

# COLLEGE STUDENTS AND BINGE DRINKING: EXPLORING THE RELATIONSHIP BETWEEN CONTROL AND INTENTION ON BEHAVIOR

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The present study draws on Ajzen's (1985, 1991) theory of planned behavior (TPB) to explore the relationships between students' intentions to drink responsibly, students' perceptions of control over their behavior, and their reported levels of drinking. We relied on a randomly selected and surveyed sample of 149 students at a Midwestern university. We hypothesized students who reported stronger intentions and greater perceived control would report reduced levels of drinking. Our findings indicated that respondents who intended to drink responsibly and scored higher on two measures of perceptions of control consumed less alcohol 10 days prior to the survey and binged less frequently in the past month. The findings further support the TPB and provide implications for prevention and control strategies.

*Keywords:* binge drinking, college students, intention, perceived behavioral control, theory of planned behavior

## INTRODUCTION

Binge drinking among youth and college students continues to be a serious concern in the U.S. and has garnered a great deal of scholarly attention to better understand the correlates, causes, and means of controlling underage drinking. Alcohol is one of the most widely used substances by youth and young adults (Johnston, O'Malley, Bachman, & Schulenberg, 2009; Meilman, Presley, & Lyerla, 1994) and has been associated with several negative health and social consequences. Heavy drinking contributes to risky behavior (e.g., driving while intoxicated, risky sexual activity, and use of illicit drugs); unintentional injury; physical aggression and violence; and can lead to lifelong addiction and physical ailments (Bennet, Miller, & Woodall, 1999; Office of the Surgeon General, 2007; Hingson, Zha, & Weitzman, 2009; Meilman et al., 1994; Miller, Naimi, Brewer, & Jones,

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2007; Wechsler & Nelson, 2008; Vicary & Karshin, 2002). Additionally, there is growing evidence of a causal link between heavy drinking and later criminal behavior, particularly violent behavior (Bushman & Cooper, 1990; Exum, 2006; Felson, Savolainen, Aaltonen, & Moustgaard, 2008; Felson, Teasdale, & Burchfield, 2008; Leonard, 2005). The toll of underage drinking on the criminal justice system is evident. In 2001, for example, underage drinking accounted for over 2.5 million traffic fatalities, injuries, violent crimes, property crimes, and other medical consequences at a cost of nearly \$62 billion dollars in medical care, lost work, and quality-of-life costs (Miller, Levy, Spicer, & Taylor, 2006). Though not all underage drinking results in negative consequences, heavy alcohol consumption by youth clearly has an important impact on society and the criminal justice system.

Despite the attention and preventative efforts targeted at underage drinking, a relatively large number of college students, most of whom are under the legal drinking age, report engaging in binge drinking, generally defined as consumption of at least five drinks in a row for men or four drinks in a row for women on one occasion (Wechsler & Nelson, 2008, p. 482). A 2005 national survey conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA) indicated that as many as 45% of college students between ages 18-24 reported binge drinking within the last 30 days (Hingson et al., 2005, p. 15). Although the 2005 data marked a significant 7% increase in binge drinking from 1999 (Hingson et al., 2005), the number of U.S. students who report binge drinking has remained fairly stable over time (Johnston et al., 2009; Wechsler, Lee, Kuo, Seibring, Nelson, & Lee, 2002a). Overall, the college student binge drinking rate has remained at a higher and more stable rate compared to high school students and non-college peers (Johnston et al., 2009, p. 23). These findings suggest that heavy drinking among college students is a significant and continuing problem.

Given the high rates of heavy drinking among college students and the serious consequences of drinking on the criminal justice system, there is a need to further examine what factors influence student drinking behaviors. The present study attempts to extend current literature through an examination of college students' intentions to binge drink at a Midwestern university. Ajzen's (1985) theory of planned behavior (TPB) provides the framework for this study. The TPB explains behavior as a process in which individuals form intentions to perform a behavior when attitudes toward the behavior are positive, subjective norms reinforce the behavior, and individuals perceive they are capable of performing the behavior (Ajzen, 1985). Behavior is subsequently predicted by individuals' intentions and their perceived control over their behavior (Ajzen, 1985). The TPB provides a useful framework and while the efficacy of the TPB has been supported in numerous studies of health behaviors, including student drinking, (Armitage, Conner, Loach, & Willets, 1999; Collins & Carey, 2007; Conner & Sparks, 2005; Cooke, Sniehotta, & Schuz, 2007; Jamison & Myers, 2008; Johnston & White, 2003; McMillan & Conner, 2003; Norman, Bennett & Lewis, 1998), the theory has potential to expand current criminological thought on how facilitating and constraining factors influence criminal behavior.

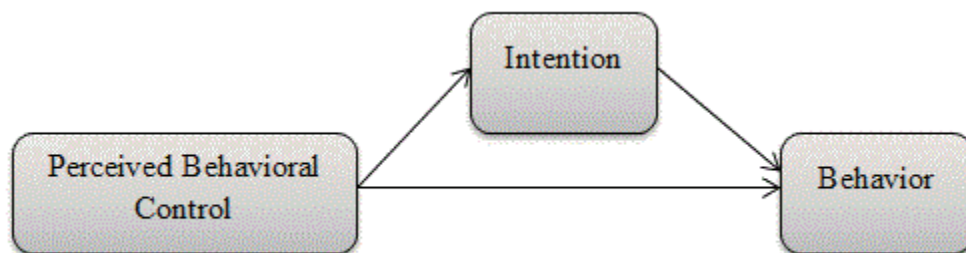
The present study incorporates one component of the theoretical model to explore the relationships between students' intentions to drink responsibly (i.e., avoid drinking to

excess), students' perceptions of control over their behavior, and their reported levels of drinking. As such, the study does not provide a test of the overall theoretical model, but rather our focus is on the predictors of behavior drawn from the TPB. We hypothesized that students who reported stronger intentions to drink responsibly and greater perceived internal and external control over their behavior would report reduced levels of drinking 10 days prior to the survey and less frequent binge drinking in the past month. We relied on a randomly selected sample of students living on campus to explore these relationships.

