feel it is less misleading and more inclusive (Vicary & Karshin, 2002).

Wechsler, Lee, Kuo, and Lee (2000) resurveyed the four-year colleges (119 colleges in total) participating in their 1993 and 1997 surveys. Surveying over 14,000 students, results indicated that two out of every five students (44%) were binge drinkers. This was the same rate demonstrated in 1993. In contrast to 1993, a polarization effect in drinking behavior emerged in 1999. Among those students that drank, those identified as frequent binge drinkers (students that indicated having binged at least 3 times in the two weeks prior) increased 4.7% (from 23.4 to 28.1%) while students that abstained from consuming any alcohol in the year prior increased 3.8% (from 15.4% to 19.2%). In comparison to students who drank but did not binge, occasional and especially frequent binge drinkers

were more likely to experience any of the twelve different alcohol-related problems surveyed (e.g., *Miss a class, Do something you regret, Get hurt or injured*; Wechsler, et al., 2000). In comparison to a non-binge drinker, an occasional bingeing student was five times more likely to endorse five or more of these problems. The negative impacts of binge drinking practices are also felt by the community in which they occur. Wechsler, et al., (1995) found that abstinent or light to moderate drinking students living on a campus with high drinking rates were almost four times more likely to experience at least one aversive consequence (e.g., pushed, hit, or assaulted, property damaged, had serious argument, insulted/humiliated) in comparison to similar students living on lower consuming campuses.

The magnitude of the college alcohol problem is illuminated when considering estimates on the number of individual's lives that are affected annually. In 1998, among college students between the ages of 18 to 24, it was projected that over 1,400 died from accidental alcohol-related injuries. While under the influence, over 500,000 students (10.6 percent) were unintentionally injured, and almost 400,000 students (8.4 percent) had unprotected sex. Moreover, more than 600,000 students (13.3 percent) were hit, pushed, or assaulted by other intoxicated students; and over 180,000 students (3.8 percent) were the victim of sexual assault (Hingson, et al., 2002).

Intervening with High-Risk College Student Drinking

Methods of intervening in hazardous drinking differ depending upon how the drinker's problem is conceptualized by those intervening. Excessive alcohol

use is generally conceptualized according to three contrasting views: the moral, disease, and harm reduction models (Marlatt & Witkiewitz, 2002). While the etiology of excessive alcohol use stems from immorality in the moral model, the disease model views it as an illness (Miller, 1993). Nonetheless, both of these models view hazardous drinkers as, “powerless to control their consumption, and emphasize total abstinence from alcohol as the only means to recovery” (Marlatt, 1998; Miller, 1993, p. 73). In contrast, a harm reduction model views addiction as the development of a maladaptive behavior that can be changed. Furthermore, the harm reduction model seeks to encourage any change that reduces the negative consequences of hazardous drinking practices (Marlatt, 1998). Although intervening in college drinking from a harm reduction approach would include goals of abstinence if so desired, reducing any harms related to hazardous drinking is the overall objective. One common and effective method of harm reduction is to reduce college student’s excessive consumption levels to more moderate levels (Marlatt & Witkiewitz, 2002).

Moderate Drinking

While the hazardous drinking practices of most college students would not meet diagnostic criteria for alcohol dependence, the level to which many consume puts them at risk for doing so (Grant, 1993). Therefore, insight into the advisability and feasibility of moderate drinking for a more severe population (i.e., individuals with a substance use disorder) is beneficial. Sobell and Sobell’s (1973a; 1973b; 1976) research was the first to advocate the short and long-term efficacy of reducing treatment seeking drinkers to more moderate levels of

consumption. These were the first of many studies to support the idea that even a person with alcohol dependence could reduce and maintain moderate drinking practices (Davis, 1987; Foy, Nunn, & Rychtarik, 1984; Sanchez-Craig, Annis, Bronet, & MacDonald, 1984).

Research by Sanchez-Craig et al. (1984) and Sobell, et al., (2000) provides further support for the usefulness and acceptability of moderate drinking goals in reducing consumption rates. Sanchez-Craig et al. (1984) compared cognitive-behaviorally oriented treatments with either moderation or abstinence treatment goals for a clinical population of problematic drinkers. Participants ($N = 70$) were randomly assigned to treatment conditions, and follow-up data was collected up to two years. While data revealed that both treatment conditions produced equal reductions in drinking, participants were much more accepting of goals of moderation. This preference is supported by Sobell, et al.'s, (2000) review of studies providing data on the natural recovery (recovery without formal treatment) of problematic drinkers. Of those recovering naturally, most did so by developing moderate drinking practices.

Concerns about the health advisability of drinking in moderation were addressed by de Lorimier's (2000) 20-year review of alcohol epidemiological studies. He concluded that drinking in moderation fairs better in lowering an individual's risks to health related problems than abstinence (or heavy consumption). Moderate drinking practices lowered health concerns for: myocardial infraction, coronary heart disease, angina, ischemic stroke, atherosclerosis, esophageal and gastric cancers (wine only), hypertension, peptic

ulcers, colds, gall stones, kidney stones, age-related macular degeneration, bone fractures (particularly for wine), cognitive decline, reducing levels of LDL and increasing levels of HDL cholesterol, and blot clots.

Moderate Drinking among College Students

Following 200 undergraduate students for 20 years, Fillmore (1974) observed that moderate drinking practices (after heavy consuming practices) tended to increase as participants aged. More recently, Jackson, et al., (2001) found that more of the college students in their seven-year longitudinal study regressed in the severity of their drinking practices than progressed. Newcombe and Bentler (1987), refer to this process as “maturing out.” Fromme and colleagues (1994) asserted that “such a ‘maturing out’ suggests that many young adults are not progressing in a downward spiral toward alcoholism” (p.143). Although many heavy drinking college students will likely leave behind their hazardous practices after graduation, they are at risk for a number of serious consequences during the developmental phase. If interventions can successfully encourage students to accelerate the maturing out process or minimize the excesses in drinking behaviors, many of the negative consequences associated with hazardous college drinking can be reduced. One such intervention is the Alcohol Skills Training Program (ASTP; Kivlahan, et al., 1990).

ASTP

The ASTP is a targeted intervention that attempts to intervene with identified problematic drinking students. In ASTP, didactic presentations followed by small group discussions regarding relevant session topics are

administered in a group format over the course of 6-8 weeks. Skills training, the major component of the ASTP, involves the implementation of cognitive-behavioral strategies in attempting to minimize the risks associated with consumption. For example, strategies include: setting safe drinking goals at the outset of the night, eating before drinking, and alternating alcoholic beverages with water. Also, participants are asked to monitor their daily consumption of alcohol, reflect on the affective and experiential effects of alcohol, and “challenge unrealistically positive alcohol expectancies and increase participants’ awareness of how beliefs affect drinking behaviors” (p. 146, Fromme, Marlatt, Baer, & Kivlahan, 1994). Additionally, skills aimed at promoting a health lifestyle (e.g. exercise, meditation, etc.) are encouraged to provide safe methods of stress management in contrast to self-medicating with alcohol. Since harm reduction is at the heart of the ASTP, its primary focus is on facilitating the lessening of harmful drinking consequences by “incorporating drinking goals (abstinence or moderation) that are compatible with the needs of the individual” (p. 868, Marlatt & Witkiewitz, 2002).

Empirical support for the ASTP is encouraging. Kivlahan and colleagues (1990) compared the ASTP ($n = 15$) to another group intervention of a purely informative nature about the aversive consequences associated with drinking ($n = 13$), and to an assessment-only control condition ($n = 15$). Follow-up data was provided for analysis in 4-month intervals following baseline up to 1-year. Significant reductions in consumption were exhibited by all three groups; however, drinking outcome measures revealed trends (albeit non-significant)

favoring ASTP group. Students in the ASTP group “reduced self-monitoring drinks per week, peak BAL, and retrospective reports of typical drinks per week by more than 50%” (p. 809). Further support was found when comparing ASTP to a self-administered ASTP manual and to a 1-hour individual feedback and advice session with a professional (Baer, Marlatt, Kivlahan, & Fromme, 1992). The ASTP condition was significantly preferred; however, significant drinking reductions were exhibited in each condition. Also of note, attrition was a concern for the self-administered ASTP manual condition.

BASICS

The Brief Alcohol Screening and Intervention for College Students (BASICS; Dimeff, et al., 1999) is another empirically supported harm reduction approach to hazardous college alcohol use; however, unlike ASTP, BASICS is individually administered. BASICS consists of two sessions. In the first session current drinking practices, attitudes, and motivational readiness to change drinking practices are assessed. During the second session, individual feedback (delivered with a non-directive, non-judgmental style) about a student’s risks associated with their current drinking practices are reviewed in an effort to elicit commitment to behavior changes by the participant. During a BASICS interview, moderation skills may be discussed when appropriate to encourage safer drinking practices, but are not as extensively emphasized as in ASTP.

Empirical support for BASICS is strong, including support from a 4-year longitudinal study. For this study (Marlatt, et al., 1998), 4,000 screeners assessing drinking practices and experiences were distributed to high school seniors in the

spring prior to their first undergraduate semester. Baseline assessment occurred in the fall, followed by the random assignment of 348 high-risk drinkers to an assessment-only control or to the BASICS intervention 3-months after completion of the baseline assessment. Additionally, a natural history comparison (consisting of abstinent, moderate, and heavy drinkers) was included. After baseline, data were collected at 6-month, 1-year, 2-year, 3-year, and 4-year follow-ups (results for the 3- and 4-year follow up are reported in Baer et al., 2001). Results provide support for the efficacy of BASICS, as participants receiving the intervention reported statistically significant (albeit small effect sizes) reductions in the quantity, frequency, and peak quantity consumption compared to the assessment-only control. Although all high-risk drinkers were drinking less, and experiencing less problems as a result of their consumption, those in the BASICS condition had substantially quicker reductions in their drinking (Baer, et al., 2001). Gains continued at 3- and 4-year follow-ups, specifically with regard to significantly encountering aversive consequences. Similar findings supporting the live model of BASICS (Murphy, et al., 2001; Roberts, et al., 2000), and computerized adaptations of BASICS (Dimeff & McNeely, 2000) are reported elsewhere. Support for the efficacy of BASICS not only provides further support for the efficacy of moderation interventions, but also support for the efficacy of brief interventions with a college population. For an excellent review on brief interventions see Moyer and Finney (2004,2005).

The moderation skills acquired during ASTP and BASICS are only useful to the extent that they are employed in the context of a drinker's life. A number of

contextual issues may undermine the ability of a student to successfully implement moderation strategies, even when motivated to do so. For example, the social context of college alcohol use is replete with heavy-drinking models, peer pressure, and advertising messages encouraging heavy use. While literature does not exist to substantiate the claim that intoxication decreases the probability that moderation skills were used, such a claim can be inferred, resulting in a vicious cycle of heavy initial alcohol use reducing the probability of moderation strategy recall, resulting in still greater intoxication. Perhaps behaviorally prompting drinkers prior to and during consumption could increase greater implementation of such skills. Cellular telephones are widely used by college students, and brief text-messages (which are quite popular in alcohol use contexts) provide an ideal medium for delivering such behavioral prompts.

Behavioral Prompting and Text-Messages

The use of behavioral prompts has proven its usefulness in a variety of behaviors including, prompting: Kegal exercises among pregnant women (Elliott, Houghton, & Langsford, 1997), adherence to antiretroviral medications among patients with HIV (Safren, Hendricksen, Desousa, Boswell, & Mayer, 2003), dietary practices of the elderly (Stock & Milan, 1993), and litter prevention (Durdan, Reeder, & Hecht, 1985). With estimates of 2.5 billion text-messages delivered a month in 2004 (Forrester, 2004), and well over 100 million American's owning cell phones in 2001 (Bachen, 2001), the implementation of text-message technology in prompting behavior could prove beneficial. Recently, such benefits of text-message technology have been observed in smoking

cessation interventions (Obermayer, et al., 2004; Rodgers, et al., 2006), and in high-risk college drinking (Jackson, et. al., 2005). Text-messages via cellular telephones may be an ideal medium for prompting college students in the drinking context because ownership and use of text messaging is fairly ubiquitous among current college students. Also, the messages are non-obtrusive, private, and instantaneously delivered. Moreover, anecdotal evidence suggests that many college students use text-messaging on heavy drinking nights. Heavy drinking nights among college students are observed on Thursday, Friday, and Saturday (Del Boca, Darkes, Greenbaum, & Goldman, 2004).

In Obermayer and colleagues' (2004) smoking cessation intervention, text-messages were delivered according to individually-timed moments of nicotine craving with suggestions on how to cope with nicotine cravings. This study also made use of the internet, as smokers ($N = 46$) were provided personalized feedback (updated by the participants) on their daily cigarette use as they prepared for and following their quit date. Among the participants that at least registered on the study website ($n = 29$), cotinine validation confirmed that 28% ($n = 8$) remained smoke-free 6-weeks following their quit date.

