Incorporating Motives into the Theory of Planned Behavior: Implications for Reducing Alcohol Abuse among College Students

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ABSTRACT

College alcohol abuse continues as a major public-health concern. Theory-driven research is necessary to address the severe negative consequences of this college drinking. One theory that offers particular promise is the theory of planned behavior (TPB). This theory posits that attitudes, perceived behavioral control, subjective norms, and intentions are the causal underpinnings of behavior. The current research investigates the utility of this theory in predicting college-student drinking behavior and investigates the potential benefit of including "motives" as an additional theoretical construct. In total, 316 students completed two electronic surveys. The first survey measured participants' standing on TPB constructs and motives. The second survey, administered two weeks later, asked participants about their alcohol consumption over the prior two weeks. Results not only shed light on the severity of the college drinking culture, but also offered a potential theoretical mechanism to promote positive behavior change. While the average participant reported consuming alcohol at binge drinking levels, the TPB with the inclusion of motives offered promise. Using structural equation modeling, this proposed model explained 71% of the variance in drinking intentions and 83% of the variance in self-reported drinking behavior in the follow-up survey. Motives added significantly to this model, indicating future TPB studies may benefit from including motives as an additional theoretical construct.

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1.0 - Introduction

Few issues have been as highly studied and debated as alcohol use. Starting with the 18th amendment in 1919 which banned the manufacture and sale of alcohol and continuing through the 21st amendment in 1933 which repealed alcohol prohibition, alcohol-related debates still remain prevalent in the 21st century. Other sources of serious political contention have been the legal blood alcohol level (BAL) at which a person is considered to be driving under the influence of alcohol and the minimum legal drinking age (MLDA).

Following legislation signed by President Ronald Reagan, all states have been required to establish their MLDA at 21 or lose all federal transportation funding. The MLDA has produced a tremendous amount of tension for college communities where the vast majority of the population makes the transition to becoming legally permitted to purchase and consume alcohol. In fact, this tension has led to grassroots efforts such as the Amethyst Initiative which includes hundreds of college chancellors and presidents who desire a rejuvenated debate on lowering the MLDA to 18.

Despite the political and practical debates over alcohol regulation and policies, empirical investigations provide a glimpse of the current consequences of alcohol consumption. Furthermore, research-based endeavors are necessary to direct alcohol-safety efforts and potentially inform policy decisions, regardless of personal political positions. In many ways, alcohol issues related to young drinkers are growing. While the age of first alcohol consumption was approximately 18 years of age in the 1960s, it has dropped to 15.7 years of age as measured in 2003 (Substance Abuse and Mental Health Services Administration, 2003).

In relation to other controlled or illegal substances, alcohol is uniquely prevalent. A 2007 survey found that 72.2% of high school seniors have consumed alcohol in direct comparison to 46.2% having smoked cigarettes, 41.8% having smoked marijuana, and 7.8% having used cocaine (Johnston, O'Malley, Bachman, & Schulenberg, 2008). This is particularly troublesome because early drinking onset has been associated with higher rates of violence, alcohol dependence, carrying a handgun, theft, other drug usage, higher rates of drink-driving, and an increased propensity to believe it is safe to drive after consuming a higher number of alcoholic beverages (SAMHSA, 2005; SAMHSA, 2004; Center on Addiction and Substance Abuse, 1994; Hingson, 2003). This is in addition to the significant negative impact alcohol has on youth brain development, particularly areas associated with memory (Zeigler et al., 2005).

These findings have clear and profound implications for the university environment. Even the high-risk behaviors initiated prior to college are often highly predictive of similar behaviors in college (Wechsler, Dowdall, Davenport, & Rimm, 1995; Wechsler et al., 2002). In fact, approximately 80% of college students admit to consuming alcohol, and about 40% of college students report drinking heavily (NIAAA, 2002). This translates into six percent of students being officially diagnosed as alcohol dependent, a third of students fitting the criteria for alcohol abuse under current diagnostic criteria, and 44% of students reporting at least one symptom of either alcohol abuse or dependence (Knight et al., 2002).

Each year, there are approximately 1,700 student deaths, 600,000 injuries, 700,000 assaults, and 90,000 sexual assaults resulting from college drinking (Hingson et al., 2005). Additionally, 474,000 students report engaging in unprotected sex annually while under the influence of alcohol (Hingson et al., 2005). As a result of alcohol consumption, 25% of students report negative academic consequences, 11% report damaging property, and five percent have had problems involving police or campus security (Task Force of the National Advisory Council of the National Institute on Alcohol Abuse and Alcoholism, 2002). Moreover, an estimated 2.8 million college students drove a vehicle under the influence of alcohol in 2001 (Hingson et al., 2005).

Several field studies have identified the exceptional risks associated with alcohol consumption in the university environments of downtown bars, private parties, and university-sanctioned fraternity parties (Fournier, Ehrhart, Glindemann, & Geller, 2004; Glindemann, Ehrhart, Drake, & Geller, 2007; Glindemann, Ehrhart, Maynard, & Geller, 2006; Glindemann & Geller, 2003; Glindemann, Geller, & Fourtney, 1991; Glindemann, Geller, & Ludwig, 1996; Glindemann, Wiegand, & Geller, 2007; Timmerman, Geller, Glindemann, & Fournier, 2003). In all of these studies, a team of trained research assistants were sent to designated indoor or outdoor environments with recently-calibrated breathalyzers to measure participants' Blood Alcohol Level (BAL). Across all settings, average BAL was found to be above the legal limit of 0.08 mL/L.

In a downtown bar setting, average BAL of students was found to be 0.090 (Glindemann, Wiegand, & Geller, 2007). Across 1,525 university students at 19 different parties it was found the mean BAL of partygoers at a private party was 0.082 mL/L and the mean BAL of partygoers at a fraternity party was 0.093 mL/L (Glindemann & Geller, 2003). This difference between

party type reached statistical significance, $p < .05$. Remarkably, the aforementioned averages all included non-drinkers who registered a 0.00 BAL when they participated. These data are indicative of the scope and severity of alcohol consumption among university students.

1.1 - Theory of Planned Behavior

Theory-driven research is needed to address these issues of alcohol abuse. One theory that offers promise is the Theory of Planned Behavior (TPB; Ajzen, 1991), which has received substantial empirical support. In fact, on his webpage, the creator of this theory, Izek Ajzen, cites 818 empirical studies that have been conducted by various researchers in support of his theory (Ajzen, 2010). There are also dozens of reviews validating this theory, notably Armitage and Conner (2001).

The Theory of Planned Behavior was developed from the Theory of Reasoned Action (TRA; Ajzen & Fishbein, 1980). Proponents of TRA sought to understand behaviors by looking at the relationship between attitudes, subjective norms, and behavioral intentions. Attitudes and subjective norms were posited as the determinants of intention. It was then presumed that intention directly influences behavior. However, many researchers have suggested TRA was insufficient when people believed they have little control over their decisions (Ajzen, 1991). Thus, TPB emerged applying the exact same framework as TRA, but with the addition of perceived behavior control as a third determinant of intentions, as illustrated in Figure 1.

Theory of Planned Behavior and Alcohol Consumption

Alcohol consumption has also been the focus of several TPB studies. Many of these TPB studies focus on youth populations. This occurs because school-aged students are easy to recruit and the constructs of the TPB are starting to form and develop at these ages. For example, Morrison, Simpson, Gillmore, Wells, and Hoppe (1996) used the components of attitudes, social norms, and intentions to explore alcohol and tobacco usage in 5th and 6th grade students. With intentions as the sole outcome measure, the results indicated that attitudes and subjective norms accounted for 24% of the variance in intentions to consume alcohol and 37% of the variance in intentions to smoke.

Marcoux and Shope (1997) also used TPB to assess alcohol consumption in 5th through 8th grade students. They had nearly 4,000 students from 179 classes in 16 school districts complete both the pre-test of attitudes, subjective norms, perceived behavioral control, and intentions and a post-test two months later on reported alcohol use. Their results provided strong

support for TPB. All model components were statistically significant. Attitudes, subjective norms, and perceived behavioral control explained 76% of the variance in intentions. It was further found that drinking intentions explained 26% of the variance in reported alcohol consumption, 38% of the variance in reported frequency of alcohol consumption, and 30% of the variance in reported alcohol misuse.

College-aged students have also been targeted by TPB alcohol research. Marcel, Bergeron, and Audet (2001) found that TPB was useful in explaining drink-driving decisions. They report attitudes, perceived behavioral control, and subjective norms (to a lesser degree) were significant predictors of intentions to drive under the influence of alcohol. TPB has also been used to determine college students' intention to seek professional psychological help for alcohol abuse. Codd and Cohen (2003) found attitudes and social norms explained 12% of the variance in intentions to seek professional help in their sample.

While the above studies examined alcohol-related outcomes, they did not specifically examine alcohol consumption as the target behavior. However, two additional studies have used TPB to directly assess alcohol consumption among college students (Conner, Warren, Close, & Sparks, 1999; Glindemann, Geller, & Ludwig 1996). Conner, Warren, Close, and Sparks (1999) assessed TPB across three samples of college students and found across all samples, attitudes, subjective norms, and perceived behavioral control explained between 28% and 40% of the variance in intentions. Intentions then explained between 12% and 50% of variance in self-reported drinking.

Glindemann, Geller, and Ludwig (1996) extended beyond self-report of alcohol consumption by sending research teams to actual parties with breathalyzers. They conducted two studies to measure the drinking intention-BAL relationship. The first study examined the relationship between drinking intentions the week prior to attending a fraternity party with at-party BAL. Questionnaires were administered to host Fraternity members at their weekly meeting the week prior to hosting their party. Using a unique subject code, these surveys were linked to BAL results at the party. The researchers found that drinking intentions one week prior to the party explained 29.2% of the variance in BAL. The second study measured drinking intentions as individuals entered the fraternity party. Upon entrance, interested participants were

asked their drinking intentions for that party. They were then given a wristband with a unique subject number. At the end of the night, these participants were administered a breathalyzer test. In Study 2, drinking intentions accounted for 28.1% of the variance in BAL.

While Glindemann, Geller, and Ludwig (1996) went the farthest in measuring TPB by extending beyond self-report, they only accounted for the intention-behavior relationship. No measures of attitudes, subjective norms, or perceived behavioral control were administered. However, the low sample size of 24 in the first study and 43 in the second study inhibited the ability to statistically evaluate the full range of relationships. Thus, follow-up research should include nearly quadruple the sample size to perform structural equation modeling (SEM) analyses of the full set of TPB relationships. This was an objective of the present research.

TRA/TPB Criticisms

As noted, numerous studies have demonstrated the efficacy of TPB. However, TPB does not come without criticism. Some of the strongest criticism comes from Ogden (2003). Ogden acknowledged the utility of the TRA and TPB, but raised several questions about the falsifiability, analytic nature, and methodological side-effects of the questionnaire responses.