### ***Theory of Planned Behavior***

The relatively stable high rates of heavy alcohol use among college students despite the potential for injury, victimization, or other criminal consequences (Johnston et al., 2009; Wechsler et al., 2002a) indicate that further understanding of students' decisions to engage in binge drinking is needed to inform prevention efforts and thereby lessen some of the harms associated with heavy drinking. Ajzen's (1985) theory of planned behavior provides a framework for assessing the relationships between students' intentions to drink responsibly (i.e., avoid drinking to excess), students' perceptions of control over their behavior, and their reported levels of drinking.

[1] Figure 1 illustrates the component of the TPB that serves as the framework for the present study. Intentions have been described as "motivational factors that influence a behavior" and stronger intentions are associated with greater likelihood of performance or avoidance of a specific behavior in accordance with intentions (Ajzen, 1991, p. 181). Thus, individual's intentions to perform or abstain from a behavior are theorized to directly predict later behavior.



*Figure 1.* A portion of the theoretical framework of the theory of planned behavior that guides the present study. A line from intention to behavior indicates that one's intention to engage in a behavior is expected to predict later behavior. Perceptions of control over one's behavior (PBC) are expected to predict intention, and, to the degree that individuals accurately perceive their ability to control their behavior, PBC is also expected to directly predict later behavior. Adapted from "The Theory of Planned Behavior," by I. Ajzen, 1991, *Organizational Behavior and Human Decision Processes*, 50, p. 182.

Perceived behavioral control (PBC) is derived from control beliefs and is typically likened to Bandura's (1982) concept of self-efficacy (i.e., belief in one's ability to perform a behavior) (Ajzen, 1991, p. 184). PBC has been defined as "the ease or difficulty of performing a behavior" (Ajzen, 2002, p. 665). The PBC construct accounts for the fact that, in some instances, internal or external factors may facilitate or constrain one's ability to act on intentions (Ajzen, 1991). Facilitating or constraining factors could include "time, money, skills, and the cooperation of others" or any factor that affects ability to engage in a behavior despite intention to do so (Ajzen, 1991, p. 182). For example, binge drinking is not completely volitional: individuals who intend to binge drink may be facilitated by opportunities to drink and availability of alcohol, and they may be simultaneously constrained by such deterrents as drinking restrictions, state and campus policies, cost of alcohol, and a number of other factors (Chaloupka & Wechsler, 1996; Kypri, Bell, Hay, & Baxter, 2008; Nelson, Naimi, Brewer, & Wechsler, 2005; Wechsler, Lee, Nelson, & Kuo, 2002b; Weitzman, Nelson, & Wechsler, 2003). The perception of possible enabling or constraining factors is theorized to influence one's intentions regarding the performance of a behavior (Ajzen, 1985, 1991).

The theory of planned behavior also suggests that the degree to which individuals *accurately* perceive these internal and external control factors affects the impact of perceived behavioral control on behavior (Ajzen, 1985, 1991). For instance, when an individual possesses an accurate perception of their control, then the reality of the environment should have a direct affect on that individual's behavior (Ajzen, 1991, p. 183). As a result, PBC is theorized to act as a determinant of both intention and behavior (Ajzen, 1985; 1991).

### ***Support for the Theory of Planned Behavior***

The TPB has been widely applied to a range of behaviors including – but not limited to – health behaviors, drug and alcohol use, risky driving behavior, sexual activity and sexual offending, and criminal reoffending by released prisoners (Ajzen, 1991; Armitage & Conner, 2001; Conner & Sparks, 2005; Forste, Clarke, & Bahr, 2011; Kiriakidis, 2008, 2010; Miller, 2010; Rennie & Shore, 2007). Meta-analyses of TPB studies indicate that measures of intention and perceived behavioral control (PBC) typically account for between 25% and 52% of explained variance for various behaviors (Armitage & Conner, 2001; Conner & Sparks, 2005; Godin & Kok, 1996; Sutton, 1998). These findings demonstrate the utility of the theory for predicting behavior, though the wide range in reports of explained variance may be a result of differences in the relationships between PBC and the type of behavior under study (Godin & Kok, 1996). Ajzen (1991) has stated that the influence of PBC may depend on the degree to which an individual has a choice in performing a given behavior (p. 185). Cases where the correspondence between perceived and actual control over behavior is low may explain differences between studies (Ajzen, 1991; Godin & Kok, 1996).

More recently, research has tested the theory with regard to student drinking. Studies of alcohol consumption generally have reported a range of 12% to 50% in the explained variance of alcohol consumption by intention and PBC with intention as the strong-

est predictor and PBC varying in significance (Armitage, Conner, Loach, & Willets, 1999; Conner, Warren, Close, & Sparks, 1999; Jamison & Myers, 2008; McMillan & Conner, 2003; Norman, Bennett, & Lewis, 1998). Some of this variance may be attributed to differences in how PBC was operationalized. For instance, Ajzen (1985, 1991) conceptualized PBC as a unitary construct, though there is now evidence to support a distinction between internal (self-efficacy or perceived ability) and external (perceived ease or difficulty) components of PBC (Armitage et al., 1999; Armitage & Conner, 2001; Kidwell & Jewell, 2003; Manstead & van Eekelen, 1998). Some of the current studies have either used self-efficacy *or* PBC, while others have incorporated measures of both internal and external components. It is also possible that differences in the setting of the study explain these variations. For instance, PBC may have less impact in a setting where students can legally drink at 18, such as the United Kingdom.