Additionally, Rodgers and colleagues (2006) randomly assigned 1,705 smokers to either receive text-messages (with cessation tips and other types of supportive messages) or to a control condition. Of those in the text-message condition, 28% ($n = 239$) reported to be smoke-free 6-weeks following the intervention in comparison to only 13% ($n = 109$) of the control condition.

Interestingly, 28% success rate was also reported by the Obermayer and colleagues (2004) study.

Pilot Study

A pilot study of the RU DRKN 2NITE? experiment was conducted in the fall of 2005 with 33 (19 women and 14 men) heavy drinking (average of 23.4 drinks per week) undergraduate college students in return for course credit and a chance to win a prize in a lottery drawing (Jackson, et al., 2005). After qualifying students (heavy drinkers) were identified from a large subject pool, they were invited to attend a brief Moderation Skills Training Session (MSTS) lecture held on the Wednesday prior to the experimental weekend. After providing consent, participants completed a baseline assessment of their drinking practices and attitudes, and were presented with a brief (less than 30 minutes) presentation on drinking moderation strategies.

The MSTS was designed to serve as a condensed and purely didactic form of the ASTP described earlier. During this presentation participants received personalized Blood Alcohol Level (BAL) cards, were instructed on how to compute their BAL, provided with information regarding alcohol use and its physiological and psychological effects, and provided with skills to moderate their drinking practices.

Following this session, participants were randomly assigned to one of two groups. One group received text-messages on subsequent heavy drinking nights (Thursday, Friday, Saturday) between the hours of 5:00 pm and 1:30 am, and the other group served as a control and did not receive any text-messages. The text-

messages contained reminders about the different moderation skills provided to all participants during the MSTs (see Appendix A for messages sent). The following Sunday afternoon, all participants were asked to complete a follow-up questionnaire that assessed their drinking practices during the weekend. Additionally, participants were asked to report about technical aspects of the study (e.g. *Were intended text-messages received?*, *Were moderation skills employed?*), their opinions about the study, and the quality of weekend that they experienced.

To examine the effects of the text-messages, weekend alcohol consumption was examined in terms of total drinks and peak BAL for each night. Peak BAL (in mg%) was computed for each weekend evening using Widmark's formula (Dimeff, et al., 1999; see Appendix A). Total weekend drinks was a composite score of a participant's reported number of drinks consumed during Thursday, Friday, and Saturday. Participants who did not drink on a particular night were excluded from analyses of individual nights; consequently the sample sizes differed for each evening. The total drinks for participants who drank on Thursday ($n = 18$), Friday ($n = 22$), and Saturday ($n = 20$) evening can be found in Figure 1. Statistically significant effects of the text-messages did not emerge for Thursday evening, $F(1, 16) = .29, p = .60, d = .26$, Friday evening, $F(1, 20) = .08, p = .78, d = .12$, or Saturday evening, $F(1, 20) = .08, p = .78, d = .13$. Figure 2 provides participant's peak BAL for each night. No statistically significant effects were observed for Thursday evening, $F(1, 16) = .54, p = .47, d = .35$,

Friday evening, $F(1, 20) = .04, p = .84, d = .09$, or Saturday evening, $F(1, 20) = .05, p = .83, d = .10$.

The findings of this pilot study are encouraging for further exploration. For both of our measures of alcohol consumption (total drinks and peak BAL), the trends on each of the heavy drinking nights were in the hypothesized direction of reduced alcohol use and less intoxication with small to moderate effect sizes. Given the small sample size and substantial within-group variability, it is not surprising that these effects were not statistically significant. Participants that received text-messages with moderation strategies provided mixed responses to a free response question asking them to describe their experiences with receiving text-messages. Many participants expressed a desire for more variety in the messages that were sent (e.g., *I found them unique, initially but became disappointed that they were the same ones every night.*). While some did not enjoy receiving the text-messages at all (e.g., *I didn't enjoy it at all.*), others evaluated it more positively (e.g., *I enjoyed receiving the text-messages, they were a great insight and reminder in the process of alcohol consumption.*).

Summary

In summary, high-risk alcohol college drinking is a major concern. Harm reduction interventions that seem to help students to implement moderation and safer drinking practices are a promising approach to reducing consequences associated with alcohol use. The effectiveness of programs designed from this standpoint (e.g., ASTP) could be enhanced by prompting hazardous drinking students to use their newly acquired moderation skills prior to and during drinking

occasions. The prevalence of cellular phones, and their ability to receive and transmit text-messages provides an ideal medium to discretely prompt high-risk drinkers.

Present Study

The purpose of the current study is to further investigate the efficacy of behaviorally prompting hazardous college drinkers using text-message technology with moderation skills presented during a MSTs. While the basic structure and content of this study is similar to the RU DRKN 2NITE? pilot study (Jackson et al., 2005), significant changes were made. Modifications include a design that allows for the investigation of exposure effects in addition to the immediate effect that prompting drinking moderation skills has on their implementation, an increased variety in the moderation skills provided via text-messaging, and inclusion of a minimal assessment (waitlist control) at baseline. The following hypotheses were made regarding the current study:

Hypothesis 1—Participants receiving text-messages will more effectively moderate their consumption in comparison to those not receiving text-messages during the first and second weekends.

Hypothesis 2—Participants receiving text-messages will report employing more moderation strategies than those not receiving messages during the first or second weekends.

Hypothesis 3—The more exposure participants have to the text-messages, then the greater that reductions will be observed in their consumption.

CHAPTER III

III. METHODS

Participants

Participants between the ages of 18-22 were recruited from a participant pool at a south central 4-year university who agree to participate in exchange for course credit and a chance to win a free personal DVD player. Participants identified as high-risk drinkers (who reported at least one episode of drinking at least 4-5 drinks on one occasion in the past month and at least 20 drinks per month on average) on screening questionnaires were contacted by phone to participate. Participants also reported that they were not involved in treatment for substance use or emotional or behavioral difficulties, owned a cell phone that is capable of receiving text-messages, agreed to pay any charges incurred from messages sent by the researchers, and reported no foreseeable events occurring during the course of the study that would significantly interfere with their current drinking behaviors (e.g. birthdays, family reunions, etc.). During recruitment, participant's weight was also obtained since weight is a participant characteristic affecting the metabolism and processing of alcohol and consequently BAL levels. Additionally, weight was used for the purposes of making the personalized blood alcohol level (BAL) card that was distributed to each participant at their assigned MSTs.

Of the 1,184 student volunteers screened, 931 were ineligible based upon the screening criteria (see Figure 3). Of the resulting 253 eligible students, 90 could not be contacted and 76 were not interested. Consequently, 87 eligible

students consented to participate, and were randomly assigned to one of the three conditions. Twenty-five participants failed to attend their assigned MSTs (12 of these participants additionally failed to complete a minimal or full baseline assessment) and were excluded from further participation. Additionally, participants that had not completed at least two of the three weekly follow-up assessments were excluded from analyses ($n = 2$). Despite claiming otherwise during initial study recruitment, participants that reported at the baseline assessment that they consumed fewer than 20 drinks per month were excluded from further analyses as they failed to meet inclusion criteria, ($n = 2$). Finally, given that the experimental manipulation was designed to alter *how* participants drink *when* they drink with the implementation of moderation prompts using text-messages, and not to foster abstinence, it would be inappropriate to include non-drinking and/or participants that did not receive text-messages when they were intended to ($n = 26$) in the analyses. Completely excluding these participants from the sample, as opposed to their exclusion only on the weekends that they did not drink and/or receive intended text messages, allowed for the examination of within-group changes. Consequently, the primary analyses consist of 32 completers, or 36.8% of the intent-to-treat sample.

Completers were compared to the non-completers that provided baseline data ($n = 44$) on demographic variables, measures of drinking behaviors, and associated consequences. On demographic variables, no differences emerged between completers and non-completers for gender, year in school, ethnicity, living arrangement, age, or weight. However, these groups did differ in their

romantic involvement status and involvement in the Greek system. Specifically, a higher percentage of completers (90.6%) than non-completers (72.7%) indicated that they were single. Additionally, a higher percentage of completers (41%) compared to non-completers (16%) were involved in the Greek system.

To compare the measures of drinking behaviors and associated consequences between completers and non-completers, t-tests were conducted. No differences were observed for the College Alcohol Problem Scale-Revised (CAPS-r; Maddock, Laforge, Rossi, & O'Hare, 2001 and O'Hare, 1997; $t(67) = -.06, p = .95$) or the Alcohol Use Disorders Identification Test (AUDIT; Saunders, Aasland, Babor, & de la Fuente, 1993; $t(67) = -1.10, p = .28$) scores. Additionally, completers did not differ from non-completers on typical weekend (referred to earlier as heavy drinking nights; i.e., Thursday, Friday, and Saturday) drinking patterns for total drinks consumed ($t(74) = -1.83, p = .07$) or average drinks consumed per drinking occasion ($t(74) = -.57, p = .57$). The total weekend drinks score was computed, by summing a participant's reported number of drinks consumed during a given weekend. The drinks per drinking occasion score was computed by dividing a participant's total weekend drinks by the total number of days s/he reported consuming alcohol for that weekend. Also of note, completers did not differ from non-completers on the peak BAL obtained for their reported typical weekend nights (Thursday, $t(74) = -1.92, p = .06$; Friday, $t(74) = -.72, p = .47$; and Saturday, $t(74) = -.49, p = .62$).

Sample Characteristics (see Table 1). The majority of the analyzed sample was male ($n = 23, 71.9\%$) with a mean age of 20.13 ($SD = 1.31, \text{range} = 18 - 23$).

The majority of participants described themselves as Caucasian or White ($n = 30$, 93.8%), single ($n = 29$, 90.6%), living with roommates ($n = 18$, 56.3%), and not involved in the Greek system ($n = 18$, 56.3%). Participants were most often in their freshman year ($n = 10$, 31.3%), and least often in their senior year ($n = 6$, 18.8%).

Measures (see Appendix B)

To ensure anonymity of data, participants were asked to create a unique identification code number. This code number was created using the following algorithm: the participants' last four digits of their social security number, followed by their birth month, and lastly, their birth day. The following measures were collected via the internet:

Demographics. During the baseline assessment, participants completed a demographic questionnaire. Questions assessed gender, weight, age, year in college, major/minor, ethnicity, grade point average, current living situation, current marital status, and current Greek system involvement.

Alcohol Use Disorders Identification Test (AUDIT). The AUDIT was developed and tested across six countries (USA, Norway, Mexico, Kenya, Australia, and Bulgaria) by the World Health Organization (Saunders, et. al, 1993). The AUDIT is a measure of hazardous drinking practices, and takes approximately two minutes to complete. It consists of 10 items comprised of three subscales: alcohol dependency, problems experienced as a result of drinking, and quantity/frequency of alcohol consumption. Participants were asked to complete the AUDIT during baseline assessment. Scores range from 0 to 40, with scores 8

or greater indicating the presence of harmful alcohol consumption. The AUDIT has demonstrated good reliability, (with cronbach's α coefficients usually in the 0.80's; Allen, Litten, Fertig, & Babor, 1997), and "acceptable" validity (Hall, Saunders, Babor, & Aasland, 1993). Additionally, the AUDIT appears not to exhibit racial or gender bias (Volk, Steinbauer, Cantor, & Holzer, 1997). The reliability of the AUDIT's for the current data was concerning, as Cronbach's α was .54.

Daily Drinking Questionnaire (DDQ). In this questionnaire, participants indicated, during baseline assessment, how much they typically drank and how many hours they typically spent drinking during each day of the week in the past month. Participants also completed the DDQ at each follow-up and reported on their actual (not typical) drinking during the prior weekend. The DDQ is a shortened version of the Drinking Practices Questionnaire (DPQ; Cahalan, Cisin, Crossley). The DDQ and DPQ have displayed moderate convergent validity (Collins, Parks, & Marlatt, 1985).

College Alcohol Problems Scale – revised (CAPS-r). The CAPS-r assesses the frequency of problems associated with a college student's drinking practices (Maddock, et. al, 2001; O'Hare, 1997). The CAPS-r consists of 8 items comprised of two subscales: Personal Problems and Social Problems subscales. The CAPS-r has been found to have adequate reliability, with a Cronbach's α coefficients for the Social Problems subscale of .75, and .79 for the Personal Problems subscale. Additionally, the CAPS-r, "appears to be a valid measure of alcohol problems faced by college students" (p. 396; Maddock, et al., 2001). Participants completed

the CAPS-r during baseline assessment. The reliability of the CAPS-r for the current data was also concerning, as Cronbach's α for the social problems subscale was .70, and .68 for the personal problems subscale.