Ogden's concern with falsifiability is perhaps the strongest critique, noting that even when specific components of the TPB model return non-significant results, authors of the research rarely choose to reject the TPB model. Instead, these authors explain away the non-significance by blaming unique population characteristics, adding meaningless extensions of the TPB model, or claiming the specific behavior under study does not need the full model to be successfully predicted.

Ajzen and Fishbein (2004) acknowledge Ogden's argument, but reiterate the theory does not require all of the model components to be meaningful or necessary in every situation. They argue it is completely acceptable for only one or two of these determinants of intentions (i.e., attitudes, subjective norms, and perceived behavioral control) to be relevant for a given behavior. Thus, it is normal and justifiable for specific components of the model to return non-significant results. However, this is indicative that TPB may indeed be over-supported in the literature.

Ogden also questions the analytical nature of the theory. She accentuates that attitudes, subjective norms, and perceived behavioral control are typically operationalized in ways that do not properly discriminate the constructs. Not only are these terms poorly operationalized, but the questions measuring attitudes, subjective norms, and perceived behavioral control are often

almost identical across these constructs. Thus, the correlations between these determinants may reflect artificial relationships due to instrumentation effects. Undoubtedly, many researchers have been empirically loose in operationalizing these constructs. However, this critique is better targeted at individual, poorly-designed studies than at TPB as a theory.

Finally, Ogden argues the questionnaires used by TPB researchers may create rather than assess cognitions. This is primarily relevant for the construct of attitudes. The argument is that questions to measure attitudes such as, "female condom decreases sexual pleasure for a man" may actually create negative attitudes versus measure the original attitude (Ogden, 2003, p.426). This is certainly a concern in any questionnaire research. Although, as noted by Ajzen and Fishbein (2004), this is an empirical question and little evidence has been reported that such effects occur.

Other critiques of TRA and TPB have come from Sharma (2007). These critiques are especially noteworthy as they pertain specifically to alcohol and drug applications of the theory. Sharma makes four critical points. First, these theories predict behavior, but do not explain behavior change. Behavior change is the critical component for most interventions, which is the primary focus of most alcohol and drug research.

Second, TRA/TPB do not account for personality, cultural, or demographic factors that certainly shape behavior. Third, TRA/TPB cannot adequately explain irrational behaviors which are often the case for alcohol and drug users. Fourth, Sharma criticizes that behaviors are mostly measured through self-report and questionnaires. These points are meritorious and should be addressed in applied alcohol research that uses TPB. Mindful of these critiques, the proposed research will primarily focus on addressing the second critique, the inclusion of individual differences as conceptualized through differential motives to consume alcohol.

1.2 - Incorporating Critiques and Prior Research into the Proposed Study

Theoretical Contributions of the Proposed Study

While TPB has been shown to be a useful tool in addressing many drinking consequences, the limitations of past research and critiques offered by leading scholars necessitates further empirical investigation and theoretical and methodological reconsideration. The current study builds upon the previous research and current TPB critiques by making several distinct methodological and theoretical innovations.

The major theoretical contribution of the present study will be to consider a new fourth determinant of intentions. As noted by Sharma (2007), individual differences constructs such as personality are not directly considered in TPB. The proposed study included the addition of "motives" to the determinants of attitude, perceived behavioral control, and subjective norms as depicted in Figure 2.

Theoretically, motives are a logical way to capture individual differences or personality dynamics. Motives have also been empirically linked to drinking outcomes (Glindemann, Wiegand, & Geller, 2007; Glindemann, Geller, & Fortney, 1991; Cooper, 1994; Fisher, Fried, & Anushko, 2007). For example, individuals drinking to celebrate have been shown to have significantly higher BALs than individuals not reporting this drinking motive (Glindemann, Wiegand, & Geller, 2007). Also, individuals drinking with social motives as a result of low self-esteem have been shown to have higher BALs than people with normal to higher self-esteem (Glindemann, Geller, & Fortney, 1991).

Drinking behaviors have been directly linked with drinking motives to the point that several scales have been developed to measure drinking motives specifically (Cooper, 1994; Fisher, Fried, & Anushko, 2007). Just like the current three determinants of intentions (i.e., attitudes, perceived behavioral control, and subjective norms), motives must also be specifically tailored to the behavior under investigation. For the purposes of drinking motives, the present study proposed conformity, self-medication, and thrill-seeking as the three primary subtypes of motives to consume alcohol. Further detail of the operationalization of motives is included in the instrument development section of this research report.

Motivation as a Personality Construct

Through a variety of theoretical conceptions, motivations have long been considered a critical aspect of personality. In Pervin's *The Science of Personality* (1996), motivations are considered to be units of personality through the following four general categories: drive/tension-reduction theories, incentive theories, cognitive theories, and self-actualization theories. Furthermore, several prominent psychologists and theorists have created personality theories that incorporate motivations. Maslow made this argument by asserting that personality is a function of an individual's status on a needs hierarchy. These needs create specific and relatively consistent motivations. Thus, these motivations emerge as personality characteristics (Maslow, 1987).

Ryan and Deci also used motivation as a personality construct. They created a taxonomy of motivations driven by both intrinsic and extrinsic motivations as they relate to self-determination (Ryan & Deci, 2000). Personality then relates to the strength and orientation of these motivational categories (Ryan & Deci, 2000).

Social-cognitive theorist Carol Dweck also found motivation to be a necessary component of personality. She describes the primary value of her implicit theories approach as, "its depiction of the manner in which underlying personality variables can translate into dynamic motivational processes to produce major patterns of cognition, affect, and behavior (1988, p. 271)." Again, motivation plays a pivotal role in understanding and defining personality.

In this social-cognitive framework, drinking motivations can also be considered a central personality dynamic. While drinking motivations have been linked to the Five-Factor Model of Personality (see Stewart & Devine, 2000; Theakston, Stewart, Dawson, Knowlden-Loewen, & Lehman, 2004), a more social-cognitive framework was chosen for this study. This classification of drinking motivations as a personality unit relate to these motives being stable, patterned, cross-cultural, and context/situation dependent (Cooper, 1994; Cox & Klinger, 1998; Cox & Klinger, 2002; Farber, Khavari, & Douglass, 1980; Fisher, Fried, & Anushko, 2007; Kuntsche, Knibbe, Gmel, & Engels, 2005; Mazzardis, Vieno, Kuntsche, & Santinello, 2010).

Addressing TPB Critiques in the Proposed Study

Ogden's critique of TPB as creating cognitions as opposed to assessing them must be addressed. This critique primarily applies to measuring attitudes in TPB. Ogden (2003) notes this problem "is particularly the case if the behavior being considered is novel and unfamiliar (p. 426)." Thus, this concern is minimal for the proposed study. After all, drinking behaviors are not unfamiliar to most college students- the population of this study. Also, this concern was addressed through the careful psychometric concern given to attitudes in the instrument developed for this study. Many attitude questions were reverse scored and guidelines developed by Ajzen were followed to ensure appropriate psychometric properties (Ajzen, Sample TpB Questionnaire; Ajzen, Behavioral interventions based on the Theory of Planned Behavior; Ajzen, 2006; Francis et al., 2004).

Ogden's (2003) concern about operationalization was also carefully addressed. As evident in the instrument development section, careful guidelines were followed in developing the questions for each construct (see Ajzen, Sample TpB Questionnaire; Ajzen, Behavioral

interventions based on the Theory of Planned Behavior; Ajzen, 2006; Francis et al., 2004). The elicitation study of the instrument is also detailed in the instrument development section. The aforementioned guidelines were followed to maximize the construct validity.

Finally, the concern from Sharma (2007) that the theory is unable to explain behavior change is directly assessed through this research. Particularly with the addition of motives, the theoretical components of TPB are indeed useful for targeting behavior change. Certainly, the results of the proposed research could be incorporated at the individual or group level. Individually, knowing the differential impact of attitudes, perceived behavioral control, subjective norms, and motives would be useful if incorporated into therapies such as CBT or motivational interviewing.

Knowing which cognitions to target and how to redirect behaviors more appropriately is highly useful. At the group level, results may indicate which factors would be good targets for community interventions. For example, certain conditions may limit the relationship between intentions and BAL. Accordingly, a potential finding will be that parties with jungle juice or mixed drinks make it more difficult for partygoers to predict their BAL. This could result in BALs deviating significantly from intentions. The implications for party designs and university regulations could be profound. Thus, behavior-change implications will be derived from this research.

1.3 - Preliminary Research: Scale Development

Guidelines for Instrument Development

Theory of Planned Behavior questionnaires must be specifically tailored to the population, behavior, and setting. As such, pilot work is highly valuable in developing questionnaires. Additionally, much empirical research and extensive review articles are available to guide the process of developing TPB instruments. Ajzen has developed three guides to constructing TPB items (Ajzen, Sample TpB Questionnaire; Ajzen, Behavioral interventions based on the Theory of Planned Behavior; Ajzen, 2006). The European Union has also funded a publication through the Centre for Health Services Research in the United Kingdom that gives in-depth analysis into the creation of TPB questionnaires for health services researchers (Francis et al., 2004).

When developing TPB items, it is suggested attitudes, perceived behavioral control, and subjective norms be measured using both "direct" and "indirect" measures (Francis et al., 2004). Direct measures are general questions with a standardized wording across behaviors and populations. Exact phrasing was provided in the aforementioned TPB resources (Ajzen, Sample TpB Questionnaire; Ajzen, Behavioral interventions based on the Theory of Planned Behavior; Ajzen, 2006; Francis et al., 2004). The strategy of this type of item is to directly ask about respondent's perceptions of the construct. Indirect items are more specific and ask about respondent's perceptions of specific behavioral beliefs and outcomes. Indirect measures require item development and pilot testing through an elicitation study.

For all three constructs (i.e., attitudes, subjective norms, and perceived behavioral control) direct measures were created from Francis et al. (2004), and an elicitation study was performed to develop indirect measures. The elicitation study is a questionnaire with open-ended questions designed to discover or "elicit" common information about theory constructs for the specific behavior, population, and setting. The questions developed from the elicited responses are considered to be more relevant than general or direct questions of theory constructs. The elicitation study for the research reported here is further described in the elicitation study section of this report.

Attitude Item Guidelines

Direct measures of attitude have a fairly strict format under the published guidelines (Ajzen, Sample TpB Questionnaire; Ajzen, Behavioral interventions based on the Theory of Planned Behavior; Ajzen, 2006; Francis et al., 2004). These questions should include both instrumental (whether the behavior achieves something) and experiential (how it feels to perform the behavior) items (Francis et al., 2004). This includes one specific behavioral stem, followed by four scales. Participants must select a number from 1-7 on the four scales of harmful-beneficial, good-bad, pleasant(for me)- unpleasant(for me), and worthless- useful.