Studies that have focused specifically on heavy drinking or binge drinking among undergraduate populations have shown similar findings. For instance, studies have found that intention and PBC account for between 25% and 82% of the explained variance in binge drinking (Cooke et al., 2007; Elliot & Ainsworth, 2012; Jamison & Myers, 2008; Johnston & White, 2003; Norman, 2011; Norman & Conner, 2006; Todd & Mullan, 2011), though PBC was not a significant predictor in each case (Armitage et al. 1999; Collins & Carey, 2007; Jamison & Myers, 2008; Todd & Mullan, 2011). These studies are not directly comparable due to differences in methodology (cross-sectional vs. longitudinal) and operationalization of the PBC component; however, they provide support for the TPB as a model for understanding students' intentions to engage in heavy drinking.

### ***Extensions to the Literature***

Current literature provides support for the theory of planned behavior (TPB) in predicting behaviors such as heavy drinking, though there are a couple of areas that have been expanded recently. One area of research has focused on how the perceived behavioral control (PBC) construct is operationalized (Armitage & Conner, 1999; Conner & Sparks, 2005; Kidwell & Jewell, 2003; Terry & O'Leary, 1995). Some have argued that PBC should be subdivided into two distinct components that represent internal and external factors (Armitage & Conner, 1999, 2001; Armitage et al., 1999; Kidwell & Jewell, 2003; Manstead & van Eekelen, 1998; Povey, Conner, Sparks, James, & Shepherd, 2000; Terry & O'Leary, 1995; Trafimow, Sheeran, Conner, & Finlay, 2002). For example, internal factors (e.g., "ability and motivation") more closely represent self-efficacy and are conceptually different from external factors (e.g., "task difficulty, cooperation of others, access to necessary resources, and luck") (Manstead & van Eekelen, 1998). There is a further discrepancy in how each construct is measured across different studies. Given the support for the distinction between self-efficacy and PBC (e.g., Armitage et al., 1999; Armitage & Conner, 1999; Manstead & Eekelen, 1998), the present study includes separate measures of self efficacy and PBC to account for differences in perceived ability (consistent with internal control factors) and perceived ease/difficulty (consistent with external control factors). Further, it is likely that distinctions between internal and external influences are greater for criminal behaviors in which criminal consequences (e.g., victimization or arrest) may



further facilitate or inhibit individuals from acting on intentions. Similar to other studies, self-efficacy is treated as perception of one's ability to reduce drinking, though perceived ease/difficulty draws on findings from the alcohol-use literature. These studies note the importance of the availability of alcohol (e.g., inducements to drink, location of alcohol outlets, and the cost of alcohol) and potential for punishment (e.g., state laws or local drinking policies designed to deter and constrict drinking) as factors that influence student drinking (Chaloupka & Wechsler, 1996; Kypri et al., 2008; Nelson et al., 2005; Wechsler, et al., 2002b; Weitzman, Nelson, & Wechsler, 2003).

A second area of exploration in the literature has been mediating and moderating relationships between TPB constructs and additional variables. The direction of recent research has focused on the mediating and moderating influences of past behavior and additional variables outside the theoretical framework, however, relatively few have tested the predicted moderating relationship between intention, PBC, and behavior (Ajzen, 1991, p. 188). Ajzen (1991) described 7 out of 12 studies that tested interaction effects, of which only one study showed modest support for a moderating effect between PBC and intention. In a more recent meta-analysis, Armitage and Conner (2001) found only 19 out of 63 studies had tested for an interaction between intention and PBC with mixed results: 9, or about half, of the studies found a significant interaction between intention and PBC with higher levels of perceived control associated with stronger intention-behavior relationships. These studies found that PBC added an average of 6% explained variance in predicting intention (Armitage & Conner, 2001, p. 484). Others have also found significant moderating relationships between intention and PBC (Terry & O'Leary, 1995; Sheeran, Trafimow, & Armitage, 2003). The variation between these studies is perhaps unsurprising, since Ajzen (1991) has stated the effect of PBC should be stronger as behavior becomes less volitional (p. 185) – a point supported by the findings of Armitage and Conner (2001) and Sheeran et al. (2003). Thus, when behavior is less volitional, PBC is expected to more strongly moderate the relationship between intention and behavior.

### CURRENT STUDY

Given findings of earlier applications of the theory of planned behavior (TPB), the present study utilizes a multidimensional perceived behavioral control (PBC) construct that draws on current alcohol-use literature. Specifically, we draw from studies of correlates of alcohol consumption by college students and particularly underage youth that have identified environmental factors that may encourage or deter heavy underage drinking (Chaloupka & Wechsler, 1996; Kypri et al., 2008; Nelson et al., 2005; Wechsler et al., 2002b; Weitzman et al., 2003). Further, we extend current literature on the relationship between PBC and intention by testing for potential mediating or moderating effects. We draw on secondary data collected as part of an evaluation for a Midwestern university. As part of the evaluation, a survey was hand-delivered to students living in four dormitories on the university campus. The survey included a number of questions that assessed student drinking, which were relevant to the present study.