Program Satisfaction Questionnaire (PSQ). The PSQ was used to assess technical aspects of the study (e.g., if text-messages were received), and how often participants employed moderation strategies (e.g., setting a goal BAL level and eating before you drink) after each weekend. Additionally, following the final weekend, items were added to the PSQ to allow participants to judge the appeal and usefulness of text-messaging moderation skills to drinkers on high-risk drinking nights.

Design and Procedures

After agreeing to participate in the study (See Appendix B for Informed Consent), participants were randomly assigned to Group 1, Group 2, or Group 3. Groups 2 and 3 served in the experimental conditions during the first week (see Figure 4 for experiment flow chart), whereas Group 1 served as a minimal-assessment waitlist control during the first weekend. At baseline, participants in Group 1 were sent an email with URL link to a minimal baseline assessment website that assessed demographic information and the quantity and frequency of their typical drinking patterns during a week (i.e., Demographics and DDQ). Participants randomized into Groups 2 and 3 were sent an email with URL link to the full baseline assessment website upon enrollment of this study (i.e., Demographics, DDQ, CAPS-r, AUDIT). Additionally, at the time they were invited and enrolled to participate in this study via phone, participants in Groups 2

and 3 were invited to attend a brief 30-minute Moderation Skills Training Session (MSTS) on a Monday night. The content and format of the MSTS in this study was identical to the MSTS in the RU DRKN 2NITE? pilot study. Following this training session, Group 3 was sent text-messages during the first weekend (i.e., Thursday, Friday, and Saturday), while Group 2 was not. Messages sent to Group 3 provided reminders about different moderation skills presented during the MSTS session approximately every two hours beginning at 6:00 pm and ending at 12:00 am. On each weekend night, text-messaging scripts varied (see Appendix B).

Week 1 Follow-Up Assessment. Following the first weekend of the study (on Sunday), participants in Groups 2 and Group 3 were sent an email with URL link to complete the first follow-up assessment (i.e., the DDQ and PSQ). Participants in Group 1 were sent an email with URL link to complete the full baseline assessment (i.e., Demographics, DDQ, CAPS-r, AUDIT). Following Follow-up 1, participants assigned to Group 1 attended the MSTS session on Monday of the second week of the study. During the second weekend, participants in Group 2 and 3 received text-messages with moderation skills, whereas Group 1 did not.

Week 2 Follow-Up Assessment. Following the second weekend of the study, all participants were sent a text-message reminder and email with URL link to complete Follow-up 2 (i.e., DDQ and PSQ). Following Follow-up 2, all groups received text-messages with moderation skills during the weekend.

Week 3 Follow-Up Assessment. Following the third weekend of the study, all participants were sent a text-message reminder and email with URL link to complete the final follow-up assessment (DDQ and PSQ). If interested, all participants were provided with referral information to treatment providers in the area.

CHAPTER IV

IV. RESULTS

Randomization Check

Of the 32 participants, 9 were randomly assigned to Group 1, 13 participants to Group 2, and 10 participants to Group 3. Chi-square and one-way ANOVA tests revealed no statistically significant differences between the three groups for all demographic measures and measures of baseline drinking behaviors and associated consequences (see Table 1).

Preliminary Analyses

The aim of this intervention was to assist hazardous drinking college students in moderating their drinking practices by sending behavioral prompts using cell phone text-messages with moderation strategies during times they were most likely to drink (i.e., Thursday, Friday, and Saturday evenings). The primary dependent variables used to determine the effectiveness of this intervention were total weekend drinks, drinks per drinking occasion, and peak BAL per weekend night. Each of these variables was calculated for each participant at each follow-up time point based upon their report on the DDQ. One participant did not report the hours she spent consuming drinks on a typical weekend at the baseline assessment. Using this participant's reported hours spent drinking at each follow-up weekend, regression formulas were constructed for each weekend night to calculate approximate values for the three missing baseline values. Lower scores on total weekend drinks, drinks per drinking occasion, or peak BAL per weekend night would reflect more moderate drinking practices.

Univariate analysis of variance tests for differences between groups on reported peak BAL for each weekend night at baseline and subsequent follow-ups did not reach significance. To enhance the ease of readability for the results section, analyses using BAL are excluded from further mention. Also, it should be noted that while the current analyses only examined the 32 participants meeting the inclusion criteria, more inclusive intent-to-treat analyses ($N = 58$) yields comparable results. Line graphs of the actual means for total drinks and drinks per drinking occasion for each group at each follow-up time-point are found in Figure 5 and Figure 6, respectively.

Primary Analyses

Hypothesis 1 (See Tables 2 and 3). The first hypothesis stated that if participants receive text-messages with moderation tips during the first and/or second weekends, then they would more effectively moderate their consumption in comparison to those not receiving text-messages. At the first follow-up, univariate analysis of variance tests were conducted to compare the differences in total drinks and drinks per drinking occasion between the three groups. The omnibus F for this test was significant for total drinks ($F(2, 29) = 3.77, p = .04, \eta^2 = .21$) and marginally significant for drinks per drinking occasion ($F(2, 29) = 3.22, p = .055, \eta^2 = .18$). Levene's test of equality of error variances was not violated for either analysis ($F(2, 29) = 2.04, p = .15$ and $F(2, 29) = .49, p = .62$ respectively). Pairwise comparisons with Bonferroni adjustments revealed only a marginally statistically significant difference between Group 1 (Control) and Group 2 (Only MSTs; $p = .056$) for total drinks. Contrary to *Hypothesis 1*, Group

2's mean total drinks in contrast to Group 3 (MSTS + text-messages), although not statistically significant, was 9.39 drinks less. Taken together, the data provides support for the efficacy of the MSTS without text-messages. At Follow-up 2, the omnibus F 's from the univariate analysis of variance tests for total drinks and drinks per drinking occasion revealed no statistically significant differences in total or drinks per drinking occasion between the three groups. While the difference is not statistically significant, Group 2 (MSTS + text-messages) consumed less total drinks and drinks per drinking occasion in comparison to Group 1, as *Hypothesis 1* would predict.

Hypothesis 2. The second hypothesis stated that if a participant receives text-messages, they will report employing more moderation strategies in comparison to those not receiving text-messages. Participants were asked to indicate whether or not they employed any of seven different types of moderation strategies over the course of the previous weekend. For each skill, participants were asked to indicate whether they used the skill *never* (scored as 0), *once* (scored as 1), *twice* (scored as 2), or *several times* (scored as 3) during the previous weekend. A composite score was computed for each participant for the total number of moderation s/he employed at Follow-ups 1 and 2. For the first follow-up, only Groups 2 and 3 were compared, as Group 1 was not asked to report on the moderation skills employed during the first weekend since they were serving as a waitlist controls prior to Follow-up 1. For Follow-up 2, all groups were compared. While an independent samples t-test for Follow-up 1 was used, a

univariate analysis of variance test was conducted to test the between-group effects at Follow-up 2.

At Follow-up 1, there was not a significant effect between Groups 2 and 3 for moderation strategies employed ($t(21) = -.44, p = .67$). Additionally, at Follow-up 2, the omnibus F was not significant ($F(2, 29) = .02, p = .98$). Consequently, while consistent with the findings of *Hypothesis 1* analyses (i.e., receiving the text-messages did not cause a decrease in drinking), both Follow-ups 1 and 2 do not support the assertion of *Hypothesis 2* that receiving text-message moderation prompts would result in a subsequent greater use of moderation strategies.

Hypothesis 3 (See Table 2 and 3). *Hypothesis 3* stated that the more exposure participants have to the text-messages, then the greater that reductions would be observed in their consumption. Examination of any within-group and between group differences at the final follow-up would provide indications of if beneficial additive effects exist. Examination of the multivariate test for total drinks and drinks per drinking occasion across each time point (baseline and Follow-ups 1-3) for each condition revealed that significance was not reached by any group. While not statistically significant, it is worth noting the small to moderate effect sizes for total drinks ($\eta^2 = .52$ (Group 1), $.32$ (Group 2), $.60$ (Group 3)) and small effect sizes for drinks per drinking occasion ($\eta^2 = .27$ (Group 1), $.18$ (Group 2), $.23$ (Group 3)). Dependent t-tests with Bonferroni adjustments made for multiple comparisons were ran to compare each follow-up time point to the baseline. All t-tests were did not reach significance..

To examine between group differences at the final follow-up, univariate analysis of variance tests were conducted to compare the differences between the three groups for total drinks and drinks per drinking occasion. The omnibus F for this test was significant for drinks per drinking occasion ($F(3, 24) = 6.46, p = .01, \eta^2 = .31$), but not for total drinks ($F(2, 29) = 1.45, p = .25$). Levene's test of equality of error variances was not violated for the drinks per drinking occasion test ($F(3, 24) = .08, p = .92$). After making pairwise comparisons between groups for drinks per drinking occasion with Bonferroni adjustments, a statistically significant difference between Group 1 and Group 2 was observed ($p = .004$). This statistically significant between-group effect provides support for *Hypothesis 3*, as Group 2 (two weekends of text-messages) consumed approximately five drinks less per drinking occasion than Group 1 (one weekend of text-messages) at the final follow-up.

Participant Satisfaction. Participant satisfaction with the components of this intervention was mixed. Participant responses to open-ended questions assessed during Follow-up 3 are provided in Appendix C. Chi-squared tests were conducted to examine differences between groups by participant ratings of the text-messages at Follow-up 3 on a 4-point liker-scale (*Strongly Disagree—Disagree—Agree—Strongly Agree*). Participants were not significantly different in their ratings for how useful ($\chi^2(6, N = 29) = 7.416, p = .28$), annoying ($\chi^2(6, N = 30) = 5.67, p = .46$), helpful ($\chi^2(6, N = 30) = 3.56, p = .74$), or confusing ($\chi^2(4, N = 28) = 5.43, p = .25$) the text-messages were. In general, while most

participants found the text-messages to be useful (69%), helpful (53.3%), and confusing (96.4%); a majority found them to be annoying (60%).

CHAPTER 5

V. DISCUSSION

Given that nearly half of all college students engage in hazardous drinking practices, and hazardous drinking practices are associated with an increase likelihood of experiencing academic, interpersonal, legal, and health related problems (including death), effective interventions for hazardous college drinking practices are needed (Wechsler, et al., 2000). Harm-reduction oriented interventions, like BASICS (Dimeff, et al., 1999) or ASTP (Kivlahan, et al., 1990), are two such interventions that have gained empirical support for their use (Kivlahan et al., 1990; Baer, et al., 1992; Marlatt, et al., 1998; Baer, et al. 2001; Murphy, et al., 2001; Roberts, et al., 2000; and Dimeff & McNeely, 2000). Both BASICS and the ASTP seek to assist college students in reducing the negative consequences of hazardous drinking practices by providing students with strategies that promote moderation practices.

Moderating one's own drinking practices is the typical route to recovery for non-treatment seeking hazardous drinkers (Sobell & Sobell, 1973a; 1973b; 1976; Sobell, et al., 2000). Several useful moderation strategies are offered to college students choosing to participate in BASICS or an ASTP group (or the 30-minute moderation skills training session presented in this study). However, the usefulness of these strategies may be limited by a student's ability to recall and implement newly acquired strategies in a drinking context. The purpose of this study was to investigate the efficacy of behaviorally prompting hazardous college

drinkers with newly acquired moderation skills through the use of text-message technology.

The effectiveness of behaviorally prompting moderation practices via cellular phone text-messages was tested over the course of three weeks among hazardous drinking college students. Participants were randomly assigned to one of three conditions (high dose text messages, low dose text messages, and delayed assessment control). Overall, and contrary to nearly all a priori hypotheses, the results of this study suggest that non-treatment seeking, hazardous college drinkers enrolled in a moderation-based skills intervention do not benefit from receiving reminders of moderation skills via cellular phone text-messaging. In fact, text-messages might inadvertently cause some students to consume more.

While text-message prompts might act to increase awareness about a person's current drinking behaviors and remind individuals to deploy moderation strategies that they already know about, such a prompt "falls upon blind eyes" if a person has no desire to implement any moderation strategies. One possible reason why the results of this study were antithetical is because of the prevalence of noncommittal attitudes toward the implementation of drinking moderation strategies. Future research on the use of text-messages in prompting behavior change should assess participant's intention to use the strategies they learn at the MSTs. If participants indicate no intention of or desire to change their drinking behaviors at the start of the intervention, perhaps those participants would best be served by not receiving moderating text-messages. However, according to the current study, they are likely to benefit from attending a MSTs.

