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APPLICATION OF INTEGRATIVE BEHAVIOR MODEL TO PREDICT INITIATION OR MAINTENANCE OF STOPPING BINGE DRINKING AMONG COLLEGE STUDENTS: A PROSPECTIVE STUDY

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APPLICATION OF INTEGRATIVE BEHAVIOR MODEL TO PREDICT INITIATION OR MAINTENANCE OF STOPPING BINGE DRINKING AMONG COLLEGE STUDENTS: A PROSPECTIVE STUDY

A DISSERTATION APPROVED FOR THE
DEPARTMENT OF HEALTH AND EXERCISE SCIENCE

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Dedicated to

my beautiful wife, Pragya Sharma Ghimire

and

the most adorable daughter, Abhana Bhochhibhoya

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Abstract

With the heightened risk for serious social and physiological consequences, binge drinking is arguably the single most important preventable cause of morbidity and mortality among college students. The negative consequences of drinking alcohol such as violence, unprotected and unplanned sexual intercourse, injury and death from accidents significantly increases when one indulges in binge drinking. Yet, the number of drinks (9.3 drinks on each occasion) and prevalence (40%) of binge drinking, both are highest among the college-aged population. To address this health concern, there have been significant public health efforts over the past two decades, but the status of college student binge drinking has not improved. Thus, identifying additional predictive variables is warranted to enhance the effectiveness of the interventions. The purpose of this study to explore various constructs of the Integrative Behavior Model (IBM) and identify major constructs that best predicts binge drinking behavior among college students with different drinking pattern i.e. binge drinker, social drinkers, and abstainers and assist in customizing future interventions for each of these groups.

This study utilized a prospective study design with two points at the interval of 30 days. The study sample included undergraduate students from a Southwestern University. A new survey was developed and utilized to understand theory-based determinants of the drinking behaviors. A pilot survey was conducted among 46 participants to evaluate the feasibility of recruitment, retention, assessment procedures, and implementation of the study. After refining the survey, the study was implemented to collect responses from 870 participants in time 1, however after eliminating incomplete data and matching responses at

time 2, only 388 responses were considered for final analysis which included 161 binge drinkers, 72 social drinkers, and 155 abstainers. Results indicated certain demographic groups drank at disproportionately higher rates which suggested at-risk groups such as African Americans compared to other ethnic groups, atheist compared to participants with religious beliefs, and age group 18-20 compared to other age groups. The IBM model significantly predicted behavioral intentions towards stopping binge drinking for binge drinkers (48.1%) as well as continuing not to binge drinking for non-binge drinkers (28.2%). Further, when non-binge drinkers were categorized as social drinkers and abstainers, IBM model predicted 60.7% 6% of the intention towards continuing not to binge drinking for social drinkers and abstainers respectively. IBM model also significantly predicted 16.6% of the drinking behavior for binge drinkers and 14.8% for non-binge drinkers.

In conclusion, the current study shows promising application of IBM in predicting and explaining binge drinking behavior among college students and furnish with the predictive factors to design effective interventions. Further, this study highlighted the need for customizing interventions based on students drinking behavior i.e. binge drinkers, social drinkers, and abstainers. This study also suggested the need to redefining few aspects of the IBM in the future studies as two components model resulted more effective than one component model for measuring attitudes, perceived norms, and perceived behavioral control. Future research needs to be conducted to determine the efficacy of the IBM for other populations, settings and health behaviors.

Chapter 1: Introduction

Background

Throughout history, drinking alcohol has been commonly found among different cultures for socialization, relaxation, celebrations, rituals, and medical purposes. Alcohol is a psychoactive intoxicating ingredient found in alcoholic beverages which alter the state of mind by changing brain functions (CDC, 2016). Consumption of alcohol results in an alteration in perceptions, consciousness, and mood. Generally, low consumption of alcohol (one to two standard drinks) leads to flushing of the skin, light-headedness, and socialization. Light to moderate drinking has been associated with possible benefits such as being social, lowering risk of arterial blockages and coronary heart disease, raising blood levels of HDL, lowering risk of diabetes, and decreasing risks of Alzheimer's disease (German & Walzem, 2000). However, when alcohol is consumed in higher concentrations, consequences could be detrimental. In the short term, higher consumption of alcohol could lead to impaired motor performance, irritability, being emotional, and injuries and fatalities due to traffic accidents and violence. Other short-term health-related consequences of higher alcohol consumption include alcohol poisoning, sexual dysfunction, unintended pregnancy, and sexually transmitted diseases (CDC, 2014). Long-term consequences of frequent heavy consumption of alcohol can lead to mental and behavioral disorders including alcohol addiction, and different chronic diseases such as liver cirrhosis, cardiovascular diseases, stroke, and some types of cancer (US Department of Health and Human Services, 2000).

With more than 88,000 deaths and an average 30 years of potential life lost with each death attributable to alcohol abuse, alcohol is the third leading lifestyle-related death in the United States (CDC, 2008; Stahre, Roeber, Kanny, & Brewer, 2015). In addition to the health consequences, alcohol abuse can also lead to significant social and economic losses to the individual and the society at large. Economically, excessive alcohol intake in 2010 cost the US around $249 billion (Sacks, Gonzales, Bouchery, Tomedi, & Brewer, 2015). One of the most damaging impacts of alcoholism is at the family level. Alcoholism can be considered as a family disease. It affects one of every four families in the US (Silverstein, 1990). With a large prevalence rate and wide availability, alcohol is accountable for more family problems than any other single factor (Parsons, 2003).

The Problem

The use of alcohol among college students has been a serious problem for a long time, but it finally began receiving national attention after the landmark study by Straus and Bacon in 1953 which was conducted among 17,000 college students in 27 colleges to explore their drinking behavior (Straus & Bacon, 1953; Whatley, 2005). The study was first of its kind to explore the drinking behavior of the college students. The study explained who, when, where, what, and with whom do students drinks; how do they react to drinking; what influences their drinking habits; and their beliefs about their drinking habits. The studies in this era mainly documented heavy drinking related with Greek house membership, especially among men. It also demonstrated the effect of peer pressure on alcohol use and examined the impact of religious affiliation and parental role.

Even though approximately half of the undergraduate student population is legally underage for drinking, the high prevalence rate of alcohol use and binge drinking among college students' population is substantial. The National Institute on Alcohol Abuse and Alcoholism (NIAAA) defines binge drinking as "a pattern of drinking that brings blood alcohol concentration (BAC) levels to 0.08 g/dL". Generally, this occurs when women consume 4 or more standard drinks or men consume 5 or more standard drinks within 2 hours (NIAAA, 2004). While there is not an official definition of the standard drink size, in the US it is commonly considered to be a volume of beverage that contains 0.6 oz (approximately 14 grams) of pure alcohol (ethanol) (Dawson, 2003). A standard drink can be considered as one 1.5 ounces of distilled spirits (hard liquor) with 40% alcohol, one 5-ounce glass of wine with 12% of alcohol, or one 12-ounce bottle of beer with 5% alcohol.

Prevalence of Binge Drinking

It is well documented that people tend to drink the heaviest during their late teens and early to mid-twenties (Fillmore et al., 1991; Naimi et al., 2003). The number of drinks (9.3 drinks on each occasion) and prevalence (40%) of binge drinking, both are highest among the college-aged population (age 18-24) (CDC, 2012). Approximately 90% of alcohol consumed by youth under 21 years old is in the form of binge drinking (U.S. Department of Justice, Office of Justice Programs, 2005). Even though age is a primary factor for binge drinking due to peer pressure and curiosity, the high rates of binge drinking are not solely due to age. Hingson (2009) reported that the college students' binge drinking was significantly higher than the same-age peers who

do not attend college (Hingson, Zha, & Weitzman, 2009). This suggests that even though most of the college drinking is underage and prohibited by the law, in the popular culture alcohol consumption has become an integral part of college life.

According to the national survey in 2014 by the Substance Abuse and Mental Health Services Administration (SAMHSA), 54.8 % of college students ages 18–22 drank alcohol in the past month. During the same timeframe, 35.3% engaged in binge drinking and 10.5% of college students engaged in heavy drinking [SAMHSA defines heavy drinking as the binge drinking on 5 or more days in the past 30 days (NIAAA, 2004)] (Center for Behavioral Health Statistics and Quality, 2015).

However, not all college students are equally associated with binge drinking behavior. Past studies suggest that a small minority of college students accounts for most of the binge drinking episodes, as less than one-fourth of college students consume almost three-quarters of all alcohol consumed by college students (Wechsler, & Wuethrich, 2002). Similarly, previous studies also reported that fraternity or sorority members and athletes are more likely to binge drink. 73% of fraternity members and 57% of sorority members reported the incidence of binge drinking. Likewise, 58% of male college athletes and 47% of female college athletes reported themselves as a binge drinker (Wechsler, & Wuethrich, 2002).

Consequences of Binge Drinking

The major issue of collegiate drinking is not associated with alcoholic drinks themselves, but the way they drink, which puts them at such a high risk for alcohol-related problems (Bennett, McCrady, Johnson, & Pandina, 1999). The negative consequences of drinking alcohol are significantly higher when one indulges in binge

drinking. For example, a study from Harvard reported that binge drinkers are 7 times more likely to miss classes and 10 times more likely to damage property compared to non-binge drinkers. Similarly, the risk of fatal accidents is 40 times higher for binge drinkers with blood alcohol concentrations of 0.14% compared to non-binge drinkers (Naimi et al., 2003). The risk is even greater for young drivers as they have less experience with both alcohol and driving. Another study from Gledhill and colleagues reported the higher probability of binge drinkers to use illicit drugs which compounds the problem dramatically (Gledhill-Hoyt, Hang, Strote, & Wechsler, 2000).

The major consequences of binge drinking among college students include:

a) Injury /death: Alcohol use among youth is related to the three top causes of youth death: accidents, homicides, and suicides (Windle, 2003). More than 2.7 million college students between ages of 18-24 reported driving under the influence each year, placing themselves and others at high risk for automobile accidents (Hingson, Heeren, Winter, & Wechsler, 2005). It is estimated that each year, more than 1,825 deaths of college students between the ages of 18-24 are caused by alcohol-related unintentional injuries including automobile accidents (Hingson, Zha, & Weitzman, 2009). Similarly, 599,000 college students between 18-24 years are unintentionally injured under the influence of alcohol (Hingson, Heeren, Winter, & Wechsler, 2005). Also, alcohol has been related to higher rates of suicidal ideation and attempt in various studies (Gonzalez, Bradizza, & Collins, 2009; Schaffer, Jeglic, & Stanley, 2008)

b) Violence and Criminal Justice Problems: Alcohol encourages violence by interfering with regular brain function which normally controls impulsive behavior such as aggression (Hingson, Heeren, & Zakocs, 2001). Of all the violent crimes associated

with college students, 95% are reported to be alcohol-related. In more than 90% of the college rapes, alcohol is found to be consumed by either the assailant and/or victim (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002; Hingson, & Howland, 2002). Annually more than 97,000 date-rapes & sexual assaults, and 696,000 assaults reported for college students between 18-24 years old are alcohol-related (Hingson et al., 2005).

Approximately 11% of college students self-reported that they have damaged property under the influence of alcohol and 5% of college students are cited in the campus security or police report as a result of their alcohol consumption (Wechsler et al., 2002). Additionally, annually around 110,000 college students between the ages of 18 - 24 are arrested for an alcohol-related violation such as driving under the influence or public intoxication (Hingson, et al., 2002; Hingson, & Howland, 2002).

c) Sexual behavior: Higher concentration of alcohol is related to unprotected and unplanned sexual intercourse among adolescents which escalates the risk for unintended pregnancy and sexually transmitted disease including human immunodeficiency virus (HIV) (SAMHSA, 2000).

It is estimated that more than 400,000 college students between the ages of 18-24 engage in unprotected sex and more than 100,000 college students reported to be too intoxicated to know if they consented to have sex (Hingson et al., 2002; Hingson, & Howland, 2002). Almost 1 in 4 college-aged students reported having had unprotected sex under the influence of alcohol or drugs (Columbia University, 2002).

d) Academic related problems: Higher concentration of alcohol use among college students is associated with academic related problems. Wechsler et al. (1998) reported that 1 in 4 college students reported negative academic consequences due to

alcohol. The negative consequences include: receiving lower grades, missing class, doing poorly on the exams, falling behind in class, and dropouts.

e) Health and other problems: Over decades of research, it has become clear that alcohol impacts both brain function and behavior differently among adolescents compared to adults. The adolescent's brain is more vulnerable to learning and memory impairment due to alcohol compared with adults (Witt, 2010).

Nationally, it is estimated that 27% of occasional binge drinkers and 54% of frequent binge drinkers reported at least one incident of blacking out which is defined as not knowing where they were or what they did while they were drinking (Weschsler, Lee, Kuo, Lee, 2000).

f) Alcohol abuse and dependence: More than 150,000 college students develop alcohol-related health issues each year (Heeren et al., 2002). Based on a nationwide survey, 31% of college students met criteria for a diagnosis of alcohol abuse and 6% met the criteria for alcohol dependence (Knight, Wechsler, Kuo, Seibring, Weitzman, & Schuckit, 2002)

With the heightened risk for serious social and physiological consequences, binge drinking is arguably the single most important preventable cause of morbidity and mortality among college students (Dowdall, Crawford, & Wechsler, 1998).

Understanding Binge Drinking Behavior

Understanding and preventing binge drinking behavior among college students is complex in nature. In the past, there have been numerous efforts to understand and prevent binge drinking behavior among college students. Studies have examined various predicting factors such as age, year of class, and membership in fraternities to

binge drinking behaviors (Grenier, Gorskey, & Folse, 1998; Makimoto, 1998). Also other factors such as past history of binge drinking, social integration into college life, peer influence, drinking to 'fit in', social and environmental contexts where drinking occurs, student personality and belief system, availability and easy access to alcohol, economic availability including retail price of alcohol and availability of disposable income for students, and institutional policies, have been found to influence binge drinking behaviors which are subtly or overtly interwoven throughout the college drinking culture (Wechsler & Nelson, 2008, US Department of Health and Human Services, 2002). Some of the variables have a reciprocal relationship. For example, alcohol and violent behaviors have been reported to have a reciprocal relationship as early violent behavior is a strong predictor of alcohol use at a later stage and early alcohol use is a strong predictor of later violent behavior (Xue, Zimmerman, & Cunnigham, 2009). Another factor that has a reciprocal relationship with alcohol is stress. Stress-relief drinking is one of the prominent factors for alcohol abuse and dependency. On the other hand, alcohol has also been reported as a frequent contributor to raising stress (Powers & Kutash, 1985). The complex nature of binge drinking phenomena warrants the need of a model that integrates these multifaceted and interrelated variables to best explain binge drinking behavior, with an aim to reduce binge drinking and its negative consequences among college students (Baer, 2002).

Theoretical Framework of the Study

Despite the significant public health efforts over the past decade, the status of college students binge drinking has not improved (Schulenberg, et al., 2001; Johnston, O'malley, Bachman, & Schulenberg, 2011). In fact, studies show that the negative

consequences due to alcohol have even increased. Between 1999 and 2005, the cases of driving under the influence among college students have increased (Hingson, Heeren, Winter, & Wechsler, 2005). Similarly, alcohol-related arrests and unintentional deaths among college students have also increased in the past decade (Hingson, Zha, & Weitzman, 2009). Thus, given the shortcomings of previous prevention efforts and interventions to curtail binge drinking behavior among college students and the deleterious consequences of binge drinking coupled with the facts, including but not limited to the death of students, warrants additional studies to understand the psychological determinants of collegiate binge drinking behaviors.

Past studies have suggested that studies utilizing a strong theoretical basis are more effective for behavior change application than those with no theoretical underpinnings (Michie & Prestwich, 2010). In this context, exploring and understanding various determinants of binge drinking behavior through a theoretical standpoint can be insightful. Past studies suggest that theory can provide a conceptual framework to understand health-related behavior and help in designing effective health-related interventions (Michie & Prestwich, 2010). Using theory in understanding behavior can provide various benefits. First, it allows collecting empirical data within an established theoretical framework. Second, the information collected from the theory based study can be used to inform and design the intervention by identifying causally related constructs (Michie & Prestwich, 2010). Third, the theoretical framework can also assist in the process of evaluating the intervention and refining it before future implementation (Michie & Abraham, 2004).

A number of models and behavioral theories have been used to understand behavior change including the Health Belief Model, Theory of Planned Behavior (TPB)/ Theory of Reasoned Action (TRA), Social Cognitive Theory, and Transtheoretical Model. Since a majority of constructs in these theories were similar and complimentary, there was a need to develop a theoretical framework to integrate these common constructs. Thus, a workshop was organized by the National Institute of Mental Health to distinguish features of the widely used health behavior theories such as Social Cognitive Theory, TRA, & TPB (Fishbein et al., 1994; Rosenstock et al., 1994) and to develop an integrated model that incorporates the major constructs from the major theories. The workshop was attended by prominent theorists including Martin Fishbein, Albert Bandura, Marshall Becker, Harry Triandis, and Fredrick Kanfer in 1991 (Fishbein et al., 1994). At the workshop participants agreed on the set of key variables (intentions, environment, skills/abilities, self-efficacy, emotional reaction, social pressure, attitudes, and personal standards/self-image) for behavior change. This led to the foundation for the Integrative Behavior Model (IBM). Later Fishbein and colleagues outlined the IBM which primarily focused on the determinants of intention towards the behavior (Fishbein, 2000; Fishbein and Cappella, 2006).

Even though IBM was coined in 1991 and integrated using multiple theories, it is clear that IBM is mainly inherited from TRA and TPB. Like TRA and TPB, the IBM identified intention, attitude, norms, and perceived behavior control as the most predictive factors for behavior change, which was conceptualized by the early work of Martin Fishbein in the 1960s (Maibach & Yzer, 1995). Fishbein in TRA proposed attitude (specific attitude towards the behavior) and subjective norms (normative beliefs

and motivation to comply) as precursors of intentions and behavior (Maibach & Yzer, 1995). Later in the 1980s, Icek Ajzen proposed perceived behavioral control as an additional construct to predict behaviors and intentions towards behaviors (Maibach & Yzer, 1995). Furthermore, when the IBM was proposed, the intention was predicted by attitudes, perceived norms, and perceived behavioral control (DiClemente, Crosby, & Kegler, 2009). The IBM extends TPB by incorporating a normative determinant in norms and perceived control in perceived behavioral control (Fishbein & Ajzen, 2010).

In addition, the indirect measures (Behavior Beliefs, Normative Beliefs, and Control Beliefs) which measure the IBM constructs (Attitude, perceived norms, and perceived behavioral control) based on individuals' beliefs help to put theory into context. The direct measures for the IBM constructs (Attitude, perceived norms, and perceived behavioral control) measures and demonstrate and the participant's likelihood of performing a behavior while the indirect measures, explain why the participant may or may not perform a behavior. In addition, responses to these measures provide the basis for program development (Montano & Kasprzyk, 2008). Refer to Figure 1 for the complete outline of the IBM.

In past, the TPB has been extensively applied to alcohol consumption behavior and meta-analytic reviews have supported the ability of the TPB in explaining behavioral intentions and behavior for alcohol consumption behavior (Ajzen, 1991; Armitage & Cinner, 2001; Cooke, Dahdah, Norman, & French, 2016). Based on the foundation of the TPB, the IBM has been augmented to integrated additional constructs to enhance the ability to predict and change health behaviors by providing holistic insights. But even though the IBM has been established for almost 25 years, it has not

been commonly utilized in health behavior research and not adequately for binge drinking behaviors (Head & Noar, 2014). In an effort to understand the application of the IBM, this study attempts to investigate the efficacy of the IBM in predicting binge drinking behavior among college students.

Purpose

Understanding the predictive factors is essential to design effective and evidence-based interventions. Despite the overwhelming research in the area of binge drinking behavior among college students, to date, the prevalence of binge drinking has not declined and negative consequences are on the rise. This study has been initiated with the belief that the IBM will be able to identify additional psychological determinants which can be addressed in future interventions. Also, there have been limited studies that have utilized the IBM in conjunction with binge drinking behaviors among college students (Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016; Braun, Glassman, Dake, Jordan, & Yingling, 2014). Therefore, the present study aims to fill that research gap as well. It is the intent of the study to explore various constructs of the IBM and identify major constructs that best predict binge drinking behavior among college students. This study will also provide insight to help understand drinking behavior among college students based on their drinking pattern (i.e. binge drinker, social drinkers, and abstainers) and assist in customizing future interventions.

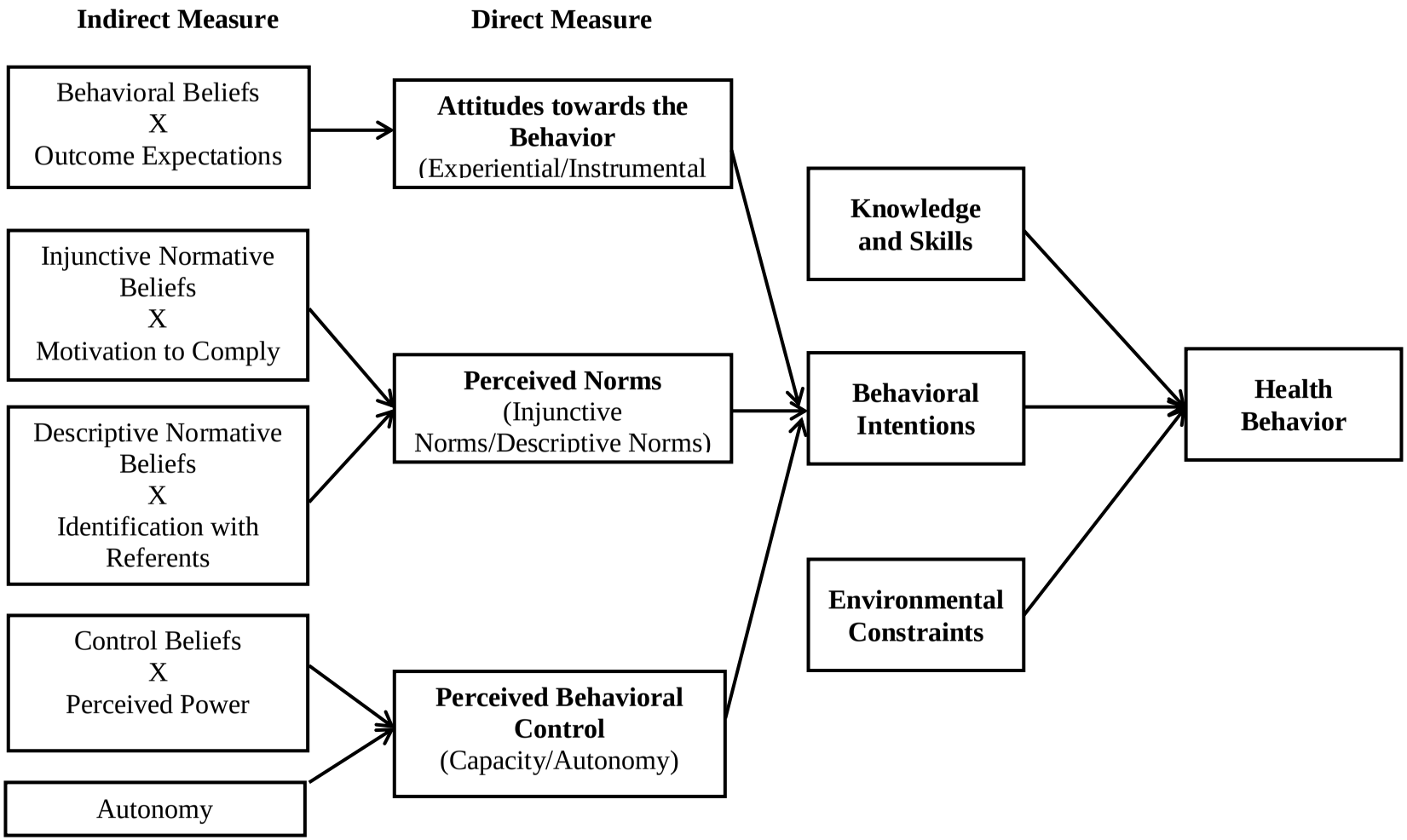


Figure 1. Integrative Behavior Model

Significance

Binge drinking among college students is one of the major health issues in higher education. The consequences of binge drinking can be as simple as a hangover or as serious as death. Academic consequences of heavy drinking among college students include lower GPA (Presley, Meilman, Cashin, & Leichliter, 1997) and dropping out of school (Core Institute, 2011). However, even after spending over-stretched budgets of college and universities for addressing the harms of alcohol consumption, the results have not been promising. Instead, the negative consequences of alcohol use among college students have further increased. This clearly indicates the ineffectiveness of current interventions. Thus, identifying additional predictive variables is warranted to enhance the effectiveness of the interventions.

To understand additional predicting variables, the current study utilized the IBM. The IBM has potential to understand binge drinking behaviors more effectively as it provides holistic insights compare to other theories. There have been two cross-sectional studies, associated with the use of the IBM for binge drinking (Sheppard et al., 2016; Braun et al., 2014) however both studies are subject to the methodological limitations including single assessment, not measuring IBM indirectly, and not including non-binge drinkers in the study. Having considered all of these limitations, the current study has been designed to address these limitations and the research gap. In the current study, IBM is measured directly and indirectly and their behavior is assessed at two points of time with a month difference. Also, the current study will try to understand binge drinking behaviors for those who binge drinks and those who do not.

Most of the time, these groups are not differentiated when implementing intervention such as mandatory alcohol-related training to be completed by all freshman in the majority of college in the US. However, when comparing college-aged students who binge drink and who do not binge drink the significant differences were observed among binge and non-binge drinkers for drinking motives (York, 2013). Similarly, the binge drinkers were found to indulge in more risky behaviors such as riding with a drunk driver, use of tobacco or other drugs, engaging in the risky sexual behavior, and getting involved in violence (Miller et al., 2007). This demands the study that differentiates the college students as binge drinker and non-binge drinker. This will help to design an intervention for these two groups with different strategies.

The current study results highlight the effectiveness of the IBM in predicting the binge drinking behavior among college students and attempt to identify additional predictive variables. This study teased out the different predicting factors for binge drinkers and non-binge drinkers. The information gleaned from this study shed some light on the major issues in binge drinking behaviors among college students and equips practitioners with the knowledge to design effective interventions.

Research Questions

Specifically, this study examined the following primary research questions. These questions are:

1. To what extent are the IBM constructs (attitude, perceived norms, and perceived behavioral control) associated with behavioral intention to

    a. discontinue binge drinking in the next 30 days for current binge drinkers?

b. continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers)?

2. To what extent are direct measures of the IBM constructs (attitudes, perceived norms, and perceived behavioral control) predicts the behavioral intentions to

a. discontinue binge drinking in the next 30 days for current binge drinkers?

b. continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers)?

3. To what extent are the extended direct measures of the IBM constructs (experiential attitude, instrumental attitude, injunctive norms, descriptive norms, capacity, and autonomy) predicts the behavioral intentions to

a. discontinue binge drinking in the next 30 days for current binge drinkers)?

b. continue not to binge drink in the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers)?

4. To what extent are direct measures of the IBM constructs (attitudes, perceived norms, and perceived behavioral control) predicting the behavioral intentions to discontinue binge drinking in the next 30 days for current binge drinkers different than the direct measures of the IBM constructs (attitudes, perceived norms, and perceived behavioral control) predicting the behavioral intentions to continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinker and abstainers?

5. To what extent are the extended direct measures of the IBM constructs (experiential attitude, instrumental attitude, injunctive norms, descriptive norms, capacity and autonomy) predicting the behavioral intentions to discontinue binge drinking in the next

30 days for the current binge drinkers different than the extended direct measures of the IBM constructs (experiential attitude, instrumental attitude, injunctive norms, descriptive norms, capacity and autonomy) predicting the behavioral intentions to continue not to binge drink in the next 30 days for the participants who currently do not binge drink(social drinkers and abstainers)?

6. To what extent the attitudes, perceived norms, and perceived behavioral control are different for gender (male vs female), year in college (freshman, sophomore, junior, and senior), Greek house membership(member vs non-member) for

   a. current binge drinkers

   b. non-binge drinkers (social drinkers and abstainers)?

7. To what extent is the IBM constructs of intentions, knowledge, and skill, and the environment predicts the binge drinking behavior for next 30 days?

8. To what extent the product of each behavioral belief and outcome evaluation have a significant relationship with attitudes, perceived norms, and perceived behavioral control.

Hypotheses

The research hypotheses for this study are as follows:

Hypothesis 1: Attitudes, perceived norms, and perceived behavioral control will be significantly related to the behavioral intention to discontinue binge drinking for the next 30 days for the current binge drinkers.

Hypothesis 2: Attitudes, perceived norms, and perceived behavioral control will be significantly related to the behavioral intention to continue not to binge drink for the next 30 days for the participants who currently do not binge drink.

Hypothesis 3: One or more of IBM constructs (Attitudes, perceived norms, and perceived behavioral control) will collectively significantly predicts the behavioral intention to discontinue binge drinking for the next 30 days for the current binge drinkers.

Hypothesis 4: One or more of extended measures of IBM constructs (Instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity, and autonomy) will collectively significantly predict the behavioral intention to continue not to binge drink for the next 30 days for the participants who are not currently binge drinking.

Hypothesis 5: Attitudes, perceived norms, and perceived behavioral control will collectively significantly predicts the behavioral intention to continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers).

Hypothesis 6: Instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity and autonomy for the current binge drinkers will collectively significantly predicts the behavioral intention to continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers).

Hypothesis 7: Attitudes, perceived norms, perceived behavioral control, the behavioral intentions, knowledge and skills, and intentions for the current binge drinker will be significantly different than for those who currently do not binge drink.

Hypothesis 8: Instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity, and autonomy will significantly predict the behavioral

intention to discontinue binge drinking for the next 30 days for the current binge drinkers.

Hypothesis 9: There will be a significant difference between male and female college students for attitudes, perceived norms, and perceived behavioral control to discontinue binge drinking for the next 30 days for the current binge drinkers.

Hypothesis 10: There will be a significant difference between male and female college students for attitudes, perceived norms, and perceived behavioral control to continue not to binge drink for the next 30 days for the participants who do not currently binge drinks (social drinkers and abstainers).

Hypothesis 11: There will be a significant difference between college students year in college for attitudes, perceived norms, and perceived behavioral control to discontinue binge drinking for the next 30 days for the current binge drinkers.

Hypothesis 12: There will be a significant difference between different college student's year in college for attitudes, perceived norms, and perceived behavioral control to continue not to binge drink for the next 30 days for the participants who are not currently binge drinkers.

Hypothesis 13: There will be a significant difference between member and non-member for Greek house among college students for attitudes, perceived norms, and perceived behavioral control to discontinue binge drinking for the next 30 days for the current binge drinkers.

Hypothesis 14: There will be a significant difference between member and non-member for Greek house among college students for attitudes, perceived norms, and perceived behavioral control to continue not to binge drink for the next 30 days for the

participants who do not currently binge drinkers (social drinkers and abstainers).

Hypothesis 15: Behavioral intentions, perceived behavioral control, and knowledge and skills will significant predicts the drinking behavior after 30 days.

Hypothesis 16: Indirect measurement of IBM constructs (Instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity, and autonomy) is significantly associated with respective direct measures (Attitudes towards the behavior, perceived norms, and perceived behavior control) for discontinuing binge drinking behavior as well as for continuing not to binge drink.

Delimitations

Delimitations for this study include:

1) Undergraduate students (both male and female) at the University of Oklahoma, Norman Campus participated in this study.
2) The participant criteria included ages 18 to 30 years old.
3) The study conducted in Spring 2017 and the influence of seasonal effects is expected on the research while studying drinking behavior among college students.
4) The study confined mainly to two types of binge drinking behaviors, i.e. discontinuing binge drinking for current binge drinkers and continuing not to binge drink for those who currently do not binge drinks. This study did not explore other drinking behaviors.

Limitations

The potential limitation of this study may include:

1) Data was collected using self-reported instruments.
2) Participants have to remember and report past 30 days drinking behavior.

3) The study used a monothematic (closed-format) design on the questionnaire and the participants only had the option to choose from the set of given response.

4) Participants of the study included undergraduate students from the University of Oklahoma, Norman Campus. Thus, conclusions of this study may not be applicable to other college or non-college populations.

5) The study utilized a prospective study research design. Thus, it inherits the limitations of the prospective study design. This includes the higher attrition rate of participants, greater expense, and more time-consuming than other study designs such as cross-sectional studies.

Assumptions

Assumptions for this study include:

1) The assessment tool "Alcohol behavior scale for college students" is reliable and valid at the time of the study.

2) The assessment tool "Alcohol behavior scale for college students" accurately measures IBM constructs in relation to the binge drinking behaviors.

3) Participants understood and complied with the provided instructions for filling out the instrument.

4) Participants answered the "Alcohol behavior scale for College students" instrument honestly and accurately.

Operational Definitions

Binge drinking: Binge drinking is defined as "a pattern of drinking that brings blood alcohol concentration (BAC) levels to 0.08 g/dL." Generally, this occurs when women consume 4 or more or men consume 5 or more drinks within 2 hours (NIAAA, 2004).

A standard drink: Different countries have different definitions for a standard drink. However, for the purpose of this study, a standard drink size is considered beverage that contains 0.6 oz (approximately 14 grams) of pure alcohol (ethanol). This standard is commonly followed in the US when referring to a standard drink (Dawson, 2003). Thus, a standard drink can be considered as one drink with 1.5 ounces of distilled spirits (hard liquor) with 40% alcohol, one 5-ounce glass of wine with 12% of alcohol, or one 12-ounce bottle of beer with 5% alcohol.

Binge drinker: For the purpose of the study, binge drinkers are categorized as those who indulge in drinking 5 or more drinks for male or 4 or more drinks for female in a single session (within 2 hours interval) in past 30 days.

Social drinker: For the purpose of the study, social drinkers are categorized as those who drink alcohol but do not consume to the extent of binge drinkers. The limit for the social drinker is less than 5 drinks for male and less than 4 drinks for female in a single session (within 2 hours interval) in past 30 days.

Abstainers: For the purpose of the study, abstainers are categorized as those who did not consume any alcohol for the past 30 days.

Behavior: In general behavior is defined as the way in which one acts. In IBM, the behavior is defined as a single, observable act with a specific target, action, context, and time (TACT) (Fisbein & Ajzen, 2010). For the purpose of this study, the behavior is defined separately for those people who binge drink and those people who do not binge drink. For current binge drinkers, the target behavior is defined as discontinuing binge drinking for the next 30 days. Similarly, for non-binge drinkers, the target behavior is defined as continuing not to binge drink for the next 30 days. The behavior is

operationalized in this study as individual responses to one item, asking respondents to report "during the past 30 days, how many times have you had: 5 or more drinks in about 2 hours (for men)? / 4 or more drinks in about 2 hours (for women)?"

For the most efficient alcohol-related intervention, it is important to understand what would make college students who engage in binge drinking quit binge drinking. Also, it is equally important to understand how to motivate the remainder of college students who do not engage in binge drinking to retain their behavior. Hence, both behaviors were studied in the current study.

Behavioral intentions: The behavioral intention is defined as an individual's indication towards the decision or readiness to conduct the behaviors. The operational definition for behavioral intention is defined as the participant's intention towards quitting binge drinking for the next 30 days (for participants who are currently involved in binge drinking) or continuing not to binge drink for the next 30 days (for participants who currently are not involved in binge drinking). Further, for the purpose of this study, this construct has been operationalized as individual responses to items referring to "I will," "I intend," and "I will try" directed towards specific binge drinking behavior.

Attitude towards a behavior: Attitude towards a behavior is defined as the degree to which engaging in the behavior is positively or negatively evaluated. For the purpose of this study, attitude is operationally defined as the participant's overall feeling of like or dislike towards: quitting binge drinking behavior for the next 30 days (for participants who are currently involve in binge drinking) or continuing not to binge drink for the next 30 days (for participants who currently are not involved in binge drinking). Also, in this study attitude is assessed using direct and indirect measures. The direct measures

will be assessed by adding *experiential attitude* (the overall affective evaluation of the behavior) and *instrumental attitude* (the overall cognitive evaluation of the behavior). The indirect measures were computed by a multiplying score of outcome evaluations (the value attached to a behavioral attribute or outcome) and behavioral beliefs (beliefs that behavioral performance will result in certain attributes or outcomes).

Perceived norm: Perceived norm is defined as the social pressure one feels towards acting or not acting on the behaviors. For the purpose of this study perceived norm is defined as assessing what important people in the participant's life think about their behavior and how other people similar to them are acting towards quitting binge drinking for the next 30 days (for current binge drinkers) or continuing not to binge drink for the next 30 days (for participants who currently do not binge drink). Perceived norm is also operationalized using direct and indirect measures. The direct measures were computed by adding descriptive norms (the perceptions of similar others conducting the behavior) and injunctive norms (a perception towards the important people to him/her think about conducting a behavior). The indirect measures were computed by multiplying injunctive/descriptive normative beliefs (the perceived belief towards what most important people support or refute the behavior) and motivation to comply with referents (the motivation to comply with what each referent thinks).

Perceived behavioral control: Perceived behavioral control is defined as one's capability to act on the behavior. For the purpose of this study, perceived behavioral control is operationally defined as their perceived control, self-efficacy, and autonomy towards quitting binge drinking for the next 30 days (for current binge drinkers) or continuing not to binge drink for the next 30 days (for participants who currently do not binge

drink). Perceived behavioral control is also operationalized using direct and indirect measures. The direct measures were computed by adding *perceived autonomy* (the degree of self-control to perform the behavior) and *perceived capacity* (also referred as Self-Efficacy). The indirect measure was computed by multiplying the score of *perceived power* (the perceived effect of each circumstances making conducting behavior easy or difficult) and *control beliefs* (the perceived likelihood of occurrence of each constraining or facilitating circumstances).

Knowledge and skills: Knowledge and skills are defined as the necessary abilities and information to participate in the behaviors. For the purpose of this study knowledge and skills were if they know what to do if other people in their surroundings has alcohol poisoning, or if they know how alcohol affects each individual differently.

Environment: The environment is defined as one's surroundings in which one conducts the behaviors. For the purpose of this study, the environment is operationally defined as the surrounding where alcohol consumption takes place such as a bar, Greek house, and social gatherings. The environment is assessed with items such as, "where do you live?" (Off-campus/on-campus).

Background factors: The final component of the IBM is background which is operationally defined by demographic factors that could impact drinking behavior such as age, year of college, membership of Greek house, gender, etc.

Race: For the purpose of this study, race and ethnicity was limited to the following categories: White, Black/African American, Hispanic /Latino, American Indian/Alaska Native/Native Hawaiian, Asian or Pacific Islander, Biracial or Multiracial, other. These categories are in accordance with the categories established by the American College

Health Assessment (American College Health Association, 2016).

Undergraduate students: For the purpose of this study, undergraduate students were defined as college students between 18 to 24 years and those enrolled as undergraduate status at the University of Oklahoma.

Chapter 2: Literature Review

Binge drinking among college students continues to be of growing concern in the higher education system with a significant portion of college students habitually engaging in this behavior (Page, Ihasz, Hantiu, Simonek, & Klarova, 2008). Despite the significant efforts over the past decade towards preventing and reducing binge drinking behavior, the status of college students' binge drinking has not improved (Schulenberg, et al., 2001; Johnston, O'malley, Bachman, & Schulenberg, 2011). In this context, exploring and understanding various determinants of binge drinking behavior through a theoretical perspective can be constructive to design efficacious interventions. The purpose of this study is to assess the application of the IBM in predicting the two types of binge drinking behaviors: a) discontinue binge drinking in the next 30 days (for a current binge drinker) or b) continue not to binge drink in the next 30 days (for those who currently do not engage in binge drinking).

While a number of studies have examined binge drinking behavior among college students, only a few studies have incorporated the Integrated Behavior Model (Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016; Braun, Glassman, Dake, Jordan, & Yingling, 2014). Also, even though binge drinkers and non-binge drinkers have different drinking motives, only a few studies have focused on the college students who do not binge drink (York, 2013). Understanding the different aspects of binge drinkers and non-binge drinkers can help aid in determining if different intervention and prevention programs specifically for these groups are warranted.

This chapter will cover many aspects related to binge drinking behavior among college students including the prevalence and consequences of binge drinking on

campus and a systematic review to provide an up-to-date and comprehensive review of the application of the IBM in drinking behavior. Since there were not many studies that have employed the IBM for binge drinking behaviors, this systematic review will also include literature that uses the Theory of Planned Behavior (TPB) which is the predecessor of the IBM.

Prevalence of Binge Drinking among College Students

To understand the prevalence of binge drinking among college students in the United States, many researchers working in this area refer to the five key national databases listed below. Each of these databases possesses different characteristics relating to population coverage, instrumentation, data collection methodology, and data collection period to provide information on youth alcohol use, drug use, and other health-related behaviors. Findings from these national data sets are in general agreement that approximately two out of five college students engage in binge drinking behavior (O'Malley and Johnston, 2002).

1. The National Survey on Drug Use and Health (NSDUH), Substance Abuse and Mental Health Services Administration (SAMHSA)
2. The National College Health Assessment (NCHA), the American College Health Association (ACHA)
3. The Core Institute (Core), the Southern Illinois University
4. College Alcohol Study (CAS), the Harvard School of Public Health
5. The National College Health Risk Behavior Survey (NCHRBS), Youth Risk Behavioral Surveillance, Centers for Disease Control and Prevention (CDC)

The Substance Abuse and Mental Health Services Administration (SAMHSA) in conjunction with the Research Triangle Institute (RTI) annually publishes the National Survey on Drug Use and Health (NSDUH). Even though the survey is not focused on college students, NSDUH is the primary source of statistical information for the use of alcohol, tobacco, and illegal drugs by U.S. civilians aged 12 or older. The data is collected via a face-to-face interview with approximately 70,000 individuals (NSDUH, 2017). NSDUH defines a current alcohol user as any who has used alcohol in the past month. Similarly, respondents drinking five or more drinks on the same occasion on at least 1 day in the past 30 days were defined as a binge drinker, and respondents drinking five or more drinks on the same occasion on 5 or more days in the past 30 days were defined as a heavy drinker. The NSDUH reported more than half (52.7%) of the people aged 12 or older as current alcohol users. Of the current alcohol users, 43.6% reported themselves as a binge drinker and 11.7% as a heavy drinker (Center for Behavioral Health Statistics and Quality, 2015). The estimates of current alcohol users have remained steady between 2009 and 2014, but are higher than the estimates reported in the NSDUH in most of the years between 2002 and 2008. For the college-aged population (age 18 to 25), about three-fifths self-reported as current alcohol users in all years between 2002 and 2014 (ranging from 59.6% to 62%). Similarly, 37.7% of the respondents between 18 to 25 years reported themselves as a binge drinker. The percentage of binge drinkers has slightly decreased among this group compared to reports from 2002 through 2013.

Since 2000, the American College Health Association (ACHA) has been collecting data about college students' health habits, behaviors, and perceptions using

the National College Health Assessment (NCHA). The NCHA publishes its report biannually. The Spring 2016 report is the most recent report published by the ACHA while this literature review was being conducted. According to the ACHA-NCHA Reference Group Data Report-Spring 2016, 63.6% of overall college students (63% of males and 64% of females) reported drinking alcohol at least once in the last 30 days prior to the assessment. Similarly, 36% of male and 22% of female college students drank more than five or more alcoholic drinks the last time they "partied"/socialized. The report also indicated that 38% of male and 28% of female college students reported drinking five or more drinks of alcohol at least one time at a sitting in the 30 days prior to the assessment (ACHA/NCHA II, 2016). Binge drinking often times happens because of drinking games among college students as it encourages excessive alcohol consumption. Almost 60% of college students (62% of males and 60% of females) reported participating in drinking games in the past 12 months.

Another source for alcohol prevalence among college students can be examined from the Core Alcohol and Drug Survey. This survey is published by the Core Institute/Southern Illinois University, which is the largest database for national alcohol and other drug data about college students in the US. The Core Alcohol and Drug Survey measures alcohol and other drug usage, perceptions, and attitudes among college students (Core Institute at Southern Illinois University, 2014). The most recent executive summary is from 2011-2013, which was published in 2014. The results of the survey reported 68.7% of students consumed alcohol in the past 30 days. The report also suggested 61.8% of students who consumed alcohol in the past 30 days were underage. The Core Institute defines binge drinking as consuming 5 or more drinks in

one sitting for both men and women. Based on this definition, 43.9% of students reported binge drinking within the past 30 days prior to the assessment.

