AN ABSTRACT OF THE THESIS OF

Katherine A. G. Lewis for the degree of Honors Baccalaureate of Fine Arts in Psychology presented on May 24th, 2011. Title: Personality and Binge Drinking: How Personality Risk Factors Affect the Prevalence and Timing of College Binge Drinking

Abstract Approved:

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 David Kerr

Through the use of daily online surveys, this study investigated the weekly trends associated with college binge drinking. It also investigated the relationship between personality risk factors and binge drinking. Personality risk factors were assessed using the TCI measures of novelty seeking and harm avoidance, and the ATQ measure of sociability.

The study found a significant relationship between binge drinking and day of the week, where students binge drank primarily on Thursdays, Fridays and Saturdays. Personality was also shown to moderate the prevalence and timing of college binge drinking. Individuals high in personality risk were more likely than their peers to binge drink on Thursdays, Fridays and Saturdays, but they did not binge drink more than their peers on the other days of the week. These findings may indicate that individuals high in personality risk are even more affected by the normative weekly binge drinking pattern than their peers.

Key Words: binge, drinking, alcohol, college student, personality

Corresponding E-mail address: katie.westermann@gmail.com

©Copyright by Katherine A. G. Lewis

May 24, 2011

All Rights Reserved

Personality and Binge Drinking:

How Personality Risk Factors Affect the Prevalence and

Timing of College Binge Drinking

by

Katherine A. G. Lewis

A PROJECT

submitted to

Oregon State University

University Honors College

in partial fullfillment of

the requirements for the

degree of

Honors Baccalaureate of Art in Psychology (Honors Associate)

Presented May 24, 2011

Commencement June 2011

Honors Baccalaureate of Fine Arts in Psychology project of Katherine A. G. Lewis presented on May 24, 2011.

APPROVED:

Mentor, representing Psychology

Committee Member, representing Psychology

Committee Member, representing English

Department Head, Department of Psychology

Dean, University Honors College

I understand that my project will become part of the permanent collection of Oregon State University, University Honors College. My signature below authorizes release of my project to any reader upon request.

Katherine A. G. Lewis, Author

TABLE OF CONTENTS

Page:

[Title Page 1](#_Toc294221401)

[Abstract 2](#_Toc294221402)

[Introduction 3](#_Toc294221403)

[Risks of College Binge Drinking 3](#_Toc294221404)

[Individual Differences in Binge Drinking 5](#_Toc294221405)

[When College Students Binge Drink 7](#_Toc294221406)

[Aims of the Current Study 9](#_Toc294221407)

[Addressing Previous Research Limitation 9](#_Toc294221408)

[Methods 11](#_Toc294221409)

[Participants 11](#_Toc294221410)

[Procedure 12](#_Toc294221411)

[Measures 13](#_Toc294221412)

[Temperament and Character Inventory. 14](#_Toc294221413)

[Adult Temperament Questionnaire. 14](#_Toc294221414)

[Aggregate personality risk construct. 15](#_Toc294221415)

[Daily online surveys. 15](#_Toc294221416)

[Data Analysis 16](#_Toc294221417)

[Construction of alcohol use variables. 16](#_Toc294221418)

[Binge Drinking. 16](#_Toc294221419)

[Personality Data Analysis. 17](#_Toc294221420)

[Completion Rates. 17](#_Toc294221421)

[Results 17](#_Toc294221422)

[Weekly Pattern of Alcohol Consumption 17](#_Toc294221423)

[Weekly Pattern of Binge Drinking 19](#_Toc294221424)

[Binge Drinking and Personality Risk 19](#_Toc294221425)

[Discussion 21](#_Toc294221426)

[References 27](#_Toc294221427)

I. LIST OF APPENDICES

Page:

APPENDIX A – Figures and Tables 33

II. LIST OF APPENDIX FIGURES

Page:

[Figure 1: Mean (95% confidence interval) drinking score on each of 24 days 34](#_Toc294221924)

[Figure 2: Mean (95% confidence interval) drinking score on each day of the week 35](#_Toc294221925)

[Figure 3: Mean (95% confidence interval) binge drinking rate on each of 24 days 36](#_Toc294221926)

[Figure 4: Mean (95% confidence interval) binge drinking rate on each of days of the week 37](#_Toc294221927)

[Figure 5: Percent of Students defined on the basis of relatively low, intermediate, or high personality risk who Binged on Weekends (Saturday and Sunday), Thursdays, and Weekdays (Sunday through Wednesday) 38](#_Toc294221928)

III. LIST OF APPENDIX TABLES

Page:

[Table 1: Mean drinking score on each day of the week 39](#_Toc294222029)

[Table 2: Proportion of participants who binged by day of the week 40](#_Toc294222030)

Running Head: PERSONALITY AND WEEKLY PATTERNS IN BINGING

# Title Page

Personality and Binge Drinking:

How Personality Risk Factors Affect the Prevalence and

Timing of College Binge Drinking

Katherine A. G. Lewis

Oregon State University

# Abstract

Through the use of daily online surveys, this study investigated the weekly trends associated with college binge drinking. It also investigated the relationship between personality risk factors and binge drinking. Personality risk factors were assessed using the TCI measures of novelty seeking and harm avoidance, and the ATQ measure of sociability because these three personality factors have been shown to be highly predictive of binge drinking behavior.

The study found a significant relationship between binge drinking and day of the week, where students binge drank primarily on Thursdays, Fridays and Saturdays. Personality was also shown to moderate the prevalence and timing of college binge drinking. Individuals high in personality risk were more likely than their peers to binge drink on Thursdays, Fridays and Saturdays, but they did not binge drink more than their peers on the other days of the week. These findings may indicate that individuals high in personality risk are even more affected by the normative weekly binge drinking pattern than their peers.

Personality and Binge Drinking:

How Personality Risk Factors Affect the Prevalence and

Timing of College Binge Drinking

# Introduction

 Drinking an excessive amount of alcohol to achieve significant intoxication, or binge drinking is a growing problem in the United States, especially on college campuses. Between 1993 and 2001 the prevalence of heavy episodic drinking increased among the United States population, and rates of binge drinking were highest among those aged 18 to 25 years (Naimi et al., 2003). Furthermore, college students are more likely than their same age peers to engage in binge drinking (Bachman, O’Malley, & Johnston, 1984; O’Malley & Johnston, 2002). A national survey of 140 college campuses found that 44% of college students engage in binge drinking, and 19% of college students are frequent binge drinkers (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1995).