Reflection on the theory of psychological reactance provides another plausible explanation for the unexpected results of the current study. According to the theory of reactance, when an individual perceives that their freedom to engage in a behavior is being threatened, then s/he becomes motivated to assert that very freedom (Brehm & Brehm, 1981). If this sample did in fact as postulated above have a noncommittal attitude toward moderating their drinking patterns, then it is not unreasonable to assume that receiving messages that informed them of how to drink might result in the feeling that their freedom to drink was being impinged upon outside of their consent.

Obermayer and colleagues (2004) found the use of text-messaging prompts to be beneficial in their smoking cessation intervention discussed earlier. In this study, inclusion criteria specified the need for participants to be in the preparation phase of smoking cessation (Prochaska & DiClemente, 1983). Thus, taking the current study and findings from the Obermayer et al. (2004) study suggests that text-messaging may be useful in prompting behavior change, however, only for those that indicate at least some degree of readiness to change. Alternatively, to address the issue of readiness to change, the text-message script could be adapted so that it was more useful to students that initially have no intention or desire to moderate their drinking.

Personalizing the text-messages for each participant might hold great promise in combating the effects of psychological reactance and differing degrees of readiness to change among participants. In the current study, participants all received text messages with the same message, at the same rate (i.e., every two

hours starting at 6:00 pm, with the last message sent at midnight). Many benefits may result in making the text-messages more individually tailored. If participants were provided the opportunity to select the text-messages and the times of their delivery, an increase in their reception and implementation may occur. Taking an active role in the process may increase a participant's sense of control and subsequently reduce psychological reactance.

The dynamic temporal nature of college student alcohol use is likely to have undermined the ability of to detect the presence of more subtle effects. In short, most college students, and certainly many in this sample, do not have well-established and consistent drinking patterns from one weekend to the next. This pattern is supported by recent literature on the temporal nature of college student drinking. Recently, Del Boca, et al., (2004) assessed the short-term fluctuations in the drinking patterns of 237 freshman students during their first academic year in college. They discovered that the rate at which college students are drinking is extremely variable. Their findings indicate that “considerable variability in drinking behavior was found, not only as a function of day of the week, but also from week to week” (p. 162). Their data suggests that while college students are largely inconsistent in the rate at which they drink on a week to week basis, the times in which they drink are likely times that they consume heavily.

Del Boca and colleagues' (2004) finding suggests that college student drinkers in general bring in a great deal of unexplained variance, as a result of their sporadic yet heavy drinking patterns. Given the amount of individual variability in drinking patterns within college drinkers on a week to week basis,

future research on college drinking interventions may benefit from studying this problem using multiple-baseline, single-case designs that select for inclusion only those participants that are frequent and consistent in the ways in which they drink.

Limitations to this study include a lack of ethnic diversity, as most (93.1%) of the sample self-identified as Caucasian/White. Generalizability of the current findings should be cautioned. Additionally concerning, are the low reliability coefficients observed for both the CAPS-r and the AUDIT measures. Perhaps the current sample is not as reliable in their self-report about drinking practices as are other hazardous drinking college students. Lastly, the DDQ baseline data collected for each participant assessed how many drinks, over how many hours, *s/he typically* drinks. In order to establish a true baseline, data should have been collected for *actual* drinking behavior for the week prior to the baseline assessment.

It appears that using text-messages to moderate college student's drinking behaviors in a broadly target intervention intended for all hazardous drinking college students is an ineffective approach to reducing drinking rates. Potential mediating factors may include participant readiness to change and/or their desire to receive text-messages should they desire to moderate their drinking. Interestingly, simple moderation skills training sessions, taking approximately 30-minutes to administer to large groups of hazardous college drinking was found to be effective in reducing drinking rates.

VII. REFERENCES

- Allen, J. P., Reinert, D. F., & Volk, R. J. (2001). The Alcohol Use Disorders Identification Test: An aid to recognition of alcohol problems in primary care patients. *Preventive Medicine: An International Journal Devoted to Practice and Theory, 33*, 428-433.
- Baer, J. S., Kivlahan, D. R., Blume, A. W., McKnight, P., & Marlatt, G. A. (2001). Brief intervention for heavy-drinking college students: 4-year follow-up and natural history. *American Journal of Public Health, 91*, 1310-1316.
- Baer, J. S., Marlatt, G. A., Kivlahan, D. R., & Fromme, K. (1992). An experimental test of three methods of alcohol risk reduction with young adults. *Journal of Consulting and Clinical Psychology, 60*, 974-979.
- Borsari, B., & Carey, K. B. (2000). Effects of a brief motivational intervention with college student drinkers. *Journal of Consulting and Clinical Psychology, 68*, 728-733.
- Brehm, S. S., & Brehm, J. W. (1981). *Psychological reactance: A theory of freedom and control*. New York: Academic.
- Cahalan, D., Cisin, I. H., & Crossley, H. M. (1969). American drinking practices: A national study of drinking behavior and attitudes. *Monographs of the Rutgers Center of Alcohol Studies, 6*, 260-260.
- Collins, R. L., Parks, G. A., & Marlatt, G. A. (1985). Social determinants of alcohol consumption: The effects of social interaction and model status on the self-administration of alcohol. *Journal of Consulting and Clinical Psychology, 53*, 189-200.

- Davis, P. (1987). Repression and the inaccessibility of affective memories. *Journal of Personality and Social Psychology*, 53, 585.
- de Lorimier, A. A. (2000). Alcohol, Wine, and Health. *The American Journal of Surgery*, 180, 357-361.
- Del Boca, F. K., Darkes, J., Greenbaum, P. E., & Goldman, M. S. (2005). Up close and personal: Temporal variability in the drinking individual college students during their first year. *Journal of Consulting and Clinical Psychology*, 72 (2), 155-164.
- Dimeff, L. A., Baer, J. S., Kivlahan, D. R., & Marlatt, G. A. (1999). *Brief Alcohol Screening and Intervention for College Students (BASICS): A harm reduction approach*. Guilford Press.
- Dimeff, L. A., & McNeely, M. (2000). Computer-enhanced primary care practitioner advice for high-risk college drinkers in a student primary health-care setting. *Cognitive and Behavioral Practice*, 7, 82-100.
- Durdan, C. A., Reeder, G. D., & Hecht, P. R. (1985). Litter in a university cafeteria: Demographic data and the use of prompts as an intervention strategy. *Environment & Behavior*, 17, 387-404.
- Elliott, C., Houghton, S., & Langsford, S. (1997). The use of visual prompts to increase Kegel exercise performance in pregnant women: A case study. *Behaviour Change*, 14, 231-235.
- Fillmore, K. M. (1974). Drinking and problem drinking in early adulthood and middle age: An exploratory 20-year follow-up study. *Quarterly Journal of Studies on Alcohol*, 35, 819-840.

- Foy, D. W., Nunn, L. B., & Rychtarik, R. G. (1984). Broad-spectrum behavioral treatment for chronic alcoholics: Effects of training controlled drinking skills. *Journal of Consulting and Clinical Psychology, 52*, 218-230.
- Fromme, K., Marlatt, G. A., Baer, J. S., & Kivlahan, D. R. (1994). The Alcohol Skills Training Program: A group intervention for young adult drinkers. *Journal of Substance Abuse Treatment, 11*, 143-154.
- Grant, B. F. (1993). ICD-10 and proposed DSM-IV harmful use of alcohol/alcohol abuse and dependence, United States 1988: A nosological comparison. *Alcoholism: Clinical and Experimental Research, 17*, 1093-1101.
- Hall, W., Saunders, J. B., Babor, T. F., & Aasland, O. G. (1993). The structure and correlates of alcohol dependence: WHO collaborative project on the early detection of persons with harmful alcohol consumption: III. *Addiction, 88*, 1627-1636.
- Hingson, R. W., Heeren, T., Zakocs, R. C., Kopstein, A., & Wechsler, H. (2002). Magnitude of alcohol-related mortality and morbidity among U. S. college students ages 18-24. *Journal of Studies on Alcohol, 63*, 136.
- Jackson, K. M., Sher, K. J., & Gotham, H. J. (2001). Transitioning into and out of large-effect drinking in young adulthood. *Journal of Abnormal Psychology, 110* (3), 378-391.
- Jackson, M., Mignogna, J., & Leffingwell, T. R. (2005, October). RU DRKN 2NITE?: Cellular Text Message Prompts for Alcohol Harm-Reduction on Campus. Poster presentation at the annual meeting of the Oklahoma Psychological Association in Oklahoma City, Oklahoma.

- Jellinek, E. M. (1960). *The disease concept of alcoholism*: New Haven, CT. Hillhouse.
- Kivlahan, D. R., Marlatt, G. A., Fromme, K., & Coppel, D. B. (1990). Secondary prevention with college drinkers: Evaluation of an alcohol skills training program. *Journal of Consulting & Clinical Psychology, 58*, 805-810.
- Maddock, J. E., Laforge, R. G., Rossi, J. S., & O'Hare, T. (2001). The College Alcohol Problems Scale. *Addictive Behaviors, 26*, 385-398.
- Marlatt, G. A. (1998). *Harm reduction: Pragmatic strategies for managing high-risk behaviors*: Guilford Press.
- Marlatt, G. A., Baer, J. S., Kivlahan, D. R., Dimeff, L. A., Larimer, M. E., Quigley, L. A., et al. (1998). Screening and brief intervention for high-risk college student drinkers: Results from a 2-year follow-up assessment. *Journal of Consulting and Clinical Psychology, 66*, 604-615.
- Marlatt, G. A., & Witkiewitz, K. (2002). Harm reduction approaches to alcohol use: Health promotion, prevention, and treatment. *Addictive Behaviors, 27*, 867-886.
- Miller, W. R. (1993). Alcoholism: Toward a better disease model. *Psychology of Addictive Behaviors, 7*, 129-136.
- Miller, W. R., & Tonigan, J. S. (1996). Assessing drinkers' motivations for change: The Stages of Change Readiness and Treatment Eagerness Scale (SOCRATES). *Psychology of Addictive Behaviors, 10*, 81-89.
- Moyer, A., & Finney, J. W. (2004). Brief Interventions for Alcohol Problems: Factors That Facilitate Implementation. *Alcohol Research & Health, 28*, 44-50.

- Murphy, J. G., Duchnick, J. J., Vuchinich, R. E., Davison, J. W., Karg, R. S., Olson, A. M., et al. (2001). Relative efficacy of a brief motivational intervention for college student drinkers. *Psychology of Addictive Behaviors, 15*, 373-379.
- Newcomb, M. D., & Bentler, P. M. (1987). Changes in drug use from high school to young adulthood: Effects of living arrangement and current life pursuit. *Journal of Applied Developmental Psychology, 8*, 221-246.
- O'Hare, T. (1997). Measuring problem drinking in first time offenders: Development and validation of the College Alcohol Problem Scale (CAPS). *Journal of Substance Abuse Treatment, 14*, 383-387.
- Obermayer, J. L., Riley, W. T., Asif, O., & Jean-Mary, J. (2004). College Smoking-Cessation Using Cell Phone Text Messaging. *Journal of American College Health, 53*, 71-78.
- Prochaska, J. O., & DiClemente, C. C. (1983). Stages and processes of self-change of smoking: Toward an integrative model of change. *Journal of Consulting and Clinical Psychology, 51* (3). 390-395.
- Roberts, L. J., Neal, D. J., Kivlahan, D. R., Baer, J. S., & Marlatt, G. A. (2000). Individual drinking changes following a brief intervention among college students: Clinical significance in an indicated preventive context. *Journal of Consulting and Clinical Psychology, 68*, 500-505.
- Rodgers, A., Corbett, T., Bramley, D., Riddell, T., Wills, M., Lin, R-B, & Jones, M. (2006). Do u smoke after text? Results of a randomised trial of smoking cessation using mobile phone text messaging. *Tobacco Control, 14*, 255-262.

- Sanchez-Craig, M., Annis, H. M., Bronet, A. R., & MacDonald, K. R. (1984). Random assignment to abstinence and controlled drinking: Evaluation of a cognitive-behavioral program for problem drinkers. *Journal of Consulting and Clinical Psychology, 52*, 390-403.
- Saunders, J. B., Aasland, O. G., Babor, T. F., & de la Fuente, J. R. (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption: II. *Addiction, 88*, 791-804.
- Sobell, L. C., Ellingstad, T. P., & Sobell, M. B. (2000). Natural recovery from alcohol and drug problems: Methodological review of the research with suggestions for future directions. *Addiction, 95*, 749-764.
- Sobell, M. B. (1973). Alcoholics treated by individualized behavior therapy: One year treatment outcome. *Behaviour Research and Therapy, Vol. 11*, 599-618.
- Sobell, M. B., & Sobell, L. C. (1973). Individualized behavior therapy for alcoholics. *Behavior Therapy, Vol. 4*, 49-72.
- Sobell, M. B., & Sobell, L. C. (1976). Second year treatment outcome of alcoholics treated by individualized behavior therapy: Results. *Behaviour Research and Therapy, 14*, 195-215.
- Stock, L. Z., & Milan, M. A. (1993). Improving dietary practices of elderly individuals: The power of prompting, feedback, and social reinforcement. *Journal of Applied Behavior Analysis, 26*, 379-387.
- Trafimow, D., & Sheeran, P. (1998). Some tests of the distinction between cognitive and affective beliefs. *Journal of Experimental Social Psychology, 34*, 378.