Indirect items should be developed through an elicitation study of relevant subject experts. Items are derived from a content analysis of open-ended questions pertaining to the "advantages" and "disadvantages" of engaging in the target behavior. These responses should then be incorporated into the item set as a function of the likelihood of experiencing a certain outcome multiplied by the desirability of that outcome.

Subjective Norm Item Guidelines

Direct measurement of subjective norms involves asking how "important people in general" feel about the behavior in question. The indirect measures of subjective norms involve the elicitation procedure of asking about individuals or groups that "approve" or "disapprove" of the behavior. The indirect measures allow for more specific targeting of relevant populations for norm assessment.

Perceived Behavioral Control Item Guidelines

Perceived behavior control is directly measured by asking questions about self-efficacy and controllability. Self-efficacy includes two questions that solicit difficulty of performing the behavior and confidence in one's ability to perform the behavior. Controllability is assessed by soliciting whether the performance of the behavior is up to the particular individual and whether factors beyond his or her control determine the behavior. The indirect measures of perceived behavioral control should be measured by an elicitation study that asks open-ended questions regarding factors that make it "easy" or "difficult" to engage in the target behavior.

Intention Item Guidelines

Two methods are commonly used to measure intentions (Francis et al., 2004). The first is to ask three questions using the wording, "I expect," "I want," and "I intend" in relation to engaging in the specific behavior. The other option is to write approximately ten scenarios or vignettes followed by questions asking the participant how they would react in the given situation. The vignettes or scenarios are to be developed through an elicitation study that determines relevant situations that would solicit intention-related responses.

Drinking Motive Item Guidelines

General drinking motive scales were developed after reviewing the drinking motivation scale by Cooper (1994) and College Drinking Influences Survey (CDIS) developed by Fisher, Fried, and Anushko (2007). The Cooper scale includes the four motivational factors of social, coping, enhancement, and conformity. The CDIS includes three motivational factors: social influences, stress reduction, and sensation seeking.

Elicitation Study

An elicitation study and item pilot were conducted using research assistants (RAs) from the Center for Applied Behavior Systems (CABS). An online survey was distributed to these RAs. The survey began with the full list of drinking motive questions, as provided in Appendix

A. RAs were then asked open-ended items about alcohol consumption for the elicitation study. The aforementioned guidelines were used to develop these open-ended items. The full list of open-ended items and responses is included in Tables 1-4. The titles of the tables reflect the exact wording of the questions. For each question, respondents were given four separate columns to list unique answers to each question. If respondents wanted to provide more than four answers, an "other" column was provided to list all remaining responses.

A total of 27 RAs completed the online survey. A focus group of 14 RAs, all of whom completed the online survey, was convened to perform a content analysis of the elicitation study and to discuss clarity of the drinking motive items. No concerns were voiced about the clarity or structure of the drinking motive items. One item showed extremely poor item-response variance (i.e., one anchor receiving greater than 75% of responses). This item was "Because I am rebelling against my parents." However, since this was only the case for a single item, the full set of items was included for the complete study reported here.

The focus group of RAs performed the content analysis through a several-step process. First, all RAs in the focus group were shown the complete list of open-ended responses for each item. Next, the focus group deleted responses considered to be nonsensical or only tapping into fringe beliefs. The focus group then started with the first remaining item under each question. They debated until consensus was reached on a larger category to which this response could be generalized. Each remaining response was then individually considered to determine if it constituted a new general category or could fully be described by an existing category. For each of the four open-ended questions, each of the general categories returned from the focus group were incorporated into survey items.

Attitude Item Development

As per the guidelines above, direct measures of attitudes are measured by asking participants to rate how "harmful v. beneficial," "good v. bad," "pleasant v. unpleasant," and "worthless v. useful" consuming alcohol would be over the next two weeks. The content analysis of the elicitation study responses returned 12 additional specific attitudes: sociability, lowered inhibitions, buzzed feeling, relaxation, behavior justification, group identity, impaired decision-making, negative physical consequences, emotional instability, increased risk for victimization, aggressive behavior. These specific attitudes were then incorporated as indirect measures of attitude.

Subjective Norm Item Development

Subjective norm items were divided into injunctive and descriptive norms. Relevant reference groups and items were developed in a focus group of RAs from CABS. The injunctive norm questions ask about important others' perceptions of them drinking or refusing to drink. Descriptive norm questions ask participants how frequently and extensively other college students will be drinking on average over the next two weeks.

Perceived Behavioral Control Item Development

Direct measures of perceived behavioral control were developed to include both self-efficacy and controllability. The elicitation study also returned several common responses to the open-ended questions of factors that make it "easy" or "difficult" to control one's level of alcohol consumption. The focus group of RAs (n=14) found the following factors in the content analysis of these responses: drinking games, uncertainty of personal tolerance, knowing one's limits, peer pressure, cognitive and behavioral impairment, friend feedback, unsure of alcohol concentration of drinks consumed, speed of consumption, attendance at a special drinking event, mood states, and front-loading.

Intention Item Development

The direct measures of intentions were used according to the aforementioned guidelines. These guidelines specified the creation of three questions regarding "expecting," "wanting," and "intending" to drink. Two additional questions were added, asking the intended frequency and intended number or drinks per drinking session over the next two weeks.

Motive Item Development

A focus group of 22 RAs from CABS developed the motive item pool used for this study. Since the RAs fit the description of the population under investigation and are familiar with standard research methodology, they were considered subject matter experts for this procedure. The development procedure followed a three-step process in the focus group. First, RAs were familiarized with the drinking motivation scale by Cooper (1994) and College Drinking Influences Survey (CDIS) developed by Fisher, Fried, and Anushko (2007). Second, the focus group brainstormed and created unique items perceived as tapping into unique motives not considered in the previous two scales. Third, item redundancy was limited by removing, rewriting, or combining similar items in the item pool.

1.4 - Hypotheses

Research hypotheses target the fit of motives into TPB and the role of intentions as a mediator of the impact of attitude, subjective norm, perceived behavioral control, and motives on self-reported alcohol consumption. Hypothesis 1 is that the inclusion of motives will increase the explanatory power of TPB in influencing behavior (H1). The research further explored the mediatory relationship of intentions. It was hypothesized that intentions will mediate the attitude-behavior relationship (H2), the subjective norm-behavior relationship (H3), perceived behavioral control-behavior relationship (H4), and the motive-behavior relationship (H5).

2.0 - Method

2.1 - Participants

Participants were undergraduate students at a large, public university in southwestern Virginia. All students were currently enrolled in at least one psychology class at this university. The majority of participants came from Introductory Psychology. There are approximately 1,200 students enrolled in this course. Since this course meets a university general curriculum requirement, students came from a variety of backgrounds and academic majors. All students in these classes were given the opportunity to participate for two points of extra course credit.

In total, 660 individuals participated in at least one phase of the study. However, the final sample size included only 316 participants who were able to be matched across both phases of the study. This final sample was predominantly female (n=246; 77.8%) as compared to male (n=70; 22.2%). Due to the sensitivity of asking age and alcohol-related questions, class status was used as a proxy for participant age. There were 116 freshmen (36.7%), 99 sophomores (31.3%), 55 juniors (17.4%), and 46 seniors (14.6%). While 52.1% of participants failed to either complete Phase II or provided insufficient information, no significant differences on either of the alcohol history measures were found between those who completed the first phase only and those entered into the final sample. However, the final sample had 8% more females than the initial sample in only Phase I.

2.2 - Procedure

A University Institutional Review Board (IRB) committee approved all parts of the study. Participants were provided an approved electronic copy of the IRB informed consent (see Appendix B). All parts of the study were conducted electronically through SONA. This is a

common website that informs potential participants of available research studies. Recruitment, informed consent administration, survey administration, and allotment of extra credit were all done electronically through SONA.

Upon registering for the research study on SONA, participants were provided a link to take an electronic survey. This survey constituted Phase I of the research study. Participants were asked demographic and alcohol-history questions. Additionally, participants were asked items that measured indirect and direct attitudes towards alcohol consumption, direct subjective norms, direct and indirect measures of perceived behavioral control, drinking motives, and drinking intentions over the next two weeks. Participants were also asked to create a unique subject code so they could be tracked across phases. This code consisted of the first two letters of their mother's maiden name, the first two letters of the city in which they were born, and the first two numbers of their birth month (e.g., March = 03). Upon completion of Phase 1, participants were given one point of extra credit.

Two weeks after completing Phase 1, participants were given the opportunity to participate in Phase 2 of the study. This was also an electronic survey through SONA. Only individuals who had completed Phase 1 were given the opportunity to participate in the second phase. In Phase 2, participants were asked about their drinking behavior over the prior two weeks. Participants also provided their subject code so responses on both phases could be matched. Upon completion of the second survey, participants were awarded an additional point of extra credit.

2.3 - Measures

Measures were created based on the results of the elicitation study as well as following the guidelines listed in the scale development section. This was also consistent with the procedures and guidelines listed in Francis et al. (2004) for constructing TPB measures. These methods were used to construct indirect and direct measures of attitudes and perceived behavioral control. Only a direct measure of subjective norms was created and used for this research. Indirect measures of subjective norms are most useful when there is uncertainty about relevant subgroups for norm formation. Since there is already a vast literature on norm formation for college drinkers, specific targeting of subpopulations was not deemed necessary, and, thus, indirect measures were not created. The intention items asked participants their intended number of drinking occasions over the next two weeks and intended average number of

drinks at each occasion. Drinking behavior was determined by asking the actual number of drinking occasions and average number of drinks consumed at each of these drinking occasions over the previous two weeks, as measured via the follow-up survey.

Drinking motives were assessed using the motives scale created by the research team. The creation of this instrument followed the guidelines described in the item development section. The final drinking motives instrument, the Drinking Motives Assessment Tool (DMAT), consisted of 44 items. Items in the DMAT measured the subconstructs of conformity, self-medication, and thrill-seeking. All items are listed in Appendix A.

3.0 - Results

3.1 - Drinking Epidemiology

Three categories of alcohol consumption were measured: alcohol history, drinking intentions, and self-reported drinking. Alcohol history was measured in Phase I as drinking behaviors in the four weeks prior to taking the survey. Drinking intentions were measured by items in Phase I as intended drinking behavior over the next two weeks. Self-reported drinking was measured in Phase II as drinking behavior during the previous two weeks. All of these categories were further decomposed into number of drinking occasions in the particular time span and average number of drinks consumed at each of these occasions in that time span.

Table 5 depicts reported drinking epidemiology broken down by class status and gender. As noted in the table, approximately 20% of participants reported they were non-drinkers. However, on the other end of the spectrum, there was also a high binge drinking rate. This is most clearly evident using Henry Wechsler's classic definition of binge drinking, which is four or more standard drinks for a female in one sitting and five or more standard drinks for a male in one sitting (Wechsler, Dowdall, Davenport, & Rimm, 1995; Wechsler et al., 2002).