## Risks of College Binge Drinking

Binge drinking is linked to a variety of risky behaviors and health consequences (Naimi et al., 2003). Students who engage in binge drinking (defined as 5 or more drinks for men and 4 or more drinks for women) are more likely to experience a number of drinking related problems, ranging from poor academic performance to serious health effects. The more college students drink, the more likely they are to miss class, experience hangovers, and fall behind in school (Park & Grant, 2005). In addition to the immediate negative effects of binge drinking, such as hangovers, binge drinking has also been shown to hinder an individual's developmental transition from adolescence into adulthood. For example, binge drinkers are less likely to hold a job or succeed in school (**Zeigler et al.,** 2004). These deficits are due in part to the neurological consequences of excessive alcohol consumption, which include impaired intellectual development, neurodegeneration of the hippocampus and prefrontal cortex, and impairment of the normative sleep-wake cycle (**Zeigler** **et al.,** 2004).

College students who report binge drinking are more likely to become hurt or injured, engage in unplanned and unprotected sex, get in trouble with campus or local police and experience a variety of other negative consequences (Wechsler, Lee, Kuo & Lee, 2000). A study based on the same sample suggests that students who engage in binge drinking aren’t the only individuals to suffer ill effects. Students who attend colleges with above average rates of binge drinking were more likely than their peers at other colleges to experience second-hand effects, including getting struck or assaulted, sustaining property damage or experiencing an unwanted sexual advance even if they themselves did not binge drink (Wechsler, Moeykens, Davenport, Castillo, & Hansen, 1995).

National prevalence data on the health and safety of college students further underscores the risks associated with college drinking. Annually, over 500,000 college students hurt or injure themselves under the influence of alcohol, and over 600,000 college students are attacked by another student who has been drinking. Furthermore, 2.2 million college students report driving under the influence of alcohol within the previous month, and 3 million report riding with a drunk driver within the previous month (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002).

Besides being a major risk factor during early adulthood, college binge drinking is predictive of alcohol dependence and abuse later in life. At a 10 year follow-up, college students who had engaged in binge drinking were more likely to have dropped out of college, hold a lower paying job and display symptoms of alcohol dependence (Jennison, 2004).

Binge drinking is a widespread problem, and there are a variety of theoretical perspectives as to why college students binge drink. Some researchers tend to focus on individual factors, such as personality, coping strategies, and attitudes (Park & Grant, 2005; Feil & Hasking, 2008). These researchers view binge drinking as an individual choice that is motivated by internal factors. Other researchers focus on the broader social and cultural determinants of binge drinking. Social norms and expectations contribute to college binge drinking. For example, advertisements and media often portray heavy drinking as a rite of passage. In addition to societal pressures, other outside factors, such as holidays and the day of the week are associated with higher rates of binge drinking (Beets et al., 2009). The current study seeks to examine a contextual factor and personality trait that is linked to college binge drinking.

## Individual Differences in Binge Drinking

Attitudes about alcohol, peer groups, and certain personality factors all influence an individual’s likelihood of binge drinking (Wechsler, Dowdall, Davenport, & Castillo, 1995). In particular, sensation seeking and sociability are predictive of binge drinking behavior. Among young adult populations, simply having a large social circle is associated with more binge drinking (Wechsler, Dowdall, Davenport, & Castillo, 1995), and sensation seeking is one of the most reliable predictors of substance abuse (Andrucci, Archer, Pancoast, & Gordon, 1989).

Sensation seeking or novelty seeking is characterized by the desire for novel and diverse stimuli, a willingness to break rules and protocol, and a disregard for danger. A person who scores high in sensation seeking is willing to take physical and social risks for the sake of an intense or thrilling experience (Andrew & Cronin, 1997). Novelty seekers are likely to gamble (Langewisch & Frisch, 1998), drive recklessly (Zuckerman & Neeb, 1980), and participate in extreme sports (Zuckerman, 1983). Individuals who score high in novelty seeking usually represent a certain personality type that acts impulsively and is more focused on rewards than punishments. Those who score high in novelty seeking generally score low in the related construct of harm avoidance, indicating that these individuals not only pursue extreme sensations and situations, but they are comparatively unperturbed by the possible negative consequences of their actions (Cloninger, 1998).

Novelty seeking has been repeatedly linked to alcohol abuse among high school and college students (Pederson, Clausen, & Lavik, 1989; Schwarz, Burkhart, & Green, 1978). Researchers theorize that novelty seekers are motivated to binge drink because of their desire for intense stimuli (Andrew & Cronin, 1997); also novelty seekers may be drawn to lively venues, where binge drinking is more likely to occur. Additionally, if an individual scores low in harm avoidance, they may be less responsive to deterrents, such as hangovers.

The related construct of extroversion also appears to put students at greater risk for binge drinking. In a study by Martsh and Miller (1996), extroversion was the single best predictor of binge drinking. Students who reported having five or more friends, being members of a sorority or fraternity, living with roommates or living in a coeducational dormitory all reported a much higher incidence of binge drinking than the average student (Wechsler, Dowdall, Davenport, & Castillo, 1995). Also, placing value on the social component of the college experience increases the likelihood of binge drinking. Students who rate parties as an “important” or “very important” college activity are more likely to binge drink than students who value academics and the arts over socializing (Wechsler, Dowdall, Davenport, & Castillo, 1995). These findings demonstrate that gregarious individuals, who put a premium on socializing, and individuals who score high on sensation seeking are more likely to binge drink than the average student.

The three constructs discussed above (novelty seeking, harm avoidance, and sociability) are all highly related, and tend to vary together. For the purposes of this study these constructs will be analyzed together. Participants who scored high in novelty seeking, scored low in harm avoidance and scored high in sociability will be referred to as high in personality risk, because all these traits put an individual at greater risk for binge drinking.