- Vicary, J. R., & Karshin, C. M. (2002). College alcohol abuse: A review of the problems, issues, and prevention approaches. *Journal of Primary Prevention, 22*, 299-331.
- Volk, R. J., Steinbauer, J. R., Cantor, S. B., & Holzer, C. E., III. (1997). The Alcohol Use Disorders Identification Test (AUDIT) as a screen for at-risk drinking in primary care patients of different racial/ethnic backgrounds. *Addiction, 92*, 197-206.
- Wechsler, H., Dowdall, G. W., Moeykens, B., & Castillo, S. (1994). Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *Journal of American Medical Association, 272*, 1672-1677, 1994.
- Wechsler, H., Dowdall, G. W., Davenport, A., Castillo, S., & Hansen, J. (1995). Correlates of college student binge drinking. *American Journal of Public Health, 85*, 921.
- Wechsler, H. & Austin, S. B., (1998). Correspondence, Binge drinking: The five/four measure. *Journal of Studies on Alcohol, 59*, 122-124.
- Wechsler, H., Lee, J. E., Kuo, M., & Lee, H. (2000). College binge drinking in the 1990s: A continuing problem: Results of the Harvard School of Public Health 1999 College Alcohol Study. *Journal of American College Health, 48*, 199-210.

Appendix A

Pilot Text-Message Script
Widmark's formula

Pilot Study Text Message Script (Jackson, et al., 2005)

Time	Text-Message
5:00 PM	RU DRKN 2nite? Decide whether or not you want to drnk alc tonight. Have a safe and fun evening.
6:00 PM	Plan 4 safe transportation. Choose a designated drvr or stay close to home. Do not drnk and drv.
7:00 PM	Eat b4 u drnk.
8:00 PM	Set a bal limit 4 drnkng 2nite. More isn't always better. Set an upper limit + stick 2 it.
9:00 PM	Think quality, not quantity. Fewer drnks = \$\$\$\$\$.
10:00 PM	Count drnks. Keep bottle caps
11:00 PM	Slow down. Pace yourself.
12:00 PM	Space your drnks. Have a soda.
1:00 AM	Stay hydrated. Drnk H2O between alc drnks. Hangovers suck.
1:30 AM	If U need a ride, call free ride, 678-1050 for a free, safe ride home.

Widmark's Formula (Dimeff, et al.,1999)

$$\text{BAL} = [(\# \text{ drinks}/2) \times (\text{gc}/\text{weight})] - (\# \text{ hours} \times \text{mr})$$

drinks = number of standard drinks (0.5 oz. alcohol each)

gc = gender constant; 7.5 for males and 9.0 for females

hours = number of hours between first and last drink

mr = metabolic rate for alcohol = 0.016

Appendix B

Measures

Text-messaging Scripts-Revised
Informed Consent

Measures

Demographics

Gender: male female

Current Age

Year in College

Ethnicity

Your current living situation

Your current marital status

Are you a Greek member?

Measures

Alcohol Use Disorders Identification Test (AUDIT, Saunders, et. al, 1993)

Please circle the answer that is correct for you.

How often do you have a drink containing alcohol?

How many drinks containing alcohol do you have on a typical day when you are drinking?

How often do you have six or more drinks on one occasion?

How often during the last year have you found that you were not able to stop drinking once you had started?

How often during the last year have you failed to do what was normally expected from you because of drinking?

How often during the last year have you needed a first drink in the morning to get yourself going after a heavy drinking session?

How often during the last year have you had a feeling of guilt or remorse after drinking?

How often during the last year have you been unable to remember what happened the night before because you had been drinking?

Have you or someone else been injured as a result of your drinking?

Has a relative or friend, or a doctor or other health worker, been concerned about your drinking or suggested you cut down?

Measures

Daily Drinking Questionnaire (DDQ; Collins, et al., 1985) Baseline

Or the following questions, *one drink* equals:

- 4 ounces of wine
- 1 wine cooler
- 12 ounces of 3.2 beer
- 8-10 ounces of "6-point" beer, malt liquor, ice beers, or "microbrew" beers
- A mixed drink with 1 ounce of liquor
- A single shot of liquor

For the *past month*, please type in a number for each day of the week indicating the *typical number of drinks* you usually consume on that day, and the *typical number of hours* you usually drink on that day. Highlight the box, then enter your answer. Please be sure to fill out the information regarding weight.

* If you did not consume any drinks on a certain day please enter "0" in the "# of Drinks" box and "0" in the "# of Hours" box.

Sunday	<input type="text" value="# of Drinks"/>	<input type="text" value="# of Hours"/>
Monday	<input type="text" value="# of Drinks"/>	<input type="text" value="# of Hours"/>
Tuesday	<input type="text" value="# of Drinks"/>	<input type="text" value="# of Hours"/>
Wednesday	<input type="text" value="# of Drinks"/>	<input type="text" value="# of Hours"/>
Thursday	<input type="text" value="# of Drinks"/>	<input type="text" value="# of Hours"/>
Friday	<input type="text" value="# of Drinks"/>	<input type="text" value="# of Hours"/>
Saturday	<input type="text" value="# of Drinks"/>	<input type="text" value="# of Hours"/>

What is your present estimated weight? pounds

Measures

Daily Drinking Questionnaire (DDQ; Collins, et al., 1985) Example of Follow-up

For the following questions, *one drink* equals:

- 4 ounces of wine
- 1 wine cooler
- 12 ounces of 3.2 beer
- 8-10 ounces of "6-point" beer, malt liquor, ice beers, or "microbrew" beers
- A mixed drink with 1 ounce of liquor
- A single shot of liquor

For the past week, please use the drop down menus to indicate how many drinks you consumed each day, and then indicate over how many hours those drinks were consumed. If you were drinking past midnight for any particular evening, even though it is technically the next day, please count those hours and number of drinks consumed toward the night that you started drinking for that evening.

* If you did not consume any drinks on a certain day please enter "0" in the "# of Drinks" box and "0" in the "# of Hours" box.

Sunday 11/05/06 (Day after OSU Vs. UT Game)	# of Drinks	# of Hours
Monday 11/06/06	# of Drinks	# of Hours
Tuesday 11/07/06	# of Drinks	# of Hours
Wednesday 11/08/06	# of Drinks	# of Hours
Thursday 11/09/06	# of Drinks	# of Hours
Friday 11/10/06	# of Drinks	# of Hours
Saturday 11/11/06 (Day of OSU Vs. Baylor Game)	# of Drinks	# of Hours

Measures

College Alcohol Problems Scale – revised (CAPS-r)

Rate HOW OFTEN you have had any of the following problems over the past month as a result of drinking alcoholic beverages.

Felt sad, blue, or depressed

Felt nervous or irritable

Felt bad about myself

Had problems with appetite or sleeping

Engaged in unplanned sexual activity

Drove under the influence

Did not use protection when engaging in sex

Engaged in illegal activities associated with drug use

Measures

Program Satisfaction Questionnaire (PSQ) Follow-up 1, 2, & 3

Following is the list of strategies that were talked about when we met this past Monday. Please indicate the number of times that you used the strategy on Thursday, Friday, and Saturday.

Planned Ahead (setting a reasonable number of drinks or Blood Alcohol Level).

Ate before you drank alcohol (dinner or snack).

Used safe transportation (designated driver, cab, etc.).

Counted drinks (keeping bottle caps in your pocket, line up the empty bottles, or other strategy).

Slowed down or paced yourself (not drinking more than your limit).

Spaced your drinks (took a break or alternated alcoholic or non-alcoholic beverages).

Drank water between drinks.

Measures

Program Satisfaction Questionnaire (PSQ)
Follow-up 1, 2, & 3

How many times did you use your personalized BAL card on Thursday (11/09), Friday (11/10), and Saturday (11/11) nights?

Did you receive text messages related to this project on Thursday (11/09), Friday (11/10), and Saturday (11/11) nights?

If yes, did you read the text messages?

If YES, please rate the messages on the following dimensions below.
If NO, please [click here](#) to continue to the next question.

Did you receive 4 text messages every night they were sent (Thursday (11/09), Friday (11/10), and Saturday (11/11) nights)?

The messages were USEFUL.

The messages were ANNOYING.

The messages were HELPFUL.

The messages were CONFUSING.

Measures

Program Satisfaction Questionnaire (PSQ)
Follow-up 3

Program Satisfaction Questions, Part I

Please describe your experience with this study (did you enjoy it, any other thoughts or opinions or evaluations of it).

Would you recommend continued use of text messages as an intervention for risky alcohol use?

Do you think that receiving the text messages had any impact upon your drinking behavior? If so, how?

Did the text message reminders make you think about your alcohol consumption? If so how?

Please describe your experience with receiving text messages (did you enjoy it, any other thoughts or opinions or evaluations of it).

Measures

Program Satisfaction Questionnaire (PSQ)
Follow-up 3

Program Satisfaction Questions, Part II

Do you think that that presentation that you viewed a couple of weeks ago on a Wednesday evening ("Alcohol 201: Advanced Skills for Safer Alcohol Use") had any impact upon your drinking behavior? If so, how?

Did you find your personalized BAL card to be...

Do you have any comments you would like to share about the personalized BAL Card?

Page 10 of 10 | [continue](#) | [previous](#) | [top](#)

Revised Text Message Script

Weekend 1, Thursday

Ru drkn 2nite? Decide whether or not you want to drnk alc tonight. Have a safe and fun evening.
Look at your bal card, decide bal required to get desired alc effect, + still save \$
Cnt drnks. Keep bottle caps
Space your drnks. Have a soda. Need ride home, call taxi, 743-1700

Weekend 1, Friday

Ru drkn 2nite? Decide now. Have fun and be safe. Eat b4 u drnk.
Look at ure bal card, decide bal required 2 get desired alc effect, + save \$
Cnt drnks. Move a ring 2 the finger # of drks each new drnk
Save \$\$\$! Ask for free coke or water next trip 2 bar.

Weekend 1, Saturday

Ru drkn 2nite? Decide b4 the night begins. Plan 2 eat b4 u drnk.
Set a bal limit 4 2nite. avoid hangover + wasting weekend day 2morrow.
Cnt drnks. Keep tabs from cans.
Think quality, not quantity. Fewer drnks = \$\$\$\$\$.

Weekend 2, Thursday

Ru drkn 2nite? Decide b4 the night begins. Plan 2 eat b4 u drnk.
Decide a bal limit 4 night. Set an upper limit + stick 2 it.
Cnt drnks. Keep bottle caps
Stay hydrated. Drnk H2O between alc drnks. Hangovers suck.

Weekend 2, Friday

Ru drkn 2nite? Decide b4 the night begins. Have fun and be safe.
Set a bal limit for 2nite. avoid hangover + wasting weekend day 2morrow
Alternate drks. Order soda or water next trip 2 bar.
Count ure drinks. Keep bottle caps.

Weekend 2, Saturday

Ru drkn 2nite? If so set a bal 4 2nite. Have fun and be safe
Plan 4 a safe way home, Designated driver or friend 2 walk with.
Save \$\$\$! Ask for free coke or water next trip to bar.
Stay hydrated, hangovers r no fun. Need ride home, call taxi, 743-1700

Weekend 3, Thursday

Ru drkn 2nite? Decide b4 the night begins. If so make sure 2 eat b4 u drkn.
Set a bal limit 4 2nite so that u have fun, avoid hangover, and save \$\$\$.
Think quality, not quantity. Fewer drnks = \$\$\$\$\$.
Slow down. Pace yourself. Stay hydrated to avoid hangover.

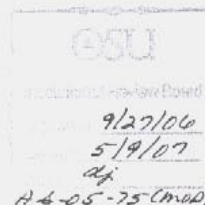
Weekend 3, Friday

Ru drkn 2nite? Plan 2 eat b4 u drnk
Set a bal limit b4 drnkng 2nite. More isn't always better.
Cnt drnks. Keep tabs from cans
Save \$\$\$! Ask for free coke or water next trip to bar.

Weekend 3, Saturday

Ru drkn 2nite? Decide now. Look @ ure BAL card and set limit if so.
Eat b4 u drink.
Slow Down. Pace yourself. Think quality, not quantity.
Stay hydrated and space ure drnks.