The Centers for Disease Control (CDC) conducted a study using the National College Health Risk Behavior Survey (NCHRBS) to assess the overall health of college students. Although this was a one-time study conducted on 1995, the study was beneficial in documenting the alcohol-drinking population based on gender, age, and race. The study reported 22.8% of males and 6.1% of female African American students engaged in binge drinking. Similarly, for Hispanic students, 39.9% of males and 22.6% of females engaged in binge drinking behaviors, and for Caucasian students, 49.4% of males and 31.6% of females engaged in binge drinking. Identical to the aforementioned studies (NSDUH, ACHA/NCHA II, and Core Alcohol and Drugs Survey), NCHRBS also reported overall binge rates for college students around 41.5% (US Department of Health and Human Services, 1997).

Another major study is the College Alcohol Study (CAS) which was conducted by Harvard University. The study assessed college students' alcohol consuming behavior. Four national assessments were conducted between 1992 and 2006. The results indicated the overall binge drinking among college students trended around 44%, which corroborates with other national assessments irrespective of different data collection methods, instruments, and period of data collection (O'Malley & Johnston, 2002; Wechsler & Nelson, 2008). Even though the rate of binge drinkers among college students has remained constant, Wechsler and Nelson's study suggested, a polarizing effect among binge drinkers and abstainers as the population sizes of both groups have increased.

Binge Drinking: A Higher Risk

Binge drinking among college students is associated with various negative consequences including violence, property damage, academic failures, criminal penalties, fatal and non-fatal injuries, sexual assaults, sexually transmitted diseases, unintended pregnancies, blackouts, alcohol poisoning, and even death. The top three negative experiences due to alcohol consumption were "did something you later regretted" (24% males, 25% females), "forgot where you were or what you did" (22% males, 21% females), and "had unprotected sex" (16% males, 15% females) as reported by the ACHA/NCHA II (2016). Similarly, the ACHA/NCHA reported 12.6% of the college students (15% of males and 12% of females) drove after drinking alcohol, which contributes to additional risks for accidents. At least, 9.4% of college students were physically injured (10% males and 9% females) after drinking alcohol within the last 12 months. The College Alcohol Study from Harvard indicated that students who binge drink three or more times in a 2-week period compared to those who only binge drink one to two times are two times more likely to get hurt or injured (11% vs 27% respectively), experience alcohol-induced memory loss (27% vs 54% respectively), engage in unplanned sex (22% vs 42% respectively), and engage in unprotected sex (10% vs 20% respectively) (Wechselet et al., 2000).

The Core Alcohol and Drug Survey assessed consequences of alcohol and drug use. Based on the responses from the students, the top five problematic experiences were: had a hangover (58.9%), got nausea or vomited (49.8%), done something later regretted (32.9%), had memory loss (32.6%), and got into an argument or fight (26.9%). Other problematic experiences not included in the top five list, which were more severe

in nature and mentioned in the study were: driven a car while under the influence (18.4%), been in trouble with the police, residence hall, or other college authorities (10.8%), thought to have a drinking or other drug problem (8.8%), been taken advantage sexually (7.9%), damaged property, pulled fire alarms etc. (4.8%), seriously thought about suicide (4.1%), and tried to commit suicide (1.2%). Additionally, a study conducted by Wechsler and Nelson (2008) reported binge drinking behaviors contributing towards risk-taking behaviors such as being violent and having unprotected sex. Alcohol has been found to encourage violence by interfering with regular brain function which normally controls impulsive behavior such as aggression (Hingson, Heeren, & Zakocs, 2001). Long term binge drinking behavior has also been found to contribute to alcohol dependence (Knight, Wechsler, Kuo, Seibring, Weitzman, & Schuckit, 2002; Wechsler & Nelson, 2008).

Even though the risks of alcohol-related harm increase with the level of alcohol consumed, since fewer people drink at levels at or beyond the binge threshold, higher numbers of total consequences occur from those who drink at relatively lower risk levels (Wechsler and Nelson 2001). Thus, alcohol drinking behavior among college students is also considered to be a well-known prevention paradox in public health. Based on the Harvard College Alcohol Study, Weitzman and Nelson (2004) estimated 25 to 30% of alcohol-related consequences resulted from students who reported consuming 3-4 drinks per occasion. This raises the concern that targeting the binge drinkers only might not be enough to reduce overall alcohol-related negative consequences. However, in the meantime, an intervention for reducing binge drinking

behaviors would certainly help to reduce death that occurs at high levels of alcohol consumption (White & Hingson, 2014).

Reasons for Binge Drinking

Multiple factors have been found to influence binge drinking behaviors which are subtly or overtly interwoven throughout the college drinking culture. These factors might have contributed to drinking being perceived as a social norm rather than an unhealthy or potentially detrimental behavior. Some of the factors that have been suggested in previous studies include: social integration into college life, peer influence, drinking to 'fit in', Greek house membership, social contexts where drinking occurs, student personality and belief system, availability and easy access to alcohol, economic availability including retail price of alcohol and availability of disposable income for students, and institutional policies (Wechsler & Nelson, 2008, US Department of Health and Human Services, 2002). The challenge for researchers or practitioners is to integrate all of the multifaceted variables and to develop a model that can best explain the relationship between drinking patterns, risk factors, and outcomes (Baer, 2002).

Age Factors

When exploring reasons for drinking behaviors among college students, the development framework including physical development, cognitive development, and moral development needs to be considered. For example, during the transition from adolescents to young adults, college students may want to act like adults which includes the privilege or right to drink (US Department of Health and Human Services, 2002). Similarly, during the adolescence stage, there is an enhancement of physiological and

hormonal response to stressors that could lead to exploratory behavior such as binge drinking (Pohorecky, 1991; Tschann et al., 1994).

Past History

Collegiate problematic drinking is a product of previous drinking behavior and experience. During college life, students experience higher independence and personal freedom, they explore and engage in intimate relationships, and are liberated from some of the responsibilities from family. The college years are the time for transition, re-exploring self-identity, and forming social relationships in new living situations, but it is also very possible that some behaviors during late adolescence and early adulthood are sustained during college life. There is considerable evidence that suggests college drinking may be an extension of the past history which might continue or intensify when students enter into college (Hersh and Hussong 2006; Leibsohn 1994; Wechsler et al. 1994). Past history including family relationships, relationships with peers, and exposure to drinking behaviors could provide reasons to binge drink. For example, college students with older siblings may indulge in drinking behaviors, especially if they look up to their older sibling who drinks (US Department of Health and Human Services, 2002).

Individual Factors

Although little evidence is available to claim that offspring of alcoholics metabolize alcohol differently, evidence has been found that offspring are more sensitive towards the effects of alcohol which leads to the bimodal pattern of abstainers or heavy drinkers (Weitzman & Wechsler, 2000; Wood, Vinson, & Sher, 2001). In terms of personality, sensational impulsivity and adventure-seeking personality have

both been associated with binge drinking (Sher et al., 1999). Evidence also suggests that students' beliefs about alcohol are related to their drinking behaviors. If students commonly believe alcohol could ease stress, help to socialize, lessen boredom, boost self-esteem, relieve depression or social anxiety, enliven a party, and make them attractive, it could promote drinking behavior (US Department of Health and Human Services, 2002). Another factor that has received wide attention with respect to drinking behaviors is religiosity. Several studies have reported that students who have strong religious beliefs and are committed to traditional values drink less compared to their peers who are less religious (Neighbors, Brown, Dibello, Rodriguez, & Foster, 2013; Hurcombe, Bayley, & Goodman, 2010).

Environmental Factors

Students are active members of the college community, and their experiences and personalities interacting with environmental variables can have an impact on use or misuse of alcohol (Presley, Meilman, & Leichliter, 2002). The social process and environment on campuses such as the presence of a Greek system (Cashin, Presley, & Meilman, 1998), and the importance of athletics on campus (Nelson and Wechsler, 2001; Baer, 1993) have been associated with a high percentage of binge drinking on campus. Similarly, a cohort study by Presley et al. (1996), indicated that various institutional policies such as having a dry campus and alcohol-free residence halls help to lower the prevalence of binge drinking (Presley, Meilman, Philip, Lyerla, 1996). The amount of alcohol consumption has also been associated with school size as well as two-year vs four-year institutions. On average, students from smaller colleges have been found to consume a higher amount of alcohol compared to students from larger

schools (Presley et al., 1996). Similarly, students from 2-year institutions have reported a lower level of average weekly consumption of alcohol compared to 4-year institutions (Presley et al., 1996). Alcohol consumption pattern has also been found to vary by region. Students at schools from the Northeast region have reported a higher rate of binge drinking than students from other regions (Presley et al., 1996).

Behavioral Theory

For more than 50 years, behavioral theories have been used in health promotion to explain and predict health behavior and facilitate the behavior change. The U.S. National Cancer Institute's monograph *Theory at a Glance* (National Cancer Institute, 1997) distinguishes two major functions of theory in the area of health promotion. First, explaining the nature of the problem, helping to identify the range of factors where the health promoter could intervene to promote healthy behavior. The second function of theory is to inform the development and implementation of the intervention programs. Hence, the overall theory could provide a full and rational appraisal of the problem, suggest possible and effective suggestion and facilitate the intervention implementations to be more effective.

There are numerous theories that have been used since and it would be invidious to attempt to provide the comprehensive list of all theories in this study. Different theories have different scope and goals. Some theories explore behavior at individual level such as the Health Belief Model while others explore behavior at the organizational or community level such as the Socio-ecological Model. Some theories focused more on behavior change such as the Transtheoretical Model while other theories attempt to explain why any behavior occurs such as a Socio-cognitive Theory.

With numerous theories, the problem in health promotion is often not due to having an insufficient theory, but rather not knowing how to select a relevant theory and apply it in practice. With this difficulty, there is a trend of fewer researchers providing rationales for selection of theory or documenting the theory operationalization process when developing theory-based programs. Also, there is a lack of guidelines on selecting of theories and single theories might not always be a good fit to explain the complexity of health behaviors researchers are dealing with. In this context, Integrative Behavior Model was introduced to incorporate the essence of major theories for explaining and predicting behavior change as well as including individual and environmental factors that affect the behaviors.

Integrated Behavioral Model

Even through the foundation of the Integrated Behavioral Model is based on the assimilation of multiple theories during 1991 NIH workshop, it can also be considered as a successor of the Theory of Reasoned Action (TRA) and Theory of Planned Behavior (TPB). The TRA was developed by Martin Fishbein and Icek Ajzen in 1975 (Ajzen, & Fishbein, 1975). The TRA states that behavioral intention is the most immediate antecedent of behavior which is influenced by the attitude towards the behaviors and subjective norms (the peer pressure). The TRA was mainly used to predict volitional behaviors that are intentional and explicitly under the control of the individual (Montano & Kasprzyk, 2008). Later, the TPB was introduced as an extension of the TRA by adding an additional construct, perceived behavioral control (Ajzen, 1985). Perceived behavioral control was added in the TRA to acknowledge the controllability (external forces which may impede or facilitate behavior change) as well

as self-efficacy (the individual's conviction that one can successfully execute the behavior required for the expected outcome). Self-efficacy theory was proposed by the Bandura in 1977 which was found to be effective in the health promotion area such as increasing physical activity, improving mental health etc (Bandura, 1977; Annesi, 2005; Gyurcsik, & Brawley, 2000; Rodgers, & Brawley, 1996).

Similar to the TRA and TPB, the IBM posits the intention to perform the behavior as the strongest predictor of the behavior, including environmental factors (both social and physical environmental) and knowledge and skills related to engaging in a specific behavior. A further intention was predicted by the three main constructs (attitude, perceived norms, and perceived behavioral control) with two sub-constructs per constructs. Attitude includes instrumental and experiential attitude, perceived norms included injunctive and descriptive norms, and perceived behavioral control included perceived control and self-efficacy (Fishbein & Ajzen, 2010).

The IBM provides is a holistic theory but relatively new theory. It has not been commonly utilized in health behavior research especially for the binge drinking behaviors (Head & Noar, 2014). In an effort to understand the application of IBM to understand binge drinking behavior following section provides an up-to-date and comprehensive review of the application of the IBM in drinking behavior. As aforementioned, since there were not many studies that have employed the IBM for binge drinking behaviors, this literature review of the IBM was conducted in conjunction with the TPB as well. The detail process of the systematic review is provided in Appendix A. Following section provides the summary of the relevant articles for this study.

Norman (2011) applied the TPB constructs to predict binge drinking intentions and behavior and also added habit as a determinant variable to explore if habit can explain the additional variance in binge drinking behaviors. The study also explores if habit can moderate the relationship between intention towards binge drinking and binge drinking behavior. The sample for the study included undergraduate students (n=137; male=25, female=112) from England. The paper-based questionnaire was administered in an introductory Psychology lecture to measure the TPB constructs (attitude, subjective norms, perceived control, self-efficacy, and intention). The habit (related with binge drinking behavior) was measured using a Self-Report Habit Index. This was a prospective study with a one-month follow-up. The hierarchical regression analysis was utilized to predict intention to engage in binge drinking over the next month. The behavior was assessed in terms of frequency of binge drinking after a month. In the follow-up, the results suggested 68.8% of the participants reported binge drinking at least 4 times over the past month. The first regression model in the study reported the TPB constructs explaining 75% of the variance in the intention towards binge drinking, however only attitude and self-efficacy were significant contributors. When habit was added in the model, it explained an additional 3% of the variance in the intention. Similarly, in another hierarchical regression model intention, habit, self-efficacy, perceived control, and intention x habit was included. This model explained 42% of the variance for the binge drinking behavior however only intention habit was significant. The study suggests that attitude and subjective norms are the significant predictor of the intention and habit were a significant predictor of the behavior.

Todd & Mullan (2011) conducted the study among 122 female undergraduate students to investigate if the theory TPB can predict the binge drinking behavior. The study also explored if the mere measurement effect (MME), and altering binge drinker prototypes willingness could help to reduce binge drinking behavior among the participants. The participants were randomly allocated to a mere measurement, prototype manipulation, and control group. The study utilized prospective cohort design. Two sets of online questionnaires were administered, separated by 2-3 weeks. Simultaneous multiple regression and hierarchical regression analyses were utilized for the statistical analysis. The results indicated that attitude, subjective norms, and PBC accounted for 55.3% of the variance in the intention and the strongest predictor of the intention in this study was the norms. Similarly, hierarchical regression analysis reported intention and PBC accounted for 40.4% of the variance on whether participants will engage in binge drinking. The mere measurement effect was more significant among participants who previously consumed more alcohol compared to the participants who consumed less alcohol. Also, the study did not report any significance of adding willingness in the model to predict binge drinking behavior and since participants in this study was all female, authors believes that gender might be the reason why willingness was not significant in this model.

Alcohol use during pregnancy is associated with negative health outcomes. Duncan, Forbes-Mckay, & Henderson (2012) conducted a study among pregnant women to apply the TPB to predict alcohol use during pregnancy. The study consists of 116 pregnant women who did consume alcohol before they were pregnant. The participants were recruited from hospitals where they were attending their 20-week

scan. Binary logistic regression was conducted for the statistical analysis. The majority of the participants (87.9%) reported making changes to their drinking habits during their pregnancy (at the time study was being conducted). The results also reported 64.7% completely abstained from alcohol, 34.5% continuing to drink alcohol at some level, and 1 participant did not respond. Out of those who continued to drink, a small number exceeded the maximum number of drinks recommended by the U.K. Government, Department of Health, for pregnant women. The TPB was able to explain 77.1% of the variance in the drinking behavior between abstainers and those who continued to drink. In the model, only intention and attitude contributed significantly to the model. The regression analysis reported intention, attitude, subjective norms were significantly higher among abstainers compared with participants who continued to drink. The results from the study also suggested that TPB without the component of PBC is more appropriate when considered to predict drinking behavior among pregnant women. The results of the current study might be mainly beneficial in interpreting the drinking behavior among pregnant women at one-time point (20 weeks) rather than predicting their future behavior.

Hagger et al., (2012) conducted a study in four different countries (England, Estonia, Finland, and Sweden). The study added motivational sequence from the self-determination theory via the mediation of the TPB to influence the intention to consume the alcohol drinking behavior within the recommended level. The participants included employees (n=486; male=225, female=262) from the large companies in aforementioned four countries. This is another study which was conducted among non-students, after the previous study of pregnant women. This is the only study in the

review which used a three-wave prospective design. The second follow-up was conducted after a month and second follow-up was after 3 months from the time baseline data was collected. The participants self-reported measures for motivation, the TPB constructs, and behavioral measures. The study utilized the estimation in a path analysis model by the simultaneous process and a robust maximum likelihood to establish the relationships. The Fast Alcohol Screening Test (FAST) was used to report on drinking behavior. The average score reported on the FAST was 2.15 ((3 or above is considered as hazardous and harmful drinking behavior). From the variables of the TPB and self-determination theory, the models accounted for 31.44% and 29.27% of the variance in binge drinking occasions in the T1→ T2 model (Time 1 to time2) and T2→T3 model (time 2 to time 3) respectively. Similarly, the model also explained 41.32% and 66.94% of the variance in a number of drinks consumed in the T1→T2 model and T2→T3 model respectively. All variables of the self-determination theory (intrinsic motivation, identified regulation, introjected regulation, and external regulation) significantly accounted for the variances in the TPB constructs (attitude, subjective norms, and PBC). The study also reported the identified regulation (the construct from the self-determination theory) such as "guideline on alcohol" was the most influential variable from the self-determination theory. Also, the model from the study suggested the past behavior (habit) explained the vast majority of the variance in the behavior compared psychological variables measured.

The study from Elliott and Ainsworth (2012) compared a one component (instrumental attitude, injunctive norm, and general perceived behavioral control) and two component (instrumental attitude, affective attitude, injunctive norm, descriptive

norm, Self-efficacy, and perceived controllability) through path analysis and bootstrapping procedures to predict binge drinking frequency in past two weeks among college students. A total of 120 participants (male=37, female=83) completed a self-reported questionnaire. The study utilized a two wave, prospective study design. The TPB constructs were measured at time 1 and after 2 weeks, subsequent binge drinking frequency was measured. The results reported that one component model was able to predict 82% of the variance (total direct and indirect effects) in binge drinking. Similarly, the two component model was significantly a better fit as it accounted for the 90% of the variance in the binge drinking. In both models, the intention was the only construct which was considered as a sole direct predictor of the binge drinking behavior. The intention was also the significant mediator of the instrumental and subsequent behavior in both models. The study also suggested that the findings from the path analysis suggest that in an intervention targeted to change participants' underlying cognitive predictors (constructs of the TPB) in isolation, only affective attitude produced significant reduction. Even with affective attitude, a large change was required to result in a small-to-moderate reduction in binge drinking. However, when affective attitude changed in combination with instrumental attitude and self-efficacy, moderate changes were sufficient to result small to moderate change in binge drinking.

A study was conducted by the French and Cooke (2012) to examine the extent to which an individual's salient beliefs can predict the TPB constructs for binge drinking behavior. The study elicited the salient beliefs of the participants on a particular evening then in general, and also asked about their actual drinking behavior. The study believes that understanding underlying cause for the binge drinking for a specific incidence is

more useful than the general behavior as most of the students' binge drinking on a weekly basis. The study conducted research in applied settings and conducted the study in a bar to contribute to improve ecological validity. The study design was a two wave prospective study but the follow up was on the same evening. The college students (n=192) were recruited when they were entering the bar and administered with an open-ended question to electing their beliefs on binge drinking behavior that evening. The students were also asked for a response to the questionnaire with the TPB constructs. For the second follow-up, participants (n=181) were asked to report the number of drinks they had consumed. A sample of 20% of the participant's beliefs from the open-ended questionnaire were coded by the two researchers and the elicited beliefs (determined from the Cohen's Kappa) were used for further analysis. The results suggested 72% of the participants reported binge drinking last week. The most frequently mentioned advantage of binge drinking is fun/enjoyment and disadvantage is a hangover. Also, the most frequently mentioned factor that would make binge drinking easy was having money and the factor that would prevent them from binge drinking is not having money. The study suggested that the participants with the higher intention believed that their friends would approve their binge drinking. The participants who reported an advantage of binge drinking had a higher intention score for binge drinking that evening. Similarly, those participants who intended to binge drink consumed more alcohol compared to those participants who did not intend to binge drink that evening. The results from the study indicated that intention was a significant predictor of the drinking behavior over the course of the evening. The results also reported attitude, subjective norms as a significant predictor [(R2=0.55, (F=74.6, df=3, 180, p<0.001))] of

the intention towards binge drinking. The current study provides the empirical data to suggest how the TPB constructs are useful in predicting binge drinking behavior among college's students.

The purpose of the study conducted by Ross & Jackson (2013) was to investigate to what extent the TPB constructs can predict binge drinking among college students. The study also measured self-efficacy separately in addition to the PBC (the TPB constructs). The study also incorporated social facilitation (social circumstances in which behavior is facilitated) with the TPB constructs. The study recruited students from the psychology class (n=91) from a large Melbourne University. The study utilized two wave prospective studies. For the initial data collection, the paper-based questionnaire related with the TPB variables along with self-efficacy and social facilitation scale were administered to the participants. On the follow up after two weeks, the participants reported their binge drinking behavior over the previous 2 weeks. Multiple regression analysis was utilized for the statistical analysis. The results reported 51.4% of the participants reporting binge drinking at least once in past 2 weeks. The results also reported the TPB constructs predicting 51% of the variance in intentions. Similarly, after adding social facilitation in the TPB constructs, the model predicted 53% of the variance in intention. In both models, PBC did not emerge as the significant contributor. The study also reported 72% of the variance in binge drinking behavior predicted by intention and PBC. The researcher added attitude and the subjective norms in the previous model and reported 77% of the variance in the binge drinking behavior was predicted. However, intention and attitude were not significant contributors to the model. The study suggested that PBC is not a significant factor in

predicting intention. Similarly, social facilitation emerges as a strong factor to motivate college students to engage in binge drinking behavior. Future research should target to change the attitude and social norms of the college students as well as address social facilitation when considering intervention for binge drinking.

The study by Braun et al., (2014) was the first study in this review which was directly related with the IBM. The researchers aimed to assess the utility of the IBM to explain heavy drinking behavior among college students. The study utilized a cross-sectional study. The participants included undergraduate students (n=356) from a large Midwestern public university. The study utilized path analysis for the assessing the predictive model. In the study, 37% of the participants indicated binge drinking the last time they partied/socialized. The results indicated that attitude, injunctive norms, and self-efficacy predicted 44% of the variance in the intention for heavy drinking. In the model experiential attitude, injunctive norm, and self-efficacy were significant predictors and experiential attitude was the strongest positive predictor in the model to predict intention towards heavy drinking. Similarly, the IBM in the study predicted 26% of the variance for heavy drinking behavior. The goodness of fit of the model was within the acceptable range; however, Chi-square values (statistical significance) for the individual paths did not fall within the significant range for any path. The study suggested that student binge drinking behavior highly depends on upon their affective expectation and the approval from their referents. The study also suggested exploring other constructs (injunctive attitude, descriptive norms, and perceive control) of the IBM which were not significant contributors in the model to examine the efficacy of the IBM in explaining drinking behaviors among college students.

In the study by Lettow et al., (2015) application of the prototypes (social image) was tested along with the TPB constructs to explain the drinking behavior among young adults. The study was administered online and utilized a prospective design with a follow-up period of one month. Four hundred and ten young adults participated in the study. The participants responded to the prototype perception (drunk, heavy drinker, tipsy, moderate drinker, and abstainer prototypes) and the TPB constructs during the first data collection stage. Similarly, in follow up after a month their intentions and drinking behavior were assessed. The study utilized hierarchical regression analysis to examine if the prototype reported by the participants moderated the relationship of abstainer and drunk. The results reported that participants consumed 7.27 drinks per week in average. The drinking behavior, attitude, descriptive norms, and PBC significantly predicted 41% of the similarity prototype model and 36% of the favorability prototype model. The prototype stability moderated the relationship of abstainers and drunk prototype similarity with the intentions but not with the behavior. The study did not find any moderation effect for the stability of favorability or for the relationships with the drinking behaviors. Similarly, only stable drunk and abstainer prototype (extreme) predicted intentions. The study suggested that young adults' health intentions seem to be guided by the association with the abstainer prototype and disassociation from the drunk prototype.

The study conducted by Chen & Feeley (2015) incorporated stress and loneliness in the TPB in predicting binge drinking behavior among college students. The additional variable (stress and loneliness) were added as researcher believed that there is a substantial amount of variance in the behavior that was not explained by the

current constructs of the TPB. The study utilized prospective study with a follow-up of two-week time line. The researchers administered the online survey and collected responses from the undergraduate students (n=179) at a public university in the U.S. At the baseline, the researchers measured all predictors (attitude, subjective norms, perceived control, stress, and loneliness) and demographic variables. Similarly, in the follow up after two weeks, the drinking behavior of the participants throughout the past two weeks was measured. A negative binomial regression analysis was utilized for the statistical analysis. The participants reported that an average number of binge drinking days in past two weeks was 0.81. The negative binomial regression model in the study reported attitude as the strongest predictor of the number of binge drinking days. Similarly, perceived behavioral control and stress also emerged as a significant contributor for the number of binge drinking occasions. The result reported loneliness and subjective were not significant predictors of the behavior. The study suggested future alcohol intervention should target students with high level of stress and during when students experience a high level of stress.

Another study that used the IBM constructs in relation to the alcohol use among college students was conducted by Sheppard et al., (2016). The measured variable from the IBM constructs in the study was personal attitude, perceived injunctive norms, perceived descriptive norms of alcohol use, and perceived descriptive norms of alcohol-related problems. The study also incorporated personal's values based on the theory of basic human values in the study. Additional variables that were also examined in this study were religious influences and involvement in the Greek life activities. The study included large sample (n=910) from a large public university in the Southeastern U.S.

This study utilized a cross-sectional study. The paper based survey (mainly publicly available scales) was administered to collect the response from the participants. A stepwise multiple regression with backward elimination was used to determine which independent variables (personal attitude, perceived injunctive norms, perceived descriptive norms of alcohol use, perceived descriptive norms of alcohol-related problems, personal values, religious influences, Greek life involvement, and demographic variable) were significant predictors for number of drinks consumed. The regression model reported 45.6% of the variance of average drinks consumed per week. The model contained only significant predictors which include personal attitudes, descriptive norms (alcohol-related problems), gender, and Greek membership status). The study suggests future studies should incorporate additional constructs from the IBM in addition to constructs examined in this study. The study also suggested including Greek membership status and gender in future studies in the domain of alcohol use among college students.

From the previous studies, it can be concluded that TPB or IBM are effective to understand binge drinking behavior. Most of the studies that were included in the literature review suggested a relationship of intention with attitude and subjective norms were mostly strong and positive, but relationship with PBC was negative and non-significant.

Some methodological limitations were identified. The first shortcoming was not applying use of TACT (Target, Action, Context, and Time) principle when designing instrument. This is important as one of the principle aims of most of the studies was to improve quality of the instrument items that measure the constructs. By making

participants to respond about the target behavior (binge drinking), desired action (stopping), the context where the action would take place (campus), and time frame for the action (eg: 30 days) ensure participants are responding to specific behavior. The current study integrated TACT principles while designing the instrument and considered them while interpreting the results.

Similarly, even though two component models for both TPB and IBM have been found to be more effective than one component models, only few studies used two component models. The current study considered this as major limitation and will evaluate the one-component model with two component model. None of the studies used the indirect measures to assess constructs of the IBM and TPB which is crucial in putting findings of the study into the context. The current study has measured IBM constructs indirectly as well so that findings from the current study can be put into context.

Chapter 3: Methods

The purpose of this study was to evaluate the efficacy of the IBM for the prediction of binge drinking behaviors among college students. Specifically, this study assessed three binge-drinking behaviors by utilizing constructs of the IBM. The first examined the behavior of current binge drinkers while the second examined the behavior of those who do not binge drink and third examined the behavior of abstainers. The IBM was operationalized to study all three behaviors and explore predictive variables that could lead to discontinuing the binge drinking behavior for the next 30 days for the binge drinkers or continue not to binge drink for the next 30 days for the social drinkers and abstainers.

This chapter highlights the methods considered for the study in four parts. The first part includes the description of the study population, sampling process, and sample size justification. This section also discusses inclusion and exclusion criteria for the participants. The second part includes an explanation of the research design. This includes study design, data collection procedures, and research timeline. The third part includes the instrument development process and proposed measurements. Finally, the fourth part explains the data analysis plan and procedure.

The ethical issues related to this study are also discussed in this chapter. Appendix A includes all the supplemental documents relevant to the study (i.e. IRB approved documents).

Study Participants

The study sample included undergraduate students from the University of Oklahoma (OU) Norman Campus. According to the Office of Institutional Research and Reporting, for Spring 2016 (2016), there was a total of 19,810 undergraduate students at the OU Norman campus. The undergraduate students enrolled in Spring 2016 included 50.9% male and 49.1% female students. Likewise, 87.7% of these students were under the age of 25, with an average age of 21.9 years. Classification in school is reported as 12.2% freshman, 15.4% sophomores, 17.4% juniors, and 30.2% seniors. Among all students at OU Norman Campus, 59.6% described themselves as white, followed by 8.3% Hispanic, 5.2% Asian, 5.2% black, 3.8% American Indian/Alaska Native, 0.1% Hawaiian, 6.8% as two or more races, and 7.5% international.

The participants were recruited via sending mass email through the OU listserv at time 1. The email included a link to the survey and consent form. Students were

informed that the participation was voluntary and personal data were not collected. However, an email address was collected from the participants at time 1 to follow up at time 2. These email addresses were used to send the link for the second survey after 30 days of the participating in the first survey. Also, the unique identifier was created to match data from time 1 to time 2 for the statistical analysis.

The sample size was based upon a priori sample size calculation using G*power software (Faul, Erdfelder, Lang, & Buchner, 2007). The G*power software suggested a sample size of 98 adequate for each group when the following parameters were entered: the power of 80%; an alpha of .05; a medium effect size (f^2=0.15); and six predictors. However, due to possible attrition, the data at time 1 was collected till at least 120 participants in each group (binge drinker, social drinker, and abstainer) participated. However, due to high attrition among social drinker, there were only 72 participants whose responses were considered for further analysis.

The inclusion criteria for the samples were: all participants must be enrolled in the undergraduate program at the OU Norman Campus; age between 18 to 30 years old. Demographic variables such as race, gender, and ethnicity were also collected; however, participation was not restricted by these variables. The exclusion criteria were students not enrolled as an undergraduate student at the OU Norman Campus. The study was initiated only after approval from the Institutional Review Board at the OU.

Research Design

This study utilized a prospective study design. This prospective study included two assessment time points. At baseline (time 1), the survey with the IBM constructs

and demographic variables were evaluated and at time 2 their binge drinking behavior for the past 30 days was assessed.

Binge drinking is directly related to blood alcohol concentration (i.e. any amount of alcohol that raises blood alcohol level to .08); however, the definition of binge drinking also provides some indication of a number of standard drinks and time reference within which alcohol is consumed (Courtney & Polich, 2009; NIAAA, 2004). As mentioned in chapter 1, NIAAA defines binge drinking as consuming four or more drinks for females and five or more standard drinks for males within a two-hour period (normally which raises the blood alcohol level to .08) (NIAAA, 2004). This definition mainly refers to a single binge; however, binge drinking in this study accompanied the pattern of the repeated behavior. The prospective study design was utilized so that the study could report the pattern of the behavior for past 30 days rather than a single event.

The decision to use 30 days' time frame for the time 2 data collection was based on two reasons. To examine if the cognitive and affective factors determine future behavior, behavior needs to be assessed during a certain period after behavioral predictors are assessed (Yzer, 2013). Also, major longitudinal studies in the US studying binge drinking behavior among college students considers a "binge drinker" as someone who has indulges in a binge episode at least once in the past 30 days (Center for Behavioral Health Statistics and Quality, 2015; ACHA/NCHA-II, 2016; CORE, 2014). Studying binge drinking behavior in reference to 30 days' time frame in this study helped to compare current study with the past studies.

The data collection process was initiated after the approval of the University of Oklahoma Institutional Review Board. Please refer to Appendix A for all approved documents from the University of Oklahoma Institutional Review Board.

The first set of dependent variables for the primary purpose of this study is binge drinking behavior which includes a) discontinuing binge drinking for the next 30 days for binge drinkers, and b) continue not to binge drink for the next 30 days for social drinkers and abstainers. The primary independent variable for this study included subscale scores on constructs of the IBM. This includes direct measures of the IBM constructs. The constructs included: intentions, knowledge and skills, environment, attitudes (instrumental and experiential attitudes and indirect measures: behavioral beliefs and outcome evaluation), perceived norms (injunctive norms and descriptive norms and indirect measures: motivation to comply with injunctive normative beliefs and identification with referents with descriptive normative beliefs), and perceived behavioral control (self-efficacy) and perceived control (autonomy) and indirect measures: control beliefs and perceived power) (Fishbein & Ajzen, 2010). Other independent variables included demographic variables such as gender, year of college, membership of Greek house etc. All items were measured using a 7-point differential scale from strongly agree to strongly disagree to measure each item unless otherwise specified.

Instrument: Alcohol Behavior Scale for College Students

A new survey was developed and utilized to understand the drinking behaviors among the college population. The survey consisted of two questionnaires. One that measured the IBM constructs and behaviors relevant to stopping binge drinking for the

next 30 days for participants who are currently drinking. The second questionnaire measured the IBM constructs and behaviors related to continuing to not binge drink for the next 30 days for social drinkers and abstainers. Depending upon their answer for the binge drinking behavior question at the beginning of the survey participants were led to appropriate sets and skipped the irrelevant one.

The sixteen-step instrument development process as recommended by Sharma and Petosa was followed for the development of the instrument which is explained in the following paragraph (Sharma & Petosa, 2014).

The first step was to define the purpose of the instrument. The purpose of the instrument is to predict binge drinking behavior among the college population utilizing the IBM. All constructs of the IBM (attitude, perceived norms, perceived behavioral control, intentions, environment, and knowledge and skills) were incorporated to understand binge drinking behaviors among the college population (Glanz, Rimer, & Viswanath, 2015) (Table 1). After the purpose, a literature review was conducted to determine if any preexisting instruments were available to serve the purpose. The review was conducted using the Health and Psychosocial Instrument database using the website of the University of Oklahoma Library. The review did not identify any preexisting instrument that fulfills the purpose of the study, however the literature review helped to guide some of the items in the current instrument. The third step of developing the instrument included determining objects of interest. As previously mentioned, the objects of interest in this instrument were constructs of the IBM. The following step was to constructively define each construct according to the purpose of the study.

Table 1. Definitions of the IBM Constructs

Constructs	Definition
Behavior	Individual planned action
Intention	Individual's determination to act towards behavior
Knowledge and Skills	Possession of the necessary information and abilities to engage in the behavior
Environmental Constraints	Individual's surroundings including physical and social condition that could impede individual from engaging in the behavior
Attitudes towards Behavior	The degree to which engaging in the behavior is negatively or positively evaluated.
Perceived Norms	The pressure individuals sense from social referents individual
Perceived Behavioral Control	Individual's capability to act the behavior

After providing general definitions, each construct was operationally defined. The following paragraph provides the operational definition of each construct for this study.

Behavior is defined separately for those people who binge drink and those people who do not binge drink. For the most efficient alcohol-related intervention, it is important to understand what would motivate college students who binge drink to quit binge drinking. Also, it is equally important to understand how to motivate the remainder of college students who do not engage in binge drinking (social drinker and abstainers) to retain their healthy behavior. That is the reason all three behaviors were being explored in this study. For the purpose of this study, the definition of binge drinking given by NIAAA was followed. The NIAAA defines binge drinking as "a pattern of drinking that brings blood alcohol concentration (BAC) levels to 0.08 g/dl". In this study, it measured by asking two items "*1. In the past thirty days, on how many days did you use alcohol?*" and "*2. During the past 30 days, how many times have you had: (for men) 5 or more drinks in about 2 hours? Or (for women) 4 or more drinks in*

about 2 hours?" The options available for participants allowed to categorized participants into binge drinker, social drinker, and abstainers. If a participant was considered to be a binge drinker they were led to the section for binge drinkers and if they were considered to be a social drinker or abstainer they were navigated to the non-binge drinkers section.

The operational definition for behavioral intention is defined as a participant's intention towards quitting binge drinking for the next 30 days for binge drinkers or continues not to binge drink for the next 30 days for participants who are currently not involved in binge drinking (social drinker and abstainers). In this study, the behavioral intention measured using three items such as "*I intend to*", "*I will*", and "*I will try to*" related to participant's respective binge drinking behavior. On the survey, the intention measured by items 51-53. The summative score for this constructs were converted to -3 to +3 scale where -3 were considered as low intentions and +3 were considered as high intentions.

The environment was operationally defined as the surrounding where alcohol consumption takes places such as bars, Greek house, and social gatherings. Similarly, knowledge and skills were operationally defined as participants' understanding of binge drinking and its consequences. In this study, the environment was measured using five items (59-63) such as "*How often do you go to house parties where alcohol is free or inexpensive?*".

Attitudes were operationally defined as participants' overall feeling of like or dislike towards quitting binge drinking behavior for the next 30 days for the binge drinkers or continuing not to binge drink for the next 30 days for participants who are

currently not involved in binge drinking (social drinker and abstainers). The direct measures of attitudes were measured by adding instrumental attitudes, and the overall cognitive evaluation of the behavior. Instrumental Attitudes was measured by three items (13-15) and experiential attitudes by using three items (16-18). The indirect measure of attitude was measured through behavioral beliefs and outcome evaluations. The indirect measure of attitude was measured by the multiplicative score of each behavioral belief (items 1-6) and corresponding outcome evaluation (items 7-12). The summative score for this constructs was converted to -3 to +3. The lower score resulted in weaker attitude and the higher score from the participants suggested stronger attitude.

Perceived norms included what important people in a participants' life think about their behavior to quit binge drinking for the next 30 days for the binge drinkers or continue not to binge drink for the next 30 days for participants who are currently not involved in binge drinking (social drinkers and abstainers). Perceived norms included two types of perceived norms: Injunctive norms and Descriptive Norms. Injunctive Norms refers to a participants' perception that most people who are important to them should or should not perform a specific behavior and Descriptive Norms refers to the perceptions that others are or are not performing the behavior in the questions (Fishbein & Ajzen, 2010). Injunctive norms were directly measured using items 31-33 and descriptive norms were directly measured using 34-36. Using direct measures, perceived norms was measured by adding direct measurement of injunctive norms and descriptive norms. Using indirect measures [through Injunctive Normative Beliefs (items 19-21), Descriptive Normative Beliefs (25-27), Motivation to Comply (22-24), and Identification with Referents (28-30)], this construct was measured by the

multiplicative score of each belief type and corresponding evaluation (items 19-30). The summative score for this constructs was converted to -3 to +3. In both direct and indirect ranges lower score indicated lower perceived norms and a higher score indicated higher perceived norms.

Perceived behavioral control is operationally defined as their perceived control, self-efficacy, and autonomy towards their respective behavioral plan related to binge drinking. There are two sub-constructs of perceived behavioral control: perceived capacity and perceived autonomy. Perceived capacity which also often referred as self-efficacy is the participant's perception of their ability to perform the specific behavior. Similarly, perceived autonomy refers to the degree of control to perform the behavior. In the current study perceived capacity was measured using items 45-47 and perceived autonomy were measured using items 48-50. Using direct measures, perceived behavioral control was measured by adding direct perceived capacity and perceived autonomy. Using indirect measure, PBC was measured by the multiplicative score of each belief [(perceived power (37-40) control beliefs (41-44)]. The summative score for this construct was converted to -3 to +3. In both direct and indirect measures, lower scores indicated lower PBC and a higher score indicated higher PBC.

The final component of the IBM was background which is operationally defined by demographic factors that could impact drinking behavior such as age, gender, ethnicity, year of college, religion, membership of Greek fraternity and sorority, and membership in the National College Athletic Association.

The instrument is divided into four sections. The first section determined participants as a binge drinker, social drinker or abstainers. The instructions guided

them to section two which included separate items for a binge drinker and a non-binge drinker (social drinker and abstainers). Section two measured various constructs of the IBM in the context of their binge drinking behavior. After completing section two, participants were directed to the section three and section four of the instrument. Section three and section four were similar for both binge drinkers and non-binge drinkers. Section three included items related to the environment and knowledge of the participants related to binge drinking. Similarly, section four included items related to demographic information. It was expected to take approximately 12-15 minutes for participants to complete the instrument.

Once the instrument was drafted it was sent to a panel of experts. A panel of experts included two experts for the IBM (Dr. Adam Barry, Texas A&M University; Dr. Amar Kanekar, University of Arkansas at Little Rock), two experts in the area of instrument development (Dr. Sarah Maness, OU; Dr. Mike Crowson, OU), two experts in the area of binge drinking (Kye Lebouff, OU, Dr. Joshua Wiener, the Oklahoma State University), and finally two from the target population (Holly Hoehner and Elizabeth Fish, undergraduate students at OU). The panel members were provided with a word document of the questionnaire. The panel of members was given 30 days to provide their feedback. Once all feedback was received, necessary components were incorporated in the revised instrument and resend to the panel members. One week was provided for the second-round of feedback before utilizing the revised instrument for the pilot study. No panel members provided additional feedback at the second round. Please refer to Appendix B for the panel members contact information and a draft letter sent to request for their expert opinion.

The Flesch-Kincaid grade level of the instrument was tested in MS-word to check the readability. The Flesch-Kincaid grade level test in MS-Word suggested a score of 4.7. Normally, 8.0 or lower classifies the instrument at an 8th-grade reading level. Future plans include testing the instrument to ensure the instrument was reliable and valid.

Statistical Analysis

Before running any statistical analysis, data were cleaned and refined. The outliers were excluded from the further analysis. For the purposes of analyses, any values beyond three standard deviations from the mean were excluded. Various statistical assumptions such as normality were tested by using skewness and kurtosis, and K-S test. Only variables that have skewness and kurtosis values between +3 and -3 were considered as normally distributed data. Similarly, the scatter plots were analyzed to explore the errors of prediction. Likewise, variance inflation factor (VIF) was examined using the multicollinearity diagnostics assessment. Multicollinearity was reported to be present if the VIF score is greater than 10 (Hair Jr, Anderson, Tatham, & William, 1995).

Upon the data collection and cleaning datasets, factor analysis was conducted for establishing construct validity. The internal consistency reliability of the instrument was established using Cronbach's alpha and construct validity was established using exploratory factor analysis in the pilot study prior to the study. Descriptive statistics were computed for reporting demographic characteristics of the sample and IBM constructs for each drinking behaviors. Descriptive statistics were also used to examine the variability of participants for binge drinking behavior and the IBM constructs

including attitude, norms, and perceived behavioral control related to binge drinking behavior. ANOVA tests were computed to determine whether students who categorized themselves as binge drinkers, social drinker, and abstainers were significantly different from each other for the IBM constructs.

Correlations were conducted to explore the association between direct and indirect measures of IBM constructs: attitudes towards the behavior, perceived norms, and perceived behavioral control. Regression analyses were utilized to assess how the constructs within the IBM predicted binge drinking behavior among college students. First, linear regression models were designed to determine which constructs (attitude, perceived norms, and perceived behavioral control) best predict intention to quit binge drinking for the next 30 days for binge drinkers or continue not to binge drink for the next 30 days for participants who are currently not involved in binge drinking(social drinkers and abstainers). Second, a logistic regression model determined the extent to which the environment, knowledge and skills, and intentions best predict the behavior to quit binge drinking for the next 30 days for the binge drinkers or continue not to binge drink for the next 30 days for participants who currently are not involved in binge drinking(social drinkers and abstainers). The levels of significance were set at 0.05 for all statistical analyses. SPSS 23.00 was used for the data analysis.

Potential Measurement Error

The current study utilized a self-reported questionnaire. There is always the possibility of participants not being honest, getting distracted while filling out the survey, or over/under estimating response due to social desirability bias. Since the term "binge drinking" is used throughout the instrument, depending upon how the

participants associate with the term “binge drinking”, they might over/under estimate their response which could lead to measurement error. Also, even though the definition of binge drinking is provided at the beginning of the instrument, the term might be new for the participants and they might not remember to provide an accurate response later while taking the survey. Since participants had an opportunity to earn $50 gift card from the raffle hence another error could be participants participating in the survey just to win a $50 card from the raffle. Also, another possible error could be participants not understanding the instrument or a specific item and not having anyone to ask. Another limitation could be that college students are known to have a high prevalence and high intensity of binge drinking and basing conclusions for the general population based on this study might not be an accurate interpretation. The whole instrument is based on the memory of participants on if they have participated in binge drinking in the past 30 days. Participants might not be able to remember if they binge drank or not in the past 30 days so the responses might have some measurement error.

Chapter 4: Results

The primary purpose of this study was to evaluate the efficacy of the IBM for the prediction of drinking behaviors among college students. Specifically, for three kinds of drinking behaviors i.e. binge drinking, social drinking, and abstainers. The IBM was operationalized to study these behaviors and explore predictive variables that could lead to discontinuing binge drinking behavior for the next 30 days for the binge drinkers or continue not to binge drink for the next 30 days for the social drinkers and abstainers.