Relying on the theoretical model, it is hypothesized that the frequency of student binge drinking is related to students' levels of intention to drink responsibly and perceptions of internal and external control. PBC included students' perceptions of the importance of availability of alcohol and potential for punishment in decisions to drink as well as students' self-efficacy in their ability to reduce drinking. Specifically, it is expected that as intention to drink responsibly increases, the frequency of binge drinking decreases. In exploring the utility of measures of PBC, it is expected that the frequency of binge drinking decreases as availability of alcohol and potential for punishment become more important to the student and as self-efficacy in ability to control drinking increases. Though the primary focus of the study was on binge drinking, we included a measure of the number of drinks students had consumed in the last 10 days, which accounted for drinking behavior that was not necessarily binge drinking.

## METHODS

### *Sample/Data*

The sampling frame for the survey included the residential listings of all four dorms at a Midwestern university, from which a random sampling method was used to draw a cluster sample of 126 suites (including four students each), or approximately 498 students. The sampling frame was stratified by gender to ensure that male and female students were equally represented and, as a result, there were 63 female and 63 male suites included in the sample. Packets of four surveys including a pre-labeled envelope and survey description sheet were prepared for the students in each suite and then distributed in early April of 2011 by a group of student volunteers. Volunteers were instructed to briefly explain the purpose of the survey, tell residents that the survey was voluntary and confidential, and explain how to return the survey to the proctor or through university mail. The volunteers visited each suite up to four times until as many surveys were collected as possible. Ultimately, 152 surveys were returned either directly to the proctor or through the mail resulting in a response rate of 33.19%. [2]

After removing a few surveys due to errors or missing data, the final sample included 149 students. Just over half of respondents were female and ranged in age from 18 to 25 ( $M = 19.85$ ,  $SD = 1.23$ ). The majority (72%) of students were under age 21, and thus drinking alcohol in any amount would be illegal for these students. The sample of students was predominantly White/Caucasian (87%) with 13% of students reporting they were Black/African American, Native American, Native Hawaiian or Pacific Islander, Asian, Alaska Native, or other race. Approximately 8% of the students reported they were of Hispanic or Latino ethnicity. Many of the students were first and second year undergraduates: 38% were first year students, 30% were second year students, 18% were third year students, and 13% were fourth year students or beyond. With the exception of being younger (i.e., on-campus residents are disproportionately freshman and sophomores), on average, the demographics of the sample were similar to the demographics of the larger population of students.

### *Measures*

**Drinking behavior.** Two separate measures were used to assess drinking behavior and each operated as a dependent variable in later analyses. The first measure of drinking behavior assessed the frequency of binge drinking during the last 30 days. Though the definition of binge drinking is somewhat contentious in alcohol studies, the definition used in the present study is generally supported (Office of the Surgeon General, 2007; Wechsler & Kuo, 2000). Binge drinking was defined as the consumption of four or more alcoholic drinks in a row (i.e., within a couple of hours) for females and the consumption of five or more alcoholic drinks in a row for males. The variable for frequency of bingeing included seven categories: 0 days, 1 day, 2-4 days, 5-10 days, 11-19 days, 20-29 days, or daily. A second measure of drinking behavior gauged the number of alcoholic beverages the respondent had consumed in the 10 days prior to the survey.

**Intention.** Intention to drink responsibly assessed the respondent's objective to avoid drinking to excess (i.e., binge drink) and was used as an independent variable in analyses. One item, ranging from 1 (never) to 5 (always), asked students to indicate the degree to which they generally intend to have fewer than 4-5 drinks when consuming alcohol or partying. Higher scores represent greater intention to drink responsibly.

**Perceived behavioral control.** The survey included three measures of perceived behavioral control (PBC) – both external (ease/difficult) and internal (ability) – that were used as independent variables in later analyses. Perceptions of the importance of the availability of alcohol and potential for punishment measured the influence of external factors in controlling decisions to drink through either inducement or deterrence. Factors such as discounted drink prices and the prevalence of alcohol outlets near campus have been associated with greater alcohol consumption by students (Chaloupka & Wechsler, 1996; Kypri et al., 2008; Wechsler et al., 2002b; Weitzman et al., 2003). As a result, the availability scale included four items on a scale ranging from 1 (very unimportant) to 5 (very important): How important are the following factors in your decisions about whether or not to drink... 1) the cost of alcohol, 2) the location of alcohol outlets, 3) an invitation by a friend to drink, and 4) whether or not someone else is buying ( $a = .817$ ). Factors likely to deter student drinking as a whole (e.g., school policies against alcohol consumption on campus) and underage drinking in particular (e.g., state and local sanctions) were included in the measure of the influence of punishment. The punishment scale included three items using the same 5-point scale: How important are the following factors in your decisions about whether or not to drink... 1) campus/dorm policies, 2) state laws, and 3) the potential for punishment ( $a = .844$ ). Higher scores indicate that availability and punishment are more important in determining decisions to drink.

**Self-efficacy** measured internal control and represented students' beliefs in their ability to control their drinking behavior. The measure included one item: How confident are you that, *if you wanted to*, you could cut down on your drinking?; ranging from 1 (not at all confident) to 5 (does not apply, I don't drink). Higher scores reflect greater confidence in ability to reduce drinking.



Control variables. Given that differences have been reported in the drinking behavior of students of different age and gender, these demographic variables were included as control variables in regression analyses. Age and gender were measured as dichotomous variables. Students under the legal drinking age of 21 were coded 0 and those 21 or older were coded 1. Males were coded 0 and females were coded 1. Race and ethnicity variables were not included because the overwhelming majority of students in the sample were Non-Hispanic and Caucasian.