## When College Students Binge Drink

In addition to individual factors such as personality, researchers interested in prevention have sought to uncover contextual factors that contribute to college binge drinking. Studies that focus more on the environment than the individual demonstrate the extent to which binge drinking behavior is related to calendar events, such as holidays and weekends. When compared to a control week, college students were 18.5 times more likely to binge brink on New Year’s Eve, 6.5 times more likely to binge drink on any given day during Spring Break, and 2.9 times more likely to binge drink on Halloween (Beets et. al., 2009). The rate of college binge drinking also increases during football games and other large campus wide events (Neal & Fromme, 2007). In fact, almost all events that are associated with parties or large student gatherings are linked to an increased rate of binge drinking. These findings demonstrate the importance of social context and cultural expectations when it comes to student binge drinking.

In addition to discrete events, binge drinking among college students may be more prevalent on certain days of the week. Through investigating the relationship between nicotine use and alcohol consumption, researchers found that first-year college students drink and smoke considerably more on Thursday, Friday and Saturday than the other four days of the week (Dierker et al. 2006). In fact, the day of the week is one of the strongest predictors of college binge drinking.

There are a number of possible explanations as to why the day of the week so greatly influences binge drinking. Friday and Saturday may be common binge drinking days because students do not have to worry about attending classes the next morning. Also, there may be a cultural expectation to celebrate the end of the week through drinking. Elevated rates of binge drinking on Thursdays are of particular interest in universities that tend not to schedule classes on Fridays. Students may drink more on Thursdays for a number of reasons. Many students arrange their schedules so as not to have class on Friday, thereby making Thursday night tantamount to a weekend. Also, binge drinking on Thursdays may become normative and expected within the local student culture, so even students who have obligations on Fridays may choose to drink on Thursday because of a perceived social expectation. Although the exact reason for the weekly drinking schedule is open to interpretation, students have been shown to follow a weekly binge drinking cycle in some samples (Dierker et al. 2006).

## Aims of the Current Study

Through the use of daily online surveys, this study seeks to investigate the weekly trends associated with college drinking and the relationship between personality factors and binge drinking. Specifically, we are investigating whether individuals who score high in personality risk binge drink more frequently than their peers. In addition to looking at binge drinking prevalence as it relates to personality, we are exploring how personality factors are related to an individual’s weekly binge drinking trends.

The following hypotheses are addressed: (1) We expect daily prevalence rates of binge drinking to be strongly influenced by the weekly academic calendar. Specifically, we predict college students will show a stable pattern (i.e., across multiple weeks) of higher likelihood of drinking and of binge drinking on Thursdays, Fridays, and Saturdays, relative to other days of the week. (2) We hypothesize that participants who are high in personality risk (defined as a high score on novelty seeking and extroversion, and a low score on harm avoidance) will be more likely to binge drink than their peers. (3) We predict that individuals who are high in personality risk will moderate the normative weekly binge drinking pattern.

## Addressing Previous Research Limitation

Previous studies on college binge drinking have had a number of limitations. Most large scale studies ask students to recall their drinking behavior over a number of days. The surveys administered by the Harvard School of Public Health in 1999 asked students to retrospect over the last two weeks (Wechsler, Lee, Kuo, & Lee, 2000); and another large multi-state study on binge drinking asked participants to characterize their alcohol consumption over the past month (Serdula, Brewer, Gillespie, Denny, & Mokdad, 2004). These longer time frames introduce error because participants are forced to make estimations in order to answer some of the more specific questions. Other studies only asked participants to remember their daily intake of alcohol over the past week, but it is still unlikely that every participant would remember the exact number of alcoholic beverages they consumed every night over the past seven days (Beets at al., 2008; Dierker et al., 2006).

Other studies attempt to circumvent retrospection problems by asking participants to fill in a diary of their drinking. However, with paper and pencil methods, researchers often cannot or do not verify whether participants actually fill in their diary each day, as opposed to simply completing the diary prior to handing it in to the researchers. Other studies ask participants to typify their drinking using general questionnaires (Wechsler, Davenport, Dowdall, Moeykens, & Castillo, 1995), but this method allows participants to estimate their behavior, which is associated with underreporting. In general, individuals tend to underestimate how much they drink (Midanik, 1982).

Finally, some previous studies only investigated certain subgroups of college students. Beets and colleagues (2009) and Dierker and colleagues (2006) only looked at college students who had a history of tobacco use. Although these studies paint a picture of binge drinking among college smokers, the findings may not generalize to all college students given the health risks associated with tobacco use and the personality factors that are over represented among smokers (McManus & Weeks, 1982). Other studies have chosen to merely look at certain age ranges (Serdula, Brewer, Gillespie, Denny, & Mokdad, 2004), and although these findings are relevant to the general population, college students are a specific subgroup that is known to binge drink more than their same aged peers who do not attend college (O’Malley & Johnston, 2002).

 In contrast with previous research on binge drinking, the current study uses daily web-based surveys. Participants only have 24 hours to report the number of drinks they consumed over the previous day. By only allowing participants to report on their drinking over the past twenty-four hours, the study increases the likelihood of receiving reliable and valid reports.

# Methods

## Participants

 Participants were undergraduate students drawn from a large public university in the Pacific Northwest. A total of 159 students between the ages of 18 and 25 years participated during the 2009-2010 academic year. Students older than 25 years of age and students who had never consumed alcohol in their entire lives were excluded from the current analysis. These individuals were excluded from the analysis because we are namely interested in binge drinking behavior among young adult college students who do not choose to abstain from alcohol.

The majority of participants (71.7%, n=114) were under the legal drinking age of 21. The sample was comprised of 37.7% freshmen (n=60), 25.2% sophomores (n=40), 14.5% juniors (n=23), and 22.6% seniors (n=36). Participants were predominantly female (78%, n=124). The majority of the sample (79.2%) identified themselves as Caucasian (n=126), 14.5% identified as Asian (n=23), 8.2% Hispanic or Latino (n=13), 2.5% African American (n=4), 2.5% Pacific Islander (n=4), and 1.3% Native American (n=2). 8.2% of participants selected more than one racial category (n=13).

At baseline, 74.2% of participants (n= 118) responded yes to the question: In the last year have you been drunk? 46.5% of participants (n=74) responded yes to the question: In the last year have you thrown up (vomited) from drinking? And 20.8% of participants (n=33) responded yes to the question: In the last year have you passed out from drinking?