This chapter will provide results based on the statistical measures and procedures. The chapter will be mainly concentrating on a pilot study, data screening, demographic information, instrument validation, the testing assumption for inferential analysis for research question and hypothesis.

Pilot Study

Since there was not an instrument that was based on the IBM to predict binge drinking, social drinking and abstaining behaviors for alcohol, a new instrument "Alcohol Behavior Scale for the College Students" was developed. The stability of the instrument was tested by conducting a pilot study among 46 students. The test-retest reliability was assessed using a Pearson's correlations coefficient and paired *t*-test. Similarly, the internal consistency reliability was verified with Cronbach alpha (α) coefficient.

Reliability and Validity Measures from Pilot Test

The pilot survey was conducted among 46 participants to evaluate the feasibility of recruitment, retention, assessment procedures, and implementation of the study. The

instrument developed for the pilot test only assessed binge drinkers and non-binge drinkers. Thus, analysis from the test-retest analysis was only applicable for two groups. The later instrument was redesigned to categorized non-binge drinkers as social drinkers and non-binge drinkers.

The test-retest reliability was assessed using a Pearson's correlations coefficient (r). A Pearson's correlational coefficient analysis of 0.70 was set to considered acceptable stability. The variable with respective a Pearson's correlations coefficient (r) is listed in Table 2 and 3. Most of the Pearson's correlation coefficients computed between T1 and T2 for both binge drinking and non-binge drinking did not reach 0.70. This suggests that responses to the questionnaire were not consistent for the same participants when the survey was administered at two different times with a two-week gap. The past literatures that also used the interval of two-week when assessing alcohol related behavior using TPB (Todd & Mullan, 2011; Elliott & Ainsworth, 2012; Ross & Jackson, 2013). The variables that met 0.70 or above condition for the Pearson's correlations coefficient (r) for binge drinkers were attitudes, perceived norms, and autonomy. Similarly, for non-binge drinkers, intentions, attitudes, experiential attitudes, and injunctive norms met 0.70 or above condition for the Pearson's correlations coefficient (r).

For the internal consistency, the lower limit of acceptability for α was set at 0.7 to ensure moderate correlation (Streiner, Norman, & Cairney, 2014). All variables reported Cronbach's Alpha above 0.7 (Table 2 and 3). This suggests most of the items were related to each other and were measuring the same construct. The variables that suggested weak correlation ($\alpha<.70$) between items included Descriptive Norms and

Capacity for the binge drinkers and Perceived Behavior Control and Capacity for non-binge drinkers. These suggested items in these variables were not measuring same constructs and need further exploration with factor analysis.

Table 2. Binge Drinkers - Direct Measures Test-retest Reliability and Internal Consistency Reliability for IBM constructs (n=28)

Variables	Time 1 x Time 2 Pearson (r)	Cronbach's Alpha (α)
Intentions	.620	.963
Attitudes	.738	.884
Instrumental Attitudes	.657	.791
Experiential Attitudes	.589	.924
Perceived Norms	.656	.792
Descriptive Norms	.369	.610
Injunctive Norms	.412	.979
Perceived Behavioral Control	.169	.757
Capacity	-.093	.407
Autonomy	.834	N/A

Table 3. Non-binge Drinkers - Direct Measures Test-retest Reliability and Internal Consistency Reliability for IBM Constructs (n=18)

Variables	Time 1 x Time 2 Pearson r	Cronbach's Alpha (α)
Intentions	.828	.757
Attitudes	.810	.927
Instrumental Attitudes	.651	.794
Experiential Attitudes	.910	.928
Perceived Norms	.677	.931
Descriptive Norms	.124	.998
Injunctive Norms	.681	.783
Perceived Behavioral Control	.489	-.372
Capacity	.431	-.643
Autonomy	.681	N/A

Determining Final Sample

A total of 870 students participated in the survey at time 1 (T1) and 433 students participated in the survey at time 2 (T2). Before proceeding with data analysis, all data were screened for missing values and outliers. Any surveys with less than 80% items completed were discarded. After discarding incomplete survey, the database included 625 responses from T1 and 406 responses from T2. Since the purpose of the study was to predict T2 behavior based on the response for IBM constructs in T1, only data that matched for both T1 and T2 based on the common identifier were used. After matching the data created in both T1 and T2 survey, the final database included 388 responses which were included for further data analysis. For data analysis, first, the participants were classified as Binge drinkers (n=161) and Non-binge drinkers (n=227). Non-binge drinkers were further classified as Social Drinker (n=72) and Abstainers (n=125). Data screening process is depicted in Figure 2.

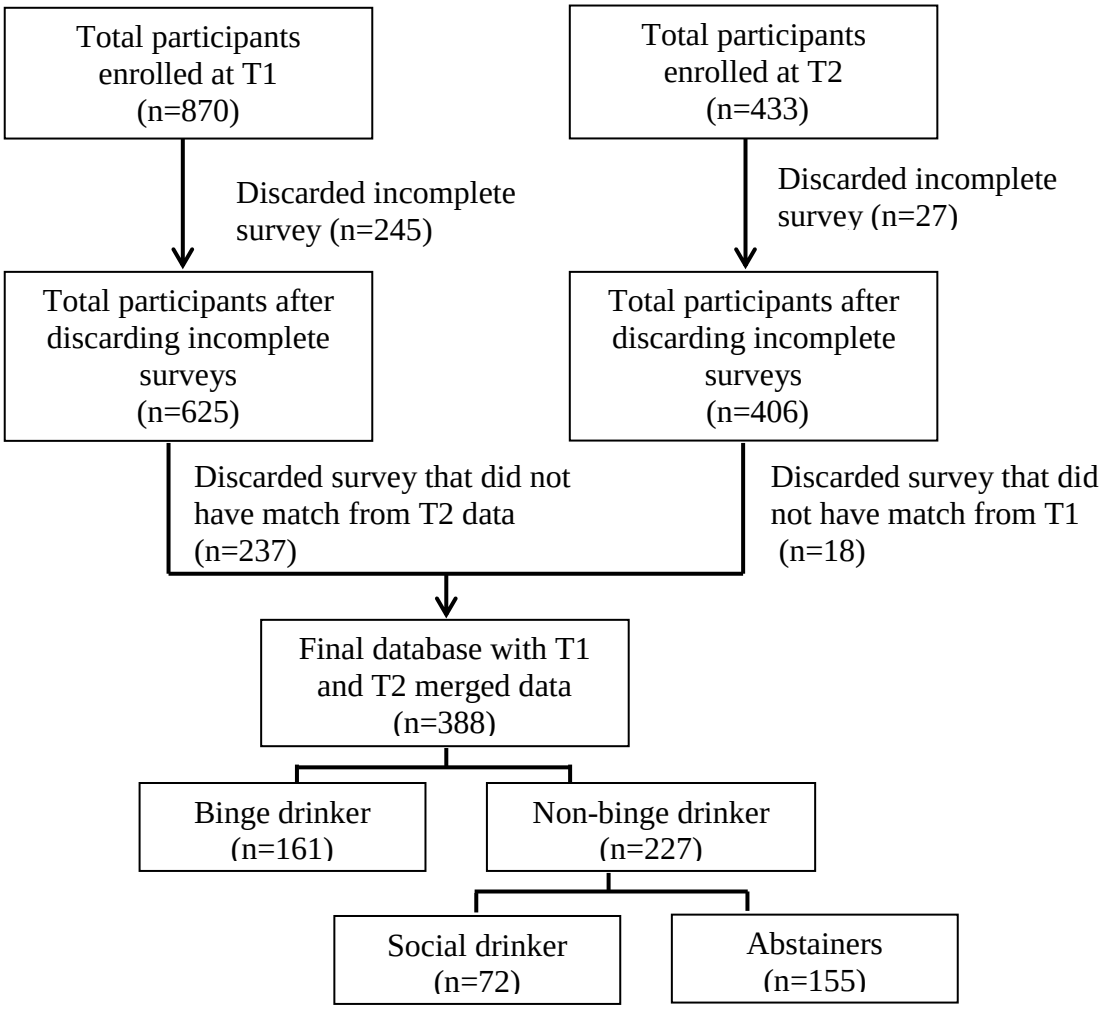


Figure 2. Determining Final Sample for the Study

Demographics Summary

The sample included 161 binge drinkers (41.5%), 72 social drinkers (18.6%), and 155 abstainers (39.9%) respectively in T1. The sample of participants based on drinking behavior was slightly different in T2 compared to T1. In T2, 147 participants reported as binge drinkers (37.9%), 82 as social drinkers (21.1%), and 159 as abstainers (41%) respectively. This shows that there was 4% reduction on binge drinkers, while 2.5% and 1.1% of increment in both social drinker and abstainer respectively in T2 compared to T1. The summary of participants is presented in Table 4. The table further

demonstrates how each category for the drinking behavior in T2 was classified compare to T1.

Table 4. Summary of Frequency Distribution Based on Drinking Behavior at Time 1 and Time 2 (n=388)

	Binge drinker n(%)	Social drinker n(%)	Abstainer n(%)
Time 1	161(41.5)	72(18.6)	155(39.9)
Time 2	147(37.9)	82(21.1)	159(41)

A comparison of demographic characteristics and study variables between binge drinkers and non-drinkers is presented in Table 5. Non-binge drinkers are further classified into social drinkers and abstainers and information are presented accordingly.

Gender, Age, race/ethnicity, and year in school: One hundred and twenty-five participants (32.3%) were male and two hundred and fifty-five (65.9%) of participants were female. A similar pattern was observed in all three groups as they represent the majority in all three groups based on drinking behavior. Female represented 64% of binge drinkers, 64% of social drinkers, and 69% of abstainers. Binge drinking seems to be slightly higher among females (42%) than males (36%). The average age of the sample was 21.29±2.01. Based on the age category, 41% of participants were between 18 to 20 years old, 53% were between age 21 to 24 years old and only 6% were more than 24 years old. Binge drinking was highest among the age group 22-24 (61%) followed by age group 18-20 (33%) and 25 years old and above (6%). Three hundred and eleven (80.4%) participants reported white as their race followed by Asian (24 participants, 6.2%), biracial or multiracial (18 participants, 4.7%), Black or African American (14 participants, 3.6%), American Indian or Alaska Native (9 participants, 2.3%), other (9 participants, 2.3%), and American Indian, Alaska Native, or Native

Hawaiian (2 participants, 0.5%). Binge drinking was highest among African American (64%) and lowest among white (37%). One hundred and ten participants (28.4%) were senior, 92 participants (23.8%) were junior, 96 participants (24.8%) were a sophomore, and 89 participants (23%) were a freshman. Prevalence of binge drinking appeared to increase with an increase in a year in school. Binge drinking was highest among senior (36%), followed by junior (25%), sophomore (21%), and freshman (19%).

Religion: Seventy-six participants (19.6%) self-reported being raised as Catholic. Similarly, 126 participants (32.6%) were raised as a Protestant denomination that allows drinking of alcoholic beverages, 71 participants (18.3%) as a Protestant denomination that does not allow drinking of alcoholic beverages, 3 participants (0.8%) as Jewish, 35 participants (95%) as other, and 76 participants (19.6%) as not following any religion. Religion appears to have an effect on binge drinking behavior. Binge drinking was highest (55.3%) among participants who did not follow any religion compared to lowest (25.4%) among Protestant denominations that do not allow drinking of alcoholic beverages. One hundred and forty-two participants (36.7%) reported never attending any religious services. Ninety-seven participants (25.1%) reported attending at least one time per week, 38 participants (9.8%) attending at least two times per week, 110 (28.4%) participants reported attending more than 3 times per week. Similarly, 177 participants (45.7%) reported never attending religious activities, 92 participants (23.8%) attending at least one time per week, 27 participants (7%) attending at least two times per week, 91 (23.5%) participants reported attending more than 3 times per week. When asked about how important is the religion to you, 116 participants (30%) reported not important at all, 66 participants (17.1%) reported slightly not important, 78

participants (20.2%) reported slightly important, and 127 participants (32.8%) reported very importantly. Again religious beliefs appeared to have an effect on binge drinking behavior as binge drinking was highest (51.7%) among those who reported religion is not important at all compared to lowest (24.4%) among those who reported religion is extremely important to them.

Membership for Greek Fraternity and Sorority and Society and National Collegiate Athletic Association (NCAA) Team: The majority of the participants reported as a full-time student (375 participants, 96.9%). Eighty-nine participants (23%) of the participants reported as a member of a Greek Fraternity or Sorority. And only 10 participants (2.6%) reported as a member of an official National Collegiate Athletic Association (NCAA) team. The average cumulative GPA of the participants was 3.51 (out of 4.0). The majority of participants (228 participants, 59.2%) reported cumulative GPA of 3.50 or above, followed by participants with a GPA higher than 2.50 but less than 3.49 (150 participants, 39%), and GPA less than 2.50(7 participants, 1.8%). Binge drinking was highest (57.1%) among participants with GPA less than 2.50 and lowest (36%) among participants with GPA above 3.5.

Based on the Chi Square test, the groups based on the drinking behavior (binge drinking, social drinking, and abstainer) were not significantly different in terms of gender, race and ethnicity, student status, and a member of a college athlete. There were significant differences in terms of year in school (p=.001), age (p=.001), religious upbringing (p=.007), the number of religious service attended per week (p=.001), number of religious activities attended per week (p=.001), the importance of religion (p=.001), and a member of Greek society (p=.001).

Table 5. A Summary of Demographics (n=387)

Demographic characteristics	Binge drinkers n (%)= 161(41)	Non Binge drinkers Social Drinkers n(%)= 72(19)	Abstainers n(%)= 155(40)	Total (n=387) (%)	Chi-Square (χ^2)	*p*-value
Gender					1.709	.944
Male	55(34)	25(35)	45(29)	125(32)		
Female	102(64)	46(64)	107(69)	255(66)		
Transgender	2(1)	1(1)	2(1)	5(1)		
Prefer not to answer	1(1)	0(0)	1(1)	2(1)		
Age					28.416	.001
18-20	53(33)	18(25)	88(57)	159(41)		
22-24	97(61)	47(65)	61(40)	205(53)		
More than 24	10(6)	7(10)	6(4)	23(6)		
Race/Ethnicity					15.489	.216
Caucasian	136(85)	59(82)	116(75)	311(80)		
Black or African American	4(3)	1(1)	9(6)	14(4)		
American Indian or Alaska Native	4(3)	0(0)	5(3)	9(2)		
Asian or Pacific Islander	5(3)	6(8)	13(8)	24(6)		
American Indian, Alaska Native, or Native Hawaiian	1(1)	1(1)	0(0)	2(1)		
Biracial or Multiracial	8(5)	2(3)	8(5)	18(5)		
Other	2(1)	3(4)	4(3)	9(2)		
Year in School					36.517	.001
Freshman	30(19)	7(10)	52(34)	89(23)		
Sophomore	33(21)	14(19)	49(32)	96(25)		
Junior	40(25)	25(35)	27(17)	92(24)		
Senior	57(36)	26(36)	27(17)	110(28)		
Religion					24.210	.007
Catholic	37(23)	16(22)	23(15)	76(20)		
Protestant (allows drinking)	51(32)	26(36)	49(32)	126(33)		
Protestant (do not allows drinking)	18(11)	15(21)	38(24)	71(18)		
Jewish	2(1)	0(0)	1(1)	3(1)		
Other	10(6)	4(6)	21(13)	35(9)		
Atheist	42(26)	11(15)	23(15)	76(20)		

Demographic characteristics	Binge drinkers n(%)= 161(41)	Non Binge drinkers Social Drinkers n(%)= 72(19)	Abstainers n(%)= 155(40)	Total (n=387) (%)	Chi-Square (χ^2)	*p*-value
Attend religious services/Per week					42.223	.001
Never	77(48)	23(32)	42(27)	142(37)		
1 time	40(25)	25(35)	32(21)	97(25)		
2 time	21(13)	3(4)	14(9)	38(10)		
3 or more time	22(14)	21(29)	67(43)	110(28)		
Attend religious activities/Per week					31.6	.001
Never	93(58)	31(43)	53(34)	177(46)		
1 time	36(23)	22(31)	34(22)	92(24)		
2 time	10(6)	1(1)	16(10)	27(7)		
3 or more time	21(13)	18(25)	52(34)	91(23)		
Importance of religion					33.493	.001
Not important	60(38)	18(25)	38(24)	116(30)		
Slightly not important	32(20)	18(25)	16(10)	66(17)		
Slightly important	37(23)	14(19)	27(17)	78(20)		
Very important	31(19)	22(31)	74(48)	127(33)		
Student Status					.935	.627
Fulltime	154(96)	71(98)	150(97)	375(97)		
Part-time	6(4)	1(2)	5(3)	12(3)		
Greek Fraternity or sorority membership					15.998	.001
Yes	52(32)	16(22)	21(14)	89(23)		
No	108(68)	56(78)	134(86)	298(77)		
Member of College Athlete						
Yes	3(2)	2(3)	5(3)	10(3)	.584	.747
No	157(98)	70(97)	150(97)	377(97)		
GPA					13.948	.007
Less than 2.49	4(3)	2(3)	1(1)	7(2)		
2.50 or less than 3.49	72(45)	33(46)	45(29)	150(39)		
3.50 or less than 4.00	82(52)	37(51)	109(70)	228(60)		

In this prospective study, 870 participants participated in the T1 survey however only 433 participants participated in the T2 survey. There was almost 50% of attrition, thus statistical analysis was conducted to explore if there was any significant difference between dropouts and those who participated in the follow up T2 survey.

Frequency distribution of the dropout and those who participated in the follow up T2 survey in terms of their drinking behavior was calculated to explore if the groups differ (Table 6). From the distribution, it can be infer that there was no clear difference in terms of frequency distribution for groups based on drinking behavior between the dropouts and those who continued the survey. In addition, the Pearson Chi-Square results suggested that there were no significant difference between dropouts and participants that continued at T2 regarding their drinking behavior [χ (1) =.002, *p*=.964)]. Further independent t-test was conducted to explore if there was any difference among dropouts and participants that continued to T2 for IBM constructs. From the results suggested no significant difference for any of the IBM constructs (Table 7).

Table 6. Summary of Frequency Distribution Based on Drinking Behavior for dropouts and those who continue to Participate in Time 2. (n=623)

	Binge drinker n(%)	**Social drinker n(%)**	**Abstainer n(%)**
Dropouts	98 (41.5)	48(20.3)	90(38.1)
Continuation	160(41.3)	72(18.6)	155(40.1)

Table 7. A Descriptive Statistics and Comparison of IBM Theory Construct Scores between Binge Drinkers and Non-Binge Drinkers using Independent t-test

Variable	Possible range	Observed range	Dropouts (n=236)		Completion (n=387)		Overall (n=623)		*p*-value
			m	*sd*	*m*	*sd*	*m*	*sd*	
Attitudes	-3 to +3	-3 to +3	1.43	1.52	1.53	1.59	1.49	1.56	.456
Perceived Norms	-3 to +3	-3 to +3	-0.09	1.10	0.05	1.03	0.00	1.06	.116
Perceived Behavioral Control	-3 to +3	-2.33 to +3	2.02	1.05	2.18	0.97	2.12	1.01	.061
Knowledge and Skills	1 to 2	1 to 1.60	1.09	.135	1.10	.125	1.10	.129	.295
Intentions	-3 to +3	-3 to +3	0.66	2.33	0.87	2.39	0.79	2.37	.288

Evaluation of Construct Validity and Internal Consistency Reliability

The Validity and Reliability of the IBM Instrument

The construct validity of the overall model for the instrument was explored using confirmatory factor analysis (CFA)/Maximum likelihood method. Both two components model and one component model were explored to establish construct validity for both binge drinking behavior and non-binge drinking behavior (Figure 3-6, Table 8-11). In two components model seven constructs including intention, experiential attitude, instrumental attitude, injunctive norms, capacity, and autonomy were tested. Each constructs included 3 items with total of 19 items. In one component model four constructs including intention, attitude, perceived norms, and perceived behavioral control were tested. All exogenous variables for both models were allowed to covary. The instrument were considered construct valid if the model fit indices meets the model fit criteria [Confirmatory Fit Index (CFI) $\geq$0.95, Tucker-Lewis Index (TLI) $\geq$0.95, and Root Mean Square Error of Approximation (RMSEA $\leq$0.08)] and if each item significantly loaded on the scale.

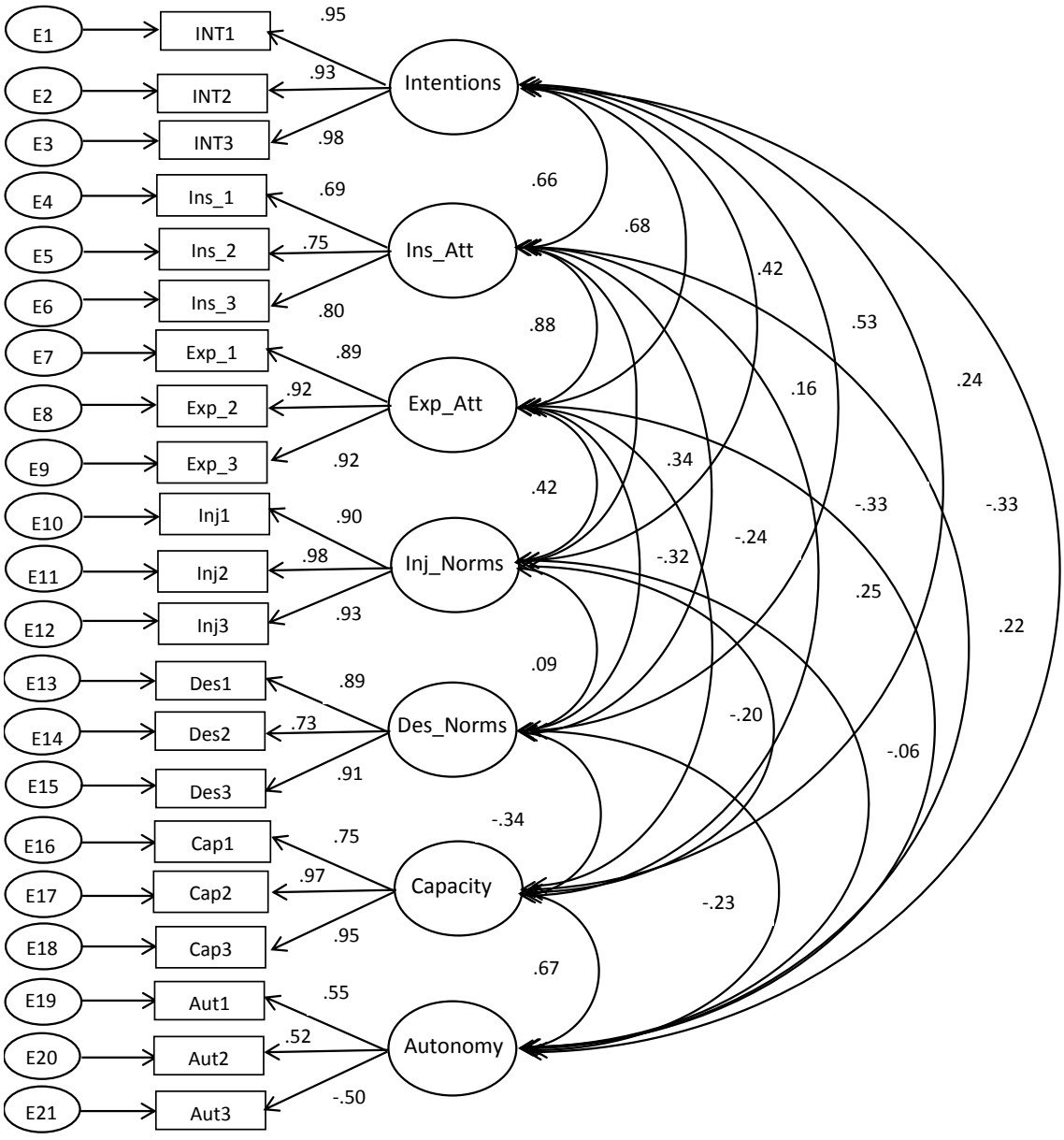


Figure 3. Results from Confirmatory Factor analysis (CFA) for the Alcohol Behavior Scale -Binge Drinkers (Two Component Model)

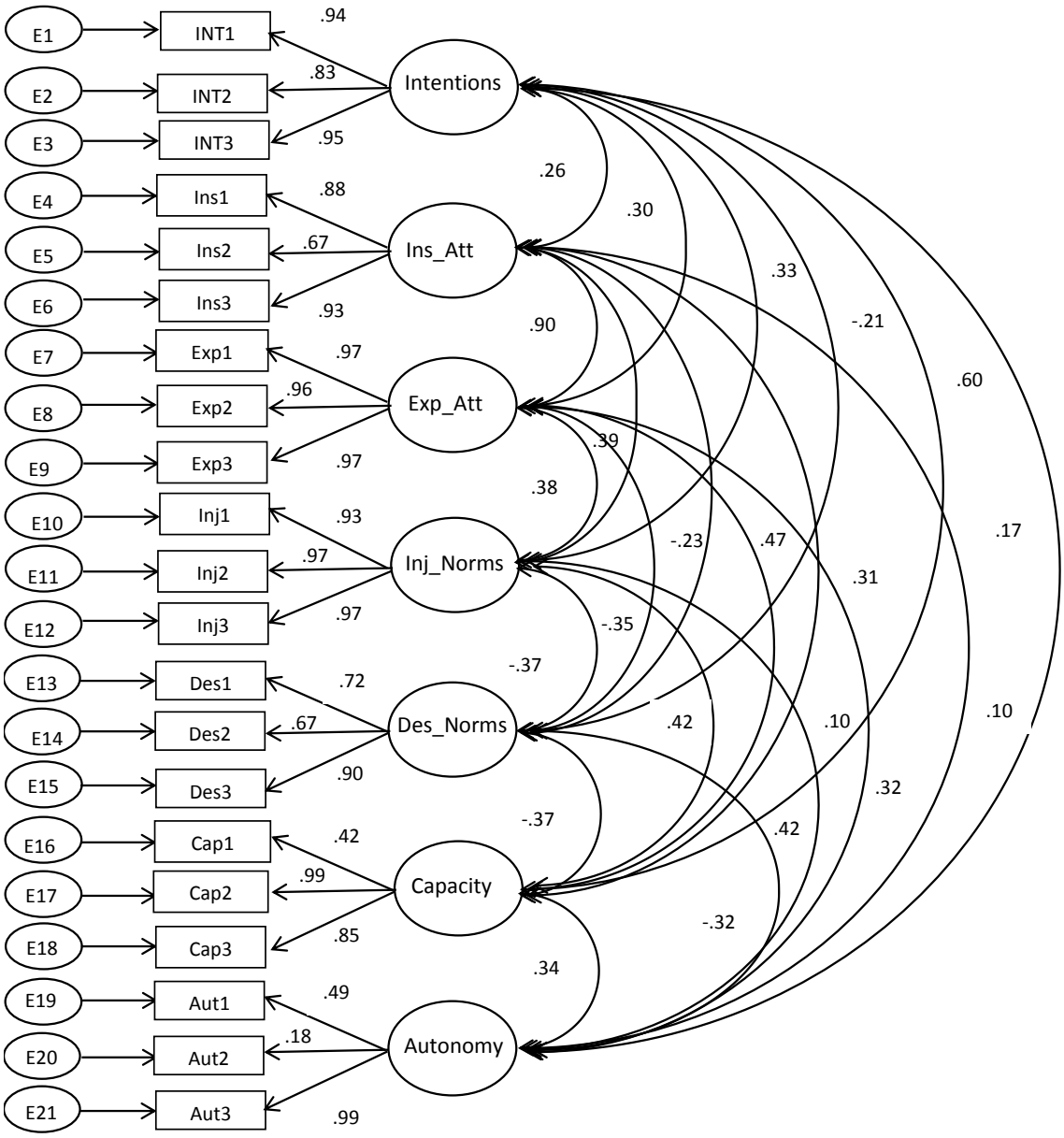


Figure 4. Results from Confirmatory Factor Analysis (CFA) for the Alcohol Behavior Scale -Non-Binge Drinkers (Two Component Model)

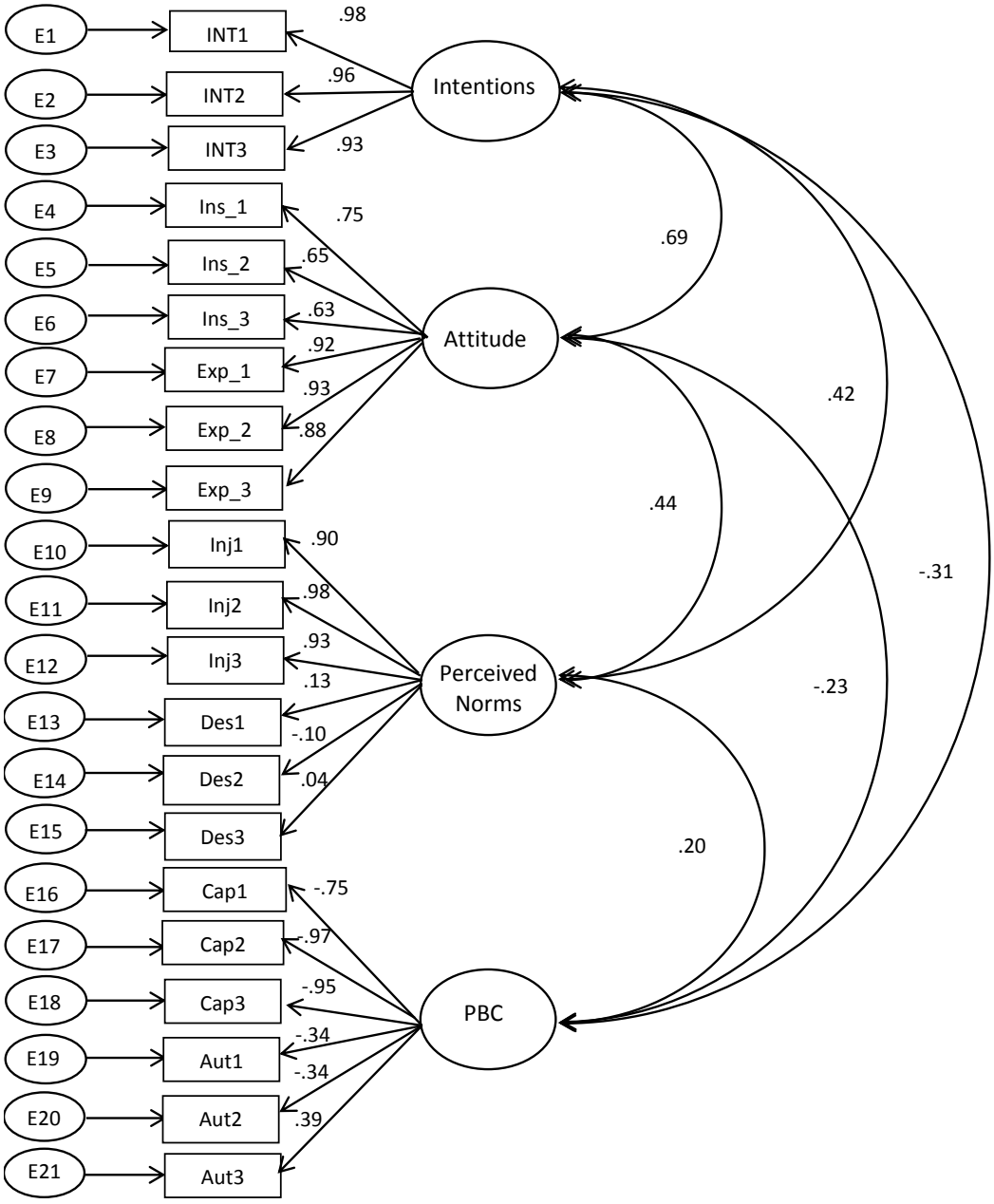


Figure 5. Results from Confirmatory Factor Analysis (CFA) for the Alcohol Behavior Scale -Binge Drinkers (One Component Model)

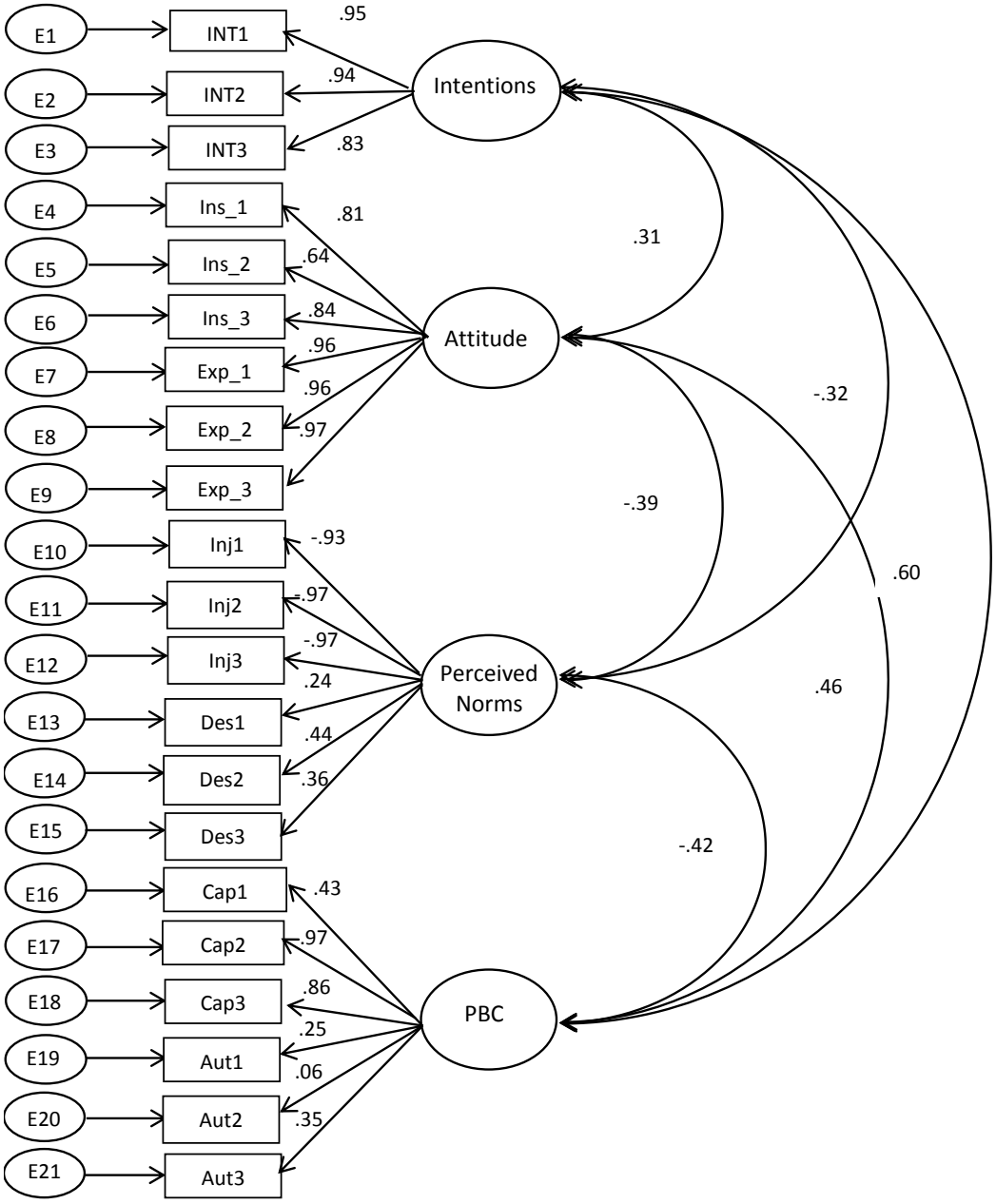


Figure 6. Results from Confirmatory Factor Analysis (CFA) for the for Alcohol Behavior Scale-Non-Binge Drinkers (One Component Model)

Table 8. Standardized (B) and unstandardized (B) coefficients for CFA analysis for Alcohol Behavior Scale for College Students (Two component model)-Binge Drinkers

Observed Variable	Latent Variable	β	B	SE
I will stop binge drink within the next 30 days.*	Intentions	.955	.972	.030
I will try to stop binge drink within the next 30 days.*	Intentions	.927	.983	.037
I intend stop binge drink within the next 30 days.*	Intentions	.982	1	
For me to stop binge drinking within the next 30 days would be…				
<Bad/Good>)(IA 1)*	Instrumental Attitudes	.689	.825	.092
<Unimportant/Important>(IA 2)*	Instrumental Attitudes	.747	1.206	.122
<Harmful/Beneficial>(IA 3)*	Instrumental Attitudes	.802	1	
<Unpleasant/Pleasant>(EA 1)*	Experiential Attitudes	.891	.990	.054
<Unsatisfying/Satisfying>(EA 2)*	Experiential Attitudes	.922	1.039	.052
<Unenjoyable/Enjoyable>(EA 3)*	Experiential Attitudes	.925	1	
Most people _____ think (s) that I should stop binge drinking for the next 30 days.				
< who are important to me> (IND 1)*	Injunctive Norms	.904	.997	.052
<who I respect>(IND 2)*	Injunctive Norms	.979	1.052	.043
<whose opinions I value>(IND 3)*	Injunctive Norms	.931	1.000	
Most _____ binge drinks.				
<people like me>(DND 1)*	Descriptive Norms	.888	.996	.073
<people I respect>(DND 2)*	Descriptive Norms	.734	.772	.072
<people similar to me>(DND 3)*	Descriptive Norms	.906	1	
I am confident that I can stop binge drinking for the next 30 days. (CAP 2)*	Capacity	.975	1.157	.092
I am sure I can stop binge drinking for the next 30 days. (CAP 3)*	Capacity	.954	1.217	
For me to stop binge drinking for the next 30 days would be (CAP 1)*	Capacity	.749	1	.086
It is completely up to me to not binge drink for the next 30 days.(AUT 2)*	Autonomy	.519	1.096	.299
I have_____to stop binge drinking for the next 30 days. (<No control/Total control> (AUT 3)*	Autonomy	-.500	-1.221	
It is _____for me to stop binge drinking for the next 30 days. <Not my choice/Completely my choice> (AUT 1)*	Autonomy	.552	1	.263

Note: *p-value*<0.05

Table 9. Standardized (B) and unstandardized (B) coefficients for CFA analysis for Alcohol Behavior Scale for College Students (Two Component Model)-Non-Binge Drinkers

Observed Variable	Latent Variable	β	B	SE
I will not binge drink for the next 30 days.(INT2) *	Intentions	.943	1.087	.059
I will try to not binge drink for the next 30 days.(INT3) *	Intentions	.836	1.044	.059
I intend to not binge drink for the next 30 days.(INT1) *	Intentions	.951	1	
For me to not to binge drink for the next 30 days would be…				
<Bad/Good>)(IA 1) *	Instrumental Attitudes	.877	.877	.043
<Unimportant/Important>(IA 2) *	Instrumental Attitudes	.675	1.236	.101
<Harmful/Beneficial>(IA 3) *	Instrumental Attitudes	.928	1	
<Unpleasant/Pleasant>(EA 1) *	Experiential Attitudes	.965	.933	.024
<Unsatisfying/Satisfying>(EA 2) *	Experiential Attitudes	.957	.982	.027
<Unenjoyable/Enjoyable>(EA 3) *	Experiential Attitudes	.969	1	
Most people _____ think (s) that I should not binge drink for the next 30 days.				
< who are important to me>(IND 1) *	Injunctive Norms	.930	1.015	.033
<who I respect>(IND 2) *	Injunctive Norms	.969	.989	.026
<whose opinions I value>(IND 3) *	Injunctive Norms	.972	1	
Most _____ binge drinks.				
<people like me>(DND 1) *	Descriptive Norms	.724	.900	.087
<people I respect>(DND 2) *	Descriptive Norms	.669	.594	.062
<people similar to me>(DND 3) *	Descriptive Norms	.905	1	
For me to not to binge drink for the next 30 days would be (CAP 1) *	Capacity	.424	.288	.043
I am confident that I will not binge drink for the next 30 days. (CAP 2) *	Capacity	.993	.924	.052
I am sure I will not binge drink for the next 30 days. (CAP 3) *	Capacity	.856	1	
It is _____for me to stop binge drinking for the next 30 days.<Not my choice/Completely my choice> (AUT 1) *	Autonomy	.496	.996	.215
It is completely up to me to not binge drink for the next 30 days. (AUT 2) *	Autonomy	.181	.871	.356
I have _____to no binge drink for the next 30 days. <No control/Total control> (AUT 3) *	Autonomy	.993	1	

Note: *p-value*<0.05

Table 10. Standardized (B) and unstandardized (B) coefficients for CFA analysis for Alcohol Behavior Scale for College Students (One component model)-Binge Drinkers

Observed Variable	Latent Variable	β	B	SE
I will stop binge drink within the next 30 days. (INT 1) *	Intentions	.980	.990	.041
I will try to stop binge drink within the next 30 days. (INT 2) *	Intentions	.957	1.015	.038
I intend stop binge drink within the next 30 days. (INT 3) *	Intentions	.928	1	
For me to stop binge drinking within the next 30 days would be…				
<Bad/Good>)(IA 1) *	Attitudes	.746	.754	.064
<Unimportant/Important>(IA 2) *	Attitudes	.652	.854	.089
<Harmful/Beneficial>(IA 3) *	Attitudes	.632	.613	.067
<Unpleasant/Pleasant>(EA 1) *	Attitudes	.917	1.012	.058
<Unsatisfying/Satisfying>(EA 2) *	Attitudes	.926	1.064	.059
<Unenjoyable/Enjoyable>(EA 3) *	Attitudes	.882	1	
Most people _____ think (s) that I should stop binge drinking for the next 30 days.				
< who are important to me> (IND 1)	Perceived Norms	.901	25.330	50.613
<who I respect>(IND 2)	Perceived Norms	.981	26.849	53.640
<whose opinions I value>(IND 3)	Perceived Norms	.929	25.399	50.746
Most _____ binge drinks.				
<people like me>(DND 1)	Perceived Norms	.135	3.284	6.856
<people I respect>(DND 2)	Perceived Norms	-.10	-2.399	5.518
<people similar to me>(DND 3)	Perceived Norms	.041	1	
For me to stop binge drinking for the next 30 days would be (CAP 1) *	Perceived Behavior Control	-.75	-1.687	.343
I am confident that I can stop binge drinking for the next 30 days. (CAP 2) *	Perceived Behavior Control	-.98	-.1967	.377
I am sure I can stop binge drinking for the next 30 days. (CAP 3) *	Perceived Behavior Control	-.95	-2.054	.395
It is _____for me to stop binge drinking for the next 30 days. <Not my choice/Completely my choice> (AUT 1) *	Perceived Behavior Control	-.34	-.655	.190
It is completely up to me to not binge drink for the next 30 days.(AUT 2) *	Perceived Behavior Control	-.34	-.771	.223
I have_____to stop binge drinking for the next 30 days. (<No control/Total control> (AUT 3) *	Perceived Behavior Control	.387	1	

Note: *p-value*<0.05

Table 11. Standardized (B) and unstandardized (B) coefficients for CFA analysis for Alcohol Behavior Scale for College Students (One component model)-Non-Binge Drinkers

Observed Variable	Latent Variable	β	B	SE
I intend to not binge drink for the next 30 days.(INT1) *	Intentions	.950	1.088	.059
I will not binge drink for the next 30 days.(INT2) *	Intentions	.944	1.046	.057
I will try to not binge drink for the next 30 days.(INT3) *	Intentions	.835	1	
For me to not to binge drink for the next 30 days would be…				
<Bad/Good>)(IA 1) *	Attitudes	.815	.632	.033
<Unimportant/Important>(IA 2) *	Attitudes	.637	.906	.076
<Harmful/Beneficial>(IA 3) *	Attitudes	.845	.705	.033
<Unpleasant/Pleasant>(EA 1) *	Attitudes	.964	.934	.025
<Unsatisfying/Satisfying>(EA 2) *	Attitudes	.958	.985	.027
<Unenjoyable/Enjoyable>(EA 3) *	Attitudes	.967	1	
Most people _____ think (s) that I should not binge drink for the next 30 days.				
< who are important to me>(IND 1) *	Perceived Norms	-.93	-2.32	.42
<who I respect>(IND 2) *	Perceived Norms	-.97	-2.27	.410
<whose opinions I value>(IND 3) *	Perceived Norms	-.97	-2.28	.413
Most _____ binge drinks.				
<people like me>(DND 1) *	Perceived Norms	.244	.767	.253
<people I respect>(DND 2) *	Perceived Norms	.438	.983	.226
<people similar to me>(DND 3) *	Perceived Norms	.358	1	
For me to not to binge drink for the next 30 days would be (CAP 1) *	Perceived Behavior Control	.427	2.762	.640
I am confident that I will not binge drink for the next 30 days. (CAP 2) *	Perceived Behavior Control	.970	8.724	1.61
I am sure I will not binge drink for the next 30 days. (CAP 3) *	Perceived Behavior Control	.863	9.601	1.78
It is _____for me to stop binge drinking for the next 30 days.<Not my choice/Completely my choice> (AUT 1) *	Perceived Behavior Control	.255	1.444	.456
It is completely up to me to not binge drink for the next 30 days. (AUT 2)	Perceived Behavior Control	.062	.847	.940
I have _____to no binge drink for the next 30 days. <No control/Total control> (AUT 3) *	Perceived Behavior Control	.353	1	

Note: *p-value*<0.05

Upon examining the initial model fit indices, both two component model reported good model fit for two indices (Binge drinkers: CFI =.957and RMSEA=.067; Non-Binge drinkers: CFI =.957, and RMSEA =.068) while TLI was slightly less to meet priori criterion (Binge drinkers: TLI =0.941; Non-Binge drinkers: TLI =0.940). In both two component model, all scales yielded significant factor loadings for all items. However, for one component model, instrument for both binge drinking and non-binge drinking behavior the model fit indices was not adequate [Binge drinkers: CFI=.846, TLI=0.806, and RMSEA=.122; Non-binge drinkers: CFI=.870, TLI=0.836, and RMSEA=.113]. Similarly, all items assessing perceived norms for the binge drinker in one component model were not significant and one Autonomy Scale (Aut2) was not significant. Standardized parameters can be found on Figures 3-6 and unstandardized and standardized estimated are presented in Table 8-11.