Including non-drinkers, 33.1% of females and 38.8% of males reported an intended average number of drinks consumed per sitting to be classified into this binge drinking category. Also including non-drinkers, 27.2% of females and 29.0% of males self-reported their average drinking over the two-week study period would be classified as binge drinking using this criterion. Actual binge drinking rates are likely higher because these numbers reflect binge drinking on average, and they are not sensitive to participants who may have only had one night of binge drinking. Thus, they reflect *frequent* binge drinkers as opposed to *occasional* binge drinkers (Wechsler et al., 2002).

Average rates of drinking across all three categories of alcohol consumption also highlight this trend. In terms of both alcohol history and drinking intentions, the average drinker (both male and female) reported reaching or intending to reach binge drinking levels on their average drinking occasion. For female drinkers, the average self-reported number of drinks was 0.34 standard drinks short of reaching binge drinking. Male drinkers' self-reported number of drinks was 0.08 standard drinks short of reaching binge drinking. These numbers are more consistent with binge drinking as a culture, as opposed to a few isolated heavy drinkers.

3.2 - Gender and Drinking Epidemiology

Several analyses were performed to examine potential gender effects. Table 5 can be referenced to see exact differences in all outcome measures as a function of gender. Figure 3 also graphically depicts mean gender differences in these outcome measures. In order to determine the significance of these differences, Hotelling's T^2 was used. Hotelling's T^2 was specifically chosen to allow for all six dependent measures to be examined simultaneously and control for Type I error.

Hotelling's Trace on the grouping variable of gender was found to be statistically significant, $F(6, 284) = 3.182$, $p < 0.01$. This indicated an overall effect of gender for the outcome measures as a set. Individual effects were analyzed using post-hoc t-tests. Using an initial alpha level of 0.10, the Bonferroni method for controlling for Type I error rates created an adjusted critical p-criteria of 0.017. For alcohol history, there were no significant gender differences for average number of drinking occasions ($p > 0.05$), but males reported drinking significantly more alcoholic beverages than females at each of these occasions ($t = -3.97$; $df = 645$), $p < 0.01$.

Similar results were found for drinking intentions as there were no significant gender differences in intended number of drinking occasions ($p > 0.05$), but males reported intending to drink significantly more drinks than females at each of these occasions ($t = -3.99$; $df = 622$), $p < 0.01$. No significant gender differences in self-reported alcohol consumption were found for number of drinking occasions ($p > .05$) or number of drinks consumed per occasions ($p = .03$.) Thus, results indicated minimal gender differences in number of drinking occasions, with the caveat that males typically consume more alcoholic beverages on these occasions.

3.3 - Class Status and Drinking Epidemiology

Table 5 also shows the alcohol consumption outcome measures broken down by class. A one-way multivariate analysis of variance (MANOVA) was performed on the grouping variable of class to examine class differences in alcohol consumption. None of the multivariate statistics (Pillai's Trace, Wilk's Lambda, Hotelling's Trace, or Roy's Largest Root) returned significance, p's > 0.05. Additionally, the one-way ANOVAs on the six outcome measures with class as the grouping variable were non-significant, p's > 0.05. Figures 4 and 5 show class averages broken down further by gender on alcohol history. Figure 4 shows differences in drinking occasions. Figure 5 shows differences in number of drinks consumed at each of these occasions.

3.4 - Measures

Attitudes

Attitudes were measured using both direct and indirect measures. As previously noted, direct measures of attitudes follow a stringent set of preexisting guidelines. This includes one behavioral stem followed by the four scales of harmful-beneficial, good-bad, pleasant(for me)-unpleasant(for me), and worthless-useful. These four direct attitude items were found to be highly reliable (α = .86; Cronbach, 1951). Specific results of the item analysis, including item total statistics, are found in Table 6. These items were also all significantly correlated (r's > 0.35; p's < .01) with all six dependent measures of drinking. Specific item correlations with these dependent measures are depicted in Table 7. The correlations between total score on the scale and these dependent variables are given in Table 8.

The indirect measures of attitudes were developed from the elicitation study. A total of 12 specific constructs related to advantages and disadvantages of drinking were created from this study. Each of these 12 constructs was incorporated into the item set as the likelihood of experiencing each of those outcomes and the desirability of that outcome. Total scores for each construct were determined by multiplying each construct's likelihood and desirability item scores. The scale of 12 items achieved good reliability (α = .75). The specific item analysis results are included in Table 9. While the total score on indirect attitude items significantly correlated with the six alcohol dependent variables (p's < 0.05), there was a wide range in the validity of individual items. Specific correlations between item scores and outcome measures are located in Table 10. The overall scale correlations with the dependent measures are depicted in Table 8.

These results indicate good reliability for both attitude measures and also show validity in predicting drinking outcomes. However, some indirect attitude constructs were much weaker than others in predicting these measures (i.e., "to justify my behavior" and "to fit in").

Subjective Norms

Subjective norms were measured using only direct items. Indirect measures require an elicitation study that investigates relevant referent groups for norm development. However, previous research has adequately addressed this research question. The direct items ask about "important people in general" instead of identifying subgroups. Five items were created to assess direct subjective norms. The first three items asked about perceptions and pressure of "important people in general" towards alcohol consumption. The final two items asked about the average number of drinking occasions and average number of alcoholic beverages consumed per drinking occasion of "important people in general," respectively.

The direct measures of subjective norms showed acceptable, but less than desirable reliability ($\alpha = .68$). Alpha if item deleted statistics did not reveal any items that were particularly detrimental to reliability. The full item analysis results are presented in Table 11. This leaves open the possibility there are multiple dimensions to subjective norms. For example, the *perceptions* of "important people in general" may capture a different type of subjective norm than the *observed behaviors* of these "important people in general."

All five items significantly correlated with all six dependent alcohol measures. Table 12 displays these individual item correlations. The total score on the direct subjective norms scale was also significantly related to all dependent measures. These correlations are presented in Table 8. Thus, this measure had acceptable reliability and was highly related to drinking outcomes.

Perceived Behavioral Control

Perceived behavioral control was assessed using both direct and indirect types of measures. Direct measures ask questions about self-efficacy and controllability. The first four items measured self-efficacy and the last three items measured controllability. Direct PBC had acceptable, but weak reliability ($\alpha = .68$). However, the standardized alpha was marginally stronger ($\alpha = .72$). The item analysis for direct PBC is summarized in Table 13. The individual item correlations with the drinking outcomes measures are reported in Table 14. While Item 4

was counter to the trend, results indicated self-efficacy correlated positively and strongly with drinking rate and controllability was significantly negatively correlated with drinking rates (p's < 0.05).

Indirect PBC items were created from the elicitation study. The goal of the elicitation study was to identify barriers and catalysts that impact an individual's ability to control his or her level of alcohol consumption. The study identified 12 qualifying factors. Each of these factors was separated into two items. The first item asked about the likelihood of experiencing one of these PBC factors. The second item asked how strongly that factor would impact his or her ability to control his or her drinking. A factor score was created by multiplying the scores on each of these items. This scale had acceptable reliability ($\alpha = .78$). The detailed item analysis results are summarized in Table 15. Mixed results occurred for the predictive validity of these item factors. Only Items 1, 3, 9, and 12 were significantly correlated with self-reported drinking. The full list of correlations is available in Table 16. As demonstrated in Table 8, indirect PBC total scores did not correlate significantly with any of the dependent alcohol measures, p's > .05. It should be noted that for purposes of computing a total score, Items 10 (I am in a happy mood when I drink) and 12 (I am in a sad mood when I drink) were excluded from the summation. While both factors emerged from the elicitation study, it was unclear how they fit into the general construct of PBC. Additionally, they seem to measure competing constructs.

Thus, direct PBC was found to be a better predictor of drinking outcomes than the indirect PBC measures developed from the elicitation study. The reliabilities were also considered acceptable for both types of measures. While total scores on indirect PBC were not significant predictors of drinking outcomes, there were several factors within this measure that demonstrated predictive validity.

Motive Items

As per the motive development guidelines previously described, a new motives scale was developed. This scale was coined the Drinking Motive Assessment Tool (DMAT), and consisted of 44 items on three factors of drinking motives: conformity, self-medication, and thrill-seeking. The overall DMAT had a high reliability ($\alpha = .96$). This was also true for the subscales of the DMAT: conformity ($n = 8$; $\alpha = .88$), self-medication ($n = 16$; $\alpha = .91$), and thrill-seeking ($n = 20$; $\alpha = .94$). The complete item analyses for these subscales are given in Tables 17, 18, and 19 respectively.

These subscales were highly related to all dependent measures of alcohol consumption. In fact, each subscale was significantly correlated to all six dependent measures of drinking. The specific correlations can be found in Table 20. The mean rating per item and standard deviations are also broken down by motives subscale in Table 20. As seen in this table, thrill-seeking was the most strongly reported and predictive motive. The bivariate correlations between individual items and all dependent measures are broken down by subscale in Tables 21, 22, and 23, respectively.

Intention Items

Intentions were measured using two items. The first item asked, "How many times do you plan to consume alcohol over the next two weeks?" The second item asked, "On average, how many drinks do you plan to consume at each of these drinking occasions?" These items were significantly correlated, $r = .684$, $p < .05$.

Table 24 shows the specific correlations between the intention items in Phase 1 and self-reported drinking in Phase 2. As can be seen, there is a strong and significant correlation between drinking intentions and self-reported drinking, $r = .760$, $p < .05$. Additionally, the best indicator of self-reported number of drinking occasions was the intended number of drinking occasions. The best predictor of self-reported number of drinks consumed at each occasion was the intended number of drinks consumed. Thus, specific intentions were more accurate in predicting their matched drinking outcome measures than were general drinking intentions.

3.5 - Structural Equation Modeling

Structural Equation Modeling (SEM) offers several advantages to classic OLS regression (Bollen, 1989; Bullock, Harlow, & Mulaik, 1994; Jöreskog & Sörbom, 1989). Primarily, SEM allows for an entire model of multiple independent and dependent variables to be examined simultaneously. This results in a single measure of fit that evaluates the entire set of interrelated research questions. The other primary advantage to SEM is its ability to calculate and account for measurement error. Thus, both the path model and measurement model can be integrated into a single analysis. Specifically, this creates the benefit of including measurement error as an integral part of the model and allows for a factor analysis to be performed on the items in this single procedure.