## Procedure

Students volunteered to participate in this study in exchange for extra credit in a psychology course. Students were informed of extra credit opportunities by the instructors of their respective courses. Those who were interested in participating signed up for a brief in person interview designed to explain the study and obtain informed consent. All students were eligible to participate in this study, excepting anyone younger than 18 years of age or women who were currently pregnant.

When students arrived for their face-to-face meeting, they were read a prepared statement about the nature of the study and given an opportunity to ask any questions. If they agreed to participate, subjects were provided with a confidential identification number and a private computer where they completed a number of online questionnaires. Initial online assessments took about 30 minutes to complete, and research assistants were present to answer any questions or concerns.

Depending on the day of their interview, participants had between one and three day(s) before they began receiving daily web-based surveys via their personal email accounts. All participants began receiving the email surveys on the Friday following the completion of the baseline assessment. Starting on Friday, participants were sent surveys every morning at 7am for 24 consecutive days. The surveys inquired about the occurrence of several behaviors during the previous 24 hours. Participants reported the number of alcoholic beverages they consumed the previous day. They were also asked about heterosexual intercourse and marijuana usage, but these data sets were not a focus of the current study.

Participants were required to complete the surveys within 24 hours of receipt, in order to minimize recollection errors. After 24 hours, the unique link expired and participants could no longer complete that day’s survey. After 24 days, participants were emailed two post-test surveys that inquired about health history and satisfaction with the study. Data were collected over the fall, winter, and spring terms of the 2009-2010 academic year. Participants were only recruited during the first seven weeks of term to ensure that the 24 daily surveys would be completed prior to finals week. Even though each participant only answered surveys for 24 days, the aggregate of all the cohorts provided data pertaining to the entire academic year, excluding finals weeks, summer, and the winter and spring breaks.

## Measures

 In addition to providing demographics and background information, participants completed a partial version of the Temperament and Character Inventory (TCI), and a shortened version of the Adult Temperament Questionnaire (ATQ). This study used two dimensions of the Temperament and Character Inventory (TCI) and one dimension of the Adult Temperament Questionnaire (ATQ) in order to assess the construct of personality risk.

Temperament and Character Inventory. The TCI is designed to measure general temperament. The TCI assesses individuals on seven distinct temperament dimensions: harm avoidance, novelty seeking, reward dependence, persistence, self-directedness, cooperativeness, and self-transcendence. These categories are based on a Cloninger’s biosocial model of personality. The TCI is a widely used assessment tool. It has been translated into over ten languages, and it has been proven useful in assessing individuals from various cultures around the world (Duijsens**, Spinhoven, Goekoop, Spermon, & Eurelings-Bontekoe**, 2000**; Sung, Kim, Yang, Abrams, & Lyoo, 2002).**

In the current study, participants were only asked to answer 40 questions pertaining to the measures of novelty seeking and harm avoidance. Novelty seeking was determined by 20 true or false statements. (e.g., “I often break rules and regulations when I think I can get away with it.”) Individuals who are high in novelty seeking are impulsive and quick tempered, with a general disregard for rules and regulations (Cloninger, 1998). Internal consistency was adequate (Cronbach’s alpha (20 items) = 0.74).

Harm avoidance was also determined by 20 true or false statements. (e.g., “Usually, I am more worried than most people that something might go wrong in the future.”) Individuals who score low in harm avoidance have very little anxiety and have an underdeveloped fear of danger (Cloninger, 1998). Internal consistency was adequate (Cronbach’s alpha (20 items) = 0.839).

Adult Temperament Questionnaire.The ATQ is a self-report model of temperament that was adapted from the Physiological Reactions Questionnaire. The ATQ includes four general constructs that assess temperament: effortful control, negative affect, sociability, and orienting sensitivity.

In the current study we are only considering the scale pertaining to sociability. Sociability is a 14 item scale designed to measure the extent to which participants enjoy spending time in groups and with friends (e.g., “I like conversations that include several people.”) Each item is rated on a 7 point scale ranging from (1) extremely untrue of you to (7) extremely true of you. Internal consistency was adequate (Cronbach’s alpha (14 items) = 0.884).

Aggregate personality risk construct.A prior exploratory factor analysis of personality variables measured in the current study supported that high novelty seeking, low harm avoidance, and high sociability loaded on a common factor (rotated factor loadings=0.753, 0.547, and 0.789, respectively) and formed an internally consistent personality risk construct (alpha = 0.673, 3 items). Therefore, the present study uses this personality risk construct, which was formed as the mean of these three z-transformed scales.

Daily online surveys. We employed the use of daily email surveys to assess the frequency and timing of participant’s alcohol consumption. The daily surveys asked students how many alcoholic beverages they had consumed the previous day. Participants had eight response options; the response options ranged from zero to six alcoholic beverages, with a final option of selecting ‘More than 6.’ Every survey reminded participants that their answers were pertaining to the previous 24 hours. For example, a survey received on Friday would state: ‘For the next question, think about what happened on Thursday, and by Thursday we always mean beginning at 7am Thursday morning and ending at 6:59am Friday.’ The explanation was included at the top of every survey to avoid confusion.

## Data Analysis

Construction of alcohol use variables.First, we determined the mean amount of alcohol consumption for each of the 24 days of the study. Across the 24 days, alcohol consumption rates followed a clear pattern based on the day of the week. After analyzing the differences across all 24 days, we grouped the data into 7 categories based on the day of the week (Monday-Sunday), and analyzed the differences between the seven days of the week using a repeated measures ANOVA. Using the ANOVA, and 21 paired sample t-tests to compare each day of the week, we found three statistically similar groups: weekdays (Sunday-Wednesdays), Thursdays, and weekends (Friday and Saturday).

Binge Drinking. After comparing general alcohol consumption, we then analyzed the proportion of students who binge drank any given day. In the current study, binge drinking was defined as 4 or more drinks in a brief period of time for women and 5 or more drinks in a brief period of time for men. This cut off is generally accepted, and research indicates that students that meet these criteria for binge drinking are at an elevated risk for alcohol related problems (Wechsler & Nelson, 2001).