### *Analysis*

Initially, both exploratory and confirmatory factor analyses were used to develop the TPB construct scales. [3] Factor analysis was conducted using general least squares analysis with direct oblimin rotation, since we anticipated that the individual survey items of each construct were correlated. Survey items that initially loaded highly onto one factor were tested through confirmatory analysis and scale reliability using the .7 standard for the alpha (Nunnally & Bernstein, 1994, p. 265). Scales were then created for the PBC constructs of availability and punishment. The means and standard deviations of each of the variables are listed in Table 1.

Table 1  
*Descriptive Statistics for Variables*

<b>Variable</b>	<b><i>M</i></b>	<b><i>SD</i></b>
<u>Drinking Behavior</u>		
Frequency of Binge Drinking	1.89	1.23
Number of drinks in the last 10 days	6.27	11.31
<u>Intention</u>		
Intend to have fewer than 4-5 drinks	3.33	1.30
<u>Availability</u>		
Cost of alcohol	3.47	1.26
Location of alcohol outlets	3.01	1.32
Invitation by friend to drink	3.48	1.18
Whether or not someone else is buying	3.31	1.29
<u>Punishment</u>		
Campus/dorm policies	3.71	1.41
State laws	3.72	1.31
Potential for punishment	3.84	1.20
<u>Self-Efficacy</u>		
Confidence in reducing drinking	4.10	0.72

*Note.* The items in these tables include variables that loaded highly onto one factor and indicated scale reliability.

The second part of the analysis involved a series of OLS regressions to test the relationships between intention, PBC, and behavior controlling for students' gender and age. Separate regressions were conducted to assess the frequency of binge drinking and the number of drinks consumed 10 days prior to the survey. We further explored possible mediating and moderating effects between intention, PBC, and drinking behavior using steps outlined by Baron and Kenny (1986). Each of the predictor variables were mean-centered to create interaction terms between intention and each PBC construct and then added to the regression models. A Sobel test (Preacher & Hayes, 2004) was conducted to assess for significant mediating relationships, and regression equations were plotted (Aiken & West, 1991) to examine significant moderating relationships.

## RESULTS

### *Descriptive Analyses*

Approximately 25% of respondents had not consumed an alcoholic beverage in the last year, 30% had consumed an alcoholic beverage but had not binged in the month prior to the survey, and 45% had binged at least once in the last 30 days. Most respondents were under the legal drinking age of 21 (72%) and, of these students, 70% had consumed alcohol within the last year while 48% had binged within the last month. Nearly 88% of students who were of legal drinking age had consumed alcohol within the last year - 38% of which reported binge drinking within the last month. There were no significant differences between underage students and of age students in classification as binge drinkers. Approximately 48% of female students and 43% of male students were binge drinkers, while 25% of Hispanic/Latino students, 46% of white/Caucasian students, and 37% of students of other races were binge drinkers. Chi-square tests indicated no significant differences in drinker classifications with regard to gender, ethnicity, or racial status. Descriptive findings of the frequency of binge drinking revealed that most binges occurred on between 1 and 4 days in the previous month (79%).

### *Overall Findings*

The correlation matrix in the Appendix shows that an initial test of bivariate relationships between the variables revealed correlations were generally in the expected direction. Intention to drink responsibly, perception of the importance of punishment, perception of self-efficacy, and age all have a significant moderate inverse relationship with increased frequency of bingeing. Similar results are evident with respect to the number of drinks in the last 10 days, though gender is significant while age is not. Notably, perception of the importance of availability is not significantly correlated to drinking behavior. Additionally, while TPB variables (i.e., intent, PBC, and self-efficacy) were significantly correlated with each other, the strength of the correlation does not indicate multicollinearity.

The results from a series of linear regressions testing predictors of frequency of bingeing are listed in Table 2. Although not included in Table 2, a standard regression analysis first indicated that greater intention to drink responsibly significantly predicted less frequent binge drinking ( $p < .001$ ). The relative contribution of PBC variables to the overall model was then assessed in Model 1. Findings revealed that perceptions of punishment

and self-efficacy were highly significant and in the expected direction (i.e., perception that punishment is less important in decisions to drink and lower confidence in ability to reduce drinking were associated with increased frequency of binge drinking). Perceptions of the importance of availability were not significant and, as a result, were dropped from later analyses. The PBC variables contributed to an adjusted  $R^2$  value of .44 for the model controlling for gender and age.

Table 2  
*Frequency of Binge Drinking Past 30 Days*

	Model 1	Model 2	Model 3	Model 4
	b	b	b	b
Predictor Variables				
Intention		-0.18* (0.09)	-0.20* (0.09)	-0.16 (0.09)
Availability	0.04 (0.02)			
Punishment	-0.14*** (0.03)	-0.18*** (0.04)	-0.19*** (0.03)	-0.16*** (0.03)
Self-Efficacy	-0.85*** (0.13)	-0.69*** (0.20)	-0.75*** (0.18)	-0.64*** (0.16)
Interaction Term				
Intent x Efficacy			-0.15 (0.10)	
Intent x Punish				0.07** (0.02)
Control Variables				
Gender	-0.09 (0.16)	-0.02 (0.20)	-0.04 (0.20)	0.08 (0.19)
Age	-0.26 (0.19)	-0.21 (0.22)	-0.20 (0.22)	-0.16 (0.21)
Adjusted $R^2$	.44	.44	.45	.48

*Note.* Standard errors are in parentheses.

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ .

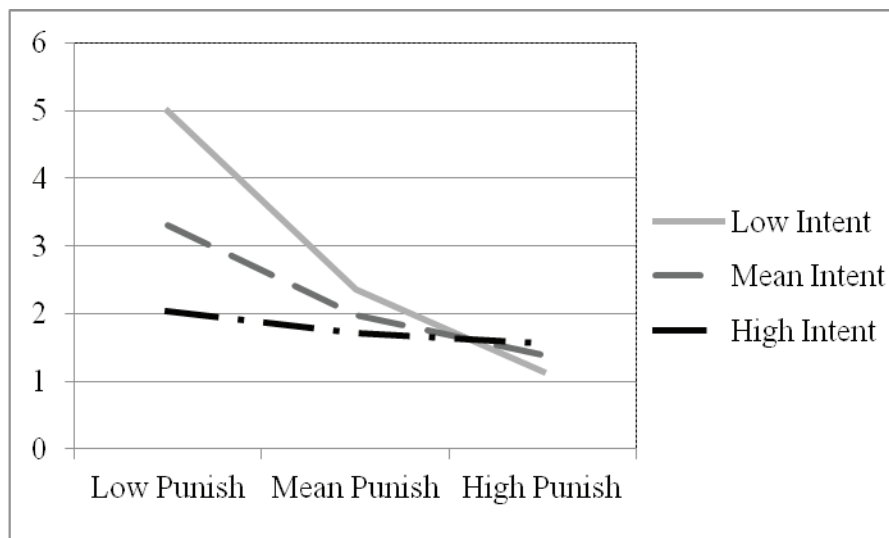
The second model regressed frequency of bingeing on both intention and PBC variables. As indicated in Table 2, intention was significant ( $p < .05$ ) while punishment and self-efficacy remained significant ( $p < .001$ ). Considering the theoretical model for the TPB suggests that intention may act as a mediator between PBC and behavior, a possible mediating effect was examined. However, a comparison of the changes in standardized coefficients indicated that any mediation effect was modest at best: the standardized coefficient for punishment changed from -0.38 to -0.43 with the addition of intention to the model, and self-efficacy changed from -0.49 to -0.32. Additionally, we conducted a Sobel test to check for partial mediation, and the results were non-significant.

Further we examined potential moderating relationships between intention and PBC variables (punishment and self-efficacy). Two interaction terms were created: one between intention and self-efficacy and one between intention and punishment. As indicated in Model 3 in Table 2, the interaction between intention and self-efficacy failed to improve

the model. In Model 4, however, the interaction between intention and punishment was significant ( $p < .01$ ), while punishment and self-efficacy remained significant. The adjusted  $R^2$  was increased by 4% over the original model to .48, suggesting some improvement in the prediction of frequency of binge after adding the interaction term.

To further explore the interaction between intention and punishment, the regression equations of intention and punishment were plotted to graphically illustrate the predicted values of frequency of binge at different levels (i.e., low, mean, and high) of intent and punishment. [4] When displaying the results visually, the moderating effect becomes clearer. As illustrated in Table 3, students who reported high intention to drink responsibly appear to be unaffected by varying degrees of perceptions of punishment; however, students who had lower degrees of intent (i.e., mean scores or lower) reported bingeing more frequently when they also perceived that the potential for punishment was not important in their decisions to drink. Students who did think that the potential for punishment was important reported less frequent binge drinking even when they did not intend to drink responsibly.

Table 3  
Predicted Values of Binge Drinking at Different Levels of Intent and Punishment



Another series of regressions was conducted to test measures of intent and PBC on the measure of the number of drinks in the past 10 days. The results again indicated that greater intention to drink responsibly significantly predicted fewer number of consumed drinks ( $p < .001$ ; not shown in Table 4), and greater perceptions of punishment and self-efficacy were associated with fewer number of drinks in the last 10 days (Model 1 in Table 4). Since the measure of availability was not significant in Model 1, it was dropped from later analyses.

Table 4  
*Number of Drinks in the Past 10 Days*

	Model 1	Model 2	Model 3	Model 4
	b	b	b	b
Predictor Variables				
Intention		-2.40** (0.94)	-2.31* (0.94)	-2.18* (0.94)
Availability	0.37 (0.35)			
Punishment	-1.33*** (0.33)	-0.95** (0.34)	-0.87** (0.35)	-0.88** (0.34)
Self-Efficacy	-4.15* (1.71)	-3.38* (1.71)	-2.93 (1.75)	-3.05 (1.71)
Interaction Term				
Intent x Efficacy			1.24 (1.05)	
Intent x Punish				0.42 (0.24)
Control Variables				
Gender	-3.62 (1.99)	-2.96 (1.98)	-2.73 (2.00)	-2.31 (2.00)
Age	1.29 (2.20)	2.65 (2.22)	2.65 (2.22)	3.12 (2.22)
Adjusted $R^2$	.21	.25	.26	.27

*Note.* Standard errors are in parentheses.

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ .

In Model 2, the inclusion of both intention and PBC variables increased adjusted explained variance from .21 to .25, while intention, punishment, and self-efficacy again emerged as significant predictors in the expected direction. In this model, there was modest evidence of a mediating effect: as a result of the inclusion of intention, the standardized coefficient for punishment decreased from -.35 to -.27 and from -.25 to -.18 for self-efficacy. The results of a Sobel test also revealed statistically significant mediating relationships for punishment ( $p = .041$ ) and self-efficacy ( $p = .033$ ).