Informed Consent Form-Page 1



Informed Consent Form

What is this project? Who is responsible for the project?

This project is designed to understand the behaviors of college student who use alcohol. The project is titled the "RUDRKN 2NITE?" and is being conducted by Thad Leffingwell, Ph.D., Assistant Professor in the Department of Psychology at Oklahoma State University. This project is approved by OSU's Institutional Review Board.

Why might I be asked to participate?

You have been invited to participate because you are currently a college student who is at least 18 years of age and indicated consuming alcohol and who currently carries a cellular telephone with text messaging capabilities.

What will I be asked to do?

Those who meet eligibility criteria will be invited to participate in the study. If you choose to participate, you will complete four online questionnaires that include questions about your alcohol use, other behaviors while using alcohol, and problems associated with using alcohol over the course of four weeks. These questionnaires should take approximately 15-20 minutes to complete. Also, you will participate in one 45-minute session involving education about alcohol on an assigned Monday night. Additionally, you will receive 4 text-messages with drinking moderation tips during Thursday, Friday, and Saturday evenings for one, two, or three weeks depending on the condition you are assigned to. You will not be asked to respond to any of these messages. Your decision to participate is entirely voluntary, and you may choose to stop participating at any time without penalty to you.

What are the risks of participating in this project?

Participation in this study will require you to share some information about behavior that may be illegal (e.g., drinking alcohol underage). There is some small risk that the privacy of these data will be compromised. Additionally, some people may experience discomfort when responding to sensitive information about their use of alcohol or related consequences. Participation may also cause some people to reflect on important life choices and experiences, and information about professional services available in the community will be made available to you. In addition, there may be a cost due to participation due to the receipt of text messages, depending on your cell phone provider and contract.

What about my privacy and confidentiality?

Participation in this study will require you to share some information that you may consider quite private and sensitive. All records from this study will be kept confidential, and several measures will be taken to make it very unlikely that this confidentiality is compromised. Computerized data will be maintained on a password-protected computer in a password-protected file accessible only by the researchers. You will be asked to create a unique code number that will be used to link the data you provide throughout the study (baseline and follow-up). After the data is linked (about one week after the follow-up data is collected), this code number will be removed, making your data completely anonymous. Your name will never be associated with the information you provide. Data obtained will be destroyed after 5 years. Your individual responses to the questionnaire will only be seen by the researchers, and will not be seen by anyone else involved at Oklahoma State University, legal authorities, or your parents. Representatives from the OSU Institutional Review Board for the Protection of Human Subjects

Informed Consent Form-Page 2

and its federal oversight agencies may need to observe the researcher(s) during the consent and data collection processes or inspect consent and data records to assure that they are being handled in agreement with approved procedures. Confidentiality of the information observed or inspected will be maintained by these representatives.

What are the benefits of participating?

If you choose to participate, the primary benefit to you will be two units of research credit. You will be asked to fill out a contact sheet in order to receive credit for participation in this study, but this information will be kept separate from the data you provide on the survey. Also, you will earn an entry into a lottery drawing for a Free 7" DVD Personal Player with each completed follow-up assessment.

What are the alternatives?

The alternative is to not participate. Your participation is voluntary. There is no penalty for choosing to not participate. If you are eligible for research credit in a course due to your participation, the instructor of that course will make optional comparable activities available. You may choose to not participate now, or at any time during your participation.

What if I have other questions or concerns about my participation?

If you have any questions or need to report an effect about the research procedures, you may contact Thad R. Leffingwell, Ph.D. at (405) 744-7494 or 215 North Murray, Stillwater, OK 74078. If you have questions about your rights as a research participant, you may take them to Sue Jacobs, Ph.D., IRB Chair of OSU's Institutional Review Board at (405) 744-1676 or 219 Cordell North, Stillwater, OK 74078.

STATEMENT OF VOLUNTARY PARTICIPATION

I understand that participation is voluntary and that I will not be penalized if I choose not to participate. I also understand that I am free to withdraw my consent at any time and end my participation in this project without penalty.

SIGNATURES

"I have read and fully understand the consent form. I have had a chance to ask questions about the study and my questions have been answered to my satisfaction. I sign this form freely and voluntarily. A copy of this form has been given to me."

Date: ___/___/___ Time: ___:___ am/pm

Name (Please Print)

Signature

"I certify that I have personally explained all elements of this form to the participant before requesting the participant to sign it."

Signed: _____
Project director or authorized representative



Appendix C

Participant Responses to PSQ

Please describe your experience with this study (did you enjoy it, any other thoughts or opinions or evaluations of it.)

- it was alright
- I think i learned some things, it made me think about my drinking habits.
- I thought it was run well but the tips and texts may be more useful for someone who drinks more.
- it was interesting and made me think
- I found that many of the techniques that were said could be useful if they were used.
- I found the presentation the most useful. The BAC cards were both fun and informative.
- I did enjoy this study, it helped me take a look at my drinking and gave me helpful hints.
- I thought it was very fun
- I enjoyed it, the information was useful.
- I enjoyed participating, and learning about alcohol use taught me stuff I didn't know before.
- easy
- it was nice. not too much work
- i did enjoy it. i didnt get all the text messages that i did get were helpful
- I learned interesting things
- Experience with the study was fine.
- Overall I enjoyed it. The messages did become quite annoying though.
- I enjoyed it, didn't take much effort to participate.
- i think this study was very educational and the reminders put it in your head for the night
- i found the study very interesting
- I enjoyed it, the text messages weren't of much use or useful.
- I thought that it was useful
- It was ok
- I thought that it was useful to find out and think back to how many drinks I was drinking during a weeks time.
- i really enjoyed it. its def. raised my awareness of not just going crazy when i drink
- i thought the study was interesting and glad that this was the one that fulfilled my experiment requirements
- yes i enjoyed it, i liked the card
- it was a good idea it actually made me think before i drank
- i thought that it was really easy.
- I enjoyed the study and got some good tips for managing my drinking habits safely.
- It was alright, I basically did it for the credits.
- I didn't mind it.

Would you recommend continued use of text messages as an intervention for risky alcohol use?

- not really
- It could be affective
- I think if someone really had a problem this could be a way of intervention to give them a subtle message.
- not really, they do not help
- No not at all.
- yes
- No, cause over time someone might get angry with the text messages.
- Yes
- No
- Not really, because I found myself getting more annoyed because it felt it was my conscience telling me to slow down.
- no
- yes its very helpful and newage
- i think its a good idea for useful tips but not for intervention
- no, i dont think i will need them anymore
- Maybe for someone who drinks a lot but really it was annoying for me because sometimes I would get several texts on nights when I wasnt even drinking.
- No.
- no
- yes they really do help
- yeah it kinda a nice thing to have that reminder. because so often you get cought up in the moment and for get simple everyday things like eating.
- yes, but if you have the right information.
- yes
- more facts about how many people have been hurt or so with the use of alcohol.
- Ya
- no. they just get annoying and they cost money
- possibly sometimes
- yes but not every night
- yes weekend text messages would be a good reminder
- yes.
- Yes.
- Nope
- No

Do you think that receiving the text messages had any impact upon your drinking behavior? If so, how?

- no
- I only recieved one text message, it used to advice and ate before i drank, that's the only message i recieved though.
- I don't think so just because I have not been drinking much on the weekends of the study. They would be more helpful to someone who drank a lot.
- no
- Yes, honestly they made me laugh and I found them annoying.
- yes, the one that told me to eat before i go out reminded me to do so.
- No.
- Not really but they did remind me what that meeting was about
- Yes, if the messages were recieved before the use had begun.
- No, I really don't. I probably would have made the same choices.
- no
- yeah it made me double check myself and laugh when i wasnt drinking
- no. i considered the information that was relayed to me but it didnt affect my drinking habits
- yes, helpful reminders
- No, not at all. If anything it was just something to laugh about.
- Not really, if it did, then it was only subconsciously
- nope
- Probably not but i at least thought about not drinking that much
- yea some times it helped me to realize how drunk i really was when i tryed to read the messages. And often times remind me to eat. Because i often don't eat supper.
- no
- yes, it made me think about how much i had had to drink and if I should slow down
- not really
- No
- no if anything it made me want to drink because it got me to think about it. and then it would be just funny because the text messages were so to the point.
- it did, but not in a very substantial way.
- yes a little bit
- yes because i would start drinking then i would recive the text messages and it would meake me think.
- yes a little, it made me think before i would go out.
- At times, I would receive the text messages and think "wow, that would be the smart thing to do". So, it did help me control how much I was drinking.
- Nope, not at all
- No

Did the text message reminders make you think about your alcohol consumption? If so how?

- no
- No
- no
- No not at all.
- yes, reminded me to drink water.
- No.
- Not really
- Yes, they just reminded me of the things I was told in the lecture.
- Yes, it made me feel bad when I was drinking because it made me feel like I was drinking too much... which I probably was.
- no
- yes they made me think of how everyone in the study got them and made me think.
- No
- no
- No, but I dont really drink that much to begin with.
- Not really. I kindof learned to ignore them.
- nope
- Yes it made me think about it just because it triggered something
- yea it made me realize how much i really do drink
- yes, but not much b/c i have received the same one every weekend
- no
- Yes, but it did seem that even though they were sending the messages I was either not around my phone or not drinking.
- yeah it made we want to go out and party that weekend.
- they just made me think if or how much i was going to drink that night
- yes it did becuase it made me want to count drinks
- yes i would start to count my drinks
- yes, it made me think about drinking more safely.
- Yes, they made me think I should probably slow down.
- Nope
- No

Please describe your experience with receiving text messages (did you enjoy it, any other thoughts or opinions or evaluations of it).

- no
- Would be more useful to a heavy drinker.
- no effect really
- I did not like them at all and I found them very annoying.
- i think it is a good program and should continue to be used
- It didnt really bother me at all but i really did take the information into effect.
- It was nice
- I thought it was cool, however I did not recieve messages every night.
- At first it was OK because I didn't get a whole lot, but this weekend I got a lot AND it was my birthday so I didn't really let it interfere with how much I drank.
- kinda annoying
- i enjoyed it. it was amusing and useful
- It didnt annoy me but i only got a few text messages every now and then
- it was helpful
- Ah, I thought it was annoying.
- It was amusing at first, but got old really quick.
- the only text I enjoyed was the reminder on Sunday to fill this oot.
- The text messages were fine. They at least get the person to think about it more!
- i really don't know they where helpful reminders, and often times shed some light on some things.
- send different information about alcohol, like shocking statistics or something useful not just eating before you drink.
- They were helpul...and kinda funny
- just got them and it was information I already knew
- It was ok, it didnt bother me
- cool and funny at first. then just got annoying
- i wouldnt say i enjoyed it, but i wasnt angry recieving them either.
- yes i enjoyed reading them
- yes i enjoyed it i thought it was a good idea
- it recieved them and read them and thought about them.
- I liked receiving the text messages because I felt they helped me to drink safely and still have a good time.
- The text messages were annoying
- It was a little annoying, but that's it.

Do you think that the presentation you viewed a couple of weeks ago on a Wednesday evening (“Alcohol 201: Advanced skills for Safer Alcohol Use”) had any impact upon your drinking behavior? If so, how?

- no
- not really, it was a lot of stuff i had prior knowledge of.
- I think it will in the future when I am less busy and have more time to go out. I will use the tips.
- no not really..i think that i already have myself under control
- Not really however it did give me an idea of how to control my drinking if I want to.
- yes, the information showed me how to still drink, but drink to where i don't have a severe hangover in the morning
- Yes, it helped me realize that drinking moderately is for my benefit to get more bang for my buck.
- Not really an impact but it did inform me of some things i didnt know
- Yes, I believe it had the most impact because I just remember the things I was told.
- Yes, I understand what it means now to pace yourself and stay in the zone where it makes you feel good instead of drinking too much and getting sick. I really did try to pace myself, I had friends make me wait an hour before drinking more this weekend because I remembered learning about it in the presentation. All in all, I enjoyed the presentation and appreciate that you guys weren't telling us to STOP drinking, but helped us to use it the right way.
- no impact on my drinking, but it was interesting
- no. i knew alot about drinking and the card although useful I thought I could memorize after looking at once. I would never bring that card out with me
- It made me try different techniques to manage my drinking but it didnt have a major impact
- yes, it made me think about how much i am accually consuming
- no, because it was mainly knowledge that we already know. It might possible to be good thing for incoming freshmen.
- I think it made me more aware of what I was doing. It provided some great ideas that should be presented to all college students.
- it's always nice to brush up on alcohol consumption advice, but it was mostly material I had already known
- it was definitely informative but i knew alot of it. It was a good refresher course for me though. It was well presented and interesting
- Well no not really i have been drinking for several years now and have learned my limits. And i have seen it ruen some peoples lives. so i would have to say i was just reminded about the topics we covered. however there were some indepth things i learned.
- no, because i have been drinking since I was 16 and I also have grown more resposbly with my drinking. I am also taking a drug and alcohol course here at OSU currently
- Yes.It made me think that it is a good idea to stop drinking before you start to go over the hill.
- No, it was valid information but just did not stop my "having fun".
- I actually did learn something new while I was there

Do you think that the presentation continued...