We first looked at binge drinking rates for each of the 24 days of the study. Then we grouped the data into categories based on the seven days of the week. Using a repeated measures ANOVA, we investigated whether rates of binge drinking differed by day of the week. We then further grouped the data into three categories: weekdays (Sunday-Wednesday), Thursdays, and weekends (Friday and Saturday); these categories were compared using paired-sample t-tests.

Personality Data Analysis.After determining the weekly pattern of drinking and binge drinking, we analyzed the role personality risk played in student drinking. In the current study, participants who scored high on novelty seeking and sociability, and scored low on harm avoidance were categorized as being high in personality risk. We then analyzed the data to determine if participants who were high in personality risk differed in their level of drinking and binge drinking. A repeated measures ANOVA, with day of the week (i.e., weekday, Thursday, weekend) as the within subjects variable, and personality risk as the between subjects variable was used to accomplish this.

We also investigated whether individuals who were high in personality risk binged during the same time of the week as individuals who were lower in personality risk. We treated the personality risk construct as a continuous variable, but probed the interaction by dividing the sample into relatively low, medium, and high personality risk groups based on the 33rd and 66th percentiles. Using the low, medium and high designations we compared the binge drinking prevalence in each group.

Completion Rates.Completion rates were strong; 84.91% (N=135) of participants completed 20 or more surveys. 98.7% of participants (n=157) completed 7 or more surveys. 97.5% of participants (n=155) completed at least one survey corresponding to each day of the week.

# Results

## Weekly Pattern of Alcohol Consumption

 Seventy-eight percent (n=124) of the sample reported consuming at least one drink over the 24 days they participated in the study. Figure 1 presents an estimate of the average number of drinks consumed per participant for each of the 24 days of the study. These numbers are estimates since participants only had the option of reporting between zero and ‘More than 6’ drinks. At the level of visual trend, there appears to be a clearly repeated pattern of elevated alcohol consumption on Thursdays, Fridays and Saturdays, and less alcohol consumption on the other days of the week.

 To explore the relationship further, we ran 21 paired samples t-tests. Using a Bonferroni correction for 21 comparisons, we set the critical p-value at .002. There were no significant differences between the rates of drinking reported on Sundays, Mondays, Tuesdays and Wednesdays (p> 0.01). Also, there were no significant differences in rates of alcohol consumption on Fridays and Saturdays (p> 0.01). Thursday was significantly different from every other day (p>0.01) except Friday. Rates of alcohol consumption on Thursdays, Fridays, and Saturdays were all significantly higher than the other days of the week (p<0.001). Figure 2 illustrates an estimate of the average number of alcoholic drinks consumed by day of the week for the sample, and Table 1 gives detailed information about mean drinking scores by day of the week.

 Considering the pattern of differences and similarity among weekdays, we decided to collapse the seven days of the week into three categories in order to facilitate subsequent analysis; these categories were: weekdays (Sunday-Wednesday), Thursdays, and Weekends (Friday and Saturday). Thursday was a distinct category because it was statistically different from Saturday. It was also analyzed separately for theoretical reasons; that is it seems to represent a unique weekly occurrence given students class schedules and the local culture surrounding Thursday drinking. The sample reported a mean score of 0.174 drinks (S.D. 0.497) per weekday, 0.956 drinks (S.D. 1.573) per Thursday, and 1.307 drinks (S.D. 1.553) per weekend day. In the means listed above, participants who reported consuming ‘More than 6’ drinks were counted as consuming 7 drinks.

## Weekly Pattern of Binge Drinking

 Approximately half (51.9%, n=81) of participants reported one or more episodes of binge drinking. Figure 3 presents the percent of students who binge drank for each of the 24 days of the study, and Figure 4 shows average binge drinking rates by day of the week. We followed the same procedures for evaluating patterns of binge drinking as we did for general alcohol consumption and found the same relationships to exist between the days of the week. Over the course of the 24 days, 10.7% (n=17) of participants binged at least once on a weekday, 24.5% (n=39) of participants binged at least once on a Thursday, and 49.1% (n=78) of participants reported one or more episodes of binge drinking on a weekend.

 To answer hypothesis one, we compared the mean rates of binge drinking by day of the week. Using paired-samples t-tests, we found that participants binged significantly more on the weekends than on Thursdays (t= 3.334, p<0.01) or on weekdays (t= 9.063, p< 0.001). We also found that participants binged significantly more on Thursdays than the other days of the week (t = 5.697, p<0.001). In summary, hypothesis one was supported by the fact that participants binged primarily on weekends, followed by Thursday, and participants were least likely to report binging on weekdays.

## Binge Drinking and Personality Risk

 Next, we evaluated our second and third hypotheses. Specifically, we tested whether participants who scored higher on personality risk would report more binge drinking and whether personality risk would moderate the weekly pattern of binge drinking within individuals. We ran a repeated measures ANOVA with day of the week (i.e. weekdays, Thursdays and weekends) as the within subjects variable and personality risk as the between subjects variable. Consistent with the paired t-tests the within subjects effect of day of the week was significant (F (2,153) =46.45, p< 0.001), indicating that rates of binge drinking depended on the day of the week. The between subjects effect of personality risk also was significant (F (1, 154) = 21.18, p< .001), indicating that on average, rates of binge drinking were associated with personality risk. Finally, the within subjects effect was moderated by personality risk, as indicated by the significant interaction (F (2,153) =13.311, p<0.001).

 To better understand these effects, we created three categories of personality risk. Participants who scored in the top one third of personality risk were sorted into the high-risk group, the middle third was sorted into the intermediate risk group, and the bottom one third was sorted into the low risk group. Mean levels of binge drinking differed by levels of risk. Over the 24 days they were in the study, 34.6% (n=18) of the low risk group reported binge drinking, 45.1% (n=23) of the intermediate risk group reported binge drinking, and 75.5% (n=40) of the high-risk group reported binge drinking at least once. Thus, hypothesis 2 was supported.

 After looking at overall binge drinking prevalence across the three risk categories, the analysis was rerun entering the three risk categories as a between subjects factors, and then graphed. As shown in Figure 5, low risk individuals binge drank the least, and high-risk individuals binge drank the most. Relevant to hypothesis 3, all groups were equally unlikely to binge drink on the weekdays, but high-risk participants were more likely than others to binge drink Thursdays and weekends.