Additional tests for moderating effects between intention and self-efficacy (Model 3) and between intention and punishment (Model 4) revealed no statistically significant findings, though the interaction term for intention and punishment did approach significance ( $p = .084$ ). This finding is noteworthy considering that the relatively small sample size reduces statistical power. While the interaction between intention and punishment was not statistically significant to the .05 standard, the adjusted explained variance did improve from .21 to .27 compared to the original model.

## DISCUSSION

Through examination of predictors of students' intentions to drink drawn from the theory of planned behavior (TPB) and from current alcohol-use literature, the present study explored the relationships between students' intentions to drink responsibly, perceptions



of control over their behavior, and reported levels of drinking. Descriptive analyses first indicated a large number of students who live on campus are in fact drinking heavily, despite the fact that the majority of these students are not of legal drinking age. Of the 149 students in the sample, 75% had consumed alcohol within the year prior to the survey, and more than half of student drinkers had binge on at least one occasion in the past month. This finding underscores the importance of efforts to better understand students' intentions to drink and drink heavily.

Though the present study was not intended to provide a strict test of the TPB, the findings generally support the value of TPB constructs in predicting heavy drinking by young adults as well as the distinction between internal and external influences on behavior. In support of expected findings, results revealed significant relationships between student intentions, perceptions of control, and student drinking. Specifically, students who reported greater intention to drink responsibly, perceived potential sanctions for underage drinking or drinking on campus were an important factor in decisions to drink, and believed they had the ability to control their drinking reported significantly less alcohol consumption than students with lower intention and PBC. The explained variance for predictors of the frequency of binge drinking ( $\text{Adj. } R^2 = .44$ ) and the number of drinks in the past 10 days ( $\text{Adj. } R^2 = .25$ ) comport with meta-analyses that report ranges of explained variance for health behaviors between 25% and 52% (Armitage & Conner, 2001; Conner & Sparks, 2005; Godin & Kok, 1996; Sutton, 1998). Additionally, internal and external measures of PBC loaded onto two separate factors and differentially impacted the relationship between intention and behavior supporting a distinction between the two constructs.

The finding that perception of availability of alcohol was not a significant influence on student decisions' to drink in this study was surprising given the extent of literature noting the impact of the availability of alcohol, prices, and location of alcohol outlets on student drinking (Chaloupka & Wechsler, 1996; Jamison & Myers, 2008; Presley, Meilman, & Leichter, 2002; Weitzman et al., 2003). Perhaps students did not perceive the influence of availability of alcohol on their behavior, or it may be that students believe alcohol is already widely available. One item on the survey indicates that over 75% of student respondents either agreed or strongly agreed with the statement that it is relatively easy to obtain alcohol underage. Though not all respondents were under the legal drinking age, the responses give some indication that it is fairly easy to obtain alcohol, so there may be little reason to expect the availability of alcohol to influence students' decisions to drink in this instance.

Evidence of a moderating effect between intention, a measure of PBC, and binge drinking provides support for the interaction model identified in the TPB (Ajzen, 1991) and may have important implications for alcohol prevention strategies, particularly within the criminal justice system. Results in Tables 2 and 3 showed a significant moderating relationship between intention and the potential for punishment in decisions to drink, though the cross-sectional design of the present study makes it difficult to determine the direction of the effect. As the findings in Table 3 illustrate, it may be that intentions are affected by the importance of potential sanctions for students. For example, if students perceive the

potential for punishment as having low importance, their intentions to drink responsibly may have greater influence over their behavior; whereas, if the importance of potential punishment is high, then students may drink less regardless of their intentions. It is also possible that the level of intention moderates the relationship such that the effect of perceptions of the threat of sanctions for drinking depends on students' level of intention to drink responsibly. Students who already possess high intention to drink responsibly may be less concerned about potential for punishment because they already intend to avoid circumstances in which they might be sanctioned for their drinking. Conversely, students who do not intend to drink responsibly may be more influenced by the potential for punishment. The findings indicate that individual perceptions interact with environmental factors, and either outcome could have important implications for efforts to deter criminal behavior.

The findings indicated that the predictor variables tested in the present study appear to have somewhat greater utility in explaining bingeing behavior compared to the number of drinks consumed in the past 10 days. This finding is perhaps unsurprising, since the measure of intention is specific to binge drinking. Differences also appeared in the mediating and moderating relationships between intention, control variables, and the type of drinking behavior. For instance, there was some evidence that intention mediates the relationship between perceptions of control (punishment and self-efficacy) and the number of drinks consumed in the last 10 days; however, only a moderating relationship was supported when we examined student binge drinking. This is perhaps an indication that binge drinking and drinking over the past 10 days are simply different behaviors.

Implications from this line of research support further exploration of the relationship between intention, PBC, and drinking as well as other potential external influences of students' perceptions of control over their behavior. For example, other alcohol-related external influences, such as perceptions of the risks of victimization or engagement in criminal behavior as the result of bingeing, the effects of alcohol on the body (e.g., reduced ability to function in school or possibly weight gain), or student norms, may be important factors that influence perceptions of control. Further research to determine what considerations are important for students will inform prevention and control strategies.

In terms of policy, findings suggest a multi-faceted approach to the reduction and prevention of heavy drinking may be a useful strategy. For instance, levels of intention to drink responsibly, perceptions of self-efficacy, and the importance of sanctions were important predictors of binge drinking in our sample. While a prevention program could target any one of these factors, a multi-faceted approach might reach more students than a singularly focused strategy alone. This approach would improve chances of successfully reducing heavy drinking among students and thereby reduce some of the harmful effects associated with heavy drinking.