- yes because it helped confirm the ideas i had about quality over quantity and enjoying yourself but planning things out.
- it didnt have an impact on my behavior, it just made me a little bit more aware of my alcohol use
- yes it taught me ways to count drinks and to look at the card
- yes it did it informed me about the peaks and valleys of drinking and how after a certain amount your not increasing that high.
- no, it was very uninteresting to me.
- Yes, it brought some things to my attention that I wasn't really aware of and made me think of ways I can drink safely and still have a lot of fun.
- No it really didn't have any impact on my drinking behavior
- No

Do you have any comments you would like to share about the personalized BAL card?

- no
- no, not really
- I like the BAL cards given to us. In the near future I'll probably use it to my advantage.
- I found the card to be the best part of the survey.
- No.
- Its kind of nice to know what approximatly my BAL is
- I think it is useful and also my friends have used it when I had it out.
- the card although useful I thought I could memorize after looking at once. I would never bring that card out with me
- I never used mine.
- I never drive after consuming alcohol, so I never really used my BAL card. If I was to drive, I might look at it though.
- make a clear disclaimer about the cards use.
- They were well developed
- I thought that it was neat to see how many drinks that I could take with my body weight.
- cool and glad to have one now
- it defenitely does help to show your intoxication level, one night i even got it out with a few of my buddies who were pretty close to my weight and we compared our BAL levels
- i enjoyed looking at it..maybe next time have breathalizers, haha
- i alwasy kept it with me, i just never used it.
- It is a handy think to have.
- It was interesting
- No

Appendix D
Tables

Table 1

Participant Characteristics

Variable		Experimental Group			χ^2	$p \leq$
		1	2	3		
Gender	Male	8	7	8	3.71	.16
	Female	1	6	2		
Year in School	Freshman	4	3	2	10.91	.09
	Sophomore	2	1	4		
	Junior	0	6	4		
	Senior	3	3	0		
Marital Status	Single	8	11	10	1.62	.45
	Dating	1	2	0		
Greek Involvement	Yes	4	4	5	1.38	.50
	No	5	9	4		
Ethnicity	Caucasian	8	0	1	4.08	.40
	Native American	12	1	0		
	Hispanic	1	0	0		
Living situation	Alone	1	0	0	4.73	.58
	Greek	3	2	4		
	Dorms	1	2	1		
	Roommate	4	9	5		

Table 1 continued

Participant Characteristics

Variable	Experimental Group			<i>F</i>	<i>p</i> ≤
	1	2	3		
Weight	175.56 (31.27)	150.77 (36.58)	157.30 (26.13)	1.62	.22
Age	19.89 (1.45)	20.46 (1.45)	19.90 (.99)	.71	.50
Total Drinks per Week	30.67 (14.64)	25.77 (20.89)	26.3 (12.10)	.25	.78
Total Drinks per Weekend	27.78 (14.55)	22.23 (15.24)	24.7 (11.94)	.41	.67
Drinks per Drinking Occasion During Weekend	9.81 (4.50)	7.94 (4.72)	8.63 (3.45)	.51	.61
AUDIT	12.67 (4.36)	12.62 (4.09)	15 (3.59)	1.19	.32
CAPS-r	15.14 (5.9)	18.12 (5.78)	14.79 (4.96)	1.26	.3
Thursday Peak BAL	.079 (.074)	.127 (.142)	.105 (.058)	.58	.57
Friday Peak BAL	.141 (.068)	.135 (.135)	.130 (.056)	.03	.97
Saturday Peak BAL	.118 (.075)	.165 (.144)	.129 (.059)	.258	.57

Note: Means for Weight and Age are listed for each group (with standard deviations listed in parentheses).

Table 2

Means and Tests of Between and Within Group Differences for Total Weekend Drinks

	Time				Tests Within Groups
	Baseline	Weekend 1	Weekend 2	Weekend 3	
Group 1	27.78 (14.55)	25.78 (9.5)	16.11 (10.28)	20.67 (8.06)	$F(3, 6)=2.15, p = .20, \eta^2 = .52$
Group 2	22.23 (15.23)	14.41 (8.97)	15.85 (7.13)	13.77 (9.54)	$F(3, 10)=1.58, p=.26, \eta^2 = .32$
Group 3	24.7 (11.94)	23.7 (13.29)	19.1 (5.61)	17.6 (10.47)	$F(3, 7)=3.49, p=.08, \eta^2 = .60$
Tests Between Groups	$F(2, 29)=.41, p = .67$	$F(2, 29)=3.77, \eta^2 = .21$	$F(2, 29) =.57, p = .57$	$F(2, 29)=1.45, p = .25$	

Note: Means are listed for each group (with standard deviations listed in parentheses).

Table 3

Means and Tests of Between and Within Group Differences for Drinks per Drinking Occasion

	Time				Tests Within Group
	Baseline	Weekend 1	Weekend 2	Weekend 3	
Group 1	9.81 (4.5)	10.15 (2.66)	8.28 (4.8)	10.76 (3.14) _a	$F(3, 24) = 1.25, p = .31$
Group 2	7.94 (4.72)	6.69 (3.51)	6.96 (2.56)	5.92 (3.09) _a	$F(3, 36) = 1.02, p = .39$
Group 3	8.63 (3.45)	9 (3.44)	8.45 (2.6)	7.33 (3.18)	$F(3, 27) = 1.08, p = .38$
Tests Between Groups	$F(2, 29) = .69, p = .51$	$F(2, 29) = 3.22, p = .056, \eta^2 = .18$	$F(2, 29) = .69, p = .51$	$F(2, 29) = 6.46, p = .005, \eta^2 = .31$	

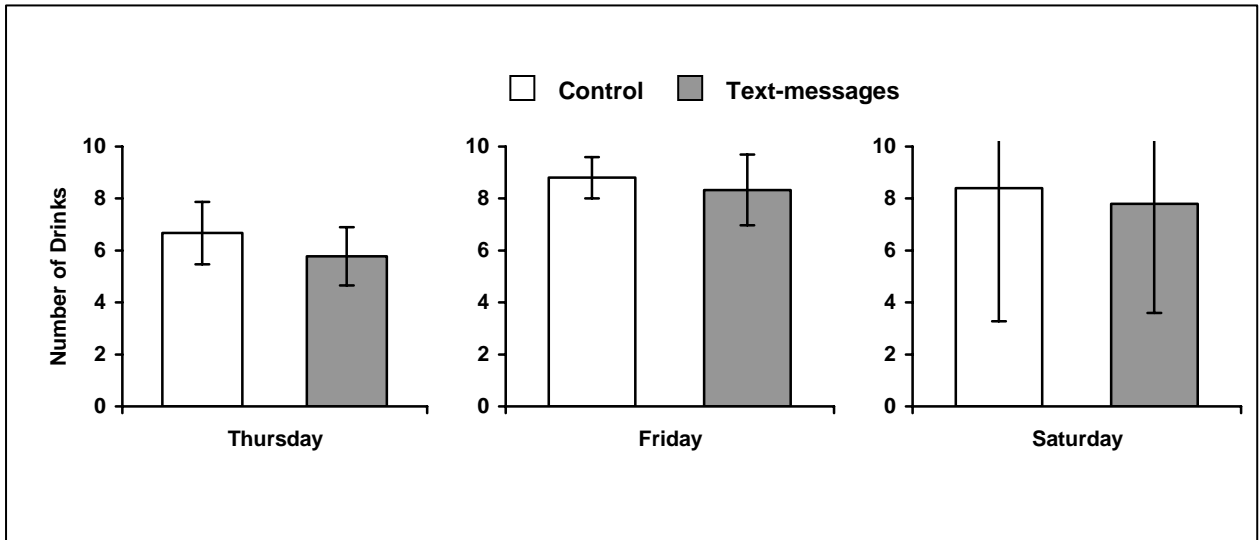
Note: Means are listed for each group (with standard deviations listed in parentheses). _a = significant ($p = .004$) pairwise comparison between groups after Bonferroni adjustments.

Appendix E

Figures

Figure 1

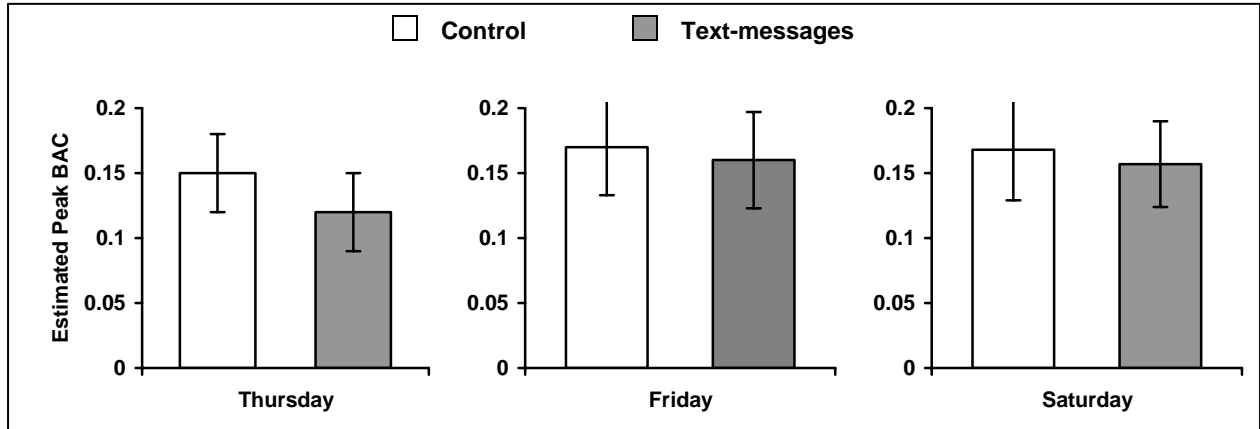
Mean total drinks on Thursday, Friday, and Saturday evening by experimental condition



Error bars are standard errors.

Figure 2

Estimated peak BAL on Thursday, Friday, and Saturday evening by experimental condition



Error bars are standard errors.