Evaluation of Construct Validity and Internal Consistency Reliability for IBM constructs

The construct validity analysis for the construct and sub-construct of the IBM for binge drinking behaviors and non-binge drinking behaviors is presented on Tables 12 and 13. Non-binge drinkers are further classified into social drinker and abstainers. This analysis was used for T1 data only as IBM constructs was not measured in T2. Only behavior and demographic related information were collected in T2. The construct validity analysis for the constructs and sub-constructs of the IBM for social drinkers and abstainers is presented in Tables 14 and 15. The confirmatory factor analysis using maximum likelihood method (MLM) was considered to evaluate construct validity. The MLM is the preferred extraction method for estimating the parameters of a factor

model. The Kaiser criterion of Eigenvalue's>1.0 was considered to confirm the presence of a number of factor solutions (Tabachnick & Fidell, 2013). Eigenvalues explained the total amount of variance attributed to each factor. Also, as a rule of thumb factor loadings of 0.32 or higher is used to identify variables that load on each factor (Comrey & Lee, 1992). Further scree plot of the constructs was visually inspected to confirm the Eigenvalues against the number of factors (Field, 2009).

It is important to note that in factor analysis the sample size for social drinkers (n=72) is relatively small for conducting confirmatory factor analysis. Even though there is not a specific rule for what sample size is adequate for confirmatory factor analysis, the Tabachnick and Fidell (2007) suggest 300 cases for conducting confirmatory factor analysis. Similarly, Grimm and Yarnold (1995) and Hatcher (1994) both have suggested at least 5 cases per item. The IBM constructs subscales for this study have 3-4 items, therefore, even though a larger sample was needed for the first recommendation, the sample size is adequate for the latter suggestion.

While computing factor analysis, it is to be noted that attitude, perceived norms, and perceived behavioral control had two sub-constructs each. If these constructs yielded two-factor solutions, no modifications were made. This also suggests that those constructs are better off measuring at a sub-construct level than merging them together and measuring as one construct.

For binge drinking (Table 12) all constructs of IBM yielded 1-factor solution except for perceived norms which yielded two factors with Eigenvalues great than 1 (2.825 and 2.387). This is somewhat expected considering the construct include two sub-construct Injunctive Norms and Descriptive Norms, thus no further changes were

made for this construct. The problem with Perceived Behavior Control was one item had factor loading of less than 0.30 (-.386) thus that item (item#50) was eliminated to improve the total variance explained and factor analysis was recalculated.

For Non-binge drinkers (Table 13) intention and attitude had one factor with Eigen Values greater than 1 (4.812) but perceived norms (3.468 and 1.525) and perceived behavioral control (2.554, 1.226) yielded two factors with Eigenvalues greater than 1 (2.825 and 2.387). This is somewhat expected considering the construct included two sub-construct Injunctive Norms and Descriptive Norm for perceived behavioral control and capacity and autonomy for perceived behavioral control, thus no further changes were made for this construct. However, Perceived Behavior Control had two items with a factor loading of less than 0.30 (.180 and .288). To improve the total variance explained item (item #49) with the lowest factor loading was eliminated and factor analysis was recalculated. After recalculation, perceived behavior control appeared to have two factors with Eigenvalue greater than 1 as well as all items had factor loading of more than 0.30 except for item #46, however, it was close (.293) so items were retained.

For social drinker (Table 14) intentions and attitudes had one factor with Eigenvalue greater than 1. Perceived norms (3.087 and 1.877) and perceived behavioral control (2.43, 1.440, and 1.004) had more than one factor with Eigenvalue greater than 1. This is somewhat expected for perceived norms considering the construct included two sub-construct Injunctive Norms and Descriptive Norms. However since one of the items (item#35) measuring perceived norms (Descriptive Norms) was less than 0.30, the item was eliminated and factor analysis was recalculated. For perceived behavioral

control, there were three factors with Eigenvalue greater than 1. Thus, two factors were extracted fixed number option and factor analysis was recalculated. The recalculated factor loadings showed one item with less than .3 factor loadings so final factor analysis was calculated after eliminating item#49 with least factor loadings and final factor analysis was computed.

For abstainers (Table 15) intentions and attitudes had one factor with Eigenvalue greater than 1. Perceived norms (3.657 and 1.306) and perceived behavioral control (2.824 and 1.012) have two factors with Eigenvalue greater than 1. This is somewhat expected considering the construct include two sub-construct Injunctive Norms and Descriptive Norm for perceived behavioral control and capacity and autonomy for perceived behavioral control, thus not further changes were made for this construct however since one of the items measuring perceived behavioral control (Item#50) was less than 0.30, the item was eliminated and factor analysis was recalculated.

Table 12. Binge Drinkers - Direct Measures Summary of Factor Analysis for Establishing Construct Validity (N=161)

Variable	Eigenvalue	Factor Loadings 1	2
Intentions	***2.825***		
I intend to do the stop binge drinking within the next 30 days		.979	
I will stop binge drinking within the next 30 days		.958	
I will try to stop binge drinking within the next 30 days		.930	
Attitudes			
Instrumental	***4.202***		
Bad/Good		.743	
Unimportant/Important		.647	
Harmful/Beneficial		.635	
Experiential:			
Unpleasant/Pleasant		.919	
Unsatisfying/Satisfying		.926	
Unenjoyable/Enjoyable		.882	
Perceived Norms	***2.825/2.387***		
Injunctive Norms:		.897	
who are important to me ….		.988	
whom I respect …		.925	
whose opinion I value...			
Descriptive Norms:			.889
like me binge drink.			.748
I respect binge drink.			.902
people similar to me binge drink.			
Perceived Behavioral Control			
Capacity:	***3.164***		
For me to stop binge drinking …		.740	
I am confident that I can stop binge drinking…		.984	
I am sure I can stop binge drinking…		.945	
Autonomy:			
It is …..for me to stop binge drinking ...		.371	
It is completely up to me to not binge...		.347	
I have….to stop binge drinking ….		-.386	
Revised Perceived Behavioral Control	***2.954***		
Capacity:			
For me to stop binge drinking …		.742	
I am confident that I can stop binge drinking…		.983	
I am sure I can stop binge drinking…		.947	
Autonomy:			
It is …..for me to stop binge drinking ...		.369	
It is completely up to me to not binge...		.346	

Note: Maximum likelihood estimation used for all subscales
Behavior: Stopping binge drinking within the next 30 days

Table 13. Non-Binge Drinkers - Direct Measures summary of Factor Analysis for Establishing Construct Validity (N=227)

Variable	Eigenvalue	Factor Loadings	
		1	2
Intentions	***2.673***		
I intend to not binge drink for the next 30 days.		.965	
I will not binge drink for the next 30 days.		.933	
I will try to not binge drink for the next 30 days		.846	
Attitudes	***4.812***		
Instrumental:		.812	
Bad/Good		.630	
Unimportant/Important		.845	
Harmful/Beneficial			
Experiential:			
Unpleasant/Pleasant		.961	
Unsatisfying/Satisfying		.965	
Unenjoyable/Enjoyable		.970	
Perceived Norms			
Injunctive Norms:			
who are important to me ...	***3.468/1.525***		
whom I respect …		.929	
whose opinion I value...		.967	
Descriptive Norms:		.970	
like me binge drink.			.658
I respect binge drink.			.493
people similar to me binge drink.			.835
Perceived Behavioral Control			
Capacity:	***2.554/1.226***		
For me to not to binge drink …			.301
I am confident that I will binge drink…			.941
I am sure I will not binge drink…			.791
Autonomy:			
It is …..for me to not binge drink ...		.492	
It is completely up to me to for deciding...		.180	
I have….to not binge drink ...		1.00	
Revised Perceived Behavioral Control	***2.522/1.115***		
Capacity:			
For me to not to binge drink …			293
I am confident that I will binge drink…			.928
I am sure I will not binge drink…			.787
Autonomy:			
It is …..for me to not binge drink ...		.494	
I have….to not binge drink.		.999	

Note: Maximum likelihood estimation used for all subscales
Behavior: Not to binge drink for the next 30 days

Table 14. Social Drinker - Direct Measures summary of Factor Analysis for Establishing Construct Validity (N=72)

Variable	Eigenvalue	Factor Loadings 1	2
Intentions	***2.800***		
I intend to not binge drink for the next 30 days.		.971	
I will not binge drink for the next 30 days.		.994	
I will try to not binge dnk for the next 30 days		.882	
Attitudes	***4.897***		
Instrumental:			
Bad/Good		.878	
Unimportant/Important		.707	
Harmful/Beneficial		.817	
Experiential:			
Unpleasant/Pleasant		977	
Unsatisfying/Satisfying		.958	
Unenjoyable/Enjoyable		.957	
Perceived Norms			
Injunctive Norms:	***3.087/1.877***		
who are important to me ...		.766	
whom I respect …		.773	
whose opinion I value...		.778	
Descriptive Norms:			
…like me binge drink.			.537
…I respect binge drink.			.245
…people similar to me binge drink.			.689
Revised Perceived Norms			
Injunctive Norms:	***2.930/1.642***		
who are important to me ….		.947	
whom I respect …		.967	
whose opinion I value...		.999	
Descriptive Norms:			.890
like me binge drink.			.759
people similar to me binge drink.			
Perceived Behavioral Control (with fixed number option)	***2.024/1.445***		
Capacity:			
For me to not to binge drink …		.319	
I am confident that I will binge drink…		.935	
I am sure I will not binge drink…		.995	
Autonomy:			.831
It is …..for me to not binge drink ...			.075
It is completely up to me to for deciding...			.841
I have….to not binge drink ...			
Revised Perceived Behavioral Control (with fixed number option)	***2.032/1.431***		
Capacity:		.322	
For me to not to binge drink …		.939	
I am confident that I will binge drink…		.992	
I am sure I will not binge drink…			
Autonomy:			
It is …..for me to not binge drink ...			.824
I have….to not binge drink ...			.844

Note: Maximum likelihood estimation used for all subscales
Behavior: Not to binge drink for the next 30 days

Table 15. Abstainers - Direct Measures Summary of Factor Analysis for Establishing Construct Validity (N=155)

Variable	Eigenvalue	Factor Loadings	
		1	2
Intentions	***2.600***		
I intend to not binge drink for the next 30 days.		.955	
I will not binge drink for the next 30 days.		.934	
I will try to not binge drink for the next 30 days		.903	
Attitudes	***4.676***		
Instrumental:		.857	
Bad/Good		.651	
Unimportant/Important		.928	
Harmful/Beneficial			
Experiential:		939	
Unpleasant/Pleasant		.942	
Unsatisfying/Satisfying		.943	
Unenjoyable/Enjoyable			
Perceived Norms			
Injunctive Norms:	***3.657/1.306***		
who are important to me ...		.859	
whom I respect …		.898	
whose opinion I value...		.877	
Descriptive Norms:			.669
like me binge drink.			.360
I respect binge drink.			.533
people similar to me binge drink.			
Perceived Behavioral Control			
Capacity:	***2.824/1.022***		
For me to not to binge drink …		.694	
I am confident that I will binge drink…		.835	
I am sure I will not binge drink…		.765	
Autonomy:			
It is …..for me to not binge drink ...			.414
It is completely up to me to for deciding...			.800
I have….to not binge drink ...			.120
Revised Perceived Behavioral Control	***2.312/1.012***		
Capacity:		.698	
For me to not to binge drink …		.878	
I am confident that I will binge drink…		.809	
I am sure I will not binge drink…			
Autonomy:			.417
It is …..for me to not binge drink ...			.843
It is completely up to me to for deciding...			

Note: Maximum likelihood estimation used for all subscales
Behavior: Not to binge drink for the next 30 days

Correlations of IBM Constructs for Each Drinking Behavior

Table 16 shows most of the IBM constructs were significantly correlated with each other for binge drinking group except for knowledge and skills. Knowledge and skills were not correlated with any constructs except intention. Also, instrumental attitude was not correlated with capacity and autonomy. Similarly, injunctive norms were not correlated with descriptive norms, perceived behavioral control, and autonomy and descriptive norms were not correlated with autonomy.

Table 17 most of the IBM constructs were significantly correlated with each other for binge drinking group except for knowledge and skills. Knowledge and skills were not correlated with any other constructs. Also, perceived norms were not correlated with intention, attitude, experiential attitude, perceived behavioral control capacity, and autonomy.

Table 18 shows not all of the IBM constructs were significantly correlated with each other for social drinking. Knowledge and skills were not correlated with any constructs. Perceived norms were not correlated with attitude, injunctive attitude, experiential attitude, descriptive norms, and autonomy. Descriptive norms were not correlated with attitude, instrumental attitude, experiential attitude, injunctive norms, and autonomy. Similarly, autonomy was only correlated with attitude, instrumental attitude, experiential attitude, and perceived behavioral control.

Table 19 shows most of the IBM constructs were significantly correlated with each other for the abstainer group except for knowledge and skills. Knowledge and skills were not correlated with any constructs like for any previous groups. In addition, the intention was correlated with injunctive attitude, perceived norms, injunctive norms,

descriptive norms. The attitude was not correlated with perceived norms and instrumental attitude neither was nor correlated with perceived norms, perceived behavioral control, capacity. Injunctive norms were not correlated with autonomy.

Table 16. Binge drinking –Pearson's Correlation Coefficient Matrix for the Integrative Behavior Model constructs (n=162)

Variable	1.Int	2.Att	3.IA	4.EA	5.PN	6.IN	7.DN	8.PBC	9.Cap	10.Aut	11. Know
1.Int		.653**	.578**	.641**	.139	.441**	-.327**	.266**	.250**	.184*	-.191**
2.Att			.925**	.945**	.180*	.477**	-.305**	.275**	.276**	.173*	-.059
3.IA				.750**	.254**	.504**	-.219**	.172*	.132	.154	-.062
4.EA					.095	.395**	-.342**	.331**	.369**	.169*	-.049
5.PN						.792**	.648**	-.218**	-.355**	.029	-.094
6.IN							.049	-.102	-.199*	.051	-.094
7.DN								-.236**	-.326**	-.036	.015
8.PBC									.870**	.809**	.020
9.Cap										.415**	-.005
10.Aut											.047
11.Skills											

Notes: **p≤0.01, *p≤0.05
Beh (Behavior); Int (Intentions); Att (Attitudes); IA (instrumental Attitudes); EA (Experiential Attitudes); PN (Perceived Norms); IN (Injunctive Norms); DN (Descriptive Norms); PBC (Perceived Behavioral Control); Cap (Capacity); Aut (Autonomy); Know (Knowledge and skills)

Table 17. . Non-binge drinking –Pearson's Correlation Coefficient Matrix for the Integrative Behavior Model constructs (n=227)

Variable	1.Int	2.Att	3.IA	4.EA	5.PN	6.IN	7.DN	8.PBC	9.Cap	10.Aut	11. Know
1.Int		.333**	.311**	.323**	.102	.340**	-.209**	.494**	.516**	.215**	-.044
2.Att			.949**	.959**	.101	.427**	-.301**	.415**	.390**	.263**	-.045
3.IA				.821**	.174*	.460**	-.248**	.317**	.313**	.170*	-.067
4.EA					.027	.361**	-.321**	.466**	.424**	.324**	-.021
5.PN						.582**	.553**	-.055	-.010	-.119	-.119
6.IN							-.356**	.353**	.388**	.112	-.073
7.DN								-.406**	-.395**	-.231**	-.077
8.PBC									.928**	.655**	-.062
9.Cap										.326**	-.017
10.Aut											-.122
11.Skills											

Notes: **p≤0.01, *p≤0.05
Beh (Behavior); Int (Intentions); Att (Attitudes); IA (instrumental Attitudes); EA (Experiential Attitudes); PN (Perceived Norms); IN (Injunctive Norms); DN (Descriptive Norms); PBC (Perceived Behavioral Control); Cap (Capacity); Aut (Autonomy); Know (Knowledge and skills)

Table 18. Social drinking – Pearson's Correlation Coefficient Matrix for the Integrative Behavior Model constructs (n=72)

Variable	1.Int	2.Att	3.IA	4.EA	5.PN	6.IN	7.DN	8.PBC	9.Cap	10.Aut	11. Skills
1.Int		.508**	.489**	.496**	.270*	.534**	-.297*	.727**	.777**	.095	-.162
2.Att			.968**	.972**	.229	.529**	-.162	.589**	.520**	.326**	-.100
3.IA				.882**	.237	.539**	-.136	.563**	.496**	.316**	-.128
4.EA					.209	.488**	-.177	.578**	.512**	.318**	-.068
5.PN						.238	.734**	.359**	.388**	.035	-.239
6.IN							-.091	.471**	.452**	.167	-.205
7.DN								-.304*	-.341**	-.003	-.136
8.PBC									.911**	.459**	-.174
9.Cap										.052	-.126
10.Aut											-.149
11.Skills											

Notes: **p≤0.01, *p≤0.05
Beh (Behavior); Int (Intentions); Att (Attitudes); IA (instrumental Attitudes); EA (Experiential Attitudes); PN (Perceived Norms); IN (Injunctive Norms); DN (Descriptive Norms); PBC (Perceived Behavioral Control); Cap (Capacity); Aut (Autonomy); Know (Knowledge and skills)

Table 19. Abstainer– Pearson's Correlation Coefficient Matrix for the Integrative Behavior Model constructs (n=155)

Variable	1.Int	2.Att	3.IA	4.EA	5.PN	6.IN	7.DN	8.PBC	9.Cap	10.Aut	11. Skills
1.Int		.183*	.155	.186*	-.015	.145	-.112	.316**	.287**	.252**	.049
2.Att			.931**	.949**	-.085	.288**	-.311**	.295**	.208*	.318**	.012
3.IA				.770**	.023	.337**	-.240**	.140	.064	.197*	-.004
4.EA					-.168*	.215*	-.335**	.398**	.309**	.391**	.028
5.PN						.435**	.610**	-.232**	-.179*	-.229**	-.002
6.IN							-.449**	.203*	.232**	.095	.062
7.DN								-.379**	-.360**	-.278**	-.075
8.PBC									.901**	.802**	.025
9.Cap										.465**	.108
10.Aut											-.099
11.Skills											

Notes: **p≤0.01, *p≤0.05
Beh (Behavior); Int (Intentions); Att (Attitudes); IA (instrumental Attitudes); EA (Experiential Attitudes); PN (Perceived Norms); IN (Injunctive Norms); DN (Descriptive Norms); PBC (Perceived Behavioral Control); Cap (Capacity); Aut (Autonomy); Know (Knowledge and skills)

Internal Consistency

Cronbach's alpha was applied to evaluate internal consistency of the IBM constructs. The acceptable internal consistency coefficients values were established *a priori* at 0.70. Also, since attitude, perceived norms, and perceived behavioral control had two sub-constructs if these constructs did not meet a priori criteria but if sub-constructs met the a *priori* criteria, no modifications were made. The Cronbach's alpha for constructs and sub-constructs for different drinking behaviors was based on modifications of items after factor analysis from the previous section (Table 20).

For binge drinkers, the constructs of behavioral intention ($\alpha = 0.969$), attitude ($\alpha = 0.910$), perceived norms ($\alpha = 0.762$), and perceived behavioral control ($\alpha = 0.809$), exceeded the acceptable a *priori* criterion. When sub-constructs were measured, all sub-constructs met a priori criterion except autonomy ($\alpha = 0.485$). Modified items for autonomy had only 2 items thus it was not further modified. For non-binge drinkers, the constructs of behavioral intention ($\alpha = 0.938$), attitude ($\alpha = 0.934$), exceeded the acceptable a *priori* criterion. But perceived norms ($\alpha = 0.429$), and perceived behavioral control ($\alpha = 0.600$) did not exceed the acceptable a priori criterion. If a core construct did not meet a priori criterion, its sub-constructs were examined before items were modified. Based on the results, even when some of these constructs did not meet a priori criterion, all sub-constructs met a priori criterion except autonomy. For autonomy ($\alpha = 0.304$), it only had only 2 items thus items were left as it is. For social drinkers, the constructs of behavioral intention ($\alpha = 0.964$), attitude ($\alpha = 0.942$) exceeded the acceptable a *priori* criterion. But perceived norms ($\alpha = 0.619$), and perceived behavioral

control (α =0.691) did not exceed the acceptable a priori criterion. However, as mentioned above these constructs consists of sub-constructs whose Cronbach alpha exceeded a priori criterion, thus further changes were not made. This further provides evidence that for those constructs measuring at sub-construct level was more appropriate than measuring at construct level. For abstainer, the constructs of behavioral intention (α = 0.922), attitude (α = 0.924), exceeded the acceptable a *priori* criterion. But perceived norm (α = 0.279), and perceived behavioral control (α =0.583) did not exceed the acceptable a priori criterion. When sub-constructs were measured, all sub-constructs met a priori criterion except autonomy (α = 0.273). But modified items for autonomy had only 2 items thus it was not further modified.

Table 20. Direct Measures Internal Consistency Reliability

Variables	Cronbach's Alpha (α)			
	Binge drinker (n=162)	Non-binge drinker (n=227)	Social drinker (n=72)	Abstainer (n=155)
Intentions	.969	.938	.964	.922
Attitudes	.910	.934	.942	.924
Instrumental Attitudes	.779	.793	.800	.777
Experiential Attitudes	.937	.976	.975	.976
Perceived Norms	.762	.429	.619	.279
Descriptive Norms	.955	.796	.760	.805
Injunctive Norms	.880	.970	.956	.956
Perceived Behavioral Control	.809	.600	.691	.583
Capacity	.915	.780	.783	.763
Autonomy	.485	.304	.821	.273

Assumption for Inferential Analysis

Various assumptions were tested and considered before performing multiple regression and binomial regression analysis. After constructs were modified from factor analysis and internal consistency analysis, the dataset was investigated for normality,

homoscedasticity, multicollinearity, and the ratio of cases to independent variables. The details of these statistical proceed are presented below.

Normality

Normality was subjectively tested by visually inspecting histograms as well as by referring to kurtosis and skewness values. Also, normality was evaluated objectively using the Kolmogorov-Smirnov (K-S) test.

The first step in normalizing data was to identify and remove potentially influential outliers. Normally any value beyond the range of ±3 standard deviation is considered the outliers. Also, visual inspection of schematic (box-and-whisker) plots, as well as Z scores, was utilized to detect the outliers. No outliers were detected during analysis and therefore no data were replaced.

After examining outliers, the distribution of the data was examined through skewness and kurtosis. Skewness and kurtosis report how values are dispersed from the mean and standard deviation (measures of central tendency). Skewness is the measurement of the asymmetry associated with the data. Similarly, Kurtosis reports how data is peaked or flat compared to a normal distribution. If skewness value is negative, that means there are more observations below the mean than above the mean and, if the skewness value is positive, there are more observations above the mean than below the mean. If the skewness is zero, the data is considered to be more symmetric about the mean. For kurtosis, if the value is positive (leptokurtic), distribution is considered to be relatively peaked and if the value is negative (platykurtic), distribution is relatively flat. The skewness and kurtosis value of the data should range ±2 range to meet normality assumption (Garson, 2011). The value of skewness and kurtosis for all

IBM constructs and sub-construct for each behavior is presented in Table 21-24. In addition to skewness and kurtosis, the normal distribution was also examined using the Kolmogorov-Smirnov (K-S) test as presented in Table 21-24. The K-S is the test to examine if the data is normally distributed. In the K-S test, the null hypothesis states that data is normally distributed. If the *p*-value is less than 0.05, the null hypothesis is rejected and data is considered not normally distributed. As presented in table 21-24, the assumption of normal distribution seems to be violated a number of times. The assumption of normal distribution was also seemed violated upon visually inspective the histograms and Q-Q plots for IBM construct and sub-construct variables for all drinking behaviors. The attempt was made to transform these variables to remedy this issue; however, it did not fix the normality issue. Regarding the skewness and kurtosis, Stevens (2009) noted that skewness and kurtosis have only a minor impact on a power or significance of statistical tests, and variances are rigorous against minor deviations from normality. Also, Kirk (1995) stated that "….the F-statistic is quite robust with respect to violation of the normality assumption." Kirk (1995) further noted that transforming data to remedy normality problem is 'rarely advantageous'. Therefore, it was decided to keep the data untransformed in subsequent analysis.

Table 21. Summary of Skewness, Kurtosis, and K-S Statistics for the IBM Theoretical Constructs for Binge Drinking Behaviors (N=161)

Variables	Skewness	Kurtosis	K-S Test	
			Value	*P*
Intentions	.546	-1.049	.177	.001
Attitudes	.296	-.269	.136	.001
Instrumental Attitudes	.209	-.570	.102	.001
Experiential Attitudes	.237	-.436	.163	.001
Perceived Norms	.046	.060	.086	.015
Descriptive Norms	.557	-.594	.108	.001
Injunctive Norms	-.236	-.579	.095	.004
Perceived Behavioral Control	-1.480	2.338	.200	.001
Capacity	-1.356	1.148	.213	.001
Autonomy	-1.813	3.057	.371	.001
Knowledge	.889	.416	.344	.001

Table 22. Summary of Skewness, Kurtosis, and K-S Statistics for the IBM Theoretical Constructs for Non-Binge Drinking Behaviors (N=227)

Variables	Skewness	Kurtosis	K-S test	
			Value	*p*
Intentions	-2.047	3.012	.411	.001
Attitudes	-2.189	4.745	.349	.001
Instrumental Attitudes	-2.126	4.498	.388	.001
Experiential Attitudes	-2.070	3.694	.417	.001
Perceived Norms	-.548	2.824	.160	.001
Descriptive Norms	-1.606	2.158	.260	.001
Injunctive Norms	.815	.065	.161	.001
Perceived Behavioral Control	-2.860	8.660	.409	.001
Capacity	-2.748	6.779	.427	.001
Autonomy	-5.064	29.612	.493	.001
Knowledge	.807	.236	.340	.001

Table 23. Summary of Skewness, Kurtosis, and K-S Statistics for the IBM Theoretical Constructs for Social Drinking Behaviors (N=72)

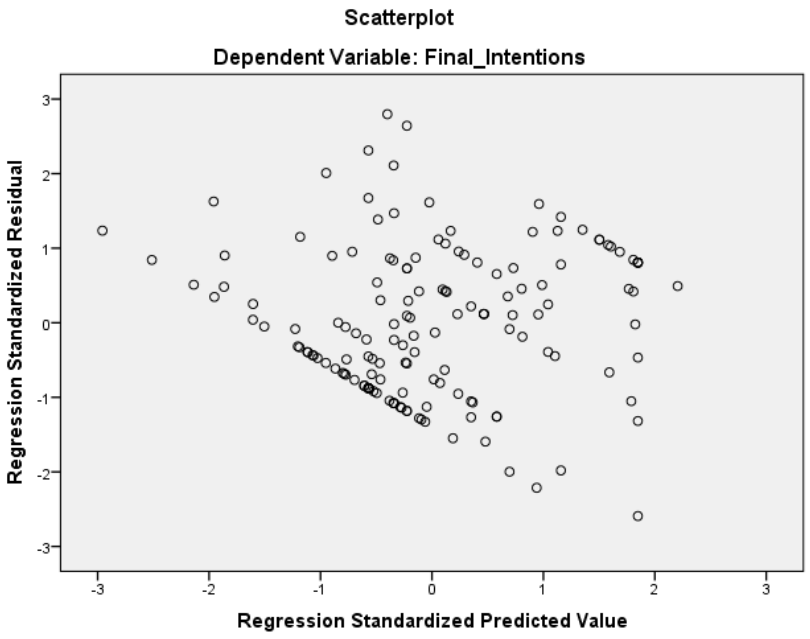
Variables	Skewness	Kurtosis	K-S test	
			Value	*p*
Intentions	-1.433	.896	.345	.001
Attitudes	-1.268	1.088	.244	.001
Instrumental Attitudes	-1.198	.973	.281	.001
Experiential Attitudes	-1.276	.782	.291	.001
Perceived Norms	1.006	.805	.133	.009
Descriptive Norms	-.963	.036	.193	.001
Injunctive Norms	.332	-.516	.162	.001
Perceived Behavioral Control	-1.437	1.130	.276	.001
Capacity	-1.775	1.998	.308	.001
Autonomy	-2.455	4.883	.454	.001
Knowledge	.949	1.111	.284	.001

Table 24. Summary of Skewness, Kurtosis, and K-S Statistics for the IBM Theoretical Constructs for Abstainers (N=162)

Variables	Skewness	Kurtosis	K-S test	
			Value	*p*
Intentions	-2.473	4.954	.441	.001
Attitudes	-2.969	9.416	.396	.001
Instrumental Attitudes	-2.920	9.174	.435	.001
Experiential Attitudes	-2.670	6.824	.475	.001
Perceived Norms	.023	1.884	.165	.001
Descriptive Norms	-1.997	4.348	.297	.001
Injunctive Norms	1.139	.954	.175	.001
Perceived Behavioral Control	-3.753	15.721	.459	.001
Capacity	-3.674	13.326	.481	.001
Autonomy	-4.765	24.907	.491	.001
Knowledge	.698	-.464	.367	.001

Homoscedasticity

An assumption of homoscedasticity is a requirement for correlational analysis. It was examined through an inspection of scatterplots between behavioral intentions as a predictor and show as a residual vs predicted plot. Based on the scatter plot below, it was clear that the assumption of homoscedasticity was maintained in this study (Figure 7).



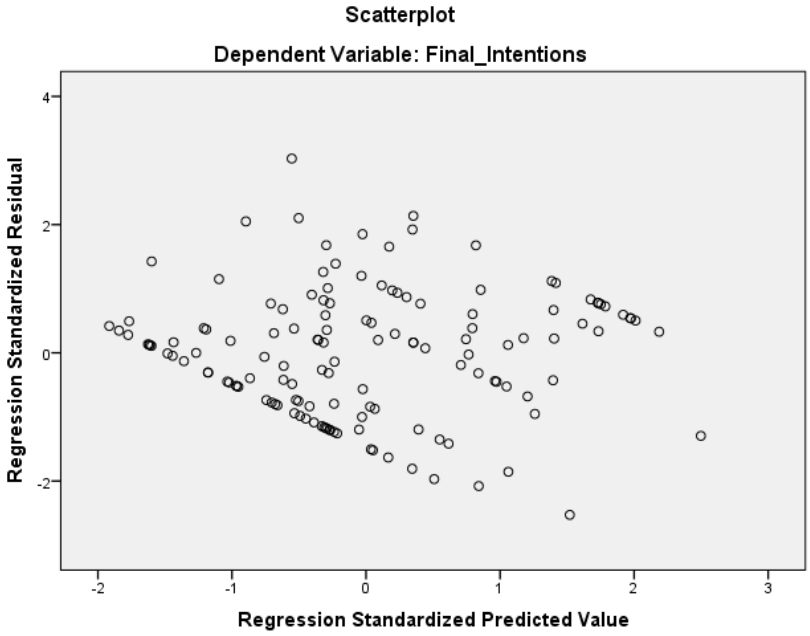


Figure 7. Homoscedasticity-Intention

Multicollinearity

Multicollinearity is an issue that could occur during regression analysis. Multicollinearity measures how much one independent variable is highly correlated with a combination of the other independent variables. Variance inflation factor (VIF) was computed for diagnosing multicollinearity. Multicollinearity is considered to be present if the VIF exceeds 5 (Stine, 1995). In this study, the VIF for each dependent variable is under 5. Thus, the assumption of multicollinearity was met and no violations were noted.

Linear Regression and Logistic Regression

Linear regression and logistic regression analysis were performed to predict the likelihood of undergraduate college students engaging in binge drinking behaviors. Logistic regression was applied to model the theoretical predictors of behavioral

intention. Similarly, logistic regression was applied to model the theoretical predictors of binge drinking behaviors.

Model 1: Predicting intention to discontinue binge drinking in the next 30 days for current binge drinkers with attitude, perceived norms and perceived behavioral control.

According to the IBM, behavioral intentions are predicted by attitudes towards the behavior, perceived norms, and perceived behavioral control. Using multiple linear regression models, the three constructs predicted 44.5% of the variance of intentions for current binge drinkers to discontinue binge drinking in the next 30 days (Table 25). Only attitudes ($p<0.001$) were significant in the model with the standardized beta of .636. More specifically, when all other variables held constant, one unit increase in attitude such as believing stopping binge drink could be more pleasant can increases behavioral intention to stop binge drinking by .636.

Model 2: Predicting intentions to discontinue binge drinking in the next 30 days for current binge drinkers with instrumental attitudes, experiential attitudes, descriptive norms, injunctive norms, capacity, and autonomy.

The same regression model was used with extended direct measures of attitudes, perceived norms, and perceived behavioral control. The constructs of attitudes were split into instrumental and experiential attitudes, perceived norms were split into injunctive and descriptive norms, and perceived behavioral control was split into capacity and autonomy (Table 25). The second model predicted 48.1% of the variance of intention to discontinue binge drinking for the next 30 days which is 2.4% higher than the model 1. In the model 2, only experimental attitude ($\beta=.358$, $p<0.001$),

injunctive norms (β=.2594, *p*=0.011), and descriptive norms (β=-.168, *p*=<0.015) were significant predictors of intentions. More specifically, when all other variables held constant, one unit increase in experiential attitude such as believing continuing not to binge drink could be more enjoyable can increases behavioral intention to stop binge drinking by .358. Similarly, one unit increase in social pressure, such as if participants believe the people who are important to the participants thinks participants should continue not to binge drink, participants tend to increase behavior intention to continue not to binge drinking by .201. And for one unit increase in descriptive norms, such as if participants believes people like me binge drinks, the participants behavioral intention to continue not to binge drink decreases by .168.

Table 25. Binge Drinkers - Parameter Estimates and Model Prediction (n=137)

	Adjusted R^2	Standardized coefficients β	t-value	*p*	Variance Inflation Factor
Model 1: Predicting Intention	.445				
Attitudes		.636	9.235	.001	1.171
Perceived Norms		.018	.268	.789	1.118
PBC		.105	1.537	.127	1.150
Model 2 : Predicting Intention	.481				
Instrumental Attitude		.167	1.687	.094	2.580
Experiential Attitude		.358	3.440	.001	2.861
Injunctive Norm		.201	2.594	.011	1.585
Descriptive Norm		-.168	-2.477	.015	1.211
Capacity		.042	.538	.592	1.616
Autonomy		.096	1.405	.162	1.224

Note: PBC (Perceived Behavioral Control)
*None of the variance inflation factors exceeded a value of 5, so no issues with multicollinearity

Model 3: Predicting intention to continue not to binge drinking in the next 30 days for non-binge drinkers with attitude, perceived norms and perceived behavioral control.

The same regression models were run for the non-binge drinking behavior. Further models were run for non-binge drinking behaviors, social drinkers and abstainers. In Table 26, all three of the core IBM constructs significantly predicted

26.2% of the variance of intentions to continue not to binge drink. Similarly, all three of the core IBM constructs predicted 46.5% of the variance of intentions to continue not to binge drink for social drinkers and only 5.2% for the abstainers. While none of the variables were significant for the abstainers, only perceived behavioral control ($p<.001$) was significant with standardized beta coefficients of .602 for the social drinkers. Thus, for social drinkers when all other variables held constant, one unit increase in perceived behavioral control such as believing to continue to not to binge drinking is easy, can increases behavioral intention to continue not to binge drinking by .602.

Model 4: Predicting intentions to continue not to binge drinking in the next 30 days for non-binge drinkers with instrumental attitudes, experiential attitudes, descriptive norms, injunctive norms, capacity, and autonomy.

The same regression model was used with extended direct measures of attitudes, perceived norms, and perceived behavioral control. The constructs of attitudes were split into instrumental and experiential attitudes, perceived norms were split into injunctive and descriptive norms, and perceived behavioral controls were split into capacity and autonomy (Table 26). The Model 4 predicted 28.1% of the variance of intention to continue not to binge drink for the next 30 days which is 1.9% higher than model 3 with core IBM constructs for non-binge drinkers. Further, 60.7% of the variance of intention to continue not to binge drink for the next 30 days which is 14.2% higher than model 3 with core IBM constructs for social drinkers. Similarly, for abstainers, Model 4 predicted 6% of the variance of the variance of intention to continue not to binge drink for the next 30 days, which was 2.5% higher than model 3 with only core IBM constructs. In model 4, the capacity for both social drinking group

and abstainers, were significant with standardized coefficients with 6.064 and 2.688 respectively. More specifically, the one unit increase in capacity such as having confidence to be able to continue not to binge drink increase behavioral intention to continue not to binge drink by 6.064 for social drinker and by 2.688 for abstainers.

Table 26. Non-binge Drinkers - Parameter Estimates and Model Prediction

	Adjusted R^2	Standardized coefficients β	t-value	*p*	Variance Inflation Factor
Model 3. Non-binge drinkers (n=227)	.262				
Attitudes		.124	1.74	.084	1.281
Perceived Norms		.096	1.501	.135	1.038
PBC		.450	6.362	.000	1.260
Model 3a: Predicting Intention (Social Drinker)(n=72)	.465				
Attitudes		.109	.876	.385	1.221
Perceived Norms		.118	1.167	.248	1.037
PBC		.602	5.130	.000	1.202
Model 3b: Predicting Intention (Abstainer) (n=155)	.040				
Attitudes		.153	1.710	.090	1.042
Perceived Norms		.018	.197	.844	1.040
PBC		.174	1.907	.059	1.081
Model 4 : Predicting Intention (non-binge drinking)(n=72)	.282				
Instrumental Attitude		.185	1.580	.116	3.559
Experimental Attitude		-.074	-.607	.545	3.875
Injunctive Norm		.088	1.165	.245	1.490
Descriptive Norm		.021	.291	.771	1.337
Capacity		.451	5.764	.001	1.581
Autonomy		.047	.672	.502	1.258
Model 4a : Predicting Intention (Social Drinking)(n=72)	.607				
Instrumental Attitude		.042	.236	.814	4.810
Experimental Attitude		.037	.215	.831	4.510
Injunctive Norm		.158	1.517	.135	1.657
Descriptive Norm		-.033	-.367	.715	1.208
Capacity		.653	6.064	.000	1.767
Autonomy		-.007	-.076	.940	1.153
Model 4b : Predicting Intention (Abstainers)(n=155)	.060				
Instrumental Attitude		.165	1.102	.273	2.968
Experimental Attitude		-.044	-.281	.780	3.262
Injunctive Norm		.033	.329	.743	1.346
Descriptive Norm		.002	.023	.982	1.487
Capacity		.286	2.688	.008	1.509
Autonomy		-.009	-.100	.920	1.074

Note: PBC (Perceived Behavioral Control)
*None of the variance inflation factors exceeded a value of 10, so where no issues with multicollinearity

Regression models for predicting binge drinking behavior for the next 30 days with intentions, perceived behavioral control, and knowledge & skills.

Model 5 evaluated participants' drinking behavior at time 2 for the current binge drinkers in time 1. In Table 27, the logistic regression suggested model successfully predicted 16.6% of the drinking behavior (binge drinking vs non-binge drinking) in time 2. Intentions (B=-0.191, Wald=4.080, p=0.043) and perceived behavioral control (B=-.697, Wald=7.654, p=0.006) were significant predictors for predicting drinking behavior for the past 30 days. This suggests that one unit increase in behavioral intention such as trying to stop binge drinking can decrease binge drinking by .191 and one unit increase in perceived behavioral control such as having confidence in in binge drink can decrease binge drinking by .697.

Model 6 evaluated participants engaging in drinking behavior at time 2 for the non-binge drinkers in time 1. The logistic regression suggested model successfully predicted 14.8% of the drinking behavior (binge drinking vs non-binge drinking) in time 2. Only perceived behavioral control (B=-.923, Wald=7.958, p=0.005) was a significant predictor for predicting drinking behavior for the past 30 days. This suggests that one unit increase in behavioral intention such as trying to continue not to binge drinking can decrease binge drinking by .923.

The regression model containing intention, perceived behavior control and knowledge and skill predicted drinking behavior in time 2 for social drinkers and abstainers. The models (Table 28) were able to predict 30.9% and 3.1% of the drinking behavior for the social drinkers and abstainers respectively. For abstainers the results in model 8 no one of the variables emerged as significant predictors for the drinking

behavior but for social drinkers in model 7 only perceived behavioral control (B=-1.697, Wald=5.323, *p*=0.021) was a significant predictor for predicting drinking behavior for the past 30 days. This suggests that one unit increase in behavioral intention such as trying to continue not to binge drinking can decrease binge drinking by 1.697.

Table 27. Model of Logistic Regression for Binge Drinking and Non-binge Drinking with Intentions, Perceived Behavioral Control, and Knowledge & Skills

Drinking Behavior	Omnibus Model	-2 L-L	H-L Test	%	N-R^2	B	SE	Wald	Sig	Exp(B)	95% CI
Model 5											
Binge drinking (Time 2)	18.587	159.27	6.930	73.9	.166						
Intentions						-.191	.094	4.080	.043	.826	[.69, .99]
PBC						-.697	.252	7.654	.006	.498	[.30,.81]
Skills						-1.540	1.565	.968	.325	.214	[.01,4.60]
Constant						4.168	1.847	5.092	.024	64.572	
Model 6											
Non-binge drinking (Time 2)	16.617	138.21	5.806	87.1	.148						
Intentions						-.133	.131	1.023	.312	.876	[.67,1.13]
PBC						-.923	.327	7.958	.005	.397	[.20,.75]
Skills						-.692	1.791	.149	.699	.501	[.01,16.75]
Constant						1.496	2.217	.456	.500	4.466	

*-2 L-L=-2 Log Likelihood; H-L=Hosmar and Lemeshow; %=classification table of overall percent of dependent variables predicted by independent variables; N-R^2=Nagelkerke's R^2; CI=Confidence Interval for Exp(B)

Table 28. Model of Logistic Regression for Social Drinker and Abstainers with Intentions, Perceived Behavioral Control, and Knowledge & Skills

Drinking Behavior	Omnibus Model	-2 L-L	H-L Test	%	N-R^2	B	SE	Wald	Sig	Exp(B)	95% CI
Model 7											
Social Drinker (Time2)	13.066	51.854	3.898	69.8	.309						
Intentions						.107	.316	.115	.734	1.113	[.59, 2.07]
PBC						-1.697	.735	5.323	.021	.183	[.04, .77]
Skills						-1.345	3.046	.195	.659	.261	[.001, 101.94]
Constant						4.59	3.678	1.557	.212	98.499	
Model 8											
Abstainers (Time 2)	.653	66.684	4.862	91.5%	.031						
Intentions						.002	.521	0	.996	1.002	[.361, 2.784]
PBC						-.213	.16	1.77	.183	.808	[.591, 1.106]
Skills						1.062	2.828	.141	.707	2.892	[.011, 739.1]
Constant						-3.085	3.104	.988	.32	.046	

*-2 L-L=-2 Log Likelihood; H-L=Hosmar and Lemeshow; %=classification table of overall percent of dependent variables predicted by independent variables; N-R^2=Nagelkerke's R^2; CI=Confidence Interval for Exp(B)

Regression models for predicting binge drinking behavior for the next 30 days with experiential attitudes, descriptive norms, intentions, perceived behavioral control, and knowledge & skills.