Selection of Model Indicators

Sample restrictions made it impossible to use all items in the SEM model. Rough guidelines require at least a 10:1 ratio of number of cases to number of free parameters (Kline, 2005). This limits the number of indicators (items) that can be assigned to each latent construct. However, the "two indicator rule" is also a widely-used convention (Bollen, 1989). This means at least two indicators should be provided for each construct. As a rule of thumb, Kline (2005) notes, "models with factors that have only two indicators are more prone to estimation problems…a minimum of three indicators per factor is recommended (p. 172)." Thus, the number of indicators for each construct needs to be sufficiently large to allow for proper estimation, but not too large to ruin the interpretability based on sample size. Accordingly, between two and five indicators were chosen for each latent construct.

Within the above constraints, several procedures were used to limit the number of indicators per construct where necessary. First, if a construct had less than five items, all items were retained as indicators for that construct. This was the case for drinking and intentions. Motives were broken down into three subconstructs (i.e., conformity, self-medication, and thrill-seeking) so each of these constructs was kept as an indicator. Second, if multiple types of items (e.g., direct versus indirect) were used for a construct, both types of items were considered for inclusion. This applied for both attitudes and subjective norms. However, indirect measures of PBC were not used because of the poor reliability and predictive validity of those items. Third, selected items had a significant bivariate relationship with the dependent measures of self-reported alcohol consumption. Fourth, the normality properties of each item were considered. If possible, items had a z-score between ± 2 for both kurtosis and skewness. Approximately, half of the items met these criteria.

Missing Data

Using the method of Dempster, Laird, and Rubin (1977), an EM Algorithm was used to compute missing data for all independent items. This was done using PRELIS 2.70, a subset of the LISREL package. This method for dealing with missing data has been shown to be superior and recommended over both listwise and pairwise deletion (Byrne, 2001; Gold & Bentler, 2000; McDonald & Ho, 2002). Even when considering sample size, proportion of missing data, and distributional characteristics, the EM Algorithm has been shown to outperform all other missing data procedures (Gold & Bentler, 2000).

Overall, 2.34% of the data was missing from the original sample. The initial sample size was 653. Data were imputed using the EM Algorithm for all independent variables, but not for the dependent measures of alcohol consumption. In total, 89 different missing-value patterns were created and the EM-algorithm converged in 11 iterations. Participants who did not answer either of the dependent measures were excluded from the analysis. This resulted in a final sample size of 308.

Model Evaluation

Model fit and the statistics used to evaluate the goodness or badness of this fit are largely inconsistent and open to interpretation across research studies (McDonald & Ho, 2002). In fact, many different fit indices exist with contended interpretations and critical cutoff values (Gerbing & Anderson, 1993; Jöreskog, 1993; Marsh, Balla, & McDonald, 1988; Mulaik et al., 1989; Tanaka, 1993). In order to capture the variety of ways global model fit is measured, a variety of statistics are used for SEM analyses (Bentler, 2007). In most cases, the cutoff criteria of Kline (2005) were used for interpretation of the results.

The most commonly used measure of fit is the χ^2 test. In this test, a non-significant χ^2 represents good model fit. However, the χ^2 test is highly susceptible to being significant as a function of sample size (Baumgartner & Homburg, 1996; Bentler, 2007; Hu, Bentler, & Kano, 1992; Markland, 2007; McDonald & Ho, 2002). Given a sample size over 250, it is possible a significant χ^2 would suggest rejecting a good fitting model. Thus, several other indices were used to assess this fit.

An additional test of model fit selected for this research is the root mean squared error of approximation (RMSEA) put forward by Steiger (1989) and Steiger (1990). Consistent with the literature, a cutoff of 0.08 was established as acceptable for RMSEA (Browne & Cudeck, 1993; Kline, 2005). The other indices included the comparative fit index (CFI; Bentler, 1990), the goodness-of-fit index (GFI; Jöreskog & Sörbom, 1989), and Tucker-Lewis Index (TLI; Tucker & Lewis, 1973). The cutoff values for these indices were established at 0.90 (Kline, 2005). The final measure of model fit is the chi square to degrees of freedom ratio (χ^2/df). A ratio below 3.0 is considered acceptable (Kline, 2005).

After examining global fit, individual parameters were examined. In the measurement model, the parameters between indicators (items) and their latent variables indicates how well each item represents the particular construct. In the structural models, the contribution of each

latent variable (i.e., attitudes, subjective norms, PBC, motives, and intentions) to drinking was assessed to determine each latent variable's role in predicting drinking behavior.

This analysis started with the measurement model. This model is a way of examining how well each of the constructs is measured. This model needs to exhibit high model fit to demonstrate the constructs are measured properly. The proposed model (the inclusion of motives) was then compared to the measurement model using a χ^2 difference test. This determined if the theoretical model is a viable model to explain the theoretical placement of the variables.

The above theoretical model was then compared to the model without motives. While a χ^2 difference test cannot be used to determine which model better fits the data because the models are not nested, two comparisons were made. First, using the methodology of Stevens (2009), the individual paths were examined to assess each model. Specifically, if the motive path is significant, this will indicate that it adds significantly to the model. This includes examining the standardized direct and indirect effects of motives on measures of intentions and self-reported drinking. Second, the R^2 difference between each model in predicting intentions and drinking was examined.

Finally, alternative models were examined. These models involved changing the latent variables so they interacted in novel ways. These models were constructed to see if there are viable alternative models to fit the data.

General Model Details

All models were run using AMOS 16.0. The final items used in the model, their correlation matrix, means, and standard deviations are all given in Table 25. The parameters between each latent variable and its first indicator were set to "1" for the procedure. Errors were allowed to freely vary. Error terms were allowed to correlate in the case the root of each item was identical. This is a largely accepted procedure in handling items that are similarly worded. The iterative procedure of Maximum Likelihood Estimation was used for all models.

Measurement Model

Results of the measurement model are presented in Figure 6. The overall model was statistically significant, χ^2 (126, N= 308) = 292.57, $p < .01$. However, other fit indices indicated reasonable fit: CFI = .95, GFI = .91, TLI = .93. The chi-square to degrees of freedom ratio was 2.32. The RMSEA was .066 with a 90% confidence interval (C.I.) of .056 and .075.

Importantly, all item loadings were statistically significant, $p < .01$. This indicates the items were measuring their respective constructs. Consistent with the theory and prior results (Hutching, Lac, & LaBrie, 2008), the constructs were all found to be significantly interrelated, p's < .01. The highest correlation was between intentions and drinking behaviors (r =. 92, p <.01). The lowest correlation was between PBC and drinking motives (r = .35, p <.01).

Proposed Model

The results of the proposed model are presented in Figure 7. This model allowed attitudes, subjective norms, PBC, and motives to freely correlate as they serve as predictors of drinking intentions. Drinking intentions then predict drinking behavior. The overall model was significant, χ^2 (130, N = 308) = 293.67, $p < .01$. The degrees of freedom ratio was 2.26. The model demonstrated good fit: CFI = .95, GFI = .91, and TLI = .93. The RMSEA was .064 with a 90% C.I. of .054 and .074.

All correlations between attitudes, subjective norms, PBC, and drinking motives were significant, p's < .05. It was found that attitudes (β = .228, $p < .01$), subjective norms (β = .487, $p < .01$), and drinking motives (β = .272, $p < .01$) significantly predicted intentions. Perceived behavioral control was not a significant predictor of intentions (β = -.003, p >.05). Drinking intentions were also a significant predictor of drinking behavior (β = .910, p <.01). The standardized indirect effects of each indicator on drinking were as follows: motive = .248, attitudes = .208, subjective norms = .444, and PBC = -.002. The estimated squared multiple correlation was .71 for intentions and .83 for drinking.

Since the measurement model and proposed model are considered nested models, a Chi-Square difference test can be used to determine if the proposed model is statistically superior to the measurement model. This is a critical step in demonstrating the appropriateness of a structural model over the simple measurement model. The χ^2 difference between the measurement model (293.667, df= 130) and the theoretical model (292.568, df =126) was 1.099 with a difference of four degrees of freedom. Since this is less than the critical value of 9.49, the proposed model is statistically superior since it has a greater number of degrees of freedom. This offers support for the structural component of TPB with the inclusion of motives.

Results for the original TPB (without motives) are presented in Figure 8. The overall TPB model was statistically significant, χ^2 (88, N = 308) = 190.08, $p < .01$. The degrees of freedom ratio was 2.16. The model demonstrated good fit: CFI = .96, GFI = .93, and TLI = .94.

The RMSEA was .061 with a 90% C.I. of .049 and .073. Consistent with TRA, not TPB, attitudes ($\beta = .365$, $p < .01$) and subjective norms ($\beta = .568$, $p < .01$) were significant predictors of intentions, but PBC ($\beta = -.019$, $p > .05$) was not a significant predictor. Intentions significantly predicted drinking ($\beta = .913$, $p < .01$). The following standardized indirect effects on drinking were observed: attitudes = .333, subjective norms = .519, and PBC = -.017. There was an estimated squared multiple correlation of .68 for intentions and .83 for drinking.

Since the original TPB model does not include motives, it cannot be considered to be nested with the theorized model. Thus, a χ^2 difference test is not applicable. Stephens' (2009) criteria of looking at path coefficients is the first method used to evaluate across models. Since drinking motives has a significant path coefficient to intentions ($\beta = .272$, $p < .01$), this indicates that drinking motives adds significantly to the overall model. Additionally, while adding motives to the TPB model did not add significantly to the estimated multiple correlation for drinking, it added an additional three percent of the variance in drinking intentions. This finding, paired with the previous findings from the stepwise regressions, indicates the inclusion of drinking motives adds to the predictive validity of TPB for self-reported drinking.

Alternative Models

Two *a priori* alternative models were hypothesized. Both of these models examined alternative ways motives could be incorporated into the TPB structure. The results for the first model are presented in Figure 9. This model, termed "Alternative Model A," allowed attitudes, subjective norms, and PBC to freely correlate and predict drinking motives. Drinking motives then predicted drinking intentions, which then predicted drinking. Essentially, this would place motives as a mediator between the classic determinants of intentions (i.e., attitudes, PBC, & subjective norms) and intentions.

Alternative Model A was statistically significant, χ^2 (133, N= 308) = 365.7, $p < .01$. The other global fit indices indicated moderate to poor fit: CFI = .93, GFI = .89, and TLI = .91. The RMSEA was .075 with a 90% C.I. of .066 and .085. Alternative Model A can be considered a nested model with the proposed model allowing for a χ^2 difference test. It was found that Alternative Model A fit the data significantly worse than the proposed model with a χ^2 difference of (365.732 - 293.667) 72.065 which exceeded the critical value of 7.82 for a df difference of (133-130) three.

The results of a second alternative model, termed "Alternative Model B," are located in Figure 10. This model allowed attitudes, subjective norms, and PBC to freely correlate and predict both drinking motives and drinking intentions. Self-reported drinking was then predicted by both drinking motives and drinking intentions. Alternative Model B was statistically significant, χ^2 (130, N= 308) = 311.68, $p < .01$. The other indices indicated moderate fit: CFI = .95, GFI = .90, and TLI = .93. The RMSEA was .067 with a 90% C.I. of .058 and .077.