Figure 3

Participant flow chart

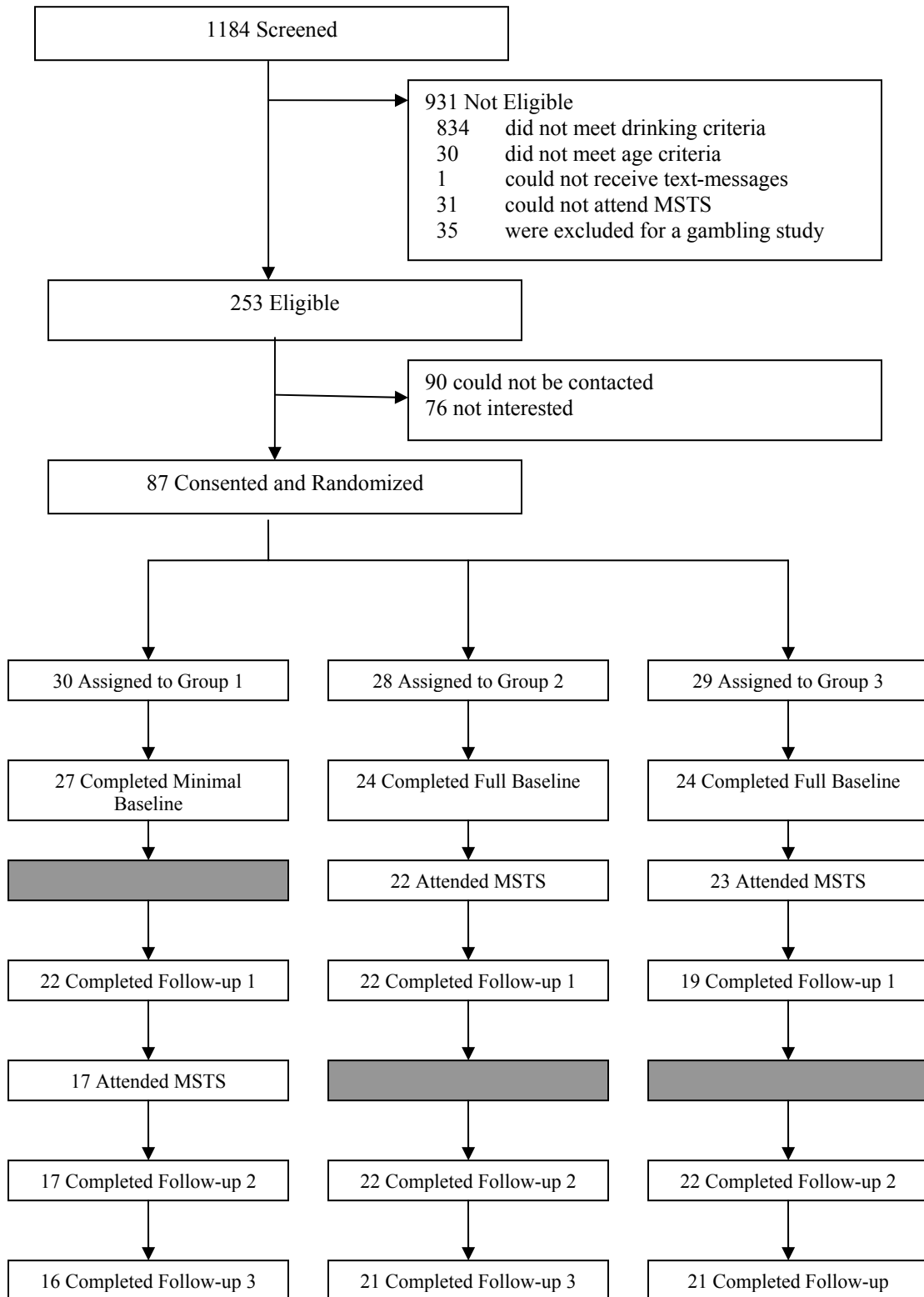


Figure 4

Experimental flow chart

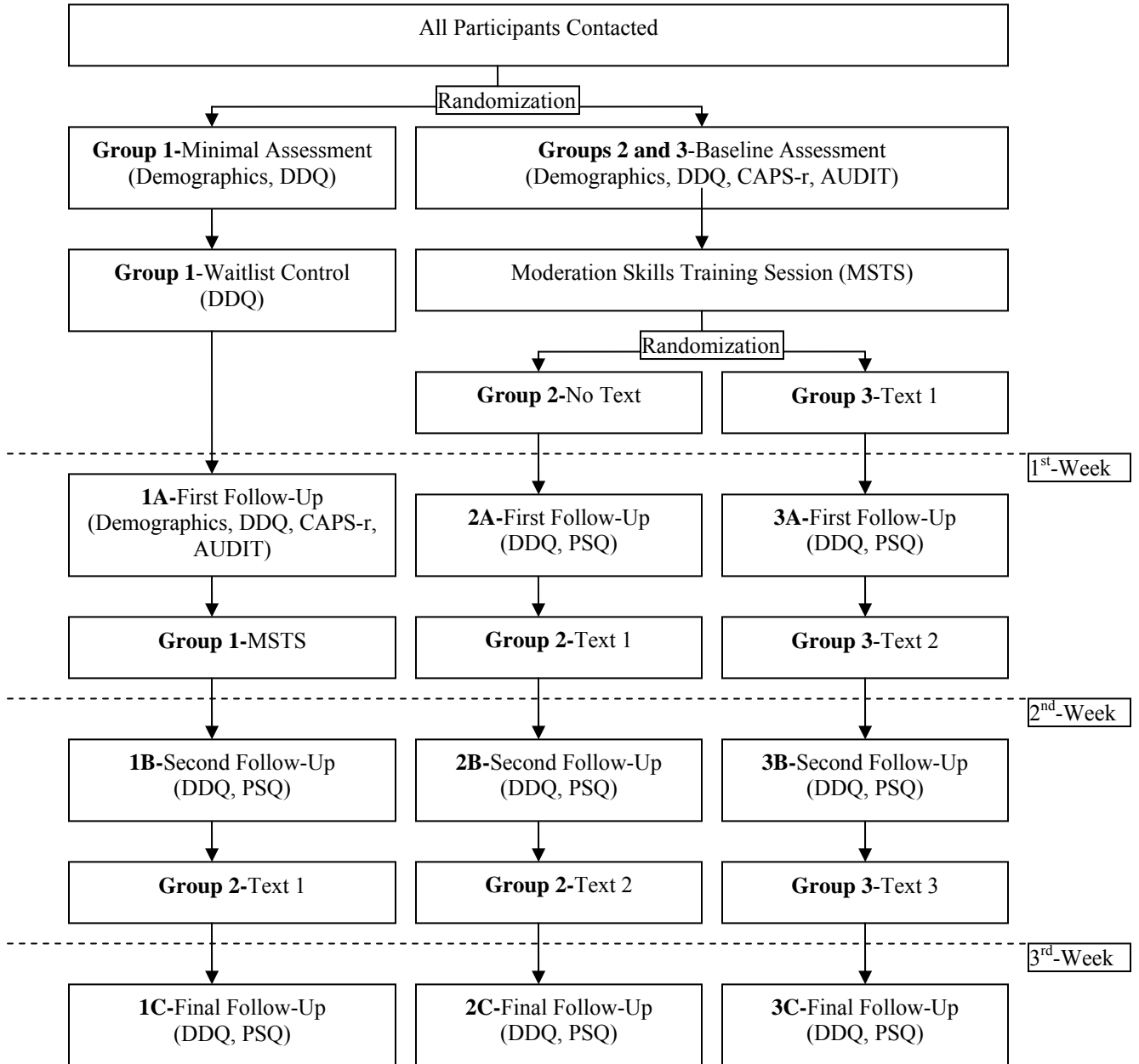


Figure 5

Mean (actual) total drinks consumed for each group at each follow-up

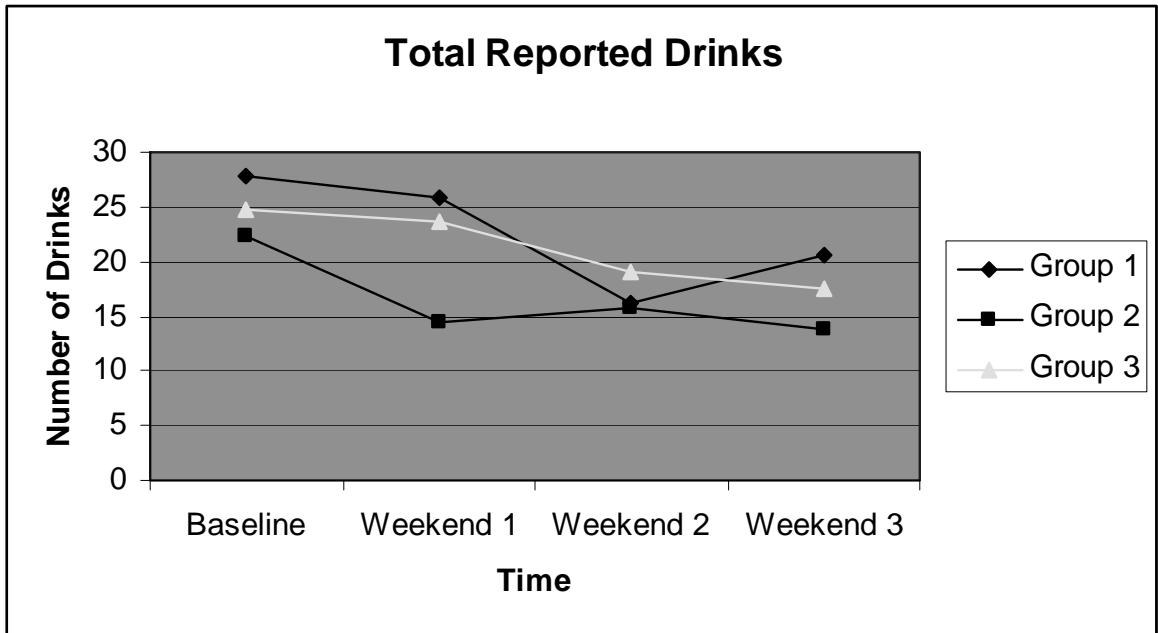
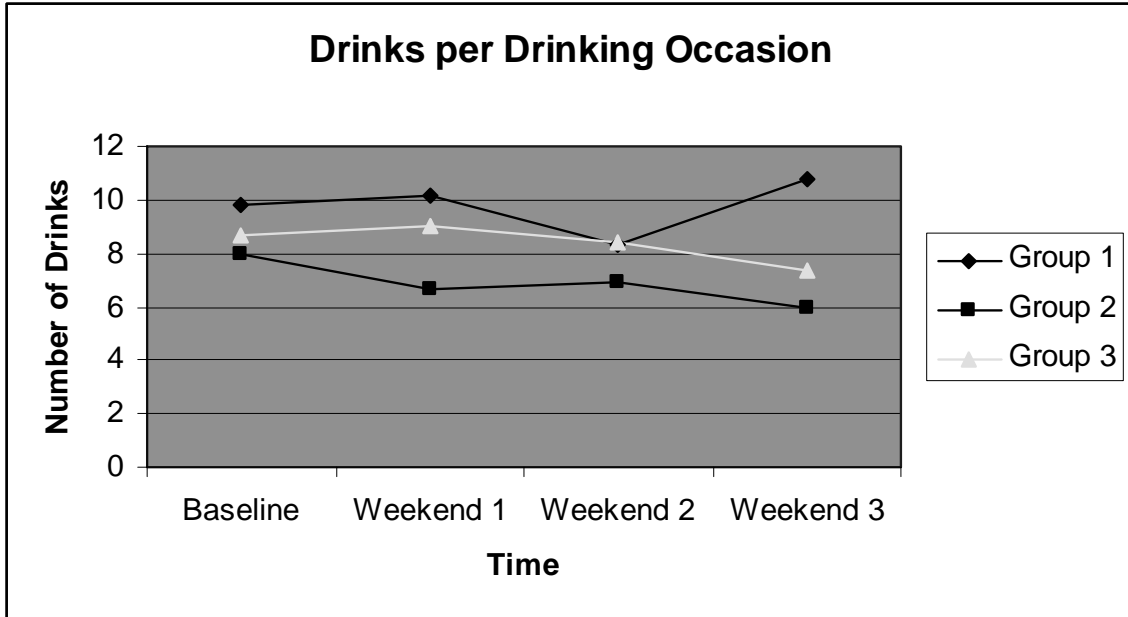


Figure 6

Mean (actual) total drinks per drinking occasion consumed for each group at each follow-up



VITA

Joseph Mignogna

Candidate for the Degree of

Master of Science

Thesis: RU DRKN 2NITE?: CELLULAR TEXT MESSAGING PROMPTS FOR
ALCOHOL HARM-REDUCTION ON CAMPUS

Major Field: Clinical Psychology

Biographical:

Education: Graduated with a Bachelor of Science in Psychology from Texas A&M University, College Station, Texas in May 2004. Completed the requirements for the Master of Science degree with a major of Clinical Psychology at Oklahoma State University, Stillwater, Oklahoma in May 2007.

Experience: Clinical experience includes Oklahoma State University Psychological Services Center, Oklahoma State University Marriage and Family Center; employed by Oklahoma State University as a research assistant, 2004 to 2005; employed by Oklahoma State University as a graduate instructor, 2005 to present.

Professional Memberships: Association for Behavioral and Cognitive Therapies, Oklahoma Psychological Society, American Psychological Association, Society of Behavioral Medicine.

Name: Joseph Mignogna

Date of Degree: May, 2007

Institution: Oklahoma State University

Location: Stillwater, Oklahoma

Title of Study: RU DRKN 2NITE?: CELLULAR TEXT MESSAGING
PROMPTS FOR ALCOHOL HARM-REDUCTION ON
CAMPUS

Pages in Study: 81

Candidate for the Degree of Master of Science

Major Field: Clinical Psychology

Scope and Method of Study: Half of all college students engage in drinking practices that are associated with an increase likelihood of experiencing academic, interpersonal, legal, and health-related problems. Interventions from a harm-reduction orientation have proven to be efficacious in reducing these risks. Often, a primary goal of these interventions is to help students to moderate their drinking. To help students accomplish this goal, they are taught a variety of moderation strategies. However, the usefulness of these strategies may be limited by a student's ability to recall and implement moderation strategies in a drinking context. The purpose of this study was to investigate the efficacy of behaviorally prompting hazardous college drinkers with newly acquired moderation strategies through the use of text-message technology.

Findings and Conclusions: The use of text-messages to moderate college student's drinking behaviors in a broadly target intervention intended for all hazardous drinking college students was ineffective at reducing drinking rates. One potentially mediating factor may be a student's readiness to change. Interestingly, a simple moderation skills training session, taking approximately 30-minutes to administer to a group of hazardous college drinking students, was found to be effective in reducing drinking rates.

ADVISER'S APPROVAL: Thad R. Leffingwell, Ph.D