Model 9 evaluated participants' drinking behavior at time 2 for the current binge drinkers in time 1. In Table 29, the logistic regression suggested model 9 successfully predicted 21.5% of the drinking behavior (binge drinking vs non-binge drinking) in time 2 which was 4.9% higher compared to model 5. In the model only descriptive norms (B=.304, Wald=4.198, p=0.040) and perceived behavioral control (B=-.577, Wald=.252, p=0.022) were significant predictors for predicting drinking behavior for the past 30 days. More specifically, one unit increases in descriptive norms such as if participants believe people like me binge drinks, the participants behavioral intention to continue not to binge drink increases by.304. Similarly, one unit increase in perceived behavioral control such as having confidence in continuing not to binge drink can decrease binge drinking by .577.

Model 10 evaluated participants engaging in drinking behavior at time 2 for the non-binge drinkers in time 1. The logistic regression suggested model successfully predicted 15.5% of the drinking behavior (binge drinking vs non-binge drinking) in time 2 which was 0.7% higher than model 6. However, none of the variables emerges as significant predictor of the behavior in model 9 for the non-binge drinkers.

The models (Table 30) were able to predict 32.2% and 9.7% of the drinking behavior for the social drinkers and abstainers respectively. For abstainers the results in model 12 no one of the variables emerged as a significant predictors of the drinking

behavior but for social drinkers in model 11 only perceived behavioral control (B=-1.997, Wald=4.577, *p*=0.032) was a significant predictor for predicting drinking behavior for the past 30 days. Thus, for social drinkers, one unit increase in perceived behavioral control such as having confidence in continuing not to binge drink can decrease binge drinking by 1.997.

Table 29. Model of Logistic Regression for Binge Drinking and Non-binge Drinking with Experiential Attitudes, Descriptive Norms, Intentions, Perceived Behavioral Control, and Knowledge & Skills

Drinking Behavior	Omnibus Model	-2 L-L	H-L Test	%	N-R^2	B	SE	Wald	Sig	Exp(B)	95% CI
Model 9											
Binge drinking (Time 2)	23.637	148.45	8.35	74.1	.215						
Experiential Attitude						-.243	.182	1.773	.183	.784	[.55, 1.12]
Descriptive Norms						.304	.148	4.198	.040	1.355	[1.01, 1.81]
Intentions						-.012	.128	.009	.923	.988	[.768,.127]
PBC						-.577	.252	5.241	.022	.561	[.343, .920]
Skills						-.711	1.647	.186	.666	.491	[.019, 12.39]
Constant						3.193	1.893	2.845	.092	24.367	
Model 10											
Non-binge drinking (Time 2)	17.093	135.76	5.318	86.6	.155						
Experiential Attitude						-0.164	0.161	1.042	0.307	0.848	[0.62, 1.16]
Descriptive Norms						0.025	0.181	0.020	0.889	1.026	[0.72, 1.46]
Intentions						-0.116	0.133	0.763	0.382	0.891	[0.69, 1.15]
PBC						-0.730	0.380	3.694	0.055	0.482	[0.23, 1.10]
Skills						-0.929	1.828	0.258	0.611	0.395	[0.01, 14.21]
Constant						1.628	2.262	0.518	0.472	5.092	

*-2 L-L=-2 Log Likelihood; H-L=Hosmar and Lemeshow; %=classification table of overall percent of dependent variables predicted by independent variables; N-R^2=Nagelkerke's R^2; CI=Confidence Interval for Exp(B)

Table 30. Model of Logistic Regression for Social Drinker and Abstainers with Experiential Attitudes, Descriptive Norms, Intentions, Perceived Behavioral Control, and Knowledge & Skills

Drinking Behavior	Omnibus Model	-2 L-L	H-L Test	%	N-R^2	B	SE	Wald	Sig	Exp(B)	95% CI
Model 11											
Social Drinker (Time2)	13.455	50.738	8.809	75	.322						
Experiential Attitude						0.159	0.307	0.269	0.604	1.173	[0.64, 2.14]
Descriptive Norms						-0.054	0.309	0.031	0.861	0.948	[0.52,1.73]
Intentions						0.118	0.339	0.121	0.728	1.125	[0.58, 2.19]
PBC						-1.997	0.933	4.577	0.032	0.136	[0.02, 0.85]
Skills						-2.001	3.298	0.368	0.544	0.135	[0.00, 86.70]
Constant						5.741	4.146	1.918	0.166	311.31	
Model 12											
Abstainers (Time 2)	3.686	65.500	13.454	91.8	.097						
Experiential Attitude						-0.076	0.249	0.092	0.762	0.927	[0.57,1.51]
Descriptive Norms						0.137	0.263	0.273	0.602	1.147	[0.69,1.92]
Intentions						-0.168	0.177	0.898	0.343	0.845	[0.60,1.20]
PBC						-0.345	0.394	0.769	0.381	0.708	[0.33,1.53]
Skills						0.789	2.833	0.078	0.781	2.202	[0.01,568.31]
Constant						-1.670	3.245	0.265	0.607	0.188	

*-2 L-L=-2 Log Likelihood; H-L=Hosmar and Lemeshow; %=classification table of overall percent of dependent variables predicted by independent variables; N-R^2=Nagelkerke's R^2; CI=Confidence Interval for Exp(B)

Determinants of Attitudes, Perceived Norms, and Perceived Behavioral Control

Attitudes

Six items evaluated behavioral beliefs and six items evaluated the corresponding outcome evaluations. As previously discussed in the methods section, each behavioral belief was multiplied by an outcome evaluation, and then correlated to total attitudes (TA), total instrumental attitudes (TIA), and total experiential attitudes (TEA).

For discontinuing binge drinking among binge drinkers, participants' beliefs about having fun ($p<0.001$) was the only items that had significant correlations with total attitudes, total instrumental attitudes, and total experiential attitudes. Similarly, being social ($p<0.05$) had a significant correlation with total experiential attitudes only (Table 31).

For continuing to not to binge drink among non-binge drinkers, having fun was ($P<0.01$) significantly correlated with total attitudes, instrumental attitudes, and total experiential attitudes. Similarly being social ($p<0.05$), was significantly correlated with total experiential attitudes (Table 32). For continuing to not to binge drink among social drinkers, being social ($p<0.05$) was significantly correlated with total instrumental attitudes, and total experiential attitudes. Similarly, being relaxed ($p<0.05$), was significantly correlated with the total attitude (Table 33). For continuing to not to binge drink among abstainers, participants' beliefs about being relaxed ($p<0.01$) and having fun ($p<0.05$) were items that had significant correlations with total attitudes, total instrumental attitudes, and total experiential attitudes. Being social had a significant correlation with total experiential attitudes ($p<0.05$) only (Table 34).

Table 31. Binge drinkers-Indirect Attitudes: Behavioral Belief, Outcome Evaluation, Belief-Evaluation Product, and Correlations of Belief Evaluation Product with Direct Attitude Measure (n=162)

Behavioral Belief	Belief Strength (bbi)		Outcome Evaluation (oe_i)		bb_ixoe_i		Correlation bb_ioe_i with		
	M	SD	M	D	M	D	TA	TIA	TEA
If I stop binge drinking within the next 30 days, I will									
…..have fun	5.16	1.61	-1.70	0.88	-8.85	5.39	-.28**	-.24**	-.28**
…..be social	4.97	1.72	-1.82	1.03	-9.01	5.98	-0.12	-0.03	-.19*
…..feel safe	5.67	1.47	-1.36	0.79	-7.51	4.40	-0.03	-0.01	-0.04
….be relaxed	5.10	1.72	-1.62	0.91	-8.22	5.55	-0.05	-0.04	-0.06
…..feel pride in myself	5.02	1.79	-1.53	0.90	-7.70	5.32	-0.15	-0.13	-0.14
….have good grades	5.54	1.49	-1.35	0.64	-7.40	3.80	-0.09	-0.06	-0.11

Note. Belief strength can range from 1 to 7 and outcome evaluation can range from -3 to 3, and bb x oe can range from -21 to 21. TA means Total Attitudes, TIA means Total Instrumental Attitudes and TEA means Total Experiential Attitudes.
*Significant: **$p \leq 0.01$, *$p \leq 0.05$

Table 32. Non-binge drinkers-Indirect Attitudes: Behavioral Belief, Outcome Evaluation, Belief-Evaluation Product, and Correlations of Belief Evaluation Product with Direct Attitude Measure (n=227)

Behavioral Belief	Belief Strength (bb_i)		Outcome Evaluation (oe_i)		bb_ixoe_i		Correlation bb_ioe_i with		
	M	SD	M	D	M	D	TA	TIA	TEA
If I stop binge drinking within the next 30 days, I will									
…..have fun	6.47	1.17	-1.83	0.93	-11.71	6.36	$-.176^{**}$	$-.152^{*}$	$-.181^{**}$
…..be social	6.11	1.53	-1.76	1.05	-10.64	7.18	$-.162^{*}$	-0.11	$-.196^{**}$
…..feel safe	6.52	1.11	-1.40	0.69	-9.17	4.64	0.02	0.05	-0.01
….be relaxed	6.22	1.38	-1.82	0.91	-11.17	6.05	-0.12	-0.08	$-.142^{*}$
…..feel pride in myself	5.96	1.71	-1.55	0.86	-9.14	5.64	-0.10	-0.08	-0.10
….have good grades	6.27	1.40	-1.42	0.71	-8.72	4.58	-0.07	-0.05	-0.08

Note. Belief strength can range from 1 to 7 and outcome evaluation can range from -3 to 3, and bb x oe can range from -21 to 21. TA means Total Attitudes, TIA means Total Instrumental Attitudes and TEA means Total Experiential Attitudes.
*Significant: **$p \leq 0.01$, *$p \leq 0.05$

Table 33. Social drinkers-Indirect Attitudes: Behavioral Belief, Outcome Evaluation, Belief-Evaluation Product, and Correlations of Belief Evaluation Product with Direct Attitude Measure (n=72)

Behavioral Belief	Belief Strength (bb_i)		Outcome Evaluation (oe_i)		$bb_i x oe_i$		Correlation $bb_i oe_i$ with		
	M	SD	M	D	M	D	TA	TIA	TEA
If I stop binge drinking within the next 30 days, I will									
…..have fun	6.59	0.90	-1.65	0.91	-10.63	5.99	-.07	-.11	-.09
…..be social	6.04	1.49	-1.85	1.06	-10.97	7.18	-.19	-.28*	-.25*
…..feel safe	6.61	0.84	-1.36	0.70	-8.99	4.40	.22	.12	.17
….be relaxed	6.31	1.19	-1.75	0.88	-10.77	5.66	.24*	.11	.18
…..feel pride in myself	6.00	1.48	-1.53	0.80	-8.83	4.82	-.02	.00	-.01
….have good grades	6.42	1.17	-1.42	0.73	-8.92	4.64	-.04	-.07	-.06

Note. Belief strength can range from 1 to 7 and outcome evaluation can range from -3 to 3, and bb x oe can range from -21 to 21. TA means Total Attitudes, TIA means Total Instrumental Attitudes, and TEA means Total Experiential Attitudes.
*Significant: **$p \leq 0.01$, *$p \leq 0.05$

Table 34. Abstainers-Indirect Attitudes: Behavioral Belief, Outcome Evaluation, Belief-Evaluation Product, and Correlations of Belief Evaluation Product with Direct Attitude Measure (n=155)

Behavioral Belief	Belief Strength (bb_i)		Outcome Evaluation (oe_i)		$bb_i x oe_i$		Correlation $bb_i oe_i$ with		
	M	SD	M	D	M	D	TA	TIA	TEA
If I stop binge drinking within the next 30 days, I will									
…..have fun	6.41	1.28	-1.91	0.93	-12.21	6.48	-.19*	-.168*	-.195*
…..be social	6.14	1.55	-1.72	1.05	-10.48	7.20	-0.14	-0.08	-.168*
…..feel safe	6.48	1.22	-1.42	0.69	-9.25	4.76	-0.05	-0.03	-0.06
….be relaxed	6.17	1.46	-1.85	0.92	-11.35	6.23	-.26**	-.23**	-.26**
…..feel pride in myself	5.94	1.81	-1.55	0.89	-9.28	5.99	-0.13	-0.10	-0.14
….have good grades	6.21	1.49	-1.43	0.71	-8.63	4.57	-0.07	-0.05	-0.09

Note. Belief strength can range from 1 to 7 and outcome evaluation can range from -3 to 3, and bb x oe can range from -21 to 21. TA means Total Attitudes, TIA means Total Instrumental Attitudes and TEA means Total Experiential Attitudes.
*Significant: **$p \leq 0.01$, * $p \leq 0.05$

Injunctive Norms

Three items evaluated injunctive normative beliefs and another three items evaluated motivation to comply. The value that was obtained by multiplying the corresponding items to one another was then correlated to total perceived norms (TPN) and total injunctive norms (TIN) (Table 35-38).

For discontinuing binge drinking among binge drinkers, parents ($p<0.05$) were only significantly correlated to total perceived norms. For non-binge drinking, parents were significantly correlated with total perceived norms (TPN) and significant other was significantly correlated with total injunctive norms (TIN). For social drinkers, family members ($p<0.01$) were only significantly correlated with total perceived norms (TPN) and total injunctive norms (TIN). And for abstainers, only family member ($p<0.01$) was significantly correlated with total perceived norms (TPN).

Descriptive Norms

Three items evaluated descriptive normative beliefs and another three items evaluated identification with referents. The value that was obtained by multiplying the corresponding items to one another was then correlated to total perceived norms (TPN) and direct measures of total descriptive norms (TDN) (Table 39-42).

For discontinuing binge drinking among binge drinkers, undergraduate students on this campus ($p<0.05$) were only significantly correlated to total perceived norms. For non-binge drinkers, all composite values were correlated with total descriptive norms (TDN). For social drinkers, all descriptive norms, undergraduate students on this campus ($p<0.05$), undergraduate students in the US ($p<0.01$) and people in my age group ($p<0.05$) were significantly correlated with total descriptive norms (TIN) but none of the descriptive norms were significantly correlated with total perceived norms. And for abstainers, none of the descriptive norms were significantly correlated with total perceived norms (TPN) as well total descriptive norms (TDN).

Table 35. Binge drinkers-Injunctive Norms: Injunctive Normative Belief, Motivation to Comply, Belief-comply Product, and Correlations of Belief-Comply Product with Direct Injunctive Measures (n=162)

Normative Belief	Injunctive Normative Beliefs (inb_i)		Motivation to Comply (mtc_i)		inb_i x mtc_i		Correlation inb_i x mtc_i	
	M	SD	M	D	M	D	TPN	TIN
My …….think(s) that I should stop binge drinking for the next 30 days								
….parents	2.38	1.52	-0.40	1.74	-0.96	4.15	.237*	0.09
….significant Other	3.32	1.82	0.41	1.61	1.90	5.55	0.23	0.22
….family member	4.17	2.00	-0.52	1.76	-1.82	7.98	0.04	0.13

Note. Injunctive Normative Beliefs can range from 1 to 7 and motivation to comply can range from -3 to 3, and inb x mtc can range from -21 to 21. TPN means Total Perceived Norms, TIA means Total Injunctive Norms

*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 36. Non-binge drinkers-Injunctive Norms: Injunctive Normative Belief, Motivation to Comply, Belief-comply Product, and Correlations of Belief-Comply Product with Direct Injunctive Measures (n=227)

Normative Belief	Injunctive Normative Beliefs (inb_i)		Motivation to Comply (mtc_i)		inb_i x mtc_i		Correlation inb_i x mtc_i	
	M	SD	M	D	M	D	TPN	TIN
My …….think(s) that I should stop binge drinking for the next 30 days								
….parents…	4.51	1.66	-0.41	2.00	-0.88	9.61	.268*	.176
….significant other…	5.07	1.53	0.70	1.81	3.16	9.98	.253	.279*
….family member…	6.37	1.24	1.22	1.94	8.95	12.27	.045	.150

Note. Injunctive Normative Beliefs can range from 1 to 7 and motivation to comply can range from -3 to 3, and inb x mtc can range from -21 to 21. TPN means Total Perceived Norms, TIA means Total Injunctive Norms

*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 37. Social drinkers -Injunctive Norms: Injunctive Normative Belief, Motivation to Comply, Belief-comply Product, and Correlations of Belief-Comply Product with Direct Injunctive Measures (n=72)

Normative Belief	Injunctive Normative Beliefs (inb_i)		Motivation to Comply (mtc_i)		inb_i x mtc_i		Correlation inb_i x mtc_i	
	M	SD	M	D	M	D	TPN	TIN
My …….think(s) that I should stop binge drinking for the next 30 days								
….parents	4.02	1.72	-0.70	1.94	-1.20	8.81	.33	.14
….significant Other	4.55	1.46	0.55	1.64	1.26	7.90	.18	.15
….family member	5.91	1.60	0.57	2.01	4.44	11.96	.436**	.491**

Note. Injunctive Normative Beliefs can range from 1 to 7 and motivation to comply can range from -3 to 3, and inb x mtc can range from -21 to 21. TPN means Total Perceived Norms, TIA means Total Injunctive Norms

*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 38. Abstainers-Injunctive Norms: Injunctive Normative Belief, Motivation to Comply, Belief-comply Product, and Correlations of Belief-Comply Product with Direct Injunctive Measures (n=155)

Normative Belief	Injunctive Normative Beliefs (inb_i)		Motivation to Comply (mtc_i)		inb_i x mtc_i		Correlation inb_i x mtc_i	
	M	SD	M	D	M	D	TPN	TIN
My …….think(s) that I should stop binge drinking for the next 30 days								
….parents	4.82	1.56	-0.25	2.03	-0.70	10.12	.06	.23
….significant Other	5.48	1.48	0.83	1.95	4.87	11.40	-.18	.11
….family member	6.61	0.92	1.55	1.82	11.26	11.84	.03	.39**

Note. Injunctive Normative Beliefs can range from 1 to 7 and motivation to comply can range from -3 to 3, and inb x mtc can range from -21 to 21. TPN means Total Perceived Norms, TIA means Total Injunctive Norms
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 39. Binge drinkers-Descriptive Norms: Descriptive Normative Belief, Identification with Referents, Belief –Referents Product, Correlations of Belief-Referents Product with Direct Descriptive Measure (n=162)

Normative Belief	Descriptive Normative Beliefs (dnb_i)		Identification with Referents (iwr_i)		dnb_i x iwr_i		Correlation dnb_i x iwr_i	
	M	SD	M	D	M	D	TPN	TDN
Most…..binge drinks								
….undergraduate students on this campus…	5.49	1.47	0.17	1.68	1.72	9.97	.237*	.091
…undergraduate students in the US..	5.59	1.33	0.25	1.59	1.94	9.59	.233	.224
…people in my age group…	5.44	1.46	0.42	1.62	2.82	9.75	.041	.130

Note. Descriptive Normative Beliefs can range from 1 to 7 and identification with referents can range from -3 to 3, and dnb x iwr can range from -21 to 21. TPN means Total Perceived Norms, TDN means Total Descriptive Norms
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 40. Non-binge drinkers-Descriptive Norms: Descriptive Normative Belief, Identification with Referents, Belief –Referents Product, Correlations of Belief-Referents Product with Direct Descriptive Measure (n=227)

Normative Belief	Descriptive Normative Beliefs (dnb_i)		Identification with Referents (iwr_i)		dnb_i x iwr_i		Correlation dnb_i x iwr_i	
	M	SD	M	D	M	D	TPN	TDN
Most…..binge drinks								
….undergraduate students on this campus…	4.88	1.43	-2.04	1.32	-10.40	7.32	.010	.149*
…undergraduate students in the US..	5.07	1.46	-2.01	1.31	-10.67	7.54	-.012	.175*
…people in my age group…	5.09	1.52	-1.96	1.34	-10.61	7.85	-.062	.166*

Note. Descriptive Normative Beliefs can range from 1 to 7 and identification with referents can range from -3 to 3, and dnb x iwr can range from -21 to 21. TPN means Total Perceived Norms, TDN means Total Descriptive Norms
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 41. Social Drinkers-Descriptive Norms: Descriptive Normative Belief, Identification with Referents, Belief –Referents Product, Correlations of Belief-Referents Product with Direct Descriptive Measure (n=72)

Normative Belief	Descriptive Normative Beliefs (dnb_i)		Identification with Referents (iwr_i)		dnb_i x iwr_i		Correlation dnb_i x iwr_i	
	M	SD	M	D	M	D	TPN	TDN
Most…..binge drinks								
….undergraduate students on this campus…	5.25	1.19	-1.78	1.24	-9.50	6.97	-.07	.254*
…undergraduate students in the US.	5.45	1.21	-1.79	1.23	-9.87	7.38	-.04	.333**
…people in my age group…	5.39	1.44	-1.65	1.30	-9.49	7.23	-.16	.270*

Note. Descriptive Normative Beliefs can range from 1 to 7 and identification with referents can range from -3 to 3, and dnb x iwr can range from -21 to 21. TPN means Total Perceived Norms, TDN means Total Descriptive Norms
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 42. Abstainers-Descriptive Norms: Descriptive Normative Belief, Identification with Referents, Belief –Referents Product, Correlations of Belief-Referents Product with Direct Descriptive Measure (n=155)

Normative Belief	Descriptive Normative Beliefs (dnb_i)		Identification with Referents (iwr_i)		dnb_i x iwr_i		Correlation dnb_i x iwr_i	
	M	SD	M	D	M	D	TPN	TDN
Most…..binge drinks								
….undergraduate students on this campus…	4.71	1.50	-2.15	1.34	-10.82	7.46	.039	.086
..undergraduate students in the US.	4.90	1.54	-2.11	1.34	-11.04	7.61	-.020	.089
…people in my age group…	4.96	1.54	-2.11	1.33	-11.14	8.09	-.026	.109

Note. Descriptive Normative Beliefs can range from 1 to 7 and identification with referents can range from -3 to 3, and dnb x iwr can range from -21 to 21. TPN means Total Perceived Norms, TDN means Total Descriptive Norms
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Perceived Behavioral Control

Four items evaluated perceived power and another four items evaluated control beliefs, the value obtained by multiplying the corresponding items to one another was then correlated to total PBC (TPBC) and direct measures of total capacity (CAP) and total autonomy (AUT).

For binge drinkers, the only item that was significantly correlated with all total PBC (TPBC) ($p<0.01$) and direct measures of total capacity (CAP) ($p<0.01$) and total autonomy (AUT) ($p<0.05$) was "you plan to go to a bar" ($p<0.05$). The items "your

friends will binge drink in front of you" and "your friends will pressure you to binge drink" were significantly correlated with total PBC (TPBC) ($p<0.01$) and direct measures of total capacity (CAP) ($p<0.01$) (Table 43).

For non-binge drinkers, the composite score was significantly correlated with both total PBC (TPBC) ($p<0.01$) and total capacity (CAP) ($p<0.01$) except "you will drink moderately" was not correlated with total PBC (TPBC) and autonomy (AUT) (Table 44).

The social drinker item, "your friends will binge drink in front of you" was correlated with total PBC (TPBC) ($p<0.01$) and direct measures of total capacity (CAP) ($p<0.01$). Similarly, the item "you will drink moderately" was significantly correlated with total PBC (TPBC) ($p<0.05$) and direct measures of total capacity (CAP) ($p<0.01$) (Table 45).

For abstainers, the "your friends will binge drink in front of you" item was correlated with total PBC (TPBC) ($p<0.01$), direct measures of total capacity (CAP) ($p<0.01$), and total autonomy (AUT) ($p<0.01$) significantly. The item "you will drink moderately" was significantly correlated with total PBC (TPBC) ($p<0.01$) and total autonomy (AUT) ($p<0.01$). The item "your friends will pressure you to binge drink" was significantly correlated with total PBC (TPBC) ($p<0.01$) and direct measures of total capacity (CAP) ($p<0.01$). And finally, the item "you plan to go to a bar" was significantly correlated with total PBC (TPBC) ($p<0.05$) and direct measures of total capacity (CAP) ($p<0.01$) (Table 46).

Table 43. Binge drinkers-Perceived Behavioral Control: Control Beliefs, Perceived Power, Belief –Power Product, Correlations of Belief-Power Product with Direct Perceived Behavioral Control Measure (n=162)

Control Belief	Control Beliefs (cb_i)		Perceived Power (pp_i)		cb_i x pp_i		Correlation cb_i $pp_{i\ with}$		
	M	SD	M	D	M	D	TPBC	TC	AUT
How likely is it that ….in the next 30 days?									
….your friends will binge drink in front of you ….	1.86	1.63	3.72	2.15	7.66	8.20	-.315**	-.384**	-0.13
….you will drink moderately….	1.09	2.01	3.09	1.87	3.11	7.32	0.16	0.13	0.14
….your friends will pressure you to binge drink….	-0.63	2.08	3.27	2.08	0.49	7.93	-.263**	-.292**	-0.14
….you plan to go to a bar	0.93	2.43	3.56	2.17	5.42	9.19	-.349**	-.407**	-.163*

Note. Control Beliefs can range from 1 to 7, perceived power can range from -3 to 3, and cb x pp can range from -21 to 21. TPBC means Total Perceived Behavioral Control
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 44. Non-binge drinkers-Perceived Behavioral Control: Control Beliefs, Perceived Power, Belief –Power Product, Correlations of Belief-Power Product with Direct Perceived Behavioral Control Measure (n=227)

Control Belief	Control Beliefs (cb_i)		Perceived Power (pp_i)		cb_i x pp_i		Correlation cb_i $pp_{i\ with}$		
	M	SD	M	D	M	D	TPBC	TC	AUT
How likely is it that ….in the next 30 days?									
….your friends will binge drink in front of you ….	1.84	1.45	-1.23	2.05	-1.02	5.18	-.406**	-.418**	-.206**
….you will drink moderately….	1.55	1.27	-1.48	2.14	-1.51	4.37	-.129	-.288**	.039
….your friends will pressure you to bring….	1.83	1.50	-2.24	1.43	-3.18	4.54	-.228**	-.195**	-.187**
….you plan to go to a bar ...	1.64	1.37	-1.92	1.95	-2.34	4.94	-.227**	-.248**	-.251**

Note. Control Beliefs can range from 1 to 7, perceived power can range from -3 to 3, and cb x pp can range from -21 to 21. TPBC means Total Perceived Behavioral Control
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 45. Social drinker -Perceived Behavioral Control: Control Beliefs, Perceived Power, Belief –Power Product, Correlations of Belief-Power Product with Direct Perceived Behavioral Control Measure (n=72)

Control Belief	Control Beliefs (cb_i)		Perceived Power (pp_i)		cb_i x pp_i		Correlation cb_i $pp_{i\ with}$		
	M	SD	M	D	M	D	TPBC	TC	AUT
How likely is it that ….in the next 30 days?									
….your friends will binge drink in front of you ….	-.68	2.11	2.18	1.53	-.11	4.82	-.385**	-.525**	0.09
….you will drink moderately….	.71	2.07	1.78	1.50	1.97	4.95	-.272*	-.392**	0.09
….your friends will pressure you to binge drink….	-2.04	1.53	2.00	1.52	-3.44	4.27	-0.16	-0.17	-0.04
….you plan to go to a bar	-.75	2.41	1.82	1.55	-.72	5.61	-0.10	-0.11	-0.01

Note. Control Beliefs can range from 1 to 7, perceived power can range from -3 to 3, and cb x pp can range from -21 to 21. TPBC means Total Perceived Behavioral Control
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Table 46. Abstainer -Perceived Behavioral Control: Control Beliefs, Perceived Power, Belief –Power Product, Correlations of Belief-Power Product with Direct Perceived Behavioral Control Measure (n=155)

Control Belief	Control Beliefs (cb_i)		Perceived Power (pp_i)		cb_i x pp_i		Correlation cb_i $pp_{i\ with}$		
	M	SD	M	D	M	D	TPBC	TC	AUT
How likely is it that ….in the next 30 days?									
….your friends will binge drink in front of you ….	-1.48	1.98	1.67	1.38	-1.45	5.30	-.347**	-.348**	-.227**
….you will drink moderately….	-2.50	1.21	1.45	1.14	-3.19	2.82	.241**	0.10	.261**
….your friends will pressure you to binge drink….	-2.32	1.38	1.75	1.48	-3.06	4.68	-.239**	-.258**	-0.14
….you plan to go to a bar	-2.46	1.41	1.56	1.27	-3.11	4.41	-.191*	-.300**	-0.05

Note. Control Beliefs can range from 1 to 7, perceived power can range from -3 to 3, and cb x pp can range from -21 to 21. TPBC means Total Perceived Behavioral Control
*Significant **$p \leq 0.01$, *$p \leq 0.05$.

Difference in Demographic variables for the IBM constructs

Gender: The independent *t*-test for the difference in IBM constructs based on gender (male and female) is presented in Table 47-50. Females (m=.70 ±1.32) reported a higher level of attitude among binge drinkers than males (m=-.10±1.16), *t* (156) =-3.769, *p*=0.001). Similarly, intention was found to be higher among females (m=-.44 ±2.13) compare to males (m=-.158±1.77), *t* (156) =-3.320, *p*=0.001).

No other gender difference was observed in binge drinkers, social drinkers, and abstainers for any other constructs.

Table 47. Binge Drinkers: Independent t-test Results for the difference in IBM Constructs based on the Gender (male and female) (n=161)

IBM Constructs	Male (n=55)		Female (n=103)		t-value	df	*p*
	Mean	SD	Mean	SD			
Attitude	-.10	1.16	.70	1.32	-3.769	156	0.001
Perceived norms	-.43	1.28	-.21	1.18	-.994	97.80	.323
Perceived Behavioral Control	2.13	1.14	1.91	1.24	1.135	116.11	.259
Intentions	-1.58	1.77	-.44	2.13	-3.320	148	.001
Knowledge	1.12	.136	1.10	.124	.763	102.39	.447

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 48. Non-binge Drinkers: Independent t-test Results for the difference in IBM Constructs based on the Gender (male and female) (n=227)

IBM Constructs	Male (n=70)		Female (n=153)		t-value	df	*p*
	Mean	SD	Mean	SD			
Attitude	2.26	1.25	2.36	1.24	-.570	131.31	.569
Perceived norms	0.24	0.76	0.31	0.80	-.585	119.67	.560
Perceived Behavioral Control	2.67	0.67	2.79	0.51	-1.468	220	.144
Intentions	1.95	1.86	2.30	1.56	-1.377	196	.170
Knowledge	1.12	0.14	1.10	0.11	1.105	109.603	.272

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 49. Social Drinkers: Independent t-test Results for the difference in IBM Constructs based on the Gender (male and female) (n=72)

IBM Constructs	Male (n=25) Mean	SD	Female (n=46) Mean	SD	t-value	df	*p*
Attitude	1.96	1.33	1.93	1.45	.07	50.59	.943
Perceived norms	0.20	0.72	0.19	1.13	.07	59.685	.943
Perceived Behavioral Control	2.47	0.66	2.48	0.78	-.08	54.402	.934
Intentions	1.72	1.73	1.88	1.86	-.34	48.79	.735
Knowledge	1.15	0.16	1.10	0.11	1.38	34.74	.176

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 50. Abstainers: t-test Results for the difference in IBM Constructs based on the Gender (male and female) (n=155)

IBM Constructs	Male (n=45) Mean	SD	Female (n=107) Mean	SD	t-value	df	*p*
Attitude	2.42	1.19	2.55	1.10	-.621	77.57	.536
Perceived norms	0.23	0.77	0.37	0.62	-1.010	58.39	.317
Perceived Behavioral Control	2.65	0.85	2.71	0.61	-.431	63.93	.668
Intentions	2.08	1.94	2.48	1.39	-1.349	133	.180
Knowledge	1.10	0.13	1.10	0.12	.248	75.65	.805

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Year in College:

The One-way ANOVA for the difference in IBM constructs based on the years in college is presented is presented in Table 51-54. For the binge drinkers, there was a significant difference between attitude [F(3,157)=2.45, *p*=0.07] and perceived behavioral control [F(3,156)=3.54, *p*=0.02] based on the year in college. For the non-binge drinkers, there was a significant group difference based on the year in the college between attitude [F(3,222)=2.51, *p*=0.06] and perceived behavioral control [F(3,222)=3.96, *p*=0.01]. For social drinkers, there was a significant difference between perceived norms [F(3,62)=3.95, *p*=0.01] based on the year in college. For the abstainers, there was a significant difference between attitude [F(3,148)=2.914, *p*=0.04] based on the year in college.

Table 51. Binge drinkers: Results of the one-way ANOVA among in IBM constructs for the year in college

IBM Constructs	1st year (n=30)		2nd year (n=33)		3rd year (n=40)		4th year (n=58)		F	*p*
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Attitude	.77	1.42	.05	1.31	.21	1.12	.65	1.42	2.45	0.07
Perceived norms	-.56	1.09	-.21	1.13	-.34	.99	-.17	1.45	0.62	0.61
Perceived Behavioral Control	2.58	.63	1.71	1.50	2.07	.96	1.82	1.30	3.54	0.02
Intentions	-.99	2.11	-1.20	2.18	-.89	1.86	-.52	2.18	0.79	0.50
Knowledge	1.13	.11	1.12	.14	1.14	.15	1.08	.11	2.00	0.12

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 52. Non-binge drinkers: Results of the one-way ANOVA among in IBM constructs for the year in college

IBM Constructs	1st year (n=30)		2nd year (n=33)		3rd year (n=40)		4th year (n=58)		F	*p*
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Attitude	2.43	1.16	2.59	0.85	2.26	1.11	1.98	1.68	2.51	0.06
Perceived norms	0.33	0.71	0.39	0.64	0.25	0.91	0.13	0.90	1.03	0.38
Perceived Behavioral Control	2.88	0.38	2.83	0.46	2.72	0.56	2.54	0.82	3.97	0.01
Intentions	2.03	1.95	2.47	1.29	2.02	1.88	2.14	1.58	0.86	0.46
Knowledge	6.10	5.85	7.41	3.87	6.06	5.63	6.42	4.75	0.86	0.46

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 53. Social drinkers: Results of the one-way ANOVA among in IBM constructs for the year in college

IBM Constructs	1st year (n=7)		2nd year (n=14)		3rd year (n=25)		4th year (n=26)		F	*p*
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Attitude	1.83	1.10	2.21	1.20	1.75	1.28	1.99	1.66	.34	.80
Perceived norms	0.73	0.88	0.72	0.76	0.10	1.05	-0.26	0.92	3.95	.01
Perceived Behavioral Control	2.50	0.53	2.39	0.93	2.47	0.78	2.54	0.65	.13	.94
Intentions	2.33	1.21	1.64	2.02	1.59	2.02	2.09	1.57	.48	.70
Knowledge	1.06	0.10	1.13	0.13	1.13	0.13	1.13	0.15	.60	.62

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 54. Abstainers: Results of the One-way ANOVA among in IBM Constructs for the Year in College

IBM Constructs	1st year (n=52)		2nd year (n=49)		3rd year (n=27)		4th year (n=27)		F	*p*
	Mean	SD	Mean	SD	Mean	SD	Mean	SD		
Attitude	2.51	1.16	2.69	0.70	2.71	0.69	1.97	1.72	2.91	0.04
Perceived norms	0.25	0.67	0.28	0.56	0.40	0.73	0.45	0.73	0.65	0.58
Perceived Behavioral Control	2.77	0.66	2.68	0.58	2.72	0.51	2.48	1.04	1.11	0.35
Intentions	1.99	2.04	2.71	0.89	2.41	1.68	2.18	1.62	1.59	0.19
Knowledge	1.10	0.11	1.11	0.13	1.10	0.13	1.10	0.12	0.07	0.98

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Greek membership: The independent *t*-test for the difference in IBM constructs based on Greek membership (yes and no) is presented in Table 55-58. None of the variables related to Greek membership were significantly different for binge drinkers and non-binge drinkers (social drinkers, and abstainers) for any IBM constructs.

Table 55. Binge Drinkers: Independent t-test Results for the difference in IBM Constructs based on the Greek Membership (Yes and No)

IBM Constructs	Yes (n=52)		No (n=109)		t-value	df	*p*
	Mean	SD	Mean	SD			
Attitude	.41	1.50	.45	1.27	-.182	87.157	.856
Perceived norms	-.06	1.11	-.39	1.26	1.560	90.482	.122
Perceived Behavioral Control	1.76	1.51	2.11	1.01	-1.776	158	.078
Intentions	-.69	2.21	-.90	2.04	.564	79.293	.575
Knowledge	1.10	.13	1.12	.13	-.703	94.645	.484

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 56. Non-binge Drinkers: Independent t-test Results for the difference in IBM Constructs based on the Greek Membership (Yes and No)

IBM Constructs	Yes (n=37)		No (n=190)		t-value	df	*p*
	Mean	SD	Mean	SD			
Attitude	1.99	1.36	2.39	1.20	-1.822	220	.070
Perceived norms	0.36	0.74	0.27	0.80	.651	56.04	.518
Perceived Behavioral Control	2.50	0.74	2.80	0.53	-2.960	224	.003
Intentions	1.76	1.91	2.26	1.62	-1.391	39.864	.172
Knowledge	1.10	0.14	1.11	0.12	-.282	47.45	.780

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 57. Social Drinkers: Independent t-test Results for the difference in IBM Constructs based on the Greek Membership (Yes and No)

IBM Constructs	Yes (n=16) Mean	SD	No (n=56) Mean	SD	t-value	df	*p*
Attitude	1.79	1.37	1.99	1.40	-.499	25.028	.622
Perceived norms	0.30	0.81	0.15	1.06	.595	32.607	.556
Perceived Behavioral Control	2.24	0.85	2.55	0.69	-1.348	21.044	.192
Intentions	1.62	2.01	1.91	1.75	-.487	18.862	.632
Knowledge	1.13	0.16	1.12	0.13	.114	20.558	.910

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Table 58. Abstainers: Independent t-test Results for the difference in IBM Constructs based on the Gender Greek Membership (Yes and No)

IBM Constructs	Yes (n=21) Mean	SD	No (n=134) Mean	SD	t-value	df	*p*
Attitude	2.14	1.37	2.56	1.07	-1.56	150.00	0.12
Perceived norms	0.40	0.73	0.31	0.65	0.57	25.74	0.58
Perceived Behavioral Control	2.48	0.87	2.71	0.66	-1.46	152.00	0.15
Intentions	1.87	1.88	2.41	1.55	-1.16	20.62	0.26
Knowledge	1.09	0.12	1.11	0.12	-0.70	26.72	0.49

Note: All IBM constructs scale range between -3 to 3 except knowledge which ranges between 1-2

Chapter 5: Conclusions and Discussions

Binge drinking among undergraduates remains a pervasive problem throughout the nation (ACHA/NCHA II, 2016). According to the National Center for Health Statistics (2005), alcohol misuse is considered the third leading cause of death for the college-aged population. Binge drinking is reportedly responsible for various problems ranging in severity from mild hangover to the severity of death. Additionally, public and private academic institutions are frequently burdened with the cost of preventive substance abuse and counseling programs, as well as covering damages incurred from drunken episodes. Recognizably an issue, a number of strategies to reduce binge drinking behavior and its negative consequences has been tried, but results of such efforts have not been encouraging. Discouragement is due largely from the results of studies that show the binge drinking prevalence among undergraduate students remaining relatively unchanged at around a 40%f prevalence rate of binge drinking among college students in past decade (Core Institute, 2011). This suggests that understanding binge drinking behavior among college students is a daunting task.

In the past, the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB), the predecessors of the IBM, have shown promise to predict high-risk behavior among college students (Braun, Glassman, Dake, Jordan, & Yingling, 2014). The IBM is an extended version of the TRA and TPB and includes additional concepts that could help to predict binge-drinking behavior among college students. However, there has been limited research using the IBM to assess binge-drinking behaviors. Thus, this study is designed to

identify predictive factors of binge drinking among college students based on the IBM, which could contribute to designing effective interventions in future.

In this chapter first hypotheses will be reviewed, followed by the implications of the research and how it related to current literature. Further, the chapter will continue with limitations, implications of the current study towards health promotion, future directions, and conclusions.

Hypothesis Testing

Eight research questions were initially developed, resulting in the generation of sixteen theoretical hypotheses. Six set of hypotheses were generated based on those research questions and theoretical hypotheses. A *priori* criterion for the significance levels was set at $p<0.05$.

Hypothesis set 1: Relationship among IBM constructs (attitude, perceived norms, and perceived behavioral control) and behavioral intentions.

The first research questions stated "To what extent are the IBM constructs (attitude, perceived norms, and perceived behavioral control) associated with behavioral intention to: a. discontinue binge drinking in the next 30 days for current binge drinkers? b. to continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers)? Two hypotheses were derived from these two research questions.

Hypothesis 1: Attitudes, perceived norms, and perceived behavioral control will be significantly related to behavioral intention to discontinue binge drinking for the next 30 days for the current binge drinkers.

A Pearson correlation (*r*) was calculated to examine the strength of the association between IBM constructs (attitudes, perceived norms, and perceived behavioral control) and behavioral intention among binge drinkers. A significant, moderate positive correlation was behavioral intention resulted for attitude [(r (162) = 0.653, $p < 0.001$)] and perceived behavioral control [(r (162) = 0.266, $p < 0.001$)]. Based on this result, the hypothesis which stated that there would be a significant relationship is accepted for attitude and perceived behavioral control but not for the perceived norms.

Hypothesis 2: Attitudes, perceived norms, and perceived behavioral control will be significantly related to the behavioral intention to continue not to binge drink for the next 30 days for the participants who currently do not binge drink.

A Pearson's correlation (*r*) was calculated to examine the strength of the association between IBM constructs (attitudes, perceived norms, and perceived behavioral control) and behavioral intention among non-binge drinkers. Again, a significant, moderate positive correlation was behavioral intention resulted for attitude [(r (227) = 0.333, $p < 0.001$)] and perceived behavioral control [(r (227) = 0.494, $p < 0.001$)]. Based on this result, the hypothesis, which stated that there would be a significant relationship, is accepted for attitude and perceived behavioral control, but not for the perceived norms.

Separately analyzed was the behavior of non-binge drinkers as social drinkers and abstainers. For social drinkers all constructs [attitude r (72) = 0.508, $p < 0.001$; perceived norms r (72) = 0.270, $p < 0.05$; and perceived behavioral

control r (72) = 0.727, $p < 0.001$)] were significantly, moderately positively correlated with behavioral intention. Based on this result, the hypothesis which stated that there would be a significant relationship is accepted for social drinkers. For abstainers only attitude [(r (155) = 0.333, $p < 0.001$)] and perceived behavioral control [(r (155) = 0.316, $p < 0.001$)] were significantly, moderately positively correlated with behavioral intention)]. Based on this result, the hypothesis which stated that there would be a significant relationship is accepted for attitude and perceived behavioral control but not for the perceived norms.

Hypothesis set 2: Test for significance of the IBM constructs (attitude, perceived norms, and perceived behavioral control) on behavioral intentions.

The second and third research questions stated "To what extent are direct measures of the IBM constructs (attitudes, perceived norms, and perceived behavioral control) and extended direct measures of the IBM constructs (experiential attitude, instrumental attitude, injunctive norms, descriptive norms, capacity, and autonomy) predicts the behavioral intentions to a) discontinue binge drinking in the next 30 days for the binge drinkers?; b) continue not to binge drink for the next 30 days for the participants for the non-binge drinkers (social drinkers and abstainers)? Four hypotheses were derived to address these research questions.

Hypothesis 3: IBM constructs (attitudes, perceived norms, and perceived behavioral control) will collectively and significantly predict the behavioral intention to discontinue binge drinking for the next 30 days for current binge drinkers.

Multiple linear regressions were conducted to examine if attitude, perceived norms, and perceived behavioral control could significantly predict the behavioral intention to discontinue binge drinking for the next 30 days for the current binge drinkers. A model including attitude, perceived norms, and perceived behavioral control was able to predict 45.7% of the variance of intentions for current binge drinkers to discontinue binge drinking. However, only attitude ($p<0.001$) was found to be significant. Thus, based on this result, the alternate hypothesis, which suggests that at least one variable will significantly predict the behavioral intention was accepted.

Hypothesis 4: The extended measures of IBM constructs (instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity, and autonomy) will collectively and significantly predict the behavioral intention to continue not to binge drink for the next 30 days for the participants who are not currently binge drinking.

Multiple linear regressions were conducted with extended direct measures of attitudes, perceived norms, and perceived behavioral control. The constructs of attitudes were split into instrumental and experiential attitudes, perceived norms were split into injunctive and descriptive norms, and perceived behavioral control was split into capacity and autonomy. The model predicted 48.1% of the variance of intention to discontinue binge drinking for the next 30 days. However, only experimental attitude, injunctive norms, and descriptive norms were significant predictors of intentions. Thus, based on this result, the alternate hypothesis which

suggests that at least one variable will significantly predict the behavioral intention was accepted.

Hypothesis 5: Attitudes, perceived norms, and perceived behavioral control will collectively and significantly predict behavioral intention to continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers).