Alternative Model B can be considered a nested model with the proposed model allowing an examination of the χ^2 difference. With the same degrees of freedom and a lower χ^2, the proposed model fit the data better statistically than Alternative Model B. Furthermore, the path from drinking motives to self-reported drinking was non-significant ($\beta = -.01$), $p > .05$. This is a strong sign of model misfit for Alternative Model B.

Both modification indices and theory offered little room for additional alternative models. The best fitting model using χ^2 difference tests remained the proposed model. This model not only had the best overall model fit, but was the most interpretable considering the individual parameter estimates.

4.0 - Discussion

4.1 - Overall Epidemiology

Several epidemiological and theoretical results emerged from the present research. The most troubling of these results is the excessive rate of average alcohol consumption. In terms of both alcohol history and future drinking intentions, average alcohol consumption was reported at binge-drinking levels for both males and females. While these high rates of consumption are troubling, they emulate results from field studies in the same geographic setting (Smith, Schry, & Geller, 2010). Specifically, Figure 11 shows a scatterplot of BACs collected on over 1,200 passerbys in a downtown setting at Virginia Tech. All BACs were collected on Thursday and Friday nights between 10:00 pm and 2:00 am. Similar to the binge-drinking rates self-reported in this study, 62.2% of participants measured downtown had a BAC over 0.08 mL/L (Smith, Schry, & Geller, 2010).

The results of this study are concerning for a variety of reasons. First, the findings are consistent with a binge-drinking culture as opposed to a few isolated binge drinkers. Thus, as reported in Smith, Schry, and Geller (2010), sites of drinking are not marked by a few highly

intoxicated individuals, but, in fact, any given drinker is more likely than not to be legally intoxicated.

Second, the results indicate drinkers are not simply reaching binge drinking levels, but intending to reach these extreme levels of intoxication. Third, individuals seem to not only plan isolated binge drinking occasions, but make binge drinking their normal plan. The culmination of this set of findings points to college as a hazardous environment that fosters a variety of high-risk behaviors with potentially devastating consequences. This reflects the need for theory-driven research to address the continuing problem of college drinking.

Gender Differences

A variety of findings also emerged in relation to gender and class effects. Contrary to many college drinking myths based on older research, females in this sample consumed alcohol as frequently as their male counterparts. However, while females did consume fewer alcohol beverages per occasion, their drinking was just as likely to be reported at binge-drinking levels for their respective gender. Thus, these levels of drinking are just as likely to produce the negative alcohol-related outcomes that males would experience, albeit at a slightly lower number of drinks (Wechsler, Dowdall, Davenport, & Rimm, 1995). These findings are consistent with more recent research that indicates similar rates of drinking for males and females (Smith, Schry, & Geller, 2010).

Class Status Differences

In terms of class status, no significant differences in drinking patterns emerged among drinkers. Unfortunately, this means students were drinking at very high rates regardless of their year in school. However, while the rates of usage among drinkers were relatively constant across class status, the percentage of non-drinkers decreased systematically as class status moved from freshmen to seniors. While 28.1% of freshmen were self-reported non-drinkers this changed to 20.5% for sophomores, 14.2% for juniors, and 8.2% for seniors. Despite drinkers looking similar across class in college, the percentage of these drinkers changed somewhat drastically. When developing interventions across these populations, it should be salient that there are more than three times as many freshmen non-drinkers as senior non-drinkers.

4.2 - Incorporation of Motives into TPB

Original TPB Model versus TRA

In addition to this epidemiological assessment, a theoretical framework for understanding this complex problem was proposed and supported. Both the original TPB, in addition to TPB with the added construct of motives, had strong empirical support. However, while attitudes and subjective norms were significant predictors of drinking intentions, which, in turn, significantly predicted self-reported drinking, PBC was in no way significant. This indicates support for TRA, which does not include PBC as a construct in its model. Other studies with alcohol consumption as a dependent variable have also found non-significant results for PBC (e.g., Hutching, Lac, & LaBrie, 2008). The lack of significance for PBC is quite possibly due to widespread ease of access to alcohol (Johnston, O'Malley, Bachman, & Schulenberg, 2008) and acceptance by many student drinkers that they do not have or need control over their level of intoxication. Thus, a lack of behavioral control not only fails to be an inhibitor of the drinking, but is often a desired characteristic of drinking.

Another potential reason for the lack of significance of PBC comes from social learning theory (Bandura, 1977a, 1977b, 1980, 1982). In social learning theory, Bandura outlines the relationship between the two constructs of outcome expectation (i.e., attitudes) and self-efficacy (a prominent subcomponent of PBC). However, a host of research has demonstrated that outcome expectancy causally influences self-efficacy judgments (Borkovec, 1978; Corcoran, 1991, 1995; Eastman & Marzillier, 1984; Kazdin, 1978; Kirsch, 1982, 1985, 1986, 1995; Teasdale, 1978; Williams, 2010; Wolpe, 1978). Thus, using TPB terminology, this field of research suggests that attitudes are causally linked to PBC. It is then expected that PBC would not necessarily have a unique contribution above and beyond that of attitudes in predicting behavioral intentions.

Support for Inclusion of Drinking Motives

Across a variety of analyses, the construct of drinking motives was demonstrated to add significantly to TPB. In the analyses it was found that motives were specifically useful in predicting the number of drinks consumed per occasion. Thus, there is strong theoretical and empirical support for incorporating motives into TPB. Furthermore, theoretical consequences emerge from these results.

Drinking motives are frequently used to investigate rates of alcohol consumption. However, these motives often studied in isolation of other relevant constructs and without a broader theoretical framework. Kuntsche and colleagues (2005) identified nearly 75 studies that examined drinking motives. In these studies, drinking motives are linked to academic performance, social relations, law abiding behavior, and alcohol abuse and dependence (Kuntsche, Knibbe, Gmel, & Engels, 2005).

Drinking motives have also been given enough prominence that behavioral psychologists Cox and Klinger (1988) claim, "The final common pathway to alcohol use is motivational (p. 168)." Yet, while drinking motivation has rightly earned prominence as a viable construct in predicting alcohol consumption, it lacks broader theoretical incorporation. Since motives are a conceptually distinct construct from the existing TPB constructs, and there is strong theoretical fit between these constructs, a broader theory incorporating all of these constructs becomes plausible and desirable. This is particularly true in a behavioral psychology framework.

4.3 - Towards a Modified TPB Framework

This proposed behavioral framework would incorporate the constructs of attitudes, subjective norms, and motives. As discussed earlier, attitudes and expectancies can be considered synonymous. Thus, a measure of attitudes would examine the rewards and penalties that are anticipated for a given behavior. Motives would be the particular set of reasons for engaging in a behavior. This not only relates to both the desirability or avoidance of particular expectancies, but also environmental factors that produce certain drives in an organism. Finally, subjective norms can be considered the "human environment." Measures of subjective norms serve as a proxy for the human or social contingencies an organism will experience. In relation to alcohol consumption, subjective norms may reflect how much "relevant others" will drink and the amount of peer pressure friends apply. In this theoretical framework, this relates to reward and penalty systems for achieving a particular range of alcohol consumption that is consistent with peers. These constructs of subjective norms, attitudes, and motives would then produce intentions to engage in a particular behavior. These intentions would produce the behavior.

4.4 - Practical Implications of the Proposed Theory

Benefits of Including Motives

In addition to theoretical implications, there are also practical benefits for incorporating motives into the TPB framework. One of the primary critiques of TPB has been that it does not

explain behavior change or potential areas for helpful intervention approaches (Sharma, 2007). Motivation, particularly for substance-abuse interventions, is widely used to facilitate healthier behaviors among individuals. In fact, Motivational Interviewing and Motivational Therapy are prominent approaches to creating behavior change (Miller & Rollnick, 2002; Rollnick & Miller, 1995).

Not only do these approaches rely on the importance of motivation as a general construct, but also they are also linked to the notion that drinkers who subscribe to different motives will develop very different patterns of drinking behavior. As one example, Kuntsche and colleagues (2005) provide the following summary of the work of Cooper et al. (1995) and Kassel et al. (2000) "Drinking to cope was found to be associated not only with heavy drinking, but also with alcohol-related problems in particular. It is argued that, while effective in short term, drinking to cope as a way to compensate for deficits in problem-focused coping leads to adverse long-term consequences because the discrepancies that foster negative affects (sic) have never been adequately addressed (p. 855)." Thus, not only can motives become a source of intervention, but also they can also be used to more narrowly address the future consequences a particular individual may experience.

Cox and Klinger (1988) offer a simple exemplar of a motivational approach to an alcohol abuse intervention. They write of their program:

> Our technique focuses on alcoholics' nonchemical incentives, aiming to help them find meaningful sources of satisfaction and to rid themselves of sources of frustration. The technique consists of two major parts. First, we carefully assess the alcoholic's motivational structure (the goals that are the compelling forces in his or her life), in order to identify points for intervention. Second, we undertake a multicomponent counseling procedure to modify the alcoholic's motivational structure, helping him or her to develop a meaningful life without alcohol. (p. 176).

In addition to the method of Cox and Klinger, all of the above therapies and interventions fit nicely into the behavioral framework posited by the new theory, proposed here, which incorporates motives as a TPB construct. As mentioned in the discussion above, motives in this framework can be thought of as capturing the particular consequences an individual desires to gain or avoid as reasons for engaging in a particular behavior. This also must then correspond to

environmental deficits that create a need for alcohol to fulfill these larger motivational needs. Thus, by identifying the particular motives for an individual to use or abuse alcohol, sites of environmental deficits can also be identified for use in behavioral interventions.

Further Implications of the Proposed Theory

While motives have clear implications for interventions, so do the other constructs within the proposed theoretical framework of TPB. In fact, many interventions can be seen as targeting both attitudes and subjective norms. Attitudes are primarily targeted through alcohol education. This is an approach that tries to modify outcome expectancies and relates strongly to social learning theory (Bandura 1977a, 1977b, 1980, 1982; Solomon & Annis, 1989). This may take on the form of demonstrating how alcohol use in moderation maximizes the positive consequences of drinking or how alcohol abuse and misuse maximizes and creates adverse consequences. Social norms interventions are also quite popular. These types of interventions are designed to target the discrepancy between perceived higher rates of alcohol consumption and the often lower actual rates of consumption.

In 2002, The Taskforce of the National Advisory Council on Alcohol Abuse and Alcoholism, charged by NIH and NIAAA, produced a comprehensive report on college alcohol consumption entitled, "A Call to Action: Changing the Culture of Drinking at U.S. Colleges (NIAAA, 2002)." In this report, three "Tier 1" strategies were recommended. To achieve Tier 1 classification, a recommendation needed empirical support and past success among the college population. These three strategies were reported as follows:

- **Strategy 1**: Combining cognitive-behavioral skills with norms clarification and motivational enhancement interventions.
- **Strategy 2**: Offering brief motivational enhancement interventions.
- **Strategy 3**: Challenging alcohol expectancies. (p. 16-17).