# Discussion

 By using daily web-based surveys, this study was able to accurately characterize binge drinking among a large cohort of college students. Over half (51.9%) of participants binge drank at least once during the 24 day period they participated in the study, which speaks to the normative nature of college binge drinking. The results also showed a consistent weekly pattern, where participants were more likely to binge on Thursdays, Fridays, and Saturdays than the other days of the week. In fact, binge drinking was almost exclusively confined to weekends or Thursdays, which illustrates the importance of context in student alcohol consumption.

Fridays and Saturdays showed the highest level of binge drinking, possibly because classes are not in session the following days. Also, parties are more likely to take place on Friday and Saturday nights, and for underage drinkers, parties may be their only opportunity to obtain alcohol. Students under the age of 21 drink alcohol less frequently than their older peers, but when they do drink, they are more likely to binge (Wechsler, Lee, Nelson, & Kuo, 2002). Therefore, the elevated levels of binge drinking on weekends may be partly attributable to alcohol availability. In addition to weekends, Thursdays showed an elevated level of binge drinking. This may be due in part to the large number of students without Friday classes, and may also be due to the local campus culture, where Thursday is seen as an extension of the weekend.

To further explore the patterns present in college binge drinking, this study probed the relationship between personality risk and binge drinking prevalence. In the current study, personality risk was defined as a combination of high novelty seeking and sociability, and a low propensity for harm avoidance. An individual who is high in novelty seeking and low in harm avoidance would be driven to experience intense stimulation, and be relatively unaffected by negative consequences (Cloninger, 1998). Therefore these individuals might not only be driven to binge drink hoping to intensify their experience, they might also be undeterred by negative after effects, such as hangovers. Sociability further contributes to binge drinking because sociable individuals may be more likely to attend parties and events where other students are binge drinking, which in turn facilitates drinking. Some studies suggest that merely living in close quarters with other college students makes an individual more likely to binge drink (Wechsler, Dowdall, Davenport, & Castillo, 1995).

Although these constructs are not entirely the equivalent to each other, our sample size was not large enough to disentangle these constructs. Future studies, with larger sample sizes, might be able to consider these constructs separately, and even indentify subgroups, such as individuals who are high in novelty seeking but low in sociability. However, we will treat this constellation of personality factors as a single high-risk personality type. Evidence from the present study suggests that personality risk plays a role in college binge drinking. Individuals who were high in personality risk were the most likely to binge drink, and individuals who scored lowest in personality risk were the least likely to binge. The clearest example of this is the finding that 75.5% of individuals who scored in the top third of personality risk reported at least one episode of binge drinking. In contrast, only 34.6% of participants who scored in the bottom third of personality risk reported one or more episodes of binge drinking.

All participants, regardless of personality, binge drank primarily on Thursday, Friday, or Saturday. These findings suggest that certain days of the week may have a consistent influence on individuals, relatively independent of their personality risk. That is, higher risk individuals are not any more likely to binge drink on weekdays (Sunday, Monday, Tuesday, or Wednesday) than their peers. By using daily surveys to gather longitudinal data, we are able to see how personality factors relate to the weekly timing of binge drinking. Past research has investigated the frequency and prevalence of binge drinking as it relates to personality, and has considered weekly patterns in select samples; however, this is the first study to reveal how personality risk may impact when individuals binge drink during the week.

A key implication of these findings is that even among high-risk personalities, contextual factors greatly influence binge drinking behavior. Prevention campaigns often focus on readjusting social norms and attitudes about drinking. These interventions are expensive, time consuming and have had limited success. Given our findings, we suggest that simply changing student schedules could be a powerful form of intervention. Considering how dependent student binge drinking appears to be on external factors, campuses could schedule more Friday morning classes as a form of binge drinking prevention. By simply making changes to the registrar, campuses could deter Thursday binge drinking, which accounts for approximately 23% of all binge drinking behavior. Also, prevention campaigns could encourage high-risk individuals to structure their weekend schedule with early morning employment or volunteer responsibilities in order to self-impose consequences.

Prior studies (Dierker et al., 2006; Neal and Fromme, 2007; Beets et. al., 2009) have demonstrated temporal patterns of college binge drinking, but none have used daily surveys. By asking participants to remember over long periods of time, prior studies have introduced possible sources of error. For example, when filling out a weekly survey, a participant may assume that they drank more on the weekend. By using daily surveys, this study increases the likelihood that participants will recall the precise number of alcoholic beverages they consumed the night previous, thus removing the bias participants may bring to the study. Also, participants only had 24 hours to fill out their surveys before the links were closed, thereby eliminating the possibility for participants to go through their inboxes and answer old survey questions.

 Although the daily survey technique is an improvement over previous retrospective data collection methods, this study still faced a number of limitations. Firstly, students chose to participate for extra credit in a psychology course; therefore all participants were enrolled in a psychology course and desirous of extra credit. These individuals might not be representative of the general undergraduate population; for example, given the planning required, more impulsive or less conscientious individuals may have been less likely to sign up for the study; conversely, students whose grades were suffering due to binge drinking may have been more likely to seek out extra credit. Furthermore, participants had a number of studies to choose from, and perhaps those who chose to participate in this study differed from their peers in key aspects of personality or substance use. For example, students who struggle with substance abuse problems may have intentionally avoided a study that pertained directly to their drinking and social behavior.

Another limitation of the current study is the gender imbalance. The sample was predominantly female. Women have been shown to differ from men in their experiences surrounding alcohol and in how much alcohol they drink on average (Park & Grant, 2005). In addition to being mostly women, this study over represents psychology majors, which may limit our ability to generalize these findings to the rest of the student body.