Multiple regressions were conducted to examine if attitude, perceived norms, and perceived behavioral control will significantly predict the behavioral intention to continue not to binge drink for the next 30 days for the non-binge drinkers. All three of the core IBM constructs significantly predicted 26.2% of the variance of intentions to continue not to binge drinking. For social drinkers, all three of the core IBM constructs predicted 46.4% of the variance of intentions to continue not to binge drinking and only 4% for the abstainers. Only perceived behavioral control was significant for all non-binge drinking groups. Thus, based on this result, for all non-binge drinkers, the social drinkers, and abstainers the alternate hypothesis which suggests that at least one variable will significantly predict the behavioral intention was accepted.

Hypothesis 6: Instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity and autonomy for the current binge drinkers will collectively and significantly predict the behavioral intention to continue not to binge drink for the next 30 days for the participants who currently do not binge drink (social drinkers and abstainers).

Model 4 predicted 28.1% of the variance of intention to continue not to binge

drink for the next 30 days. Furthermore, 60.7% of the variance of intention to continue not to binge drink for the next 30 days for social drinkers and 6% for the abstainers. Completion of the analysis found capacity only to have significance. Thus, based on this result, for all non-binge drinkers, the social drinkers, and abstainers the alternate hypothesis which stated that at least one variable will significantly predict the behavioral intention was accepted.

Hypothesis set 3: Test the difference between groups (binge drinkers, social drinkers, and abstainers) based on IBM constructs.

The fourth and fifth research questions stated, "to what extent are direct measures of the IBM constructs (attitudes, perceived norms, and perceived behavioral control), and extended direct measures of the IBM constructs (experiential attitude, instrumental attitude, injunctive norms, descriptive norms, capacity and autonomy) predicting the behavioral intentions to discontinue binge drinking in the next 30 days different among binge drinkers, social drinkers, and abstainers". Two hypotheses were derived to address these research questions.

Hypothesis 7: Attitudes, perceived norms, perceived behavioral control, the behavioral intentions, knowledge and skills, and intentions for the current binge drinker will be significantly different from who currently do not binge drink.

Hypothesis 8: Instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity, and autonomy will significantly predict the behavioral intention to discontinue binge drinking for the next 30 days for the current binge drinkers.

A one-way ANOVA test was conducted to demonstrate difference in attitudes, perceived norms, and perceived behavioral control in terms of IBM constructs (attitudes, and perceived norms, and perceived behavioral control), and extended direct measures of the IBM constructs (Instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity, and autonomy). A follow up, post-hoc using the Bonferroni method was conducted to identify where the differences occurred between the groups. The results from the one-way ANOVA indicated that attitude and perceived behavioral control were significantly different between all three groups. However, perceived norms among binge drinkers were different than social drinkers and abstainers; but similar significant differences were not observed between social drinkers and abstainers. Similarly, instrumental attitudes, experiential attitudes, descriptive norms, injunctive norms, and capacity were significantly different between all three groups. However, autonomy for binge drinkers was significantly different among binge drinkers when compared to social drinkers and abstainers; but significant differences were not observed between social drinkers and abstainers. Based on this result, the hypotheses which stated that direct measures of the IBM constructs (attitude, perceived norms, and perceived behavioral control), and extended direct measures of the IBM constructs (instrumental attitudes, experiential attitudes, injunctive norms, descriptive norms, capacity, and autonomy) were accepted.

Hypothesis set 4: Test the difference between demographic variables (gender, year in college, Greek House membership for different drinking

groups (binge drinkers, social drinkers, and abstainers) based on the IBM constructs.

The sixth research question stated "To what extent are attitudes, perceived norms, and perceived behavioral control different based on gender (male vs female), year in college (freshman, sophomore, junior, and senior), and Greek house membership (member vs non-member) for current binge drinkers vs non-binge drinkers (social drinkers and abstainers). Six hypotheses were derived to address this research questions. Three hypotheses were related with examining differences between IBM constructs for gender, year in college, and Greek house membership among binge drinkers and six were related examining difference the IBM constructs among non-binge drinkers.

Hypothesis 9: There will be a significant difference between male and female college students for attitudes, perceived norms, and perceived behavioral control to discontinue binge drinking for the next 30 days for the current binge drinkers.

An independent *t*-test was conducted to examine the differences in IBM constructs based on the gender. Female (m=.70 ±1.32) reported higher level of attitude among binge drinkers than male (m=-.10±1.16), t (156) =-3.769, p=0.001. Based on this result, the alternate hypotheses that suggest that there will be a significant difference between male and female college students for one or more the IBM constructs (attitude, perceived norms, and perceived behavioral control) for binge drinkers is accepted.

Hypothesis 10: There will be a significant difference between male and

female college students for attitudes, perceived norms, and perceived behavioral control to continue not to binge drink for the next 30 days for the participants who do not currently binge drinks (social drinkers and abstainers).

An independent *t*-test was again conducted to examine the difference in IBM constructs based on the gender. No gender difference was observed in non-binge drinkers for any constructs. Furthermore, when non-binge drinkers were categorized as social drinkers, and abstainers, no differences were observed for any constructs. Based on this result, the hypothesis which stated that there will be a significant difference between male and female college students for the IBM constructs (attitude, perceived norms, and perceived behavioral control) for binge drinkers is not accepted for any IBM constructs.

Hypothesis 11: There will be a significant difference between college students' year in college for attitudes, perceived norms, and perceived behavioral control to discontinue binge drinking for the next 30 days for the current binge drinkers.

The One-way ANOVA was utilized for the difference in IBM constructs based on the years in college. For the binge drinkers, their significant difference was observed between attitude [$F(3,157)=2.45$, $p=0.07$] and perceived behavioral control [$F(3,156)=3.54$, $p=0.02$] based on the year in college. The significant difference was not observed for perceived norms. Based on this result, the alternative hypothesis which stated that there will be a significant difference between college students a year in college for one or more IBM constructs

(attitudes, perceived norms, and perceived behavioral control) to discontinue binge drinking for the next 30 days for the current binge drinkers is accepted.

Hypothesis 12: There will be a significant difference between different college student's year in college for attitudes, perceived norms, and perceived behavioral control to continue not to binge drink for the next 30 days for the participants who are not currently binge drinkers (social drinkers and abstainers).

For the non-binge drinkers, there was a significant group difference based on the year in the college between attitude [$F(3,222)=2.51$, $p=0.06$] and perceived behavioral control [$F(3,222)=3.96$, $p=0.01$] but not for perceived norms. Based on this result, the alternate hypothesis which suggest that there will be a significant difference between college students' year in college for one or more IBM constructs (attitudes, perceived norms, and perceived behavioral control) to continue not to binge drink for the next 30 days for the non-binge drinkers is accepted.

Hypothesis 13: There will be a significant difference between member and non-member for Greek house among college students for attitudes, perceived norms, and perceived behavioral control to discontinue binge drinking for the next 30 days for the current binge drinkers.

Hypothesis 14: There will be a significant difference between member and non-member for Greek house among college students for attitudes, perceived norms, and perceived behavioral control to continue not to binge drink for the next 30 days for the participants who do not currently binge drinkers (social drinkers and abstainers).

The independent *t*-test for the difference in IBM constructs based on the Greek membership (yes and no) suggested none of the variables related to the Greek membership were significantly different for binge drinkers and non-binge drinkers (social drinkers, and abstainers) for any IBM constructs. Thus, the null hypothesis, which suggests that IBM constructs are different among students with Greek membership and non-membership, is failed to reject.

Hypothesis set 5: Test for significance of the IBM constructs (attitude, perceived norms, and perceived behavioral control) on behavioral intentions.

The seventh question stated, "To what extent is the IBM constructs of intentions, perceived behavioral control, and knowledge and skill predicts the binge drinking behavior for next 30 days". One hypothesis was derived to address this research questions.

Hypothesis 15: Behavioral intentions, perceived behavioral control, and knowledge and skills will significant predicts the drinking behavior after 30 days.

Binomial logistic regression was conducted to examine to what extent the intentions, the perceived behavioral control, and knowledge and skills predict variability of the binge drinking behaviors for the next 30 days. The model successfully predicted 17.3% of the drinking behavior (binge drinking vs non-binge drinking) in time 2 for the binge drinkers. Intentions (B=-0.191, Wald=4.080, p=0.043) and perceived behavioral control (B=-.697, Wald=7.654, p=0.006) were a significant predictor for predicting drinking behavior for the next 30 days. Based on this result, the alternate hypothesis which stated that one or more of the variables (intentions, knowledge and skills, and the perceived

behavioral control predicts) variability of the binge drinking behaviors for the next 30 days was accepted. Similarly, for the non-binge drinkers, 14.8% of the drinking behavior in time 2 was predicted by the model. Only perceived behavior control (B=-0.923, Wald=7.958, p=0.005) was a significant predictor for predicting drinking behavior for the next 30 days. Based on this result, the alternate hypothesis which stated that one or more of the variables (intentions, knowledge and skills, and the perceived behavioral control predicts) variability of the binge drinking behaviors for the next 30 days was accepted.

Hypothesis set 5: Correlations between direct measurement of IBM constructs and sub-constructs and their subsequent indirect constructs (belief-evaluation products)

Hypothesis 16: Pearson correlation (r) was utilized to examine the correlation between direct measurement of IBM constructs and sub-constructs and their subsequent indirect constructs (belief-evaluation products). As reported in the results section (Table 26-29), not all belief-evaluation products were significantly correlated with total attitudes, total instrumental attitudes, or total experiential attitudes for all drinking behaviors (binge drinker, social drinkers, and abstainers). Therefore, this hypothesis could not be accepted. Similarly, not all products of each injunctive normative belief and motivation to comply (Tables 30-33) had significant correlations with total perceived norms (TPN) and total injunctive norms (TIN), thus resulting in the acceptance of the null hypothesis. The null hypotheses for the belief-evaluation products had to be accepted because not all of the belief-evaluation products (Tables 34-37) were significantly

correlated to either total perceived norms (TPN) or total descriptive norms (TDN) for all drinking behaviors. And finally, the null hypotheses had to be accepted because not all the belief-evaluation products (38-41) were significantly correlated to either total PBC (TPBC), total capacity (CAP), or total autonomy (AUT).

Discussions

Even though the prevalence rate of binge drinkers in this study was 40%, which is slightly less than national average of 43%, it is still largely consistent with the national epidemiological studies (Core, 2011). The majority of the participants in the study were female (66%). Certain demographical characteristics were associated with disproportionately higher drinking rates, than others. This suggests an increased risk of binge drinking based on their demographic characteristics. In the current study binge drinking was reported higher among females (42%) compared to males (36%). This finding is contradictory to national statistics for drinking among college students (ACHA/NCHA-II, 2016). ACHA/NCHA-II reported that males accounted for 38% binge drinkers, compared to females who only accounted for 28.2%.

Also, Lader & Goddard (2006) suggests that men (34%) drank more alcohol than women (19%) when respondents were asked how often, on average; they had an alcoholic drink over the past year. It is possible that the disproportionally higher percentage of female participants in this study (66.0%) led to the differences between from current study and the national reports as well as past studies. Another possibility may be that fewer males might have been interested in taking this voluntarily online survey, despite engaging in binge drinking behaviors.

The current study also suggested disproportionate drinking among ethnic groups. For instance, binge drinking was highest among African American (64%) and lowest among Whites (37%). However, the national survey suggests Native Americans (29.6%) and Whites (25.9%) have a higher risk for alcohol use disorders, however once alcohol dependence occurs, Black (21.4%) and Hispanics (25.6%) experience higher rates for persistent or recurrent dependence compare to Whites (SAMHSA, 2007). The participants of this current study were predominantly white (n=311, 80.4%) compared to African American (n=14, 3.6%) which could have skewed the data for the African American sample.

The prevalence of binge drinking was highest among the age group 18-20 (33%). This finding is significantly lower than the national average for college students (43%) (NCHS, 2005) but people under the age of 21 are reported as high-risk population for alcohol misuse by numerous previous studies (Hingson et al, 2005; Pacific Institute for Research and Evaluation, 2005). Also, the Behavioral Risk Factor Surveillance System (1993-2001) suggested the underage drinking prevalence rate at 56% (Naimi, Brewer, Mokdad, Denny, Serdula, & Marks, 2003). Thus, intervention for the underage population is needed to curtail prevalence of binge drinking behavior.

The demographic summary reported the increasing trend of binge drinking with an increase in a year in school. Prevalence of binge drinking was highest among seniors (36%) and lowest among the freshmen (19%). However, most of the intervention at the institution level given such as mandatory online training for reducing alcohol misuse is given during freshman year. The increasing trend of

binge drinking with each upward tick of years in college, suggests that intervention should be given periodically so that declining trends can be observed instead of increasing trends of binge drinking.

How religious beliefs impact binge drinking behaviors was not the main focus of this study. However, a significant difference emerged for binge drinking behaviors between participants who held strong religious beliefs that drinking was wrong (25.4%), and to those who identified as atheists (55.3%). Many studies in past have suggested the inverse relationship between participants' religious beliefs and alcohol use. Brown, et al., (2001) reported a negative relationship of alcohol use with religious service attendance ($r=-0.15$, $p<0.05$) and fundamentalism ($r=-0.25$, $p<.01$) for white males. Similarly, Michalak, Trocki, & Bond (2007) reported religious variables increasing the variance explained from 15.5% to 28.1% for predicting heavy drinking after adding with gender and age in the regression model. This suggests, religion is strongly related with drinking behaviors, especially abstention. Future intervention could instigate spirituality beliefs in the interventions within as well as outside the traditional religious setting.

The study design of the current study was unique in terms of studying college students based on their drinking behaviors. By doing this, psychological determinants of their drinking behaviors were identified and highlighted for each group. This is important because the motives are strong predictor for the behavior and binge drinkers and social drinkers might have different motivations to drink. Binge drinkers may drink simply to get drunk or because it's a habit, but social

drinkers might be drinking just to have good time with their friends. For abstainers, interventions focusing on drinking abstinence may be irrelevant. Based on this, it can be concluded that the current trend of interventions that follow a "one-size-fits-all" approach to alcohol treatment and prevention is likely ineffective. The study by York (2013) reported similar patterns and suggested future interventions incorporate different strategies based on drinking motivations and behaviors.

Integrative Behavior Model Variable Assessment

Generally, the utility of the theory for explaining and predicting any behavior is evaluated based on the variance explained. The higher the variance is explained, better the theory is considered. The regression analysis conducted in this study suggested core constructs of the IBM explained approximately 46% of behavioral intention towards discontinuing binge drinking and 48% based on the extended IBM constructs. The IBM model was even better in explaining behavioral intention to continue not to binge drink for the social drinkers with 47% of the variance explained by the core constructs and approximately 61% explained by the extended IBM constructs. Even though multiple linear regressions were significant, IBM only predicted 4% of the behavioral intention to continue not to binge drink for the abstainers with core constructs and only 6% for with the extended IBM constructs. Also, the IBM was insignificant in predicting continuing not to stop binge drinking behaviors for the social drinkers and abstainers. As aforementioned the items in questionnaire were not customized to measure abstainers and social drinkers but for overall non-binge drinkers. This

could have affected the overall inefficiency of the model. Also, it seems like IBM is more useful when behavior change initiation is required but may be less useful when behavior maintenance is sought. Overall, the analysis suggested using two component analyses for all three drinking behaviors in future research when utilizing the IBM as it yields a greater variance for the intention. Also, factor analysis indicated that core constructs of the IBM seems to measure two constructs rather than single constructs especially for perceived norms and perceived behavior control. From the multiple regressions, IBM seems to be ineffective to measure abstainer's intention to continue not to binge drink. One reason for the lower level of variance explained for the abstainers may be due to the way items were based. All items for the non-binge drinker were based on discontinuing binge drinking and for the abstainer these items might be less relevant.

With logistic regression analysis, the IBM reported 17.3% of the drinking behavior variance for the binge drinker and 14.8% for the non-binge drinker. Braun, et al., (2014) utilized the IBM model in predicting binge drinking behavior among college students and reported IBM explaining 44% of the intention to binge drink and 26% of the binge drinking behavior. Even though variance explained for the binge drinking behavior was lower than reported by Braun, et al., (2014), the study from Braun, et al., (2014) corroborated with the current study. Braun, et al., indicated that attitude, injunctive norms, and self-efficacy predicting 44% of the variance in the intention for heavy drinking and 26% of the

variance for the heavy drinking behavior. Similarly, Sheppard, et al., (2016) reported 45.6% of the variance of average drinks consumed per week.

The result of the current study matches with the meta-analysis conducted by Armitage and Conner (2001) when considering TPB. Armitage and Conner reported the TPB was able to explain 39% of the behavioral intention and 27% of the behavior when considering wide range of the behavior. When compared with the TPB, IBM in this study explained higher variance for the behavioral intention but less variance for the actual behavior. Another recent systematic review and meta-analysis was conducted by Cooke, et al., (2016) to understand how well the TPB can predict alcohol consumption behaviors supported the utility of the TPB to predict alcohol consumption. Especially attitudes, subjective norms, and self-efficacy were found to have the large-sized relationships with the intention and the behaviors.

Linear Regression and Logistic Regression for the Binge Drinkers

The linear regression suggested attitudes as the only significant predictor of the behavioral intention for binge drinkers to stop binge drinking. The study by Norman (2011) utilized Theory of Planned Behavior to predict binge drinking behavior among undergraduate students and observed TPB explaining 75% of the variance (with constructs attitude, subjective norms, self-efficacy, and perceived control) in the intention but only attitude and self-efficacy were found to be significant. Similarly, French & Cooke (2012) reported 55% of the variance in the behavioral intention being explained by the attitude (β=.42, p<0.001) and subject norms (β=.42, p<0.001). In the study by Ross and Jackson (2013), while

investigating the TPB's application to binge drinking among university students, attitudes, subjective norms, and perceived behavioral control explained 50% of variance in intention [$F(3,116)=116)=38.45$, $p<0.001$). In this study by Ross and Jackson, only attitudes ($\beta=.43$, $p<0.001$) and subjective norm ($\beta=.58$, $p<0.001$) was found to be significant, but perceived behavior control was found to be non-significant factor of intentions. This suggests that those attitudes are normally found to be strong predictor of the intention and this study is consistent with the past findings. Thus, students who have a positive attitude towards stopping binge drinking behavior have better possibility to stop binge drinking in the long-term.

The current study supported two-component IBM possessed better predictive validity for behavioral intention for all drinking groups compared to one-component IBM. In past studies a two-component model for TPB was found to be more effective compared to a one-component model (82%) to predict behavioral intention (Elliott & Ainsworth, 2012). According to Elliott and Thomson (2011), there are small numbers of studies that have also provided strong support for a two-component model being a significantly better fit for predicting behavioral intention compared to one-component model. This suggests current study providing strong support for the superiority of the two-component model over and over compare to one-component model as past studies have suggested. Thus, it may be time to shift from a one-component model to two-component in adapting a more effective model.

When the two component model of the IBM was used, experiential attitude ($\beta=.35$, $p<0.001$) as well as injunctive norm ($\beta=.201$, $p=.011$) and descriptive norm ($\beta=$-

.168, p=0.015) were found to be significant predictors of the intentions. Experiential attitude is the emotional response towards the behaviors. Similarly, injunctive norm constituents to complying with other's expectations. It measures the referent's approval or disapproval in performing the specific behavior. Likewise, descriptive norm is complying with other in individual's social and personal networks in doing behavior. The results from the current study, suggest that if students perceived that emotional response towards stopping binge drinking is favorable, it indicates they have stronger intention to stop binge drinking. Previous research from Elliott and Ainsworth (2012) on relationship between experiential attitude and intentions yielded significant relationship with a strong path coefficient (r=.57) (Elliott & Ainsworth, 2012). Thus, helping to generate more positive experience after stopping binge drinking for the binge drinkers may likely help them to stop binge drinking in long term. The result suggests that if the referents approve stopping binge drinking behavior, it is easy to stop binge drinking. Similarly, if people in one's surrounding with strong social identity (descriptive norms) are binge drinking, it is difficult to stop binge drinking. The injunctive norms are measured as subjective norms under TPB model. Previous research exploring subject norms on the TPB for the alcohol use indicated subjective norms (β=-.30, p<0.05) as a significant predictor of the behavioral intentions (Park et al., 2009) to not to join alcohol-related social gatherings. Similarly, the Montano and Kasprzyk (2008) reported a statistically significant relationship between intentions and subject norms (r= 0.23). In the current study, subjective norms were not the strongest predictor of the behavioral intention. This suggests that participants consider the referent's opinion for binge

drinking but may still make personal decisions which may not be solely based on their referent's disapproval or approval.

For the binge drinkers, instrumental attitudes, capacity, and autonomy were not found to be significant predictors for behavioral intention to stop binge drinking for past 30 days. Instrumental attitudes are the respondent's beliefs about the outcomes of the behaviors. Instrumental attitudes were also not reported as significant predictor for predicting binge drinking behavior in Braun, et al., (2014). Braun, et al., (2014) suggested two reasons for instrumental attitude not being significant towards the behavioral intention. First, the items that have been used in assessing instrumental attitude such as bad-good, harmful-beneficial may not have resonated well with the respondents. Referents could also be potential confounders. For example, even though participants know binge drinking is harmful, s/he might still indulge in binge drinking behavior due to peer pressure. This study failed to demonstrate the significant relationships between instrumental attitude and behavioral intention. The meta-analysis by Armitage and Conner (2001), suggests attitudes (summation of instrumental attitudes and experiential attitudes) is typically the strongest predictor of the intention to binge drink. But the study did not suggest specifically for each sub-construct. Thus, additional studies may be required to reassess the content of the instrumental attitude so that if not found significant, it can be discarded for alcohol related studies.

Capacity is the individual's belief in performing specific tasks which is also considered as self-efficacy in the TPB. Even though binge drinkers' scores

on capacity to stop binge drinking were high (mean=2.82 out of 3.00), capacity was not the significant predictor of their intention. This suggests that most of the participants already have a higher level of capacity. However, this factor was not important when it came to predicting intention for stopping binge drinking. There are interventions that attempt to build capacity of binge drinkers. The current study suggests that college students perceived high level of capacity but capacity did not seem to play significant role for college students making the decision to stop binge drinking; at least in comparison to attitudes and norms. This is inconsistent with past studies. For instance, Johnston & White (2003) found a significant relationship between capacity and intention for binge drinking (β = .33; $p < .001$).

However, one thing to note is some studies such as Braun et al., (2014) reported a relationship between intention and capacity as negative (r=0.28) (suggesting that as capacity increases, it lessened the binge drinking behavior and vice-versa. The positive or negative relationship between capacity and intention may be due to how the items were framed in the current study compared to previous studies. In the current study capacity was related with intention to stopping binge drinking and in other studies capacity might have been measured in relation with binge drinking.

Finally, autonomy (the degree of self-control to perform the behavior) was not found to be significant for stopping binge drinking among binge drinkers. The reason could be that even though prevalence of binge drinking is high among college students, they also believe they have higher level of control for stopping

binge drinking. Also, this study is based on self-reported data, and respondents may have overstated their autonomy. Other reasons for not finding significant relationships between autonomy and perceived control is due to the role of confounding variables, or the items in autonomy did not elicit responses from the participants as intended.

When logistic regressions were conducted, the ability to predict drinking behaviors among binge drinkers from both perceived behavioral control and intentions were found to be significant; but knowledge and skill were not significant contributors. However, when descriptive norms and experiential attitudes were added, descriptive norms emerge as significant contributor but intention did not emerged as the significant predictor of the behavior. The strong relationship between intentions and PBC with the behavior is consistently reported in the previous studies. For example, Cooke et al., in a systematic review and meta-analysis reported intention as having the strongest relationship for alcohol consumption behavior (r=.54); followed respectively by the sub-component of the PBC, self-efficacy/capacity (r=.41). Similarly, Armitage and Conner (2001) reported the range of PBC combined with intention explained 57% of the variance in the behavior. Similarly, McEachan et al., (2016) in their Met-Analysis reported descriptive norms as a stronger predictor of the behavior compare to injunctive norms. These findings support interventions enhancing perceived behavioral control and especially capacity for college students to reduce binge-drinking behaviors. Similarly interventions with focus on descriptive norms are more effective than injunctive norms.

Linear Regression and Logistic Regression for the Non-Binge Drinkers (Social Drinkers and Abstainers)

From the logistic regression analysis for non-binge drinkers only perceived behavioral control was found to be a significant predictor of the behavioral intention to stop binge drinking. Perceived behavioral control was also found to be significant predictor of intention for both social drinker and abstainers. This finding was supported by previous studies such as Cook et al., (2007) and Norman & Conner (2006). Furthermore, when regression analysis was conducted using two components for the IBM constructs, only capacity was found to be significant predictor of the intention. This suggests that for the non-binge drinker's capacity yields the most variance in the intention towards continuing not to binge drink. The intervention targeted towards the non-binge drinkers should focus on enhancing capacity to continue not to binge drinking to enhance their confidence. This may be true when there is vast amount of social pressure for college students to binge drink, wherein they may be unsure of how to say no and avoid the peer pressure.

None of other constructs were significant in predicting intentions for continuing not to binge drink. The reasons could be that continuing not to binge drinking for the non-binge drinkers, especially for the abstainers does not involve any further behavior change. This could be the reason IBM constructs was not significant when predicting much their intentions. Another reason could be that the items in the instrument were not well designed to elicit the response the study aimed to obtain. This was especially true for the abstainers as the items were

mainly designed to collect from non-binge drinkers but not specifically for the abstainers. And from the descriptive statistics, it can be noted that there is a significant difference between social drinkers and abstainers for the IBM constructs. Future studies studying abstainers need to consider this factor and customize items accordingly.

Limitations

There were numerous limitations which should be considered when evaluating the results of this study. The most important limitation was the use of self-reported instruments. Even though self-reports remain the most common means to assess drinking behavior, there are always possibilities of responses being biased and dishonest as well as chances of misinterpretations of the questions with the self-reporting instrument. Davis, Thake, & Vilhena (2010) reported the tendency of social desirability consistently under-estimating when participants are self-reporting their drinking behavior. Also, social desirability seems to affect highly on the distant drinking events and on traditional weekdays for higher alcohol consumption (Thursday through Saturday) but less affecting when recalling their drinking behavior as they go back in time (Davis, Thake, & Vilhena, 2010).

Another major limitation was the research design. The study utilized a prospective study design and evaluated data at two-time points. In prospective studies, various measurement reactivity effects such as the mere measurement effect could lead participants to alter their response. Mankarious and Emily (2015) reported the general trend of significant decrease in undesirable behavior

compare to the baseline. Thus, behavior reported at T2 might not be accurate if participants have perceived binge drinking as undesirable behaviors. Also, in the current study, participants had to recall their binge drinking behavior for past 30 days when responding to the survey at the time 2. This could have caused failure to recall among participants who simply could not accurately remember how much and how frequently drank. Also, two point assessments might not be an accurate assessment of binge drinking behaviors. For studying behaviors like binge drinking, it is possible that evaluating data at more than two points would be more accurate.

Participants were recruited from a convenience sample of students at a Southwestern University. Results of this study may not be generalized beyond the study participants. The responses in the study were collected via online survey thus it inherited the limitations of the online survey. The major problem related with the online survey includes confirming multiple responses did not come from same person, or in this case confirming that both responses for the survey came from the same person. Another limitation could be that students are being overwhelmed with numerous online survey requests in university settings. Students tend to participate about topics they like, and rarely bother to consider surveys that are least interesting for them. Thus, by using online survey, the study may have missed a large portion of the students who might not be interested in an alcohol related online survey. This could have caused selection bias among participants.

The current study studied binge drinking behavior among college students. Even though the definition of binge drinking was provided in the instrument, remembering and utilizing it while responding to each item might have been challenging for the participants. This might have affected their responses. Also, since the term binge drinking is a widely adopted concept, they might be using their individual reference for number of drinks or standard of single drinks when considering binge drinking. Generally, research reports that college students, as well as the general public, have tendencies to define single drinks as much larger than a typical single drink considered for the definition of the binge drinking (White and Hingson, 2014). Hence, not using right reference for binge drinking definition to respond the survey might have affected the responses. Also, 5 drinks for man or 4 drinks for women for defining binge drinking is not the universal definition as different countries follow different standards when defining binge drinking which might have skewed the responses if international students participated in the study.

Implications towards Health Promotion

The constant prevalence rate of binge drinking among college students and growing concern for their health warrants additional research in this area. The current study examined the utility of the IBM to predict and explain binge drinking behaviors among college students. The current study yielded three major contributions.

First, the study suggests that institutions implementing an identical intervention to all college students with different drinking behavior should rethink

their strategy to prevent binge drinking. College students with binge drinking behavior have different motivations and goals compare to social drinkers when it comes to consuming alcohol. Abstainers might have a different set of attitudes, perceived norms, and perceived behavioral control when it comes to drinking alcohol. The current study shows these groups are different when assessed using IBM constructs and call for a different set of interventions for each of these groups.

Second, the application of the current study can be helping in designing an intervention to reduce binge drinking behaviors. The aim of the IBM is to provide with more information in designing effective interventions with intent to change risky behavior. Most of the intervention encompassed by the university (which is mainly online training) is mainly focused on the perceived norms, especially descriptive norms (Bhochhibhoya, Hayes, Branscum, & Taylor, 2015). The results from this study suggest that attitude, especially experiential attitude, as the strongest predictor of intentions towards drinking behavior among all drinking groups. Future interventions should focus on changing participants' experiential attitude in the intervention which might help in reducing their binge drinking behaviors. The meta-analysis from McEachan et al., (2016) also reported experiential attitude to be stronger predictor for behavior than instrumental attitude suggesting experiential attitude is better predictor for hedonic and impulsive "risk" behaviors such as binge drinking. Thus, future intervention needs to include component through health education and communication to change the experiential attitude.

For the binge drinking behaviors, perceived behavioral control and descriptive norms were reported to be significant. Thus, for binge drinkers interventions can improve perceived behavioral control by praising their success to abstain from binge drinking for certain periods of time; sharing success stories of peers; verbal persuasion such as brief motivational interview; and/or simply by offering encouragement to continue stopping binge drinking. In addition, intervention can promote stopping binge drinking by enhancing descriptive norms pressure such as using peer educators for the intervention. Numerous studies in past also have suggested modifying descriptive norms such as correcting misperceptions of binge drinking behavior among peers can reduce binge drinking among college students (Bewick et al., 2010; LaBrie, Hummer, Neighbors, & Pedersen, 2008; Neighbors, Larimer, & Lewis, 2004).

For non-binge drinkers, only perceived behavior control emerged as significant of the behavior. Thus, intervention that can enhance perceived behavior control especially building capacity to continue not to binge drink. The intervention could have components such as motivating participants to not be around binge drinkers, not going to bar, requesting friends to not encouraging for binge drinking.

Third, the study also contributed by featuring an instrument with comprehensive lists of items to measure IBM constructs including direct and indirect measures. Even though results suggested the requirement to modify few items especially for autonomy; the instrument used in this study can be considered

as a blueprint for future studies. Also, future researchers have an opportunity to modify the instrument for other health related behaviors.

Future Directions

A number of recommendations can be noted from the current study for the future research in the area of binge drinking among college students.

1. The instrument used in the current study had a few caveats and needs to be optimized utilizing the current results. Based on the pre and posttest, Pearson correlation (*r*) suggesting low stability for few constructs. Also, few items did not meet prior criterion for Cronbach alpha. Similarly, correlations of the product of belief and outcome for the IBM constructs (attitude, perceived norms, and perceived behavioral control) were not significant. These shortcomings give an opportunity to improve the items to develop an optimal questionnaire for the future research.

   To improve parsimony and model efficacy, another recommendation is to remove items with poor factor loadings since they did not contribute to the model or offer explanation about particular behaviors. For example, perceived behavioral control was not a significant predictor of intention but was the strongest significant predictor for all drinking behaviors (binge drinking, social drinking, and abstaining). Future research can explore this by using path analysis and establish new determinants of binge drinking behaviors.

2. In the current study, the results suggested the extended direct measures (two components) of the IBM constructs were more effective in predicting

intention towards the behavior for all drinking behaviors (binge drinking, social drinking, and abstaining). More research is required to confirm it as well as to ensure extended direct measures as better assessment of the IBM constructs.

3. Learning from this study can be applied in other settings. First, the results of this study can be compared with other university settings. The instrument from this study can also be adjusted to study other populations (beyond college students). The findings from this study can also be helpful in designing future interventions and prevention programs and determine where resources should be allocated. Similarly, this survey can be adjusted to study other high-risk behaviors using IBM such as drug abuse, smoking marijuana, risky sexual behavior, etc.
4. This is the first study that utilized the IBM to study different groups of college students based on drinking behavior. Even though the groups were categorized based on the drinking behavior (binge drinkers, social drinkers and abstainers), the instrument was mainly designed to categorize binge drinkers and non-binge drinkers. The prediction models with 4-6% of the behavior's intention suggested that the instrument was not effective to measure abstainers' behavior. Future research could customize the questionnaire to assess abstainers' behavior or not include them in the study as the behavior is not pertinent to them. Also, results from analyzing different groups based on their drinking behavior (binge drinkers, social drinkers, and abstainers) for the IBM constructs suggested that attitude, perceived norms,

and perceived behavioral control are different for each of these groups. For instance, the results of the current study indicated attitudes and especially experiential attitudes were significant predictors of intention towards stopping binge drinking for binge drinkers. Whereas for the non-binge drinker, perceived behavioral control, especially capacity, was the strongest predictor of the intention towards continuing not to binge drink for the non-binge drinker (social drinkers and abstainers). This information suggests that different sets of intervention is required for each group and this study can be useful in customizing future interventions for each for these groups.

5. Future research should direct towards establishing a user friendly universal definition of binge drinking so that studies all across the world can be comparable. For example, in the USA under four standard drinks (56 g) for men and three standard drinks (42g) for women within two hours is considered to be non-binge but it is still well over the recommended amount by health authorities in Sweden (20g for men and 10 g for women). Similarly, one standard drink in the UK and Iceland is considered an amount beverage with 8g of alcohol is well under the standard in Austria with 20g of alcohol. The lack of consistency when measuring binge drinking across the research studies needs to be a concern. Future researchers need to come to a consensus on the best way to measure binge drinking standards as well as different levels of binge drinking rather than just one definition, as different levels of binge drinking might have different consequences.

6. The demographic results suggest that religion seems to have a significant impact on binge drinking behaviors. Binge drinking was highest (55.3%) among participants who did not follow any religion compared to lowest (25.4%) among Protestant denominations that do not allow drinking of alcoholic beverages. Future studies should explore how the religious aspects can be integrated into the future intervention to enhance its efficacy.

Summary

The current study shows promising application of IBM in predicting and explaining binge drinking behavior among college students and provide more specificity towards predictive factors to design effective interventions. In addition, this study was significant in highlighting the need for different sets of intervention to the groups with different drinking behavior (binge drinkers, social drinkers, and abstainers). The current study suggested that the IBM successfully predicted 46%, 46.5%, and 4% of the intention towards respective binge drinking intention for binge drinkers, social drinkers, and abstainers.

Similarly, this study also determines the need to focus on at-risk groups as indicated by the results of the study. For instance, binge drinking seems to increase with each uptick in college year. However, most of the prevention at the institutional level is given to freshmen only. Similarly, binge drinking seems to be significantly highest among African Americans (64%) compared to Whites (37%). However, at the institutional level there is a lack of intervention that specifically focuses on African Americans.

This study also suggests the remodeling of the IBM. The two components model of IBM resulted as more effective than one component for measuring attitudes, perceived norms, and perceived behavioral control. Also perceived behavioral control was found to be more effective in predicting drinking behavior among all three drinking groups rather than predicting intentions towards the behavior.

In conclusion, this study supports the efficacy of the IBM. However, findings should be interpreted considering its limitations and scope. Future research needs to be conducted to determine the efficacy of the IBM for other population settings and health behaviors for its wide applications.

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Appendix A: Systematic Review

Using the Theory of Planned Behavior and Integrative Behavior Model to predict alcohol consumption behavior: A systematic review

Introduction:

Alcohol is the most widely used addictive substance in the United States. The prevalence rate of alcohol consumption is high for celebrations, relaxing, and socializing purpose and alcohol is moderately consumed at large. However, with more than 88,000 deaths and in average 30 years of potential life lost with each death, mainly attributable to alcohol addiction, heavy drinking, and binge drinking, alcohol is the third leading lifestyle-related cause of death in the United States.

The area of my interest is to study the binge drinking behavior among college students. National Institute on Alcohol Abuse and Alcoholism (NIAAA) defines binge drinking as "a pattern of drinking that brings blood alcohol concentration levels to 0.08 g/dl" which generally results when men consume more than 5 drinks and women consume more than 4 drinks within two hours. The number of drinks (9.3 drinks in each occasion) and prevalence (40%) of binge drinking, both are highest among the college-aged population (CDC, 2012). Thus, binge drinking behavior among college students has been acknowledged as an important public health concern (Hingson, Zha, & Weitzman, 2009).

It is estimated that each year, more than 1825 deaths, 97,000 date-rapes & sexual assault, and 646,000 assaults reported among college students are

alcohol-related (Hingson, Zha, & Weitzman, 2009). The binge drinking pattern is also correlated with the sexually transmitted diseases and unintended pregnancy among this population (CDC, 2014). Similarly, Wechsler et al., (1998) reported that 1 in 4 college students reported academic consequences due to drinking such as missing class, doing poorly in the exams, falling behind in class, and receiving lower grades.

Despite significant public health efforts over the past decade, the status of colleges student binge drinking have remained remarkably stable (Johnston, O'malley, Bachman, & Schulenberg, 2011). In this context, exploring and understating various determinants of the behavior is essential. Past studies suggest that the theory can provide a conceptual framework to understand health-related behavior and help in designing effective health-related interventions (Michie & Prestwich, 2010). Using theory in understanding behavior can provide various benefits. First, it allows collecting empirical data within an established theoretical framework. Second, the information collected from the theory based study can be used to inform and design the intervention by identifying causally related constructs (Michie & Prestwich, 2010). Third, the theoretical framework can also assist in evaluating the intervention and refine it before the future implementation (Michie & Abraham, 2004).

In past, the Theory of Planned Behavior (TPB) has been extensively used in predicting health-related human behavior such as alcohol consumption (Ajzen, 1991). Of late researcher has also considered the Integrated Behavior

Model (IBM), which includes the constructs from TPB as well as constructs from other major behavior theories, for predicting health-related behavior.

The IBM and TPB both identify 'intention' as the most predictive factor for behavior change. In both models, the intention is mainly predicted by the attitudes, norms (the IBM includes both injunctive and descriptive norm but the TPB only included injunctive norm), and perceived behavioral control. In addition to these constructs common to the TPB, the IBM further included knowledge skills, environmental constraints, and habit in the model.

Past studies have suggested the TPB model reporting 22% to 65% of the variance in binge-drinking behavior (Cooke, Sniehotta, & Schuz, 2007; Johnston & White, 2003; Norman, Armitage, & Quigley, 2007), these reports are an almost decade old. The current study is mainly focused on the studies that have been conducted in the past five years. Recently, the systematic review has been conducted by Cooke, Dahdah, Norman, and French (2016) however, they only included the TPB and not the IBM. The center theory of my dissertation is the IBM thus; this systematic review was necessary to search studies that have used the IBM in addition to the studies that have used the TPB.

The purpose of this systematic review is to identify the constructs of the TPB and the IBM that are highly associated with the alcohol consumption behavior. This study will also provide an up-to-date and comprehensive review of the application of the TPB and the IBM in predicting alcohol consumption behavior.

Methods

Search strategy and inclusion/exclusion criteria

This Preferred Reporting Items for Systematic reviews and Meta-analyses (PRISMA) Statement was followed for guiding the review process (http://www.prisma-statement.org/Default.aspx). The PRISMA Statement provides with a framework to include a minimum set of items to report systematic review. The PRISMA also provide with flow diagram and a checklist and a step-wise instruction (Appendix 1), best practices in reporting systematic reviews (Moher, Liberati, Tetzalf, & Altman, 2009). The search was made on October 21, 2016, from the University of Oklahoma library website (https://libraries.ou.edu/). Following six databases were included in the search process: Academic Search Premier, CINAHL Plus with full text, Communication Sources, ERIC, Health source: Nursing/Academic Edition, and Medline. Six keywords were used to identify the relevant article; out of which three were related with alcohol consumption behavior (alcohol, binge drinking, and heavy drinking) and remaining 3 are a different name associated with the theory (Integrated Behavior Model, Integrated Model, and Theory of Planned Behavior). The Boolean search strategy was selected with the combination of keywords associated with alcohol consumption behavior and the theory such as alcohol and Integrated Behavior Model, binge drinking and Integrated Behavioral model. The screening criteria for article search included: peer-reviewed, full text, English language, article published between January 2011 and October 2016. Other inclusion criteria to filter the articles search included:

1. Studies must have to be alcohol related as the targeted behavior. It could be an intention to drink, abstinence, or drinking under a certain limit. The studies in which alcohol was indirect behavior such as drunk driving, alcohol and sexual behavior were not included in the review.
2. Studies had to be focused on the TPB or IBM constructs. If the study assessing different theory except for the TPB or IBM, then those studies were not included.
3. Studies should include measures of the constructs of the theory (IBM or TPB). Thus, articles such as editorial or review paper were not included in the review.

Selection of studies

Overall total of 259 articles were identified from the database search using a different combination of the keyword search. The author screened all 259 article title and keywords. After preliminary screening based on title and keywords, 216 articles were excluded and 43 articles remained for the further review. Numbers of duplicate studies to appear as article were search multiple times using a different set of keywords. Thus, 24 articles out of 43 articles in the pool were deleted due to duplication. The abstract of 19 articles was reviewed and 3 articles were excluded based on not meeting inclusion criteria. The full text of the remaining 16 article was reviewed and 5 articles were excluded due to not meeting inclusion criteria in the study (one article used only attitude from the TPB constructs, another used only intention from the TPB constructs, one used behavioral reasoning theory, and two articles used integrated model by incorporating with part or whole of the TPB). Finally, 11 articles were

considered for the review process. The flow chart of article selection process is also presented in Figure 1.

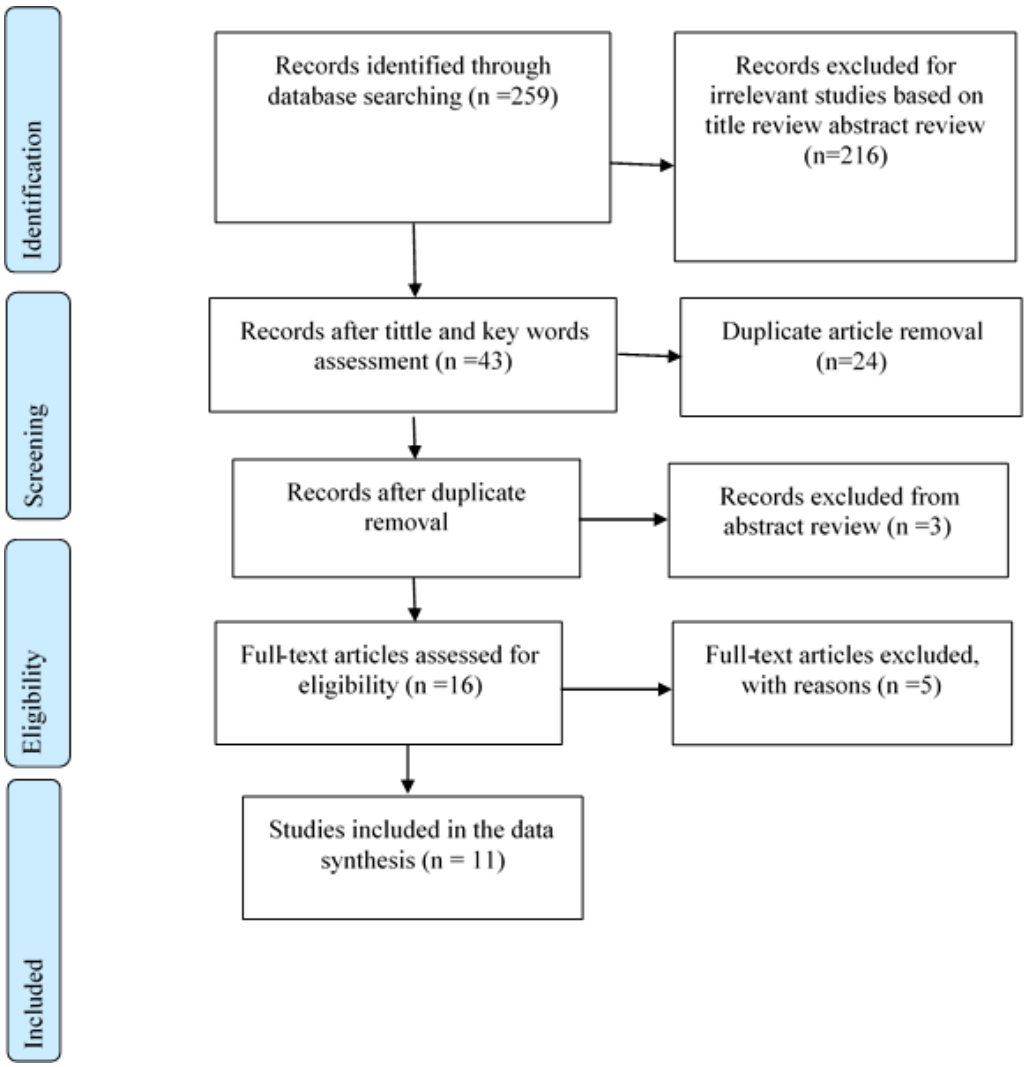

Figure 1. Article Selection Process for Systematic Review

Data extraction

Data were extracted from the studies which were included in the final selection for the review. The information that was extracted from the papers included: study details (author, year, location of the study), purpose of the study, sample details (target population, sample size, gender, age, priori sample size justification), study design, constructs being measured, statistical analysis, results (relationship between constructs, and change in behavior), and salient outcomes. After the information was collected, the data was synthesized using Table 1 and Table 2 in the chronological order. The information from each article is summarized and compared in the result section.