It is perhaps not a coincidence these strategies happen to reflect subjective norms, motives, and attitudes, respectively. While these interventions and strategies reflect constructs that are meaningful and effective (i.e., attitudes, subjective norms, and motives), they lack a theoretical perspective to explain and unite these constructs. The proposed framework derived from this research achieves this precise objective.

4.5 - Recommendations for Usage of Proposed TPB Instruments

In addition to the theoretical implications, there are also several important psychometric advancements put forth by the research. In this research, a comprehensive measure of attitudes, PBC, subjective norms, and motives was created. These measures demonstrated strong reliability and validity. This is highly important in TPB research because questions need to be specifically tailored to the behavior, setting, and population in question. Thus, the instrument created by this research could be used across other studies concerned with college alcohol abuse or related interventions.

In relation to the psychometric properties of the items, it is important to consider that most constructs were measured using two types of items: direct and indirect. Both types of measures demonstrated similar predictive validity. Accordingly, several recommendations can be gleaned from this research in selecting which types of items to use for future studies. This choice would be largely defined by both research objective and space constraints for a particular questionnaire. Clearly, to maximize the number of ways and depth to which a construct is measured, it is preferable to ask both types of items. However, this is not always plausible because of practical research constraints.

It is recommended that direct items be used when there is a space constraint and when dealing with the constructs at a broad level. The direct measures contained less than half the items used by the indirect measures. Direct items also performed at least as well as the indirect measures for this population. However, the benefit to the indirect items is they probe more deeply into the construct. For example, instead of simply measuring if attitudes towards a behavior are "good versus bad," one would measure a specific attitude. Knowing the results for a specific attitude gives greater insight into the construct and helps identify sources for community, environmental, and individual interventions. Thus, it is recommended indirect items be used when space allows, when the research question demands more than construct-level knowledge, and when the measures are being used for interventions.

4.6 - Study Limitations

There were several limitations to this research. The largest limitation is that actual behavior was not measured in this study. While self-report is highly related to behavior, an actual behavioral measure or indicator would have added significantly to the research. In addition to regular memory constraints with recalling behavior, alcohol usage produces

physiological effects that further complicate recall about exact alcohol-related behavior. Another limitation is that only one school was used for this study. Schools with different demographics and other characteristics may produce different findings.

A third primary limitation was the high dropout rate. Since there was no financial incentive to participate in both phases and partial extra credit was awarded for participation in only Phase I, many individuals chose to discontinue their participation. While individuals who dropped out of the study were statistically similar to those who remained in terms of alcohol history, it is impossible to determine if other systematic characteristics were related to dropping out. This would make the results less generalizable to the full population of college students.

Finally, it should be noted that non-drinkers were included in the SEM analyses. It is anticipated that the pattern of responses for drinkers and non-drinkers are very different. It is possible some of the variance seen in the SEM model is driven by the pattern of differences between drinkers and non-drinkers.

4.7 - Future Research

Future research could address all of the above limitations. A next step would be to take the survey to other colleges and universities across the country. It would be beneficial to include a financial incentive for participation in both phases to minimize the dropout rate. Although more challenging, a better next step would be take this research directly to the field and better assess actual behavior. This would likely take the form of administering breathalyzers to participants. If possible, these participants would take Phase I, the measure of attitudes, PBC, subjective norms, and motives, prior to consuming alcohol. That way the theoretical framework of TPB and motives could be used to predict BAL. A less desirable approach would be to give the TPB survey while people are drinking and investigate the relationship between those responses and their current BAL. Either approach would greatly benefit from achieving a much closer approximation of behavior than self-report.

5.0 - Conclusion

In conclusion, this research not only addressed many of the concerns put forward about TPB, but was unique in several other ways. First, this study created a psychometrically sound measure of TPB and motives. It did this by not only creating direct measures of the constructs, but indirect measures through an elicitation study. These indirect, more specific, items have been shown to be more meaningful at predicting behavior (Ajzen & Fishbein, 1973; Brown,

Christiansen, & Goldman, 1987; Fromme, Stroot, & Kaplan, 1993; Kuther, 2002). Second, this is one of only a handful of studies that investigated drinking motives using both a pre and post-test (Kuntsche, Knibbe, Gmel, & Engels, 2005). Third, it created a new TPB framework that predicted alcohol consumption significantly better than the classic TRA or TPB. Fourth, it created clear and identifiable areas for interventions.

This study and others have shed light on the dangerous rates of alcohol consumption among college students. Theory-driven research is paramount to finding solutions to this and other problems across society. This research provides one theoretical solution for addressing these problems. By incorporating TPB and motives, two previously isolated, yet empirically demonstrated psychological entities, into a behavioral theoretical framework, there is hope that positive change can be accomplished. Each and every day, approximately five students lose their lives as a consequence of alcohol consumption. Many more face lesser negative consequences. Through a focus on TPB and motives it is plausible some of these tremendous consequences may be averted.

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Table 1: What are the Advantages of Consuming Alcohol at a Party?

Sub	1	2	3	4	All others:
1	Social lubrication				
2					
3	I become more sociable.	My inhibitions go away.	I like the feeling of being buzzed.	It makes me a better dancer.	
4	Bond more with the people around you	More interesting things can happen than when you're sober	More openness	Have an excuse to be silly and laugh	
5	have more fun at the party	fit in with everyone else	be more social	taste new drinks	
6	I do not personally feel there are any advantages of consuming alcohol period. I do not drink alcohol. I have never been drunk. I have been tipsy before, but I do not understand the attraction of feeling/being drunk and probably never will.				
7	To have more fun	To be more sociable	It's easier to meet more people		
8	Become more relaxed	Have a good time	It livens up a party	Easier to meet people	
9	Friendler, more social environment	More fun to drink at a party than not drinking	Increased sociability makes it easier to meet new people	Funny things happen when people drink	
10	have fun	fit in	make new friends	relax after a long week	
11	You blend in with everyone else.	You can participate in games involving drinking alcohol.	You can try different drinks or ways of drinking.	Drinking at a party is cheaper usually than drinking at a restaurant or bar.	
12	to fit in	meet people			
13	breaks the ice	stress reliever	pass time	theme	
14	socialize with other drinkers				
15	lowers inhibitions.	makes it easier to get to know others.	all around makes the night more fun.	makes the party more of a celebration.	bonding with friends, makes one more outgoing
16	more fun	loosen up			
17	You think ugly chicks aren't that ugly and you want to bang them	You don't give a shit about anything	You get this happy dizzy feeling	You love everyone and are generally happy	
18	more relaxed state	social opportunities with friends	do something different	social norm of acceptability (comments and actions) changes to allow for worse	
19	Have fun	More sociable	Meet new people		
20	To make you	To make you relax and			

	more sociable	let you enjoy the party		
21	I feel relaxed	I feel more confident about talking to people	Even though it doesn't make me dance better, I at least feel like I'm a better dancer	
22	it can increase the level of enjoyment and fun to be had			
23	social lubricant	less awkwardness	have a fun time	see different sides of people
24	becomes easier to interact with others	can forget about other problems at the time	can relax and have more fun at the party	
25	Being a part of the group.	Getting the "buzz".	Relixing after a busy week.	Being more social because your inhibitions are lower.
26				
27	social lubrication	Uninhibited		

Table 2: What are the Disadvantages of Consuming Alcohol at a Party?

Sub	1	2	3	4	All others:
1	Lowers inhibitions	Hangovers	Affects decision-making	Portrays people in a negative manner	
2					
3	Sometimes I forget what happens and it's scary.	Sometimes I make decisions that I would not normally make and it's scary.	Sometimes I come very close to getting in a lot of trouble and it's scary.	Beer goggles blind. As in I think someone is super cute and then when I' m sober I realize I was horribly mistaken. Because I was so intoxicated.	
4	Hungover	Possibility of making bad decisions	Emotions less stable	Looking like a hott mess..embarrassing	More apt to taking things the wrong way
5	make a fool of yourself	no way of getting home	can get in trouble later if cops catch you	negative bodily consequences (vomiting, hangover, etc)	
6	Impaired decision making	Say things you may regret			
7	Risk of getting in trouble	Drinking too much	Hangover the next day		
8	The next morning - hangover, unproductive	Embarrassing yourself	Regretable decisions	The long term effects alcohol has	
9	Getting sick or injured if you drink too much	Things get damaged or broken	People make stupid mistakes when drunk		
10	get too drunk/make a fool of yourself	transportation issues	be taken advantage of	suddenly in a situation you can't control	have to depend on other people you don't trust (if too drunk)
11	Mixed drinks have an unknown amount of alcohol in them.	Activities and socializing make it hard to keep track of how much you are drinking.	You are not drinking at your own place, so you have to know a safe way home.	Drinking may lead you to do things you normally wouldn't around the people present at the party.	
12	making bad decisions				
13	inebriation	Vomiting	violence	sexual experiences	
14	potential hangover				
15	theres always the issue of how to get home.	hangover the next morning	can lead one to take unsafe risks, ie. unprotected	can lead to altercations, fighting	hazy memory, always the possibility of making a fool out of

			sex, drunk driving		oneself.
16	possible risks	not knowing how much alcohol is in juice			
17	You think ugly chicks aren't that ugly and you want to bang them	You don't give a shit about anything	Your senses are extremely impaired	Your motor functions are also impaired	
18	physical consequences (hangover, tiredness, weight)	poor decision making	wasting valuable time that could be put to better use		
19	Losing control	Feeling sick or hungover the next morning	Loss of memory	Taking risks you wouldn't normally take	
20	The chance of consuming too much	Having judgements impaired which can lead to bad outcomes.	Doing things you would normally not do.		
21	People coule take advantage of you	Could beomce hung over	The next day is spent sleeping, not being productive	Could get myself in trouble with the law	
22	difficulty finding a ride home	you can get sick from too much			
23	hangover	forget things	say things that you wouldn't normally say	do things that you wouldn't normally do	see different sides of people
24	possibility of drinking too much	decreased inhibitions	possibility of getting into a fight or being taken advantage of		
25	Dulled Senses.	Loss of concentration.	Unable to express yourself correctly.	The possibility of doing things you might regret.	
26					
27	Higher probability of risky behavior	Uninhibited	loss of brain cells and healthier state of being		

Table 3: What Factors or Circumstances Make it Difficult to Accurately Determine Your Level of Intoxication?