Finally, the daily surveys asked participants to report the number of drinks they consumed over the previous 24 hours. The surveys did not ask participants to specify the time frame over which the drinks were consumed. The definition of binge drinking (4+ drinks for women and 5+ drinks for men) assumes that the drinks are consumed in close proximity to each other. Our method may lead to an overestimation of binge drinking since participants could have consumed their drinks over the course of an entire day (e.g. drinks consumed at both lunch and dinner). To correct this problem, future research could ask participants to specify the time frame and context of alcohol consumption. For example, participants could select whether they drank with family, friends, at a party and so on. Adding questions about context into a study of this nature would reveal a great deal about the details surrounding binge drinking in college. Whether drinking occurs in groups, alone, or at parties is entirely conjecture at this stage. If researchers could determine the prevalence of binge drinking at house parties versus bars or clubs, then they would know which situations are most associated with binge drinking. Detailed information of this sort could aid in tailoring specific prevention campaigns. In spite of the possible limitations of the current research, our daily survey method is a reliable and accurate way to gather detailed data and could be utilized in future research.

 In conclusion, college binge drinking continues to be prevalent. For years, college binge drinking has been demonstrably common and pervasive (Beets et al., 2009), and there has been a quandary about whether to focus prevention campaigns on environmental factors or on the individual. Some findings illustrate the importance of context (Neal & Fromme, 2007), while other studies highlight the individual factors associated with binge drinking (Wechesler, Dowdall, Davenport, & Castillo, 1995). The findings from the present study indicate that both environment and personality play important roles in student binge drinking. However, all participants binged almost exclusively on Thursdays and the weekend, and individuals who were high in personality risk were even more likely to binge drink on Thursdays and weekends than their peers, which demonstrates the comparative important of external factors, such as the day of the week. Given that some features of the weekly schedule are under the direct control of university administration, this represents a potentially powerful focus for prevention. We recommend that future prevention campaigns focus on disrupting this weekly pattern in order to reduce the number of college binge drinking episodes.

# References

Andrew, M., & Cronin, C. (1997). Two measures of sensation seeking as predictors of alcohol use among high school males. *Personality and Individual Differences*, 22(3), 393-401.

Andrucci, G. L., Archer, R. P., Pancoast, D. L., & Gordon, R. A. (1989). The relationship of MMPI and sensation seeking scales to adolescent drug use. *Journal of Personality Assessment*, 53, 253-266.

Bachman, J. G., O'Malley, P. M., & Johnston, L. D. (1984). Drug use among young adults: The impacts of role status and social environments. *Journal of Personality and Social Psychology*, 47, 629-645.

Beets, M. W., Flay, B. R., Vuchinich, S., Li, K. K., Acock, A., Snyder, F. J. (2009).

Longitudinal patterns of binge drinking among first year college students with a history of tobacco use. *Drug and Alcohol Dependence*, 103, 1-8.

Cloninger, C. R. (1998). A psychobiological model of temperament and character. In J.

Richter (Ed.), The Development of Psychiatry and Its Complexity (pp. 1-16) New York: University UMEA.

Crews, F. T., Braun, C. J., Switzer III, R. C., & Knapp, D. J. (2000). Binge ethanol consumption causes differential damage in young adolescent rats compared with adult rats. *Alcoholism: Clinical and Experimental Research*, 24, 1712-1723.

Dierker, L., Lloyd-Richardson, E., Stolar, M., Flay, B., Tiffany, S., Collins, L., Bailey, S., Nichter, M., Nichter, M., & Clayton, R. (2006). The proximal association between smoking and alcohol use among first year college students. *Drug and Alcohol Dependence*, 81, 1-9.

Donohow, L., Zimmerman, R., Cupp, P. S., Novak, S., Colon, S., & Abell, R. (2000). Sensation seeking, impulsive decision-making and risky sex: Implications for risk-taking and design of interventions. *Personality and Individual Differences*, 28, 1079-1091.

Duijsens, I. J., Spinhoven, P., Goekoop, J. G., Sperman, T., & Eurelings-Bontekoe, E. H. M. (2000). The Dutch Temperament and Character Inventory (TCI): dimensional structure, reliability and validity in a normal and psychiatric outpatient sample. *Personality and Individual Differences*, 28, 487-99.

Evans, D. E., & Rothbart, M. K. (2007). Developing a model for adult temperament. *Journal of Research in Personality*, 41, 868-888.

Feil, J., & Hasking, P. (2008). The relationship between personality, coping strategies and

 alcohol use. *Addiction Research and Theory*, 16(5), 526-537.

Gourdriaan, A. E., Grekin, E. R., & Sher, K. J. (2007). Decision making and binge drinking: A longitudinal study. *Alcoholism: Clinical and Experimental Research*, 31(6), 928-938.

Hingson, R. W., Heeren, T., Zakocs, R. C., Kopstein, A., Wechsler. H. (2002). Magnitude of alcohol-related mortality and morbidity among college students ages 18-24. *Journal of Studies on Alcohol and Drugs*, 63(2), 136-144.

Jackson, K. M., Sher, K. J., & Park, A. (2005). Drinking among college students:

 Consumption and consequences. *Recent Developments in Alcoholism*, 7(1), 85-117.

Jennison, K. M. (2004). The short-term effects and unintended long-term consequences of binge drinking in college: a 10-year follow-up study. *American Journal of Drug and Alcohol Abuse*, 2004;30(3):659-84.

Koski-Jännes, A., Cunningham, J. A., Tolonen, K., & Bothas, H. (2007). Internet-based self-assessment of drinking—3 month follow up data. *Addictive Behaviors*, 32, 533-542.

Khadjesari, Z., Murray, E., Kalaitzaki, E., White, I. R., McCambridge, J., Godfrey, C., & Wallace, P. (2009). Test-retest reliability of an online measure of past week alcohol consumption (the TOT-AL), and comparison with face-to-face interview. *Addictive Behaviors*, 34, 337-342.

Langewisch, M. W. J., Frisch, G. R. (1998). Gambling behavior and pathology in relation to impulsivity, sensation seeking, and risky behavior in male college students. *Journal of Gambling Studies*, 14(3), 1-15.

Martsh, C. T., & Miller, W. R. (1997). Extraversion predicts heavy drinking in college

 students. *Personality and Individual Differences*, 23(1), 153-155.

McCartym C. A., Ebel, B. E., Garrison, M. M., DiGiuseppe, D. L., Christakis, D. A., & Rivara, F. P. (2004). Continuity of binge and harmful drinking from late adolescence to early adulthood. *Official Journal of the American Academy of Pediatrics*, 114(3), 714-719.