Results

Even though the search strategy included both the TPB and IBM, only two studies were related with the IBM was identified from the search. Remaining nine was related with the TPB. This suggests that the IBM is still an underutilized theory in the domain of the alcohol consumption behavior. The majority of the studies aimed to determine the extent to which the TPB/IBM constructs (Attitude, Norms, and PBC) could predict intention to alcohol-related behavior and actual behavior. However, few studies also examined other factors such as habit (Norman, 2011), willingness (Todd & Mullan, 2011), individually salient beliefs (French & Cooke, 2012), and prototype perceptions (Lettow, Vries, Burdorf, Conner, & Empelen, 2015) in addition to the TPB/IBM constructs.

In terms of countries out of 11 studies, 3 were studied in the USA. Similarly, 8 studies, 3 were studied in the England, 2 were studied in the Australia, 1 in Scotland, 1 in the Netherlands, and 1 in multiple European countries (England, Estonia, Finland,

Scotland). This suggests that alcohol consumption is an important public health issue all over the world. If other language in addition to English language would have been in criteria, additional studies from other part of the world also could have emerged in the search.

The inclusion did not specify any particular drinking behavior or population. However, 8 studies were studied binge drinking behavior, one studied heavy drinking (Braun, Glassman, Dake, Jordan, & Yingling, 2014), one studied maximum amount of drink recommended to the pregnant women (Duncan, Forbes-Mckay, & Henderson, 2012), and one studied overall alcohol consumption behavior (Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016). It shows that binge drinking is the most studied alcohol-related behavior using the IBM/TPB constructs. None of the articles studied outcome behavior as a discontinuing binge drinking which in fact should be the interest of the health researcher rather as well. Also, none of the studying the motivation to stay abstainers is the neglected subset when it comes to the study of the alcohol-related behavior. However, motivating individual to remain abstainer or moderate drinker is as important as to reduce heavy drinking and binge drinking behaviors.

The majority of studies were conducted among undergraduate students (7 out of 11). There was a study conducted among college students but did not mention if the participants were undergraduate students or also included graduate students (French & Cooke, 2012). Similarly, there was a study conducted among pregnant women (Duncan, Forbes-Mckay, & Henderson, 2012), one study among employees of large companies (Hagger, Lonsdale, Koka, Hein, Pasi, Lintunen, & Chatzisarantis, 2012),

and one among young adults but not specified if the participants were students (Lettow, Vries, Burdorf, Conner, & Empelen, 2015). This shows that binge drinking behavior is a major drinking problem associated with the undergraduate population. However, these also suggested the need for researchers to explore beyond convenient sampling of college students and study other high-risk population such as the pregnant women, employees.

There were two studies conducted among female sample only (Todd & Mullan, 2011; Duncan, Forbes-Mckay, & Henderson, 2012). In the remaining studies which were conducted among both male and female, the participants were predominantly female except for one study where male and female was equal (French & Cooke, 2012). This finding is in accordance with the recent review reported by that review study by Cooke, Dahdah, Norman, & French (2016). They suggested most of the study they included in the review also reported were mainly participated by female. The sample size in the study ranged from 91 to 910 (Ross, 2013; Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016). Among 11 studies reviewed in this study, only 2 studies provided justification for sample size (Duncan, Forbes-Mckay, Henderson, 2012; Braun, Glassman, Dake, Jordan, & Yingling, 2014). Also, the study was predominantly conducted among the age group of 19-23. One study whose age group was out of this range was conducted among pregnant women (Duncan, Forbes-Mckay, & Henderson, 2012). Two studies did not explicitly mention the age in their study (French & Cooke, 2012, Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016).

The common study design in the review was a prospective study. Eight studies in the review were a prospective study (seven with the two wave follow up and one

with the three wave follow up after three months) and three studies were a cross-sectional study. Four out of eight prospective studies had 2 weeks of follow-up. One study of the remaining four prospective study had follow-up period in the same evening and remain three had a follow-up after a month. All studies were self-reported studies. The review reported the paper-based survey was commonly used to administer the survey. In total six studies administered paper based survey only, four administered online survey only, and one study administered both online and paper-based survey.

Most of the studies used a number of drinks (6 studies) or frequency of binge drinking as a measurement to the outcome behavior (4 studies). One study used drinking occasions for the pregnant women as any number of drinks would be detrimental for this group (Duncan, Forbes-Mckay, & Henderson, 2012). No one of the studies in this review considered not drinking behavior.

For the statistical analysis, four studies used a multiple regression analysis, three studies used a path analysis, two studies used hierarchical regression analysis, one study used negative binomial regression, and the last study used binary logistic regression to compute the prediction model. Even though multiple regression and hierarchical regression is commonly used, if the determinant variable is the count (number of drinks, the occasion of binge drinking), Poisson regression is recommended (Gardner, Mulvey, & Shaw, 1995).

Four studies reported the prevalence of binge drinking in their sample. The range of prevalence for binge drinking from those studies ranged from 29.5% to 72%. Remaining studies presented the prevalence of drinking behavior in different forms. The study with the pregnant women as target population reported 34.5% pregnant

women drinking alcohol at some level and 7.8% exceeding the maximum recommended level for a pregnant woman (Duncan, Forbes-Mckay, & Henderson, 2012). Hagger et al., (2012) reported the Fast Alcohol Screening Test score of the sample as 2.15 (3 or above is considered as hazardous and harmful drinking behavior). Similarly, Elliott & Ainsworth (2012) reported that on the average participants reported frequent tendency to binge drink but did not report any quantifiable number. Braun, Glassman, Dake, Jordan, & Yingling (2014) reported prevalence in terms of heavy drinking which was 37% in the study sample. In Lettow, Vries, Burdorf, Conner, & Empelen (2015) study, Participants reported consuming in an average of 7.27±9.79 drinks per week but did not report binge drinking prevalence. Sheppard, Usdan, Higginbotham, & Cremeens-Matthews (2016) study did not report the prevalence of any drinking behavior. One important thing to note here is that different studies are defining alcohol problems with different scale/measures. The current review suggests multiple measurements for the alcohol consumption. Also, even for a common term such as binge drinking, the standard definition is yet to be established. For example, the standard for the binge drinking varies in different nations and also by gender (Chen & Feeley, 2015; French & Cooke, 2012; Ross & Jackson, 2013). Without having a standard measure for the drinking problem it is difficult to compare the drinking issues in different studies and outcome after the interventions.

One of the major purposes of conducting systematic review was to explore to what extent the IBM/TPB constructs (Attitude, Norms, and PBC) can predict analyze the intentions to the alcohol-related behaviors and actual behavior. Five studies have reported the relationship between the IBM/TPB constructs and the intention towards the

alcohol-related behaviors. The variance reported in those studies ranged from 45% to 75% (Braun, Glassman, Dake, Jordan, & Yingling, 2014; Norman, 2011). The variance range reported for actual alcohol-related behavior due to the TPB constructs was 26% to 90% (Elliott & Ainsworth, 2012; Braun, Glassman, Dake, Jordan, & Yingling, 2014). Other noticeable studies included: the TPB constructs reporting 77.1% in drinking behavior among pregnant women who were abstainer and drinkers. Based on the review it can be suggested to not include PBC in future studies to predict alcohol-related behavior as it was not a significant factor of the predictor in most of the studies (Duncan, Forbes-Mckay, Henderson, 2012; Ross & Jackson, 2013). Other factors that were suggested to add in the TPB model to increase predictability for the alcohol-related behavior included: habit, willingness, variables of self-determination theory (intrinsic motivation, identified regulation, introjected regulation, and external regulation) stress, loneliness, prototype perception, Greek house member status, gender, (Norman , 2011; Todd & Mullan, 2011; Hagger et al., 2012; Chen & Feeley, 2015; Lettow,Vries, Burdorf, Conner, & Empelen, 2015; Sheppard, Usdan, Higginbotham, & Cremeens-Matthews, 2016).

Table 1. Descriptions of the Theory of Planned Behavior and the Integrated Behavioral Model studies for Alcohol-Related Behavior from 2011 to 2016

Author (Year); Location of the study	Purpose	Target population; Sample Size; Gender; Age; A priori sample size justification)	Study Design, Measures, and Statistical analysis
Norman (2011); England	• To apply the TPB constructs to predict the binge drinking intentions and behavior • To test if habit explains additional variance in binge drinking behavior and moderates the relationship between binge drinking intension and behavior	Undergraduate students; n=137; male=25, female=112; age=19.12±1.85; No	• A prospective study with a one-month follow-up • Paper-based questionnaire measuring the TPB constructs • Habit (the Self-Report Habit Index) • Target behavior (Frequency of Binge drinking) • Hierarchical regression analysis
Todd & Mullan (2011); Australia	• To reduce binge drinking by utilizing both a TPB based Mere Measurement Effect, and binge drinker prototypes from the prototype willingness model (PWM) • To test if willingness explains additional variance in binge drinking behavior	Undergraduate students (freshman); n=122; all female; age=19±1.5; No	• An online prospective study with 2-3 weeks follow-up • Participants were randomly allocated to three groups a) manipulation group, b) a mere measurement group, c) a control group • A simultaneous multiple regression and a hierarchical logistic regression
Duncan, Forbes-Mckay, Henderson (2012); England	• To apply the TPB constructs to understand why some women continue to use alcohol during pregnancy	20-week pregnant women who consumed alcohol before becoming pregnant; n=116; all female; age=29.6±5.11; Yes	• A cross-sectional study • Postal self-reported questionnaire distributed in two hospital • Alcohol use measured using the Alcohol Use Disorders Identification Test and number of drinking occasions • A Mann-Whitney U Test and a binary logistic regression
Hagger et al., (2012); four European Nations	• To use the TPB constructs and the self-determination theory constructs to study the determinants of alcohol-related behaviors (units of alcohol consumed and frequency of binge drinking occasions)	Employees from large companies from 4 nation; n=486; male=225, female=261; age=30.41±8.31; No	• A 3 wave prospective study with follow-up after one month and 3 month • Self-reporting questionnaire on constructs of self-determination theory, the TPB, and past alcohol consumption (using Fast Alcohol Screening Test) and binge drinking occasions (time 1), psychological and alcohol-related behavior (time 2), and follow-up behavioral measures (time 3) • A path analysis model and a robust maximum likelihood method
Elliott & Ainsworth (2012); Scotland	• To compare one component (instrumental attitude, injunctive norm, perceived behavioral control) vs two component of the TPB in predicting binge drinking behavior (Instrumental and Affective attitude, injunctive and descriptive norms, and self-efficacy and perceived controllability)	Undergraduates; n=120, male37=, female=83; age=20.40±1.69; No	• A prospective study with after 2 weeks follow-up • The TPB construct measure in time 1 and subsequent binge drinking was measured in time 2 using self-reported questionnaire (both paper-based and online) • Path analysis and bootstrapping procedures
French & Cooke (2012); England	• To determine the extent to which the TPB constructs predict intention to binge drinking and actual drinking behavior that evening • To identify the individually salient beliefs related with the binge drinking behaviors and the beliefs to predict the TPB constructs, intention to binge drinking, and actual drinking behavior	Students; n=192; males=96, females=96; age not mentioned; No	• A prospective study with a follow-up on the same evening • Behavioral beliefs, normative beliefs, and control beliefs were elicited using open-ended item and the TPB constructs using 13 items 7-point rating scale • Behavior measured in terms of number of drinks that evening (time 2=end of the evening) • Linear regression analysis
Ross & Jackson (2013); Australia	• To determine the extent to which the TPB constructs predict binge drinking behaviors • To determine the extent to which the intention to drink predict binge drinking behaviors in the following 2 week period	Undergraduate students (psychology major), n=91; male=28, female=63; age=23±5.53; No	• A prospective study with after 2 weeks follow-up • Paper-based questionnaire to measure the TPB constructs, self-efficacy (different then perceive behavioral control), and social facilitation scales (time 1) and also binge drinking behavior (number of drinks in single occasion) (time 2) • Multiple regression analysis
Braun, Glassman, Dake, Jordan, & Yingling (2014); USA	• To predict heavy drinking behavior among college students using the IBM constructs • To determine which IBM constructs is the most predictive of the heavy drinking behavior	Undergraduates students; n=355; male=171, female=184; age=23.4±5.9; Yes	• A cross-sectional study • A customized survey to measure the IBM constructs based on the focus group discussion • A path analysis and non-parametric test such as chi-square test were utilized
Lettow, Vries, Burdorf, Conner, & Empelen (2015); Netherland	• To understand the determinants of binge drinking behavior by applying augmented the TPB (adding temporal stability of the prototype perceptions)	Young adults; n=410; male=89, female=321; age=21±2.14; No	• An online prospective study with a one-month follow-up • Measured the TPB constructs using customized survey, drinking behavior by calculating total of consumed glasses of alcohol during the past week, and prototype by portraying five type of drinkers (abstainer, moderate drinker, tipsy drinker, heavy drinker, drunk) • A hierarchical regression analysis

Table 2. Results and Salient Outcomes of the Theory of Planned Behavior and the Integrated Behavioral Model Study for Alcohol-Related Behavior from 2011 to 2016

Author (Year)	Results	Salient outcomes
Norman (2011)	• 68.8% of participants reported binge drinking at least 4 times over the past month • The TPB explained 75% of the variance (R^2=.75, F(4,132)=99.32, p<.001) in binge drinking intentions (only attitude and self-efficacy was significant) and 35% of the variance (R^2=.35, F(3,105)=18.65, p<.001) in binge drinking behavior at one-month follow-up (with only intention a significant contribution) • Habit explained addition 6% of the variance in the binge drinking behavior	• Binge drinking behavior is under the control of both intentional and habitual processes • Intention and habit complement each other to predict binge drinking behavior
Todd & Mullan (2011)	• 29.5% participants reported binge drinking at least once in the past 2 weeks • The TPB were significant predictors of the intention (R^2=.55, F(3,76)=32.20, p<.001)and the behaviors (R^2=.40, $\chi 2$ (2,N=80)=324.65, p<.001) but willingness was not	• The TPB model is more effective in predicting binge drinking among female undergraduates than the prototype willingness model • Mere measurement effect was more significant among participants who previously consumed more alcohol • The gender (all female) could be the reason for being subjective norms to be the strongest predictor of norms
Duncan, Forbes-Mckay, Henderson (2012)	• 64.7% abstaining from alcohol completely and 34.5% reported drinking alcohol at some level (7.8% drinking more than the maximum level recommended for a pregnant woman • Intention (Z = -7.18, p < .05; r = .71), attitude (Z = -6.82, p < .05; r = .73) , subjective norm (Z = -4.53, p < .05;r = .45) were significantly higher among abstainers compared with participants who continued to drink • The TPB model explained 77.1% of the variance ($\chi 2$ (4, N = 86) = 71.84, p < .001) in drinking behavior distinguishing between drinkers and abstainers • Only the intention and attitude subscale made a uniquely significant contribution to the model	• The TPB without the PBC component is a more effective model to for predicting alcohol behavior during pregnancy • Overall behavior change techniques were listed but not specified in relation to the study
Hagger et a., (2012)	• The mean Fast Alcohol Screening Test score of the sample was 2.15 (3 or above is considered as hazardous and harmful drinking behavior) • From the variables of the TPB and self-determination theory, the models accounted for 31.44% and 41.32% of the variance in binge-drinking occasions and number of drinks consumed respectively in the T1→T2 model, and 29.27% and 66.94% and of the variance, respectively, in T2→T3 • Variables of the self-determination theory (intrinsic motivation, identified regulation, introjected regulation, and external regulation) significantly accounted for the variances on the TPB constructs	• Identified regulation (guideline) for the drink is the most influential variable from the self-determination theory to predict intentions and alcohol-related behavior • Vast majority of explained variance on the behavior was from past behavior (habit) rather than any of the psychological variables
Elliott & Ainsworth (2012)	• On average participants reported binge drinking frequently • 82% and 90% of the variance in the binge drinking behavior (total direct + indirect effects) was reported by the one-component model and two-component model respectively • In both models, intention was only sole direct predictor of the binge drinking behavior and intention was a significant mediator of the instrumental and subsequent behavior	• The one component the TPB possessed good predictive validity, however, two –component the TPB provided a significantly better fit model for the study • Intervention that is combination of the TPB constructs have a higher effect on the behavior changes than intervention only targeted for the TPB constructs in isolation
French & Cooke (2012)	• 72% reporting binge drinking at least once in the past week • Attitude and subjective norms were significant predictors of intention [adj. R^2 =0.55, (F=74.6, df=3,180,p<0.001)] • The intention was a significant predictor of drinking behavior over the course of the evening [adj. R^2 =0.32, (F=41.2, df=2,173, p<0.001)]	• Friends approve (normative belief) and lack of money (control belief) were significantly predicted intention and is recommended to be used in the intervention • Attitude and subjective norms were found to predict intention to binge drinking and intention a was found to predict the binge drinking behavior
Ross & Jackson (2013)	• 51.4% participants reported binge drinking at least once in past 2 weeks • Attitude, subjective norm, and PBC predicted 51% of the variance in intentions [adj. R^2 =.51, F(3, 116) = 38.45, p < 0.001] but PBC was not significant and adding social facilitation in the same model added significant increase in the prediction of intentions [adj. R^2 =.53, F(4, 114) =7.03, p = 0.009] • Intention and PBC predicted 72% of the variance in binge drinking behavior [adj. R^2 =.72, F(2, 76) = 96.31, p < 0.001] but PBC was not significant and adding attitude and subjective norms in the same model added a significant increase in the prediction of binge drinking behavior [adj. R^2 =.76, F(4, 74) =49.93, p = 0.014] but attitude was not significant	• PBC failed to significantly predict binge drinking behavior among college students whereas attitude and subjective norms were found to predict intention to binge drinking and intention a was found to predict the binge drinking behavior • Being social (social facilitation) is the strong motivation for the college students to engage in binge drinking
Braun, Glassman, Dake, Jordan, & Yingling (2014)	• 37% participants reported high-risk drinking the last time they partied • Experiential attitude (0.34), injunctive norms (0.23), and self-efficacy (-0.28) all are a significant predictor of intentions to engage in high-risk drinking • The IBM constructs explained 45% and 26% of the intentions and high-risk drinking behavior respectively	• The IBM is recommended as a promising theory to understand the high-risk drinking prevention among college students, however, more study in assessing IBM in this area is warranted to establish its applicability
Lettow,Vries, Burdorf, Conner, & Empelen (2015)	• Participants reported consuming in average of 7.27±9.79 drinks per week • Attitude, descriptive norms, PBC and drinking behavior significantly predicted variance for the favorability prototype model (36%) and similarity model (41%) • The prototype stability moderated the relationship of abstainers and drunk prototype similarity with the intentions but not with the behavior	• Stable porotype similarity perceptions were more predictive of intentions then unstable perceptions. This is could be very useful especially for young adults' health intentions.

TPB=Theory of Planned Behavior; IBM=Integrated Behavioral Model

Discussion

The current review suggests that there are not many studies that have utilized the IBM. My dissertation "*Does integrative behavior model predict the binge drinking behavior among college students? A prospective study*" could be beneficial in reporting the application of the IBM in predicting binge drinking-related behavior (stopping to binge drinking behavior and continue not to binge drink).

Largely, the current review supports the utility of the IBM/TPB when applied to alcohol drinking behavior. The results from the review suggested that the correlation of the attitude and subjective norm were mostly positive and strong for the alcohol drinking behavior whereas correlation for the PBC was negative, small, and non-significant. Similar to the previous review, attitude emerged as the strongest determinant of the intention as well as the alcohol-related behavior (McEachan et al., 2011). The relationship between norms and intention emerge as the second important determinant of the intention and alcohol-related behavior however perceived behavioral control mainly reported small correlations. However, self-efficacy, when measured separately, had a strong and positive relationship with intention and alcohol-related behavior. Thus based on this review excluding perceived behavioral control construct could be suggested. Duncan, Forbes-Mckay, Henderson (2012) suggested the PBC is not significant if the participants do not have or perceive to have the drinking problem. This suggests that the college students (the target population of most of the studies) believe they have the high level of self-control and do not have a drinking problem, whereas prevalence rate on binge drinking among college students suggests otherwise. However, replacing PBC with the self-efficacy could be more effective to predict

intention and alcohol-related behavior. This review also helped me to be considerate with the items in the PBC or self-efficacy constructs and the reported results upon the completion of the study.

The current review reported the application of IBM/TPB constructs in predicting intentions towards the alcohol-related behaviors and actual behavior. The variance predicted for intentions towards the alcohol-related behaviors and actual behavior ranged from 45%-75% and 26% to 90% (Braun, Glassman, Dake, Jordan, & Yingling, 2014; Norman, 2011; Elliott & Ainsworth, 2012. A previous meta-analysis conducted by Armitage & Conner (2001) reported that the TPB explained 39% and 27% of the variance in the intentions and the behaviors respectively. Comparing it with the current review, the IBM/TPB seems to be more effective with the alcohol-related behavior. Based on the variance, the constructs of the IBM could be instrumental in determining binge drinking-related behavior.

The current review provided support for the prospective study design for exploring the predictability of the IBM constructs in determines binge-drinking related behavior. The current review brought the application of the Poisson regression to my attention which I might not have considered for my dissertation. I will be considering using the Poisson regression if the outcome variable in the dissertation ends up being the count data (eg. number of drinks, the occasion of the binge drinking days). In addition to the study design and statistical analysis, the review was also helpful in bringing few techniques into my attention for the dissertation study such as using 2-week diaries to collect binge drinking data, considering mere measurement effect during follow-up. For the sampling, the review suggested that there is a trend of

participation in the survey by the female however, the male and female have different drinking pattern. Lader & Goddard (2006) suggests that man drinks more alcohol than women. Thus, I will attempt to balance the gender in the study so that the results can represent both male and female.

There were few patterns reflected from the review. Most of the studies that are the IBM/TPB constructs are limited to the exploring the relationship between constructs, intention, and the behaviors. Few studies mention few ideas on how to use the results of the studies in the intervention but no one of the studies was intervention related. Another pattern was that almost all of the studies except one were short-term (up to 2 weeks). Drinking behavior are general long-term and also have life-long consequences. Thus, there is a notable gap for long-term research in the area of alcohol-related.

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Appendix B: IRB Documents

1. **IRB Application**
2. **Consent form**
3. **Research Protocol**
4. **Survey Instrument**
5. **Office of Human Research Participation protection (Graduate Student as Principal Investigator)**
6. **Follow up Survey**
7. **Recruitment Script for Initial Survey**
8. **Recruitment for follow-up survey**
9. **IRB Approval of Initial Submission**
10. **IRB Approval of Study Modification**
11. **IRB Final Report-Inactivation**

HSC Application (Version 1.1)

1.0 General Information

* Enter the full title of your study:

APPLICATION OF INTEGRATIVE BEHAVIOR MODEL TO PREDICT INITIATION OR MAINTENANCE OF STOPPING BINGE DRINKING AMONG COLLEGE STUDENTS: A PROSPECTIVE STUDY

* Enter the short title you would like to use to reference the study:

APPLICATION OF IBM TO PREDICT BINGE DRINKING

* This field allows you to enter an abbreviated version of the Study Title to quickly identify this study.

2.0 Add Department(s)

2.1 List departments associated with this study

Primary Dept?	Department Name
◉	NC - NC - Health and Exercise Science

3.0 Assign key study personnel(KSP) access to the study

3.1 * Please add a Principal Investigator for the study:

Amir Bhochhibhoya

3.2 If applicable, please select the Research Staff personnel:

A) Additional Investigators

B) Research Support Staff

3.3 Please add a Study Contact:

Amir Bhochhibhoya

Paul W Branscum, PHD

The Study Contact(s) will receive all important system notifications along with the Principal Investigator. (e.g. The project contact(s) are typically either the Study Coordinator or the Principal Investigator themselves).

3.4 If applicable, please add a Faculty Advisor:

Paul W Branscum, PHD

4.0 4.0-Institutional Review Board (IRB) Office

4.1 Select the appropriate office to initially receive this application:

○ Health Sciences Center IRB Office (Includes Tulsa Campuses affiliated with the HSC)
◉ Norman Campus IRB Office (Includes Tulsa and Cameron campuses affiliated with the NC)

5.0 25-NC Type of Submission

5.1 Select the type of submission you wish to complete:

◉ Study Application / Research Application
○ Protocol Development Application
○ Determination of Human Subjects Research Worksheet

6.0 100-Key Study Personnel (KSP) Information

6.1 Click the "Add a row" button to add a row, then select a member of your KSP and list the research responsibilities and availability. Click the button again to add another row until you have a row for each KSP. This table must reflect each person listed in Section 3.0.

Name	OU Capacity /Position		This person is trained and has adequate time to:						
Key Study Personnel: Mr Bhochhibhoya, Amir	Degree / Credentials:	☐ Faculty ☐ Adjunct Faculty ☑ Graduate Student ☐ Undergraduate Student ☐ Staff	☐ Fellow ☐ Resident ☐ Intern	☑ Screen / Recruit ☑ Obtain Consent	☑ Conduct Follow-up ☑ Manage /Monitor Data	☐ Administer Drug / Device ☐ Dispense Drug / Device ☐ Advise / Consult ☐ Access to de-identified data / samples only	☐ Other, describe:		If applicable, indicate this individual's affiliate institution (e.g., DMEI, VAMC, Cameron, etc.)
Key Study Personnel: Dr. Branscum, Paul W, PHD	Degree / Credentials:	☑ Faculty ☐ Adjunct Faculty ☐ Graduate Student ☐ Undergraduate Student ☐ Staff	☐ Fellow ☐ Resident ☐ Intern	☑ Screen / Recruit ☑ Obtain Consent	☑ Conduct Follow-up ☑ Manage /Monitor Data	☐ Administer Drug / Device ☐ Dispense Drug / Device ☐ Advise / Consult ☐ Access to de-identified data / samples only	☐ Other, describe:		If applicable, indicate this individual's affiliate institution (e.g., DMEI, VAMC, Cameron, etc.)

6.2 If any of the individuals listed above do not have adequate time to perform their research activities, provide the name of the individual and an explanation as to how this is being addressed:

(Additionally, provide name discrepancies for HRPP training in this text box.)

6.3 Describe the process used to ensure that all persons assisting with the research are adequately informed about the protocol and their research-related duties and functions.

Before the study begins the PI will conduct a meeting with the faculty advisor to discuss the study design and expected roles and responsibilities. PI and faculty advisor will have each other's email address and phone number in case anyone has any questions during the study. Also, they will conduct a regular meeting to keep up to date on the study.

6.4 Are there any non-OU collaborating researchers involved with this study (and this study is not an industry-sponsored study)?

○ Yes ◉ No

6.5 By checking the box below you verify there is an adequate number of qualified research personnel to fulfill all necessary roles of the study.

☑ I verify there is an adequate number of qualified research personnel to fulfill all necessary roles of the study.

6.6 Norman Campus Researchers Only: Are any of the investigators noted above currently associated with another institution?

○ Yes ◉ No

If YES, please provide the name of the KSP and the other institution.

7.0 300-Primary Focus / Nature of Research

7.1 The primary focus / nature of the research is:

○ Bio-Medical/Clinical
◉ Social/Behavioral

8.0 305-Use of Human Cell Lines

8.1 Does the research involve use of human cell line(s) and/or human cloned DNA/RNA?

○ Yes ◉ No

9.0 310-Research Design / Project Abstract

9.1 Provide a brief summary for each of the items below:

Purpose and/or hypothesis:

It is the intent of the study to explore constructs of the Integrative Behavior Model and design a model that best predicts binge drinking behavior among college students. This study will also provide insight to help understand binge drinking behavior among college students and inform future interventions.

Experimental design:

This will be the prospective study with the convenient sample of 1,000 students who will participate in the online survey. Students will be requested to take the survey at the baseline and report their drinking behavior after 30 days.

Proposed procedure:

The research team will forward a mass email to all undergraduate students enrolled at the University of Oklahoma, Norman campus via University of Oklahoma Mass email listserv. The email will include a request to take the survey and hyperlink for the survey. The first page of the online survey will act as an information sheet as well as the request for consent for participating further. The first page will also include a brief introduction to the study and survey instructions. Both the email and the first page of the survey will clearly

explain to students that participation in this study is voluntary and all personal information collected from the survey will be kept confidential. At the end of survey participants will be lead to another survey where participants will provide their email address for follow up. IP address of the respondents will not be collected during the survey. Participants will be allowed to send an email or call the PI for additional questions or concerns about the study.

Importance of knowledge reasonably expected to result from the research:

The current study results will highlight the effectiveness of the IBM in predicting the binge drinking behavior among college students and will see if additional predictive variables can be determined. This study will also tease out the different predicting factors for binge drinkers and non-binge drinkers. The information gleaned from this study will shed some light on the major issues in binge drinking behaviors among college students and equip practitioners with the knowledge to design effective interventions.

9.2 Has this research been previously submitted to the IRB?

○ Yes ◉ No

If YES, provide the IRB number previously associated with this research:

9.3 If the research involves more than minimal risk, describe the plan for monitoring the data collected to ensure the safety of participants.

The participants are requested to suggest information about drinking behavior which could lead to social and legal risks. Thus, personal details (except email) will not be collected during the survey that reveals personal identity. Email address will be collected via the separate online link and will not be tied to the participant's response. Similarly, information will be collected only for study purpose and will be dealt with stick confidential. So the whole study will be designed to keep risk at the minimal level.

9.4 If you are using an online survey, enter the URL (link) to the survey in the box below and remember to upload a copy of the survey in the upload section at the end of this application.

1.Initial Survey Link: http://oucas.qualtrics.com/jfe/form/SV_2o4HutnPeRS6g73

2.Link to collect email address separately so there response is not tied to their respective email address: http://oucas.qualtrics.com/SE/?SID=SV_eEee0pY7TDHvhFX

3.Follow-up survey: http://oucas.qualtrics.com/SE/?SID=SV_3atA5honW70k2Jn

10.0 320-Participant Contact

10.1 Does your research involve direct interaction with potential participants?

Including, but not limited to:

- Obtaining Informed Consent
- Conducting Focus Group Activities
- Using Surveys/Questionnaires (paper as well as web-based)
- Telephone Interactions

◉ Yes ○ No

10.2 Does your research involve review or analysis of pre-existing (retrospective) records / data / biological specimens?

○ Yes ◉ No

11.0 900-Social Behavioral/Student Studies
11.1 Is this research considered a thesis or dissertation?
◉ Yes ○ No
11.2 Does your research involve deception?
○ Yes ◉ No
11.3 Are you conducting the research outside the United States?
○ Yes ◉ No

12.0 1000-Student Research
12.1 Students as Investigators are required to submit the Student as Principal Investigator form. Click the HELP bubble for more information.
Provide the name of the student who is writing the thesis/dissertation: Amir Bhochhibhoya
12.2 Provide five (5) references from the literature to support your hypothesis:
Braun, R. E., Glassman, T., Sheu, J. J., Dake, J., Jordan, T., & Yingling, F. (2014). Using the Integrated Behavioral Model to predict high-risk drinking among college students. *Journal of Alcohol and Drug Education*, *58*(2), 46-63. Cooke, R., Dahdah, M., Norman, P., & French, D. P. (2016). How well does the theory of planned behaviour predict alcohol consumption? A systematic review and meta-analysis. *Health Psychology Review*, *10*(2), 148-167. U.S. Department of Health and Human Services (USDHHS). (2002). High-risk drinking in college: What we know and what we need to learn. In: USDHHS Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism: National Institutes of Health. In *Final Report of the Panel on Contexts and Consequences*. Retrieved from: https://www.collegedrinkingprevention.gov/media/FINALPanel1.pdf White, A., & Hingson, R. (2014). The burden of alcohol use: Excessive alcohol consumption and related consequences among college students. *Alcohol Research: Current Reviews*, *35*(2), 201-218. York, C. M. (2013). *Exploring the Differences in Drinking Motives among Adolescent Binge and Non-Binge Drinkers* (Doctoral dissertation, University of Illinois at Chicago).
12.3 Proposed end date:
05/15/2018

13.0 1300-Radiation Exposure
13.1 Does the research involve the use of ionizing radiation?
○ Yes ◉ No

14.0 1400-Institutional Biosafety Committee

14.1 Does the research involve the administration or transfer of recombinant DNA, microorganisms, viruses, or biological toxins to humans?

○ Yes ◉ No

15.0 1500-Multiple Sites

15.1 Is this a multi-center study?

○ Yes ◉ No

If YES, has information management regarding risk and interim results reporting been addressed in sufficient detail in the protocol?

○ Yes ○ No

16.0 1600 - Study Sites

16.1 Facilities

Describe the facilities/equipment available for this study (for example: address where consent will take place, where follow-up appointments will take place, any laboratory facilities/equipment anticipated, use of clinic facilities):

All data collection will occur online, therefore no facilities are necessary for data collection. After responses are collected, data will be stored in the Community Nutrition and Physical Activity lab and will be protected in the password protected computer in the lab. All data analyses will be done in the Community Nutrition and Physical Activity Lab (PI's office and lab). The Community Nutrition and Physical Activity lab is located at the collums building in the OU Norman campus.

16.2 What is the site of the research or data collection? (Check all that apply.)

Campuses

☑ OU Norman Campus
☐ OU HSC Campus
☐ OU Tulsa-Norman
☐ OU Tulsa-HSC

Affiliates

☐ Cameron
☐ VA OKC
☐ VA Muskogee
☐ DMEI
☐ OMRF
☐ OFDR
☐ OU Medical Center
☐ Oklahoma Cancer Specialists and Research Institute - Tulsa
☐ Rogers State University

Other

☐ Non-OU Site

17.0 1700-Funding /Support Information

17.1 Check all of the appropriate boxes for funding / support sources for this research. Include pending funding source(s).

- [x] OU Internal/Departmental (Check this if you are not receiving external funding.)
- [ ] External (Industry/State/Federal/Non-Profit)
- [ ] Direct / Indirect Federal Agency Funding (Depts. of Defense, Education, Energy, or Justice, or EPA)

(Direct vs. Indirect Federal funding will be addressed in another section if this box is checked.)

18.0 1800-Risks and Benefits

18.1 Does the research involve any of the following possible risks or harms to participants?

Check All that Apply:

- [ ] Economic Risks
- [ ] Employment/occupational risk
- [ ] Legal Risks
- [ ] Physical Risks
- [ ] Psychological
- [ ] Social Risks
- [x] None
- [ ] Other:

If OTHER, describe:

18.2 Describe the nature and degree of all risk or harm associated with participation in the research. If none, state "None."

None

18.3 Explain what steps will be taken to minimize risks or harms and to protect participant welfare.

To minimized risks and to protect participant's identity, no personal information (except email address) will be collected. The email address will be requested for the follow-up as well as to enter in a raffle at the end of the study. Email address will be collected via a separate online link and will not be tied to the participant's response. After data is collected, email addresses will be kept in a separate file after the number is assign to each participant. Collected data will be used for study purpose only and data will be dealt with strict confidentiality.

18.4 Describe the anticipated direct benefits of this research for the individual participants. If none, state "None."

Participants in this study will be provided with an opportunity to participate in a raffle for four gift card worth of $ 50.00 each. Participants will be requested to provide with an email address to participate in the raffle. The winner will be notified via email. All email address will be kept in the separate file from other data after the number is assigned to each participant.

18.5 Investigator's Risk / Benefit Assessment

Select the appropriate option.

- (•) Research not involving greater than minimal risk.
- ( ) Research involving greater than minimal risk but presents the prospect of direct benefit to individual participants.
- ( ) Research involving greater than minimal risk and no prospect of direct benefit for the individual participant, but likely to yield generalizable knowledge about the participants disorder or condition.

19.0 1900-Research Population and Enrollment

19.1 Will your research involve the use of a control group for comparison? (If your study involves randomization, select NO - see HELP bubble)

- ( ) Yes (•) No

20.0 1920-Number and Source of Research Participants

20.1 Age Range for Children:

- [x] Not Applicable (only adults in the study)

From

To:

20.2 Age Range for Adults:

- [ ] Not Applicable (only children in the research)

From:

18

To:

25

20.3 Gender:

Both

20.4 Maximum Number of Research Participants to be recruited (see HELP bubble for definition of recruited):

(If the number provided here does not match what is in the consent document, please provide rationale for the discrepancy in Section 5000; e.g. sponsor contract.)

1000

20.5 Specify the Source of the Research Participants:

- [ ] Your Practice Referral
- [ ] Outside Practice Referral
- [ ] Students from any class other than the researcher's
- [ ] Students from the researcher's class
- [ ] Chart Review / Registry / Medical Records to determine eligibility
- [x] Advertisements / Recruitment Materials (phone, verbal, media scripts, email, flyer)
- [ ] Web Listing

☐ Recruitment Databases
☐ Recruitment through "snowball" sampling or random digit dialing
☐ Department Pool
☐ Other:

If Other, describe:

21.0 1930-Participant Demographics

21.1 Protected Groups

Are you actively recruiting or specifically gathering information on any of the following protected groups?

○ Yes ◉ No

If YES, check all that apply:

☐ Children (under 18)
☐ Pregnant Women
☐ Elderly (65 & older)
☐ Decisionally Impaired (Unable to Consent)
☐ Fetuses
☐ Prisoners
☐ Psychologically Impaired (Able to Consent)
☐ Native American Tribes and/or Tribal Organizations
☐ Other Vulnerable Persons/Populations
☐ My research involves pre-existing materials (data, records, specimens, etc.). Some of the research materials may include one or more of the above groups, but these groups were not the focus of the research

For each protected group checked above, provide a description of additional safeguards included in the protocol to protect their rights and welfare.

Minimal Risk Attestation

☐ Check this box if this study involves no more than minimal risk, and no additional safeguards are necessary.

21.2 Racial/Ethnic Origin:

Is the **focus** of the research to include a particular racial/ethnic origin?

○ Yes ◉ No

If YES, check all that apply:

☐ Hispanic or Latino
☐ Native American or Alaskan Native
☐ Asian
☐ Native Hawaiian or Other Pacific Islander
☐ Black or African American
☐ Caucasian

If OTHER, describe:

22.0 1940 - Participant Medical Clearance

22.1 Will medical clearance or medical screening be necessary for participants to participate because of tissue or blood sampling, administration of substances such as food or drugs, or physical exercise conditioning?

○ Yes ◉ No

If YES, explain below how clearance will be obtained. If a screening instrument will be used, please upload it at the end of the application.

23.0 2000-Recruitment

23.1 Indicate how potential participants will be approached (upload applicable documents at the end of the application process):

Check all that apply:

☐ Direct Contact
☐ Dear Doctor Letter
☐ Dear Patient Letter
☐ Phone Call
☐ School Officials
☑ Advertisements / Recruitment Materials (Includes phone, media and verbal scripts, email and flyers.)
☐ Other

If OTHER, describe:

24.0 2100-Cost / Compensation to Participants

24.1 Cost:

If applicable, (Bio Medical Studies only) will participants incur any costs over/above their routine care as a result of their participation in the research?

○ Yes
◉ No
○ NA

If YES, describe:

24.2 Compensation:

Will participants be compensated (i.e. credit hours, food, monetary) for their participation in the study?

◉ Yes ○ No

If YES, specify the purpose:

For your time a drawing will be held for four gift cards worth of $ 50.00 each

25.0 2110-Compensation

25.1 Select the form(s) of compensation:

☐ Money
☑ Gift / Gas Card
☐ Food

☐ Class Credit Hours
☐ Other:

If OTHER, describe:

25.2 Provide the total amount of compensation a participant is eligible to receive for the research:

four person randomly selected at the end of the study will receive $50 each.

25.3 Select the timing of compensation:

○ At each study visit
○ At specific time points according to the protocol
◉ At the conclusion of the study
○ Other:

If OTHER, describe:

25.4 Is there bonus compensation if the participant completes the research?

○ Yes ◉ No

If YES, describe the bonus:

26.0 2200-Informed Consent

26.1 Check each method that applies:

☐ Signed consent will be obtained from participants, legally authorized representatives (LAR) and/or parents.
☑ Electronic consent will be obtained from participants via the web or email.
☐ Verbal / implied consent will be obtained using an information sheet or script
☐ Informed consent will not be obtained
☐ Social/Behavioral Deception Study with consent being obtained at the end of the study

27.0 2210-Consent of Participants

27.1 Who will be consenting to participate in the research? (Check all that apply)

☑ Participant
☐ Child
☐ Parent of Child
☐ Guardian
☐ Legally Authorized Representative
☐ Child, Guardian, or Legally Authorized Representative outside the State of Oklahoma

27.2 Describe the consent process, any waiting period between informing the prospective participants and obtaining, the consent, and how it provides participants with sufficient opportunity to consider participating in the research:

Researchers will send a mass email to all undergraduate students enrolled at the University of Oklahoma, Norman Campus. Potential participants will receive an email which will contain detail information about the study. The email will also contain contact information of the PI in case they have any questions. If participants proceed to the online survey via the link provided in the email, they will begin with the consent form which will contain detail information about the study including purpose, the length of participation, risks and benefits, compensation, confidentiality. At the end of the consent form, they have to agree before they

can participate in the survey. This way participants will be provided with the sufficient opportunity to contact researcher if they have any questions or concerns before they provide consent for the study.

27.3 Describe measures instituted to minimize undue influence and/or coercion during the recruitment and/or consent process:

In the email as well as consent form, it will clearly mention that participation is completely voluntary. Participants can withdraw at any time while taking the survey or during follow-up.

27.4 All participants entered onto the master list of participants for the study must sign a consent document prior to undergoing any study related interactions or interventions, unless the IRB has granted a waiver of informed consent or a waiver of signed consent.

☑ By checking this box, the PI agrees to abide by the above requirement.

27.5 Language

Is the only language of the consent and data collection processes English?

◉ Yes ○ No

If NO, what other languages will be used?

Upload a copy of the consent document in the appropriate language at the end of the application process and upload a translator statement for translated documents. **See HELP bubble for translator statement template**.

28.0 2230-Waiver of Signed Written Consent

28.1 Your selection requires a waiver of signed written consent.

Explain the reason for the waiver:

○ Category 1 The only record linking the participant and the research is the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each participant will be asked whether they want documentation linking them with the research and their wishes will govern. The research is not subject to FDA regulations.

◉ Category 2 The research present no more than minimal risk of harm to participants and involves no procedures for which written consent is normally required outside of the research context.

29.0 2400-Privacy and Confidentiality

29.1 Describe how information will be accessed from or about participants and the provisions used to protect the privacy interests of participants.

☐ Interactions are held in a private area.
☐ Only designated personnel are present during discussions.
☐ Medical, educational, client, and other records reviewed in a private area.
☑ Other

If OTHER, describe:

The survey will be online so participants can participate at their convenience and when their privacy is maintained.

29.2 Describe the instituted measures to protect the confidentiality of identifiable private data of study participants.

Indicate how data are kept secure (check all that apply):

- ☐ Data are coded; data key is destroyed at end of study.
- ☑ Data are coded; data key is kept separately and securely.
- ☑ Data are kept in a locked file cabinet.
- ☑ Data are kept in a locked office or suite.
- ☑ Electronic data are protected with a password.
- ☑ Data are stored on a secure network and/or encrypted devices.

29.3 Will you provide a copy of identified research data to anyone outside of the research team?

○ Yes ◉ No

If YES, explain below why and to whom.

29.4 Will you obtain a Federal Certificate of Confidentiality for this research?

○ Yes ◉ No

If YES, attach documentation of application (and a copy of the Certificate of Confidentiality award if granted) at the end of the application process.

If the data collected contains information about illegal behavior, visit the NIH Certificate of Confidentiality.
See Help bubble for additional information.