### ***Limitations and Future Research***

There are several limitations of the current study that should be noted. One key limitation is the reliance on cross-sectional data. Longitudinal methods are generally preferred for applications of the TPB to obtain an initial measure of intention and PBC prior to as-

sessing behavior. This process is essential for establishing causal order; though, given our use of secondary data, we relied on measures of students' past drinking behavior. Despite this limitation, other studies have relied on cross-sectional methods to assess the TPB with results comparable to studies that use longitudinal methods (Conner et al., 1999; Jamison & Myers, 2008; Murgraff, McDermott, & Walsh, 2001), though future studies could improve on our findings by obtaining longitudinal data.

Another limitation is that we rely on self-report data, which can be less reliable if students do not report their drinking behavior and intentions honestly or accurately (Maxfield & Babbie, 2008, pp. 161-165). It is likely that the intoxicating effects of alcohol distort students' perceptions of the extent and frequency of their drinking. This presents an interesting challenge in collecting data, especially when alcohol use on many college campuses is restricted and underage drinking is fairly covert. One implication for future research may be to experiment with alternative methods of collecting data about student drinking. For instance, Butler, Dodge, and Faurote (2010) utilized an online log system for students to record their drinking behavior shortly after it occurred, which minimized validity and reliability issues connected with self-reports.

A third limitation is the relatively low response rate of 33%, though it is not uncharacteristic of student populations and current trends show declining student response rates over the last 20 years (Baruch, 1999; Sax, Gilmartin, & Bryant, 2003). For example, Sax et al. (2003) have argued that the decreasing response rates among students may be a consequence of increases in junk mail and the number of questionnaires that students receive. The low response rate in this study translates into a small sample size, which reduces the statistical power to find effects when they exist; though, significant findings were reached despite this limitation.

A few of the measures used in the present study could be improved with future research. Currently, there is some disagreement over how to define and operationalize binge drinking (Wechsler & Kuo, 2000). The commonly used measure of binge drinking that we adhere to may be limited in how well it accounts for the amount of time alcohol is consumed or individual weight and tolerance differences (DeJong, 2001). Given the use of secondary data, measures of intention and self-efficacy were limited to single items, which may pose problems with construct validity (Maxfield & Babbie, 2008, pp. 86-88). Future research might employ traditional measures of these constructs that rely on multiple-item measures. Finally, measures of availability of alcohol and potential for punishment tap influences of control beliefs on students' decisions to drink, though they are imprecise measures of control. However, evidence of the moderating effect between intention and a measure of PBC on drinking behavior highlights an interesting area for future research to explore. Additionally, the results suggest features of students' motivations and perceptions of control that may be targeted by alcohol prevention and control efforts.

Finally, with regard to future research, we suggest that the theory of planned behavior may have promise in the fields of criminal justice and criminological research. In the current study, a component of the theory of planned behavior model (Ajzen, 1991)

was applied to binge drinking, a behavior that was illegal for nearly three-quarters of the sample. Although a few other scholars (Forste et al., 2011; Kiriakidis, 2008, 2010; Miller, 2010; Rennie & Shore, 2007) have begun to use the TPB to help explain illegal behavior, we suggest that more of this type of research is warranted. The theory of planned behavior has two benefits specifically relevant to the areas of criminal justice and criminological research. First, the TPB incorporates intentions in its explanation of behavior, a relevant, yet understudied concept in criminological research (Silver & Ulmer, 2012; Wells & Horney, 2002). Second, the theory of planned behavior represents a framework that can account for factors that both facilitate and constrain behavior. Thus it may be a promising framework for the inclusion of criminological variables that often are associated with theories based on opposing assumptions. For example, social control theories generally are based on the assumption that crime is normal and that certain controls in society *constrain* behavior while other theories are of the assumption that certain environmental or social influences shape or *facilitate* criminal behavior (e.g., learning theories, social disorganization, etc). The theory of planned behavior has the capacity to incorporate variables from both viewpoints and thus should be explored further.

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## ENDNOTES

1. As indicated in Figure 1, the TPB framework used in the present study is only a portion of the overall theoretical model developed by Ajzen (1985). The complete model states that individuals develop intentions to perform or abstain from a behavior from underlying favorable attitudes and perceptions of subjective norms toward the behavior as well as perceived control over engaging in the behavior (Ajzen, 1985, 1991).
2. Although 498 surveys were initially prepared, volunteers were unable to deliver 10 packets (40 surveys) and thus the response rate is calculated based on the 458 delivered surveys. A number of factors make it likely that the response rate was slightly higher. For example, some suites had fewer than four students and a few students were excluded from the sample because they were underage. Since it is unknown how many surveys were not completed for these reasons, it is only possible to conclude that there were 458 students in the original sample, though the actual number is probably lower.
3. Please feel free to contact the authors for further information on the loading values for each factor.
4. Aiken and West (1991) have provided helpful suggestions on how to calculate and plot separate regression equations in testing interactions, which were used in the present study (e.g., see pp. 9-14).

## APPENDIX

*Pearson's Correlation of Variables*

	1.	2.	3.	4.	5.	6.	7.
1. FreBinge Drinking							
2. Drinks Last 10 Days	.65***						
3. Intention	-.45***	-.43***					
4. Availability	.16	.07	-.23*				
5. Punishment	-.41***	-.41***	.36***	.29***			
6. Self-Efficacy	-.52***	-.28**	.40***	-.42***	.06		
7. Age	-.11**	-.03	.31***	.16	.20*	-.10	
8. Gender	-.06	-.21*	.12	.13	.06	-.01	-.07

*Note.* FreBinge = the frequency of binge drinking in the last month.

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$