McManus I. C., & Weeks S. J., (1982). Smoking, personality and reasons for smoking. Psychological Medicine, 12(2), 349-356.

Naimi, T. S., Brewer, R. D., Mokdad, A., Denny, C., Serdula, M. K., & Marks, J. S. (2003). Binge drinking among US adults. *Journal of the American Medical Association*, 289(1), 70-75.

Neal, D. J., & Fromme, K., (2007). Hook ‘em horns and heavy drinking: Alcohol use and

 collegiate sports. *Addictive Behaviors*, 32, 2681-2693.

O'Malley, P. M., & Johnston, L. D. (2002). Epidemiology of alcohol and other drug use among American college students. *Journal of Studies on Alcohol*, 14, 23-39.

Park, C. L., & Grant, C. (2005). Determinants of positive and negative consequences of alcohol consumption in college students: Alcohol use, gender, and psychological characteristics. *Addictive Behavior*, 30, 755-765.

Pederson, W., Clausen, S. E., & Lavik, N. J. (2007). Patterns of drug use and sensation-seeking among adolescents in Norway. *Acta Psychiatrica Scandinavica*, 79(4), 386-390.

Rothbart, M. K., Ahadi, S. A., & Evans, D. E. (2000). Temperament and Personality: Origins and Outcomes. *Journal of Personality and Social Psychology*, 78(1), 122-135.

Schwarz, R. M., Burkhart, B. R., & Green, S. B. (1978). Turning on or turning off: Sensation seeking or tension reduction as motivational determinants of alcohol use. *Journal of Consulting and Clinical Psychology*, 46, 1144-1145.

Serdula, M. K., Brewer, R. D., Gillespie, C., Denny, C. H., & Mokdad, A. (2004). Trends in alcohol use and binge drinking, 1985-199. *American Journal of Preventative Medicine*, 26(4), 294-298.

Sung, S. M., Kim, J. H., Yang, E., Abrams, K. Y., & Lyoo, I. K. (2002). Reliability and validity of the Korean version of the Temperament and Character Inventory. *Contemporary Psychiatry*,43, 235-43.

Wechsler, H., Davenport, A., Dowdall, G., Moeykens, B., & Castillo, S. (1994). Health and behavioral consequences of binge drinking in college: A national survey of students at 140 campuses. *Journal of the American Medical Association*, 272, 1672-1677.

Wechsler, H., Dowdall, G. W., Davenport, A., & Caastillo, S. (1995). Correlates of college student binge drinking. *American Journal of Public Health*, 85(7), 921-926.

Wechsler, H., Lee, J., 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.

Wechsler, H., Lee, J. E., Kuo, M., Nelson, T. F., & Lee, H. (2002). Trends in college binge drinking during a period of increased prevention efforts: Findings from 4 Harvard school of public health college alcohol study surveys: 1993-2001. *Journal of American College Health*, 50(5), 203-217.

Wechsler, H., Lee, J. E., Nelson, T. F., Kuo, M. (2002). Underage college students’ drinking behavior, access to alcohol, and the influence of deterrent policies: Findings from the Harvard school of public health college alcohol study. *Journal of American College Health*, 50(5) 223-236.

Wechsler, H., Moeykens, B., Davenport, A., Castillo, S., & Hansen, J. (1995). The adverse impact of heavy episodic drinkers on other college students. Journal of Studies on Alcohol, 56, 628-634.

Wechsler, H., Nelson, T. F. (2001). Binge drinking and the American college student: What’s five drinks? *Psychology of Addictive Behavior*, 15(4), 287-291.

Weitzman, E. R., Nelson, T. F., & Wechsler, H. (2003). Taking up binge drinking in college: The influences of person, social group, and environment. *Journal of Adolescent Health*, 32, 26-35.

Werch, C. E., Pappas, D. M., Carlson, J. M., DiClemente, C. C., Chally, P. S., & Sinder, J. A. (2000). Results of a social norm intervention to prevent binge drinking among first-year residential college students. *Journal of American College Health*, 49, 85-92.

**Zeigler, D. W., Wang, C. C., Yoast, R. A., Dickinson, B. D., McCaffree, M. A., Robinowitz, C. B., & Sterling, M. L. (2004).** The neurocognitive effects of alcohol on adolescents and college students. *Preventative Medicine,* 40(1), 23-32.

Zuckerman, M. (1983). Sensation seeking and sports. *Personality and Individual Differences,* 4*,* 285-292.

Zuckerman, M., & Neeb, M. (1980). Demographic influences in sensation seeking and expressions of sensation seeking in religion, smoking, and driving habits. *Personality and Individual Differences,* 1*,* 197-206.

APPENDIX A – Figures and Tables

Figure : Mean (95% confidence interval) drinking score on each of 24 days



Day of the week (assessment #)

Figure : Mean (95% confidence interval) drinking score on each day of the week



 Day of the Week

Figure : Mean (95% confidence interval) binge drinking rate on each of 24 days



Day of the week (assessment #)

Figure : Mean (95% confidence interval) binge drinking rate on each of days of the week



Day of the Week

Figure : Percent of Students defined on the basis of relatively low, intermediate, or high personality risk who Binged on Weekends (Saturday and Sunday), Thursdays, and Weekdays (Sunday through Wednesday)



 Day of the Week

Table : Mean drinking score on each day of the week

| Day of the Week | Mean # of Drinks | Std. Deviation |
| --- | --- | --- |
| Monday | .1168 | .41494 |
| Tuesday  | .1773 | .65309 |
| Wednesday | .2361 | .72065 |
| Thursday | .9305 | 1.55358 |
| Friday | 1.1842 | 1.57843 |
| Saturday | 1.3916 | 1.81993 |
| Sunday | .1858 | .57580 |

Table : Proportion of participants who binged by day of the week

| Day of The Week | Binge Drinking Rate | Std. Deviation |
| --- | --- | --- |
| Monday | .01 | .065 |
| Tuesday | .01 | .095 |
| Wednesday | .02 | .099 |
| Thursday | .12 | .244 |
| Friday | .16 | .244 |
| Saturday | .19 | .292 |
| Sunday | .02 | .093 |