29.5 Will participants be identified in audio, video, or digital recorded responses?

○ Yes ◉ No

If YES, explain ***why*** these forms of data are necessary to the project **and** indicate whether or not the data will be destroyed at the conclusion of the study:

(*If the data will not be erased at the conclusion of the study,* ***provide a rationale*** *for why this is necessary in the text editor field above.*)

30.0 2450-Application Type

30.1 What level of review is appropriate for your research?

- ○ Full Committee
- ○ Expedited
- ◉ Exempt

31.0 2470-Exempt Review

31.1 Select the appropriate category (see HELP bubble for full definitions):

- ○ 1 - Research involving normal educational practices
- ◉ 2 - Research involving the use of survey procedures
- ○ 3 - Research involving appointed or elected officials
- ○ 4 - Publicly available materials or information that is recorded in a de-identified manner
- ○ 5 - Demonstration projects or public service programs
- ○ 6 - Taste and food quality evaluation

32.0 2600-Conflict of Interest

32.1 Do you or any key study personnel, including non-OU collaborators, have a Conflict of Interest (as defined in the OU COI Policy – see help bubble) in the Sponsor/Agency that could possibly affect or be perceived to affect the results of the research, educational, or service activities proposed?

By responding to this question, you are confirming that you have read the relevant conflict of interest policies.

○ Yes ◉ No

If you answered 'Yes' to the COI question, click the bar to complete the COI Disclosure Form. If your campus's Office of Research has provided you with a COI management plan, upload it along with your other study documents -OR- upload documentation from that office that a management plan is not required.

No form has been attached.

33.0 2700-HIPAA

33.1 Does your research involve the collection, use or sharing of Protected Health Information?

○ Yes ◉ No

Please note: Storing Protected Health Information (PHI) in the cloud (Office 365, Qualtrics, Surveymonkey, etc.,) is not permitted.

HIPAA forms are located in Operating Procedures, which is located under the blue My Assistant tab in the left-hand navigation from your iRIS home screen. When clicking on the appropriate HIPAA form, remember to "Save As" to your desktop. **For HSC HIPAA Forms 5 - 9, use only those forms located in Operating Procedures as these forms have been modified from the "paper-based" forms.**

You will have the opportunity to upload HIPAA documents at the end of the application.

34.0 5000-Exit Application Interview

34.1 Use the text box below to add any other information you would like to include in this application.

34.2 Principal Investigator Certification

☑ I certify that all information provided in this submission, including support materials, is complete and accurate.

For studies/research applications:

☑ I certify that all investigators have completed the education requirements of the Norman Campus IRB ("NC IRB") or OU Health Sciences Center Campus IRB ("HSC IRB"), as applicable and required for conducting human subjects research.

☑ I assure that I have obtained all necessary approvals from external entities, as applicable and required for conducting human subjects research.

☑ I assure compliance of all investigators to this submission as approved; relevant OU IRB policies and procedures; applicable federal, state and local laws; and, ethical conduct of the research and protection of the rights and welfare of human participants, as applicable and required for conducting human subjects research.

☑ I agree to obtain legally effective informed consent from research participants, as applicable.

☑ I agree to promptly report protocol deviations and/or unanticipated problems as defined by OU IRB policy to the OU IRB, as applicable.

☑ I assure that I have documentation of encryption for all electronic devices used in conducting human subjects research.

The Application portion of the submission process is now complete. Click the " **Save and Continue**" button in

the top right to move into sections where all pertinent study documents for the initial submission packet can be uploaded and attached.

University of Oklahoma
Institutional Review Board
Information Sheet to Participate in a Research Study

Project Title: Application of Integrative Behavior Model to predict initiation or maintenance of stopping binge drinking among college students: a prospective study

Principal Investigator:	Amir Bhochhibhoya
Department:	Health and Exercise Science

Would you like to be involved in research at the University of Oklahoma?
I am Amir Bhochhibhoya from the Department of Health and Exercise Science and I invite you to participate in my research project entitled "Application of Integrative Behavior Model to predict initiation or maintenance of stopping binge drinking among college students: a prospective study". This research is being conducted at the University of Oklahoma, Norman Campus. You were selected as a possible participant because you are undergraduate student at the University of Oklahoma, Norman Campus. You must be at least 18 years of age to participate in this study.

Please read this document and contact me to ask any questions that you may have BEFORE agreeing to take part in my research.

What is the purpose of this research?
The purpose of this research is to understand drinking behavior among college students.

How many participants will be in this research?
About 1,000 undergraduate students will take part in this research.

What will I be asked to do?
If you agree to be in this research, you will be asked to complete the online survey related to alcohol consumption behavior. After 30- days the researcher will ask you to complete another survey about your drinking behaviors for the past 30 days.

How long will this take?
Your participation will take 10-15 minutes to complete the initial survey and less than 5 minutes to complete follow up survey.

What are the risks and/or benefits if I participate?
There are no risks and no benefits from being in this research.

Will I be compensated for participating?
You will not be directly reimbursed for your time and participation in this research. However, four winners will be selected from the pool of participants for a raffle for $ 50.00. If you would like to be entered into a raffle, please provide your email address at the end of this survey. A winner will be notified through email. Your participation in the raffle is completely voluntary. At the end of the study, **all email addresses** will be deleted.

IRB NUMBER: 7852
IRB APPROVAL DATE: 03/22/201

Who will see my information?
In research reports, there will be no information that will make it possible to identify you. Research records will be stored securely and only approved researchers and the OU Institution Review Board will have access to the records.

You have the right to access the research data that has been collected about you as a part of this research. However, you may not have access to this information until the entire research has completely finished and you consent to this temporary restriction.

Do I have to participate?
No. If you do not participate, you will not be penalized or lose benefits or services unrelated to the research. If you decide to participate, you may decline to answer any question and can stop participating at any time.

Will my identity be anonymous or confidential?

You will be requested to provide email address for the follow up as well as participating in the raffle. The email address will only be used to send you a follow up survey. Your name will not be retained or linked with your responses. The data you provide will be retained in anonymous form. All email address will be deleted after all the data collection is completed and winner of the raffle is notified.

Will I be contacted again?
The researcher would like to contact you again for the follow up after 30 days of initial survey submission. By agreeing to this consent form, I give my permission for the researcher to contact me via my email address for the follow-up.

Who do I contact with questions, concerns or complaints?
If you have questions, concerns or complaints about the research or have experienced a research-related injury, contact researcher or faculty sponsor at

Principal Investigator	**Faculty Sponsor**
Amir Bhochhibhoya, Ph.D (C), MBA, CHES	Paul Branscum, Ph.D., R.D.
Graduate Assistant	Assistant Professor
Department of Health and Exercise Science	Department of Health & Exercise Science
The University of Oklahoma	The University of Oklahoma
201 East Lindsey St., Collums Building 150 A	1401 Asp Avenue
Norman, OK 73019	Norman, OK 73019
Ph: (405) 619-8842	Ph: 405-325-9028
Email: amirkb@ou.edu	pbranscum@ou.edu

You can also contact the University of Oklahoma – Norman Campus Institutional Review Board (OU-NC IRB) at 405-325-8110 or irb@ou.edu if you have questions about your rights as a research participant, concerns, or complaints about the research and wish to talk to someone other than the researcher(s) or if you cannot reach the researcher(s).

Please print this document for your records. By providing information to the researcher(s), I am agreeing to participate in this research.

This study has been approved by the University of Oklahoma, Norman Campus IRB.

IRB NUMBER: 7852
IRB APPROVAL DATE: 03/22/201

Please select yes if you agree to participate in this study.

□ I agree to participate (click should connect to survey)
□ I do not want to participate (click should connect to a Thank You for considering page)

University of Oklahoma – Norman Campus
Institutional Review Board
Description of Study Protocol

1. **Provide a description of the purpose of your study and** your research design. (**Examples**: A pre-test – post test 2 x 2 experiment, with a control group and an experimental group that will receive one intervention. A grounded theory exploration of a topic. A pre-test post-test evaluation of a new classroom teaching method. An online cross-sectional survey of students related to curriculum topic. An 8-week walking study with a control and 2 comparison groups receiving either a diet or exercise message intervention). Guidance: This description should be short and written for a lay reader not for someone in your field. Also, your response should be understandable without the reader having to refer to another study document. Do not cut and paste your thesis/dissertation research abstract.

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The purpose of this research is to predict alcohol drinking behavior among college students using theory of Integrated Behavioral Model. This will be online survey and will be administered to undergraduate students at the University of Oklahoma, Norman Campus via University of Oklahoma Mass mail. The information will be collected at two point of the time. First time participants will take survey which will take 10-15 minutes. After 30 days researcher will contact participants for follow up on their drinking behavior which will take less than 5 minutes.

2. If your study will be conducted internationally, involves the military, involves deception, or includes non-OU research personnel, you should address the following areas related to your proposed study:
   a. deception – the debriefing process that will be used
   b. international research – review and approval of the study by a local ethics council, in country research support, verification of the cultural appropriateness of all study intervention and testing procedures and study documents
   c. research involving the military – the unit that will be responsible for providing IRR or research approval and completion of the applicable DoD research approval form(s)
   d. non-OU research collaborators – provide a contact information, institution of employment, and a description of the specific research responsibilities of each collaborator

N/A

3. **Describe** your participants (examples: 10 day care directors in Tulsa, 50 employees of ABC Company in Norman, 5 people between 18 and 45 who do weight resistance exercise at least two times a week). **Include** information for each type of participant. Guidance: Many studies gather data from different types of participants such as teachers and their students, employees and their supervisors, kids and their parents. Be sure to provide a description of all types of potential participants and the number of each.

This study will be conducted with undergrad students at the University of Oklahoma, Norman Campus. Age range for participation is between 18 to 30. Participants could be of any gender, ethnicity, and year in college. Approximately 1,000 participants will be requested to complete the survey.

4. **Provide** the inclusion and exclusion criteria for selection for each type of participant. **Where** will you obtain the contact information for potential participants? Guidance: If the information is public, describe the source of the contact information. You may not ask an organization or other entity to provide contact information for potential participants without their (potential participants) consent to release this information. You may ask that institution to distribute recruiting material that includes the researcher's contact information so that potential participants can contact the researcher directly if interested in participating. If you involve an institution or other entity in recruitment activities, upload a signed, site- support letter, on the organization's letterhead, that confirms that the signor has reviewed your research design and is willing to assist you in participant recruitment. Please note that access to contact information as a component of your job function DOES NOT automatically mean that you have access to this information for research purposes. This permission must be provided by your employing organization.

The faculty sponsor of the researcher will send a mass email. All undergraduate students enrolled to all undergraduate students who are enrolled at the University of Oklahoma, Norman campus and those who have not unsubscribed for mass email will receive the email and will be eligible for the study participation. Inclusion criteria for this study includes: being an enrolled as an undergraduate student at the University of Oklahoma and being between the ages of 18 to 30. There are no exclusion criteria, other than not meeting the inclusion criteria.

5. **Recruitment: Who** will approach potential participants? What information are potential participants given about the study? What safeguards are in place to minimize coercion? **If** the researcher(s) is also the participants' supervisor/instructor, how will you assure that the identity of the research participants remains unknown to the researchers until after (1) the data have been gathered and are de-identified or (2) the class grades have been assigned? Guidance: If the participants are under the direct supervision of the researcher(s) (such as employees or students of the researcher(s)), someone other than the researcher must conduct all recruitment and identifiable data collection activities. Upload recruitment materials, such as verbal or written scripts, email messages, postings to websites, flyers, and/or letters. If you recruit participants who are not at OU, include this language: ***"The University of Oklahoma is an Equal Opportunity Institution."*** For OU mass email – you must have the proper permission to use the email list and must include this language in your email message: ***"The OU IRB has approved the content of this advertisement but the investigator is responsible for securing authorization to distribute this message by mass email."***

The faculty sponsor of the researcher will send a mass email. The recruitment email will include a brief study description, the study objectives, and the voluntary nature of the study. Students will also be informed that no personal data will be collected and study is totally voluntary in nature and collected data will be kept strictly confidential. However, participants will be asked to provide email address for the follow up. Also, email address will be collected to determine winners for the raffle after all data are collected and winner of the raffle will be notified via email.

Potential participants will be allowed to contact the PI/faculty sponsor with questions pertaining to the study. Contact information for the PI/faculty sponsor will be provided in the email as well as in the informed consent. A draft of the recruitment email has been uploaded with this IRB application.

6. **What identifying information will you collect? How** long will you retain participant contact/identifying information? **How** will you store this information during the study? **How** will

you dispose of contact information when the study is completed or when you no longer need this information? Guidance: If you do not have permission to report the names of your participants, then it is advisable to assign pseudonyms or study numbers to each participant as soon as the data are collected to reduce the risk to participants if research files are accidentally released. Participants can give you permission to release their identities or to store identifiable research records in the Waiver of Elements of Confidentiality section of the informed consent documents.

Participant's email address will be collected during study for the follow up. Email address will also help to contact winner of the raffle which will be determined at the end of data collection.

Potential participants will be allowed to contact the PI/ faculty sponsor with questions about the study. Collected email address will be kept separately and will be deleted after winner for raffle draw is awarded. All other collected information will be used only for study purpose and will be dealt with strict confidentiality.

7. **Provide** a step-by-step description of each of the tasks that participants will be asked to perform during the study. Guidance: Tasks include the consent process, completion of data collection instruments and any intervention or de-briefing activities.

   For each study task, list each task sequentially in the order participants will complete it; indicate the approximate time it will take to complete each task and the setting (such as, in a classroom, in the participants' workplace, in a public place, at home). Guidance: If you have multiple kinds of participants (i.e., students and teachers, employees and executives, etc.), include separate entries for each kind of participant and each task.

   For each data collection instrument, indicate the frequency of administration and the method of administration (i.e., face-to-face, telephone, mail, or via a website). Guidance: Upload a copy of each data collection instrument, including surveys, questionnaires, interview protocols, questions for focus groups, observation recording forms, etc.

   For face-to-face interviews and focus groups/group interviews, describe other persons who are not participants who will be present and the activities of each of these persons. **What** steps will you take to ensure that the discussion is held confidential by all the participants after the focus group? Guidance: All non-participant attendees are considered key study personnel since they have access to identifiable data. If someone other than the researcher will transcribe interviews, a confidentiality agreement should be completed and submitted with your application. A copy of the OU-NC approved confidentiality agreement form should be modified for your study and uploaded with other study documents.

Task	Time	Setting	Method of Administration
Complete survey	10-15 min	Online	The survey will be provided through mass email. After students take survey, data will be collected directly from the website
Follow up	Less than 5 min through email.	Online	The survey will be provided

8. **What** steps will you take to protect the identity of your participants? If interviews or focus groups are audio recorded and will be transcribed, who will transcribe the audio, and how will participants' identities be protected in the transcripts? Guidance: for audio-recorded data, you can mask the identity of the participants by using software programs such as Audacity (a free download). Also, participants should be addressed by a pseudonym or code during interviews

to avoid inclusion of names that make interviewees identifiable or a procedure for de-identifying transcripts must be proposed. Photographs of classrooms should not include any identifiable images of the students under 18 who are in the classroom. If you intend to publicly release audio, video or photography, then you will need to have participants sign the OU Talent Release document.

Only participant's email address will be collected during study for study follow up and to determine winner of raffle draw at the end of data collection process. Participation will have option to not provide email address, if they don't want to participate in the raffle. Winner of the raffle will be notified via email.

Potential participants will be allowed to contact the PI/ faculty sponsor with questions about the study. Collected email address will be kept separately and will be deleted after follow up response is collected and winner for raffle draw is contacted. All information will be inputted on a password-protected computer.

9. **How** will you store, secure, and dispose of each kind of data in your research records, including paper documents, electronic files, audio/video recorded data, photography and/or research records? **How** will you store and dispose of signed consent documents and master lists that link identifying information to ID code numbers? **For** what length of time will you retain your research records? Guidance: To retain research records that contain identifiable information about the participants (or that contain sufficient information for deductive re-identification) after the close of the study, you will need to provide a justification for this request. In addition, you will need to include the Waiver of Elements of Confidentiality section on the consent documents. For de-identified data sets with no potential for deductive re-identification of participants, research records can be kept indefinitely.

Data Type	Storage	Security	Disposal Method	Retention time
Electronic data	Laboratory computer	Password protected and use secured network only	Data files will be deleted from all computers using the "empty trash" feature.	Data files will be deleted after 3 years.

IRB #: _____

Participant ID: Please fill in the following information to generate a unique identifier. You will be requested to re-take this survey at a later point and the following information will be used to match pre and post survey information during the analysis.

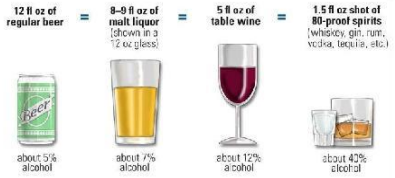
- First letter of own first name: ☐
- First letter of father's first name (A–Z): ☐
- First letter of mother's first name (A–Z): ☐
- Birthday – "01–31": ☐☐
- Birth month – "01–12": ☐☐
- Birth year – "yyyy": ☐☐

Alcohol behavior scale for college students

Part I:

Consent & Directions: Thank you for participating in our survey. Please remember that your participation is voluntary. All information from this survey will be anonymous, and your information will be dealt with strict confidentiality. There is no right or wrong answer. Please select the box that best describes your opinion. Thank you for your participation!

One alcoholic "drink" is defined as 12 oz. of beer, 5 oz of wine, or 1.25 oz of hard liquor either straight or in a mixed drink.



1. In the past thirty days, on how many days did you use Alcohol?

   N/A, don't drink
   Have used but not in last 30 days
   1-2 days
   3-5 days
   6-9 days
   10-19 days
   20-29 days
   Use daily

[If select "N/A, don't drink " or "have used but not in last 30 days" please skip to the section for non-binge drinker (in the follow survey it will take to the end of the survey)]

2. During the past thirty days, how many times have you had:
   (for men) 5 or more drinks (Beer, wine, liquor) in about 2 hours?
   (for women) 4 or more drinks (Beer, wine, liquor) in about 2 hours?
   N/A, don't drink
   Have used but not in last 30 days
   1 time
   2 times
   3 times
   4 times
   5 times
   6 times
   7 times
   8 times 9 times
   10 or more times

[If select "N/A, don't drink " or "have used but not in last 30 days" please skip to the section III for non-binge drinker (in the follow survey it will take to the end of the survey)]

Part II:
Please use the following definition of binge drinking while answering the remaining questions.

***Binge drinking*: Binge drinking is defined as a pattern of drinking five or more drinks (for men) or four or more drinks (for women) in about 2 hours.**

One alcoholic "drink" is defined as 12 oz. of beer, 5 oz. of wine, or 1.25 oz. of hard liquor either straight or in a mixed drink.

Please read each question carefully and circle the number that best describes your opinion. There is no right or wrong answer so please give your personal opinion.

If I stop binge drinking within the next 30 days, I will…..

1….have fun.	**Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
2….be social.	**Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
3. …feel safe.	**Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
4. …be relaxed.	**Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
5…feel pride in myself.	**Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**

6…have good grades. **Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**

7. Having fun is… **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
8. Being social is… **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
9. Feeling safe is… **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
10. Feeling relaxed is… **Not important at all 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
11. Having pride in myself is… **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
12. Having good grades is… **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**

For me to stop binge drinking within the next 30 days would be…

13. **Bad:** **1 : 2 : 3 : 4 : 5 : 6 : 7 : Good**
14. **Unimportant :** **1 : 2 : 3 : 4 : 5 : 6 : 7 : Important**
15. **Harmful:** **1 : 2 : 3 : 4 : 5 : 6 : 7 : Beneficial**
16. **Unpleasant:** **1 : 2 : 3 : 4 : 5 : 6 : 7 : Pleasant**
17. **Unsatisfying:** **1 : 2 : 3 : 4 : 5 : 6 : 7 : Satisfying**
18. **Unenjoyable:** **1 : 2 : 3 : 4 : 5 : 6 : 7 : Enjoyable**

My _____ think(s) that I should stop binge drinking for the next 30 days. (Leave blank if it is not applicable for you)

19. … friends… **Strongly disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
20. boyfriend/girlfriend/significant other.. **Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree N/A**
21. …family members... **Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

When it comes to me deciding to binge drink or not, I want to do what my _____ think(s) I should do.

22. …friends… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
23. .boyfriend/girlfriend/ significant other. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree N/A**
24. …family... **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

Most _____ binge drinks.

25. …undergraduate students on this campus … **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
26. ..undergraduate students in the US.. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
27. ... people in my age group.. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

When it comes to binge drinking, I am most like …

28. … undergraduate students on this campus… **Not at all alike : 1 : 2 : 3 : 4 : 5 : 6 : 7 : completely alike**
29. ..undergraduate students on the US.. **Not at all alike: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Completely alike**
30. …... people in my age group. **Not at all alike : 1 : 2 : 3 : 4 : 5 : 6 : 7 : completely alike**

Most people _____ think (s) that I should stop binge drinking for the next 30 days.

31. …who are important to me … **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
32. …who I respect … **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
33. …whose opinions I value. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

Most _____ binge drinks.

34. …people like me…. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
35. …people I respect… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
36. …people similar to me… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

37. How likely is it that your friends will **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**

binge drink in front of you in the next 30 days?

38. How likely is it you will drink moderately in the next 30 days? (Moderately drinking is defined as having up to 1 drink per day for women and 2 drinks per day for men) **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
39. How likely is it that your friends will pressure you to binge drink in the next 30 days? **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
40. How likely is it that you plan to go to a bar in the next 30 days? **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**

……

_____will make it difficult for me to stop binge drink for the next 30 days.

41. Having friends that binge drinks in front of me… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
42. Drinking moderately (Moderate drinking is defined as having up to 1 drink per day for women and 2 drinks per day for men). **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
43. Having friends that pressure me to binge drink.. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
44. Going to a bar… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

……

45. For me to stop binge drinking for the next 30 days would be **Extremely difficult : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely Easy**
46. I am confident that I can stop binge drinking for the next 30 days. **Not confident at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely confident**
47. I am sure I can stop binge drinking for the next 30 days. **Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly agree**

……

48. It is _____for me to stop binge drinking for the next 30 days. **Not my choice: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Completely my choice**
49. It is completely up to me to not binge drink for the next 30 days. **Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly agree**
50. I have_____to stop binge drinking for the next 30 days. **No Control: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Total control**

……

I_____ stop binge drinking within the next 30 days.

51. …intend to… **Strongly disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 :Strongly agree**
52. …will… **Strongly disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 :Strongly agree**
53. ….will try to… **Strongly disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly agree**

……

54. In past 30 days, have you experienced any of the followings when drinking alcohol? (Please mark the appropriate column for each row)

	No	Yes
Did something you later regretted		
Forgot where you were or what you did		
Got in trouble with the police		
Someone had sex with me without my consent		
Had sex with someone without their consent		
Had unprotected sex		
Physically injured yourself		
Physically injured another person		
Seriously considered suicide		
Drive after drinking any alcohol at all		
Drive after drinking five or more drinks of alcohol		

55. During the last 30 days, when you "partied"/socialized, how often did you: (Please mark the appropriate column for each row)

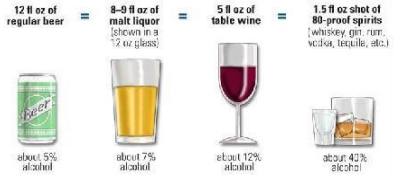
	1. Never	7. Always
Alternate non-alcoholic with alcoholic beverages		
Avoid drinking games		
Choose not to drink alcohol		
Determine, in advance, not to exceed a set number of drinks		
Eat before and/or during drinking		
Have a friend let you know when you have had enough		
Keep track of how many drinks you were having		
Pace your drinks to 1 or fewer per hour		
Stay with the same group of friends the entire time you were drinking		
Stick with only one kind of alcohol when drinking		
Use a designated driver		

(After this question,please skip part III and proceed to part IV)

Part III: *(only for students who selected '**None**' for question in Part I)*
Please use the following definition of binge drinking while answering remaining questions.

***Binge drinking*: Binge drinking is defined as a pattern of drinking five or more drinks (for men) or four or more drinks (for women) in about 2 hours.**

One alcoholic "drink" is defined as 12 oz. of beer, 5 oz of wine, or 1.25 oz of hard liquor either straight or in a mixed drink.



Please read each question carefully and circle the number that best describes your opinion. There is no right or wrong answer so please give your personal opinion.

If I do not binge drink for the next 30 days, I will.....

1. ...have fun. **Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
2. ... be social. **Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
3. ... feel safe. **Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
4. ... be relaxed. **Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
5. ... feel proud. **Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
6. ... have good grades **Extremely unlikely : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**

7. Having fun is... **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
8. Being social is... **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
9. Feeling safe is... **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
10. Feeling relaxed is... **Not important at all 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
11. Having pride in myself is... **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**
12. Having good grades is... **Not important at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely important**

For me not to binge drink for the next 30 days would be.....

13. Bad : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Good
14. Unimportant : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Important
15. Harmful: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Beneficial
16. Unpleasant: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Pleasant
17. Unsatisfying: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Satisfying
18. Unenjoyable: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Enjoyable

My _____ think(s) that I should not binge drink for next 30 days. (Leave blank if it is not applicable for you)

19. … friends… **Strongly disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 :Strongly Agree**
20. boyfriend/girlfriend/significant other..**Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 :Strongly Agree N/A**
21. …family... **Strongly disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 :Strongly Agree**

……

When it comes to me deciding to binge drinkor not, I want to do what my _____ think(s) I should do.

22. …friends… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
23. .boyfriend/girlfriend/ significant other. **Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree N/A**
24. …family... **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

……

Most _____ binge drinks.

25. ..undergraduate students on this campus..**Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
26. ..undergraduate students in the US..**Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
27. …... people in my age group.. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

……

When it comes to binge drinking, I am most like

28. ..undergraduate students on this campus …**Not at all alike: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Completely alike**
29. ..undergraduate students in the US.. **Not at all alike: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Completely alike**
30. …... people in my age group. **Not at all alike: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Completely alike**

……

Most people _____ think(s) that I should not binge drink for the next 30 days.

31. …who are important to me … **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
32. …who I respect … **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
33. …whose opinions I value… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

……

Most _____ do not binge drink.

34. …people like me…. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
35. …people I respect… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
36. …. people similar to me…. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

……

37. How likely is it that your friends will binge drink in front of you in the next 30 days? **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
38. How likely is it you will drink moderately in the next 30 days? (Moderate drinking is defined as having up to 1 drink per day for women and 2 drinks per day for men). **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
39. How likely is it that your friends will pressure you to binge drink in the next 30 days? **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**
40. How likely is it that you will plan to go to a bar in the next 30 days? **Extremely unlikely: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely likely**

……

_____will make it difficult for me to not binge drink for the next 30 days.

41. Having friends that binge drinks in front of me…**Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
42. Drinking moderately (Moderate drinking is defined as having up to 1 drink per day for women and 2 drinks per day for men). **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
43. Having friends that pressure me to binge drink.. **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**
44. Going to a bar… **Strongly Disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

……

45. For me not to binge drink **Extremely difficult : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely easy**

for the next 30 days would be

46. I am confident that I will not binge drink for the next 30 days. **Not confident at all: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Extremely confident**
47. I am sure I will not binge drink for the next 30 days. **Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly agree**

……

48. It is _____for me to not binge drink for the next 30 days. **Not my choice: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Completely my choice**
49. It is completely up to me for deciding to not binge drink for the next 30 days. **Strongly disagree: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly agree**
50. I have_____to not binge drink for the next 30 days. **No Control: 1 : 2 : 3 : 4 : 5 : 6 : 7 : Total control**

……

I_____ not binge drink for the next 30 days.

51. …intend to… **Strongly Disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 :Strongly Agree**
52. …will… **Strongly Disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 :Strongly Agree**
53. …will try to… **Strongly Disagree : 1 : 2 : 3 : 4 : 5 : 6 : 7 : Strongly Agree**

……

Part IV: *(for all participants)*
Please choose an answer from the following options based on your knowledge and experience. Please do not use any external resources including the Internet.

54. Alcohol affects each individual differently.
True □ False □
55. You can drink coffee to sober up quickly.
True □ False □
56. If someone is drunk and passed out, it is safe to leave him/her alone to sleep.
True □ False □
57. Alcohol is categorized as a mood-altering stimulant drug.
True □ False □
58. Alcohol is the third leading preventable cause of death in the U.S.
True □ False □

……

59. How often do you go to house parties where alcohol is free or inexpensive?
_____**times per month**
60. How often in the bar do you participate in a special promotion ($1 drinks, pitcher, happy hour etc.) for drinks?
_____**times per month**
61. How often do you go to the bars near the campus area?
_____**times per month**
62. Where do you live?
Off campus □ **On-campus** □
63. There are bars in walkable distance from where I live.
Yes □ **No** □

Part V (Demographics): *(for all participants)*
Please select the answer that best matches your information.

64. What is your gender?
Male □ **Female** □ **Transgender** □ **Prefer not to answer** □

65. What year were you born? **19**_____

66. What race do you most identify with?
Caucasian □ **African American** □ **Hispanic** □ **Asian** □ **Native American or Pacific** □ **Other** □_____

67. **In what Religion were you raised?**
Catholic □
Protestant (religion allows drinking of alcoholic beverages eg: Presbyterians, Lutherans, etc.) □
Protestant (religion does not allow drinking eg: Primitive Baptist, Southern Baptist, Church of Christ etc.) □
Jewish
Other_____
Do not follow any religion □

68. I frequently attend religious services **Never: 1 : 2 : 3 : 4 Once a week or more**
69. I frequently attend religious activities **Never: 1 : 2 : 3 : 4 Once a week or more**
70. How important is religion to you? **Not important: 1 : 2 : 3 : 4 Very important**

71. What year in college are you?
1st year (Freshman) □ **2nd year (Sophomore)** □ **3rd year (Junior)** □ **4th or more years (Senior)** □

72. What is your current student enrollment status?
Fulltime □ **Part-time** □

73. Are you currently member of a Greek Fraternity or Sorority?
Yes □ **No** □

74. What is your major? _____

75. What is your approximate Grade Point Average (GPA) on a 4.0 scale? _____

This is the end of questionnaire, thank you for participating!!

University of Oklahoma – Norman Campus
Office of Human Research Participant Protection
Appendix B – Graduate Student as Principal Investigator

Highest degree held by student: ___Bachelors __X__Masters

Student's degree program: ___Masters __X__Doctoral

This project has been reviewed to determine that the scope, anticipated risks and benefits, and methodology are appropriate for this research by:

__X__ Approval of thesis/dissertation proposal by faculty committee

___ My personal review and approval of research proposal

___ Other—describe below

The graduate student is qualified to conduct independent research based on the following credentials (Check all that apply):

__X__ has completed a graduate research methods course

__X__ has completed the training in Responsible Conduct of Research

__X__ has experience as an independent or closely supervised research team member. Describe below and include the name of the researcher who supervised your activities.

Dr. Paul Branscum

___ Other—describe below

FACULTY SPONSOR'S ASSURANCE

By my signature as sponsor on this research application, I certify that the graduate student investigator is knowledgeable about the regulations and policies governing research with human subjects and has sufficient training and experience to conduct this particular study in accordance with the research protocol. Additionally,

I confirm that I have reviewed this IRB application, including the protocol, and verify that it is complete and the research scope, anticipated risks and benefits, and methodology are appropriate in design.

I agree to meet with the investigator on a regular basis to monitor study progress.

I assure that the investigator will promptly report unanticipated problems and will adhere to all requirements for continuing review and modification.

If I will be unavailable, e.g., sabbatical leave, vacation, or resignation, I will arrange for an alternate faculty sponsor to assume responsibility during my absence, and I will advise the OU-NC IRB of such changes.

If the graduate student investigator leaves the university, I will provide all necessary documents for terminating the study or continuing review.

Faculty Sponsor Signature:	Date (mm/dd/yyyy) 3/10/17
Print PI Name: Amir Bhochhibhoya	
PI Signature:	Date (mm/dd/yyyy) 03/10/2017

Participant ID: Please fill in the following information to generate a unique identifier. You will be requested to re-take this survey at a later point and the following information will be used to match pre and post survey information during the analysis.

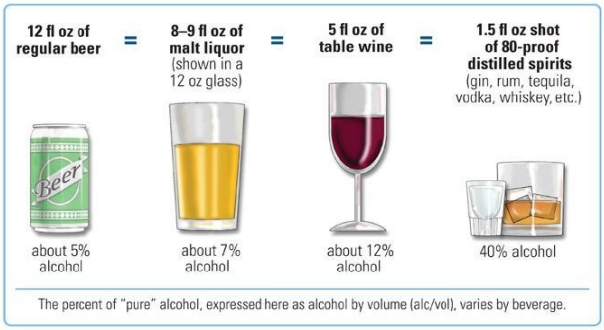
- First letter of own first name:
- First letter of father's first name (A–Z):
- First letter of mother's first name (A–Z):
- Birthday – "01–31":
- Birth month – "01–12":
- Birth year – "yyyy":

Alcohol behavior scale for college students

Part I:

Consent & Directions: This is the follow up of the survey you submitted 30 days ago. Thank you for participating in our survey. Please remember that your participation is voluntary. All information from this survey will be anonymous, and your information will be dealt with strict confidentiality. There is no right or wrong answer. Please select the box that best describes your opinion. Thank you for your participation!

One alcoholic "drink" is defined as 12 oz. of beer, 5 oz of wine, or 1.25 oz of hard liquor either straight or in a mixed drink.



1. In the past thirty days, on how many days did you use Alcohol?

N/A, don't drink	6-9 days
Have used but not in last 30 days	10-19 days
1-2 days	20-29 days
3-5 days	Use daily

[If select "N/A, don't drink" or "have used but not in last 30 days" please skip to the demographic section]

2. During the past thirty days, how many times have you had:

(for men) 5 or more drinks (Beer, wine, liquor) in about 2 hours?
(for women) 4 or more drinks (Beer, wine, liquor) in about 2 hours?

None
Have used but not in last 30 days
1 time
2 times
3 times
4 times
5 times
6 times
7 times
8 times 9 times
10 or more times

[If select "None "please skip to the demographic section]

3. In past 30 days, have you experienced any of the followings when drinking alcohol? (Please mark the appropriate column for each row)

	No	Yes
Did something you later regretted		
Forgot where you were or what you did		
Got in trouble with the police		
Someone had sex with me without my consent		
Had sex with someone without their consent		
Had unprotected sex		
Physically injured yourself		
Physically injured another person		
Seriously considered suicide		
Drive after drinking any alcohol at all		
Drive after drinking five or more drinks of alcohol		

4. During the last 30 days, when you "partied"/socialized, how often did you: (Please mark the appropriate column for each row)

	Never	Rarely	Sometimes	Most of the time	Always
Alternate non-alcoholic with alcoholic beverages					
Avoid drinking games					
Choose not to drink alcohol					
Determine, in advance, not to exceed a set number of drinks					
Eat before and/or during drinking					
Have a friend let you know when you have had enough					
Keep track of how many drinks you were having					
Pace your drinks to 1 or fewer per hour					
Stay with the same group of friends the entire time you were drinking					
Stick with only one kind of alcohol when drinking					

Use a designated driver					

Demographics

5. What is your gender?
Male □ **Female** □ **Transgender** □ **Prefer not to answer** □

6. What year were you born? **19**_____

7. What race do you most identify with?
Caucasian □ **African American** □ **Hispanic** □ **Asian** □ **Native American or Pacific** □ **Other** □_____

8. In what Religion were you raised?
Catholic □
Protestant (religion allows drinking of alcoholic beverages eg: Presbyterians, Lutherans, etc.) □
Protestant (religion does not allow drinking eg: Primitive Baptist, Southern Baptist, Church of Christ etc.) □
Jewish □
Other_____
Do not follow any religion □

9. I frequently attend religious services **Never: 1 : 2 : 3 : 4 Once a week or more**
10. I frequently attend religious activities **Never: 1 : 2 : 3 : 4 Once a week or more**
11. How important is religion to you? **Not important: 1 : 2 : 3 : 4 Very important**

12. What year in college are you?
1st year (Freshman) □ **2nd year (Sophomore)** □ **3rd year (Junior)** □ **4th or more years (Senior)** □

13. What is your current student enrollment status?
Fulltime □ **Part-time** □

14. Are you currently member of a Greek Fraternity or Sorority?
Yes □ **No** □

15. Are you a member of an official National Collegiate Athletic Association (NCAA) team?
Yes □ **No** □

16. What is your major? _____

17. What is your approximate Grade Point Average (GPA) on a 4.0 scale? _____

This is the end of questionnaire, thank you for participating!!

Recruitment script for Initial Survey

Hi everyone,

My name is Amir Bhochhibhoya. I am graduate student at the Health and Exercise Science Department here at the University of Oklahoma. I am conducting a study to understand alcohol drinking behavior on campus.

I would appreciate if you could please provide us with your support by participating in this survey. The survey will take you approximately 10-15 minutes to complete. The survey is strictly voluntary in nature. There isn't any significant risk or benefit associated with this survey. You can skip the entire survey or any part of the survey if you would like.

Also, you will be asked to fill the follow up survey after 30 days. The follow up survey will be sent to you via email you will provide at the end of the survey. The follow-up survey will ask you about your drinking behaviors for the past 30 days. It will take less than 5 minutes to complete the survey.

For your time a drawing will be held at the conclusion of this study for four gift cards worth of $ 50.00 each. Please remember, only participants who participated in both the pre and follow-up survey will be considered for the raffle. You will be required to provide your email address if you want to participate in this raffle as the winner will be notified through an email. .

We would like to reassure you that information collected from this study will be used only for research purpose and will be strictly confidential. If you have any questions about the study, please feel free to contact me at amirkb@ou.edu or faculty advisor pbranscum@ou.edu.

Please click on the link below to participate.

Click here to take **the survey**.

Or copy paste following link in address bar:

http://oucas.qualtrics.com/jfe/form/SV_2o4HutnPeRS6g73

Thank you for your time.

The OU IRB has approved the content of this advertisement but the investigator is responsible for securing authorization to distribute this message by mass email.

-Amir Bhochhibhoya

IRB NUMBER: 7852
IRB APPROVAL DATE: 03/22/2017

Recruitment script for follow-up survey

Hi {Name of the participants},

My name is Amir Bhochhibhoya. I am graduate student at the Health and Exercise Science Department here at the University of Oklahoma. I am conducting a study to understand alcohol drinking behavior on campus, and you already participated in Part 1 of the study.

Thank you again for participating in the first part of study. We would now like you to participate in Part 2 of the study, by filling out a very brief survey. This survey will ask you about your drinking behaviors for the past 30 days. It will take less than 5 minutes to complete the survey.

Please remember that this survey is strictly voluntary in nature. There isn't any significant risk or benefit associated with this survey. You can skip the entire survey or any part of the survey if you would like.

For your time a drawing will be held at the conclusion of this study for four gift cards worth of $ 50.00 each. Please remember, only participants who participated in both the pre and follow-up survey will be considered for the raffle. The winner will be notified through an email. .

We would like to reassure you that information collected from this study will be used only for research purpose and will be strictly confidential. If you have any questions about the study, please feel free to contact me at amirkb@ou.edu or faculty advisor pbranscum@ou.edu.

Please click on the link below to participate.

Click here to take **the survey**.

Or copy paste following link in address bar:

http://oucas.qualtrics.com/SE/?SID=SV_3atA5honW70k2Jn

Thank you for your time.

The University of Oklahoma is an Equal Opportunity Institution.

-Amir Bhochhibhoya

IRB NUMBER: 7852
IRB APPROVAL DATE: 03/22/2017

The UNIVERSITY of OKLAHOMA

Institutional Review Board for the Protection of Human Subjects

Approval of Initial Submission – Exempt from IRB Review – AP01

Date: March 22, 2017 **IRB#:** 7852

Principal Investigator: Mr Amir Bhochhibhoya **Approval Date:** 03/22/2017

Exempt Category: 2

Study Title: APPLICATION OF INTEGRATIVE BEHAVIOR MODEL TO PREDICT INITIATION OR MAINTENANCE OF STOPPING BINGE DRINKING AMONG COLLEGE STUDENTS: A PROSPECTIVE STUDY

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Notify the IRB at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

Fred Beard, Ph.D.
Vice Chair, Institutional Review Board

The UNIVERSITY of OKLAHOMA

Institutional Review Board for the Protection of Human Subjects

Approval of Study Modification – Expedited Review – AP0

Date: March 28, 2017 **IRB#:** 7852

Principal Investigator: Mr Amir Bhochhibhoya **Reference No: 664081**

Study Title: APPLICATION OF INTEGRATIVE BEHAVIOR MODEL TO PREDICT INITIATION OR MAINTENANCE OF STOPPING BINGE DRINKING AMONG COLLEGE STUDENTS: A PROSPECTIVE STUDY

Approval Date: 03/28/2017

Modification Description:
Update to follow up survey.

The review and approval of this submission is based on the determination that the study, as amended, will continue to be conducted in a manner consistent with the requirements of 45 CFR 46.

To view the approved documents for this submission, open this study from the My Studies option, go to Submission History, go to Completed Submissions tab and then click the Details icon.

If the consent form(s) were revised as a part of this modification, discontinue use of all previous versions of the consent form.

If you have questions about this notification or using iRIS, contact the HRPP office at (405) 325-8110 or irb@ou.edu. The HRPP Administrator assigned for this submission: Karen Braswell.

Cordially,

Fred Beard, Ph.D.
Vice Chair, Institutional Review Board

The UNIVERSITY of OKLAHOMA

Institutional Review Board for the Protection of Human Subjects

Final Report – Inactivation

Date: May 05, 2017 **IRB#:** 7852

To: Mr Amir Bhochhibhoya **Inactivation Date:** 05/05/2017

Study Title: APPLICATION OF INTEGRATIVE BEHAVIOR MODEL TO PREDICT INITIATION OR MAINTENANCE OF STOPPING BINGE DRINKING AMONG COLLEGE STUDENTS: A PROSPECTIVE STUDY

On behalf of the Institutional Review Board (IRB), I have reviewed the Final Report for the above-referenced research study. You have indicated that this study has been completed and should be inactivated. This letter is to confirm that the IRB has inactivated this research study as of the date indicated above.

Note that this action completely terminates all aspects and arms of this research study. Should you wish to reactivate this study, you will need to submit a new IRB application.

If you have questions about this notification or using iRIS, contact the IRB at (405) 325-8110 or irb@ou.edu.

Cordially,

Fred Beard, Ph.D.
Vice Chair, Institutional Review Board

Appendix C. Panel of Experts for Alcohol Behavior Scale for College Students

Experts for the IBM
Dr. Adam Barry
Associate Professor and Associate Department Head,
Heath and Kinesiology
Texas A&M University

Dr. Amar Kanekar
Assistant Professor and Graduate Coordinator
Health Education and Health Promotion
University of Arkansas at Little Rock

Experts in the area of instrument development
Dr. Sarah Maness
Assistant Professor
Health and Exercise Science
University of Oklahoma

Dr. Mike Crowson
Associate Professor
Department of Educational Psychology
University of Oklahoma

Two experts in the area of binge drinking
Kye Lebouff,
University of Oklahoma

Dr. Joshua Wiener
Professor and Department Head
Department of Marketing
Oklahoma State University

Two from the target population
Holly Hoehner and Elizabeth Fish
(undergraduate students at the University of Oklahoma).

Dear Dr. Barry
Dr. Amar Kanekar
Dr. Sarah Maness
Dr. Mike Crowson
Kye Lebouff,
Dr. Joshua Wiener,

I am 2nd year PhD student under Dr. Paul Branscum in the Department of Health and Exercise Science in the University of Oklahoma. I will really appreciate if you can help me in reviewing attached instrument.

Based on your expertise in the area of health education and instrument development, I would appreciate if you can help me to establish the face validity and construct validity, and readability of the instrument.

I am planning to conduct a study to examine binge drinking behavior among college student using integrative behavior model. Attach please find the document for universal definition and operational definition of various constructs of integrative behavior model.

I was not able to find the scale that meets the need of the study so I have designed this instrument based on literature review. The literature review included previous studies that have used integrative behavior model for other behavior. Another focus of literature review also included understanding major factors that affect binge drinking among college population.

The instrument is divided into four parts. The first part will include introduction and behavior related questionnaire. Depending on their current behavior on binge drinking, they will either take part II or part III of the questionnaire and part IV will include remaining questions common for both groups.

Attach please find the complete instrument and definition (universal and operational) and scoring guidelines. Please feel free to comment in the instrument itself. The link for the online survey is http://oucas.qualtrics.com/SE/?SID=SV_4NhByUAFO9cDiId, if you want to preview the instrument.

Kindly respond and return the instrument with your valuable comments to me by April 4th, 2015. After receiving input from you and other experts, I will revise and resend you for the second review.

If you have questions I can be reached at 405-619-8842 (cell) or amirkb@ou.edu (email).

I am extremely thankful for your time, and would like to convey my gratitude for your valuable comments on the instrument.

Thank you.