Sub	1	2	3	4	All others:
1	Drinking alcohol at a fast rate	Playing drinking games	Being around others who are consuming large amounts of alcohol	Drinking hard liquor, such as jungle juice	Pre-gaming before parties
2					
3	All the commotion at the party rattles your perceptions and senses so much that you can't tell if you're drunk or just overwhelmed.	Everyone else is getting drunk too so you can't compare your behavior to other people.	Sometimes you don't know exaaactly what you're drinking and it might all hit you at once.	My friends always tell me I'm fine and to keep drinking. And I usually believe them.	
4	Actually being highly intoxicated	Not knowing how much alcohol is in your drink	Playing drinking games or chugging many times	Drinking different sorts of things	
5	time between drinking and feeling effects (~15 mins)	drinks like jungle juice - unknown amount of alcohol	oversized glasses	not knowing how much a serving of liquor/beer/ wine really is	gauging how drunk you are by how drunk your friends are - sometimes
6	Socializing while drinking				
7	When drinks are made for me (jungle juice)	Drinks used out of a pitcher for drinking games	Becoming too drunk to remember		
8	What I feel my tolerance is, is different from what it actually is	I won't feel the immediate effect after a drink			
9	Alcohol level of drinks consumed	Delay between consuming drink and feeling its effects	Difficulty keeping track of the number of drinks consumed		
10	fluctuating tolerance level	different effects from differnent	not paying attention to your consumption	blacking out	

		types of alcohol			
11	Drinking games in which you are drinking a small amount often.	Not knowing the alcohol content of mixed drinks or bucket drinks.	Socializing and other distractions make you lose track of the amount you are drinking.	Pre-gaming, or drinking before doing out, makes it harder to tell how drunk you are later in the night.	
12	not knowing the amount of alcohol in a drink, such as jungle juice				
13	cannot probably measure what your consuming	may not be aware what your consuming	can forget how much you have been drinking	there's no way to know when you've had just enough or too much other than vomiting	
14	different kinds of drinks	drinking over an extended period of time	drinking games		
15	location whether its bar, home or party. It is easier to determine how many drinks I have had at a bar, because I'm thinking about my tab. Also, If its a new location I tend to drink more, making it harder to determine how intoxicated I actually am.	People, if I'm with my family or non drinking friends, I am usually more aware of my intoxication	Events, I tend to get drunker at shows or clubs. Dancing especially leads me to drink more because I want to feel more comfortable.	If I playing a drinking game like beer pong or card drinking game it is harder to know intoxicated I am.	Shooters, jungle juice, keg beer and mixed drinks also make it hard for me to keep track of how much drinks I have had.
16	people always refilling your cup	playing a game	drinking too fast		
17	Weight and tolerance	You don't know what proof all the drinks are	Past experience with alcohol	Juice and mixed drinks	
18	others providing feedback that are just as intoxicated	tiredness (on weekends from long week) is overly attributed for feelings as opposed to the reality (of intoxication)			
19	Friends				
20	Not knowing how many drinks you've consumed.	Being around people who are also intoxicated			
21	Not knowing how much alcohol is in the jungle juice	If my friends are drunk too, they aren't good judges of	Sometimes I can't tell if I'm really hyper or just drunk		

		how drunk I am		
22	**unknown amount of alcohol in a drink, jungle juice, gin bucket, etc**			
23	easy to forget the amount of drink you consume	consume more than you think during drinking games	easy to be a 'follower'	
24	different drinks affect you at different rates	playing drinking games	not caring and not paying attention to the number of drinks consumed	
25	Everyone is the same way.	Having no real tasks to do.	Having no real or stimulation conversation.	Thinking you can or can't drive.
26				
27	One may not know how efficiently their metabolism is working at the time.	One may not know the amount of alcohol that is in each consumed drink		

Table 4: What Factors or Circumstances Enable you to Accurately Gauge Your Level of Intoxication While Drinking?

Sub	1	2	3	4	All others:
1	Impaired senses	Reactions from others			
2					
3	When the room starts spinning I should probably find a bathroom because I'm gonna vom.	I can notice easily when I start slurring my words.	I get very clumsy when I'm drunk and start tripping or having trouble walking. It's very noticable to me.	I talk A LOT. I talk so much that I'm thirsty again so I keep drinking.	
4	Making your own drinks	Drinking less over a long period of time	Knowing your limits from prior experiences	Breathalyzer	
5	counting drinks you've had	gauging how drunk you are by how drunk your friends are – sometimes	taking a breathalyzer test	taking a few minutes alone to clear your head	
6	I do not drink.				
7	Keeping track of cans or bottles	Make my own drinks	Use my own drinks for drinking games rather than "community" pitchers		
8	Fuzziness	Clumsiness	Feel more outgoing than normal		
9	Using a system to track how many drinks you've had	Having a sober person around to tell you you're drunk	Setting a drink limit at the beginning of the night	Being conscious of the situation (what/when you've eaten that day, how quickly you're consuming drinks, etc.)	Using a breathalyzer!
10	arm tally of drinks consumed	motor skills	having trouble conversing normally	setting a limit for yourself	
11	Mixing your own drinks.	Drinking more slowly and being aware of how you feel over time.	Keeping track of the amount that you are drinking (number of cups, cans, etc)	Only allowing yourself to drink a certain amount regardless of pressure from others (only keeping and drinking one cup throughout the night)	
12	knowing your tolerance level	knowing exactly how many drinks you've had			
13	if your at a bar	Breathalyzer	balance	senses (how warm or cold I think I am)	
14	taking shots	drinking slowly			
15	Being at the bar, where I have to pay for each	If I have close friends around, I am	If I have to drive home I am better at keeping track of	If i am drinking beer, canned or bottles, I am	If I know I have to be somewhere the next morning,

	drink helps me keep track of my intoxication.	more likely to ask them if how drunk I appear.	my intoxication.	better at gauging my intoxication.	I will be better at gauging my intoxication.
16	drinking slowly	looking at others around you	what friends say		
17	Weight and tolerance	Pouring your own beer or shots makes it easier	Past experience with alcohol	How much you want to bone fat chicks	
18	completely subjective (can I walk well?, am I spinning?, am I doing silly things?)	sober friends who determine intoxication level			
19	Experience	Knowing your limit	Not mixing types of alcohol		
20	Walking around and trying to use motor skills.				
21	How dizzy I am	How I am acting towards to opposite sex	If my stomach hurts I have had too much		
22	keeping track of amount to drink, when known				
23	seeing other peoples actions	forgetting one's train of thought	stumbling/falling	others telling you to stop drinking	
24	having others keep track of my drinking				
25	Doing calculations (like adding a tip at a resteraunt).	Having a meaniful conversation.	Comparing my behavior with someone who has not been drinking.	A breathalyzer.	
26					
27	Knowledge of how much alcohol one has consumed	Prior experience with drinking	BAC breathalyzer	Any sort of visceral reactions	

Table 5

Mean (std. dev.) Drinking Outcomes as a Function of Class Status and Gender.

	Non-drinkers (%)[†]	Alcohol History		Drinking Intentions		Self-reported Drinking	
		Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Freshman	**28.1%**	**6.0(3.9)**	**5.2(2.4)**	**3.4(2.2)**	**4.8(2.3)**	**3.0(2.6)**	**4.2(2.6)**
Female	25.8%	5.8(3.7)	4.7(2.2)	3.3(2.2)	4.3(2.1)	2.8(2.0)	4.1(2.4)
Male	32.3%	6.4(4.2)	6.3(2.6)	3.6(2.3)	5.7(2.4)	3.3(3.5)	4.5(3.0)
Sophomore	**20.5%**	**6.7(5.5)**	**4.5(2.2)**	**3.3(2.0)**	**4.3(2.2)**	**2.7(2.0)**	**4.0(2.4)**
Female	17.9%	6.5(5.6)	4.1(1.7)	3.2(2.0)	4.0(1.8)	2.6(1.9)	3.6(2.2)
Male	28.6%	7.3(5.0)	6.0(3.2)	3.6(2.3)	5.4(3.2)	3.5(2.2)	5.9(2.6)
Junior	**14.2%**	**6.5(4.2)**	**4.7(3.4)**	**3.5(2.0)**	**4.2(2.2)**	**2.7(2.2)**	**3.7(2.4)**
Female	12.0%	6.7(4.2)	4.1(2.1)	3.5(2.0)	3.9(2.0)	2.7(2.2)	3.6(2.4)
Male	25.0%	5.2(3.9)	8.1(6.7)	3.1(1.8)	5.5(2.6)	2.8(2.5)	4.2(3.1)
Senior	**8.2%**	**6.7(4.5)**	**4.4(2.5)**	**3.5(2.1)**	**4.0(2.2)**	**3.0(2.7)**	**3.6(2.4)**
Female	8.9%	6.4(4.4)	4.2(2.5)	3.4(2.1)	3.8(2.1)	2.9(2.2)	3.3(2.0)
Male	5.9%	7.6(5.3)	5.3(2.3)	3.7(2.1)	4.9(2.4)	3.8(5.2)	5.3(3.8)
Female (Overall)	**17.9%**	**6.3(4.6)**	**4.3(2.1)**	**3.4(2.1)**	**4.0(2.0)**	**2.7(2.0)**	**3.7(2.3)**
Male (Overall)	**27.7%**	**6.7(4.6)**	**6.3(3.5)**	**3.6(2.1)**	**5.5(2.6)**	**3.4(3.3)**	**4.9(3.0)**
Total	**20.5%**	**6.4(4.6)**	**4.8(2.6)**	**3.4(2.1)**	**4.4(2.2)**	**2.8(2.4)**	**3.9(2.5)**

Note. Non-drinkers were excluded from averages of alcohol history, drinking intentions, and self-reported drinking.

[†]Non-drinkers were defined as participants with an alcohol history of zero.

Table 6: Item Analysis for Direct Attitude Scale

Statistics for Direct Attitude Scale	4	15.14	27.75	5.27

	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	3.79	3.38	4.52	1.46	1.34	.28
Item Variances	2.46	1.96	3.25	1.29	1.66	.35
Inter-Item Correlations	.61	.50	.71	.22	1.44	.01

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
Attitude1: Harmful-Beneficial	11.70	17.31	0.73	0.56	0.815
Attitude2: Good-Bad	11.34	15.94	0.72	0.58	0.814
Attitude3: Pleasant-Unpleasant	10.62	14.40	0.74	0.58	0.812
Attitude4: Worthless-Useful	11.77	17.72	0.66	0.49	0.841

	Alpha	Standardized Item Alpha
Reliability Coefficients	0.860	0.863

Table 7: Correlations Between Drinking Outcomes and Direct Attitude Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Attitude1	3.42 (1.41)	.433**	.468**	.484**	.444**	.398**	.425**
Attitude2[†]	3.80 (1.61)	.399**	.416**	.373**	.405**	.374**	.360**
Attitude3[†]	4.53 (1.81)	.482**	.532**	.446**	.532**	.421**	.423**
Attitude4	3.36 (1.44)	.447**	.532**	.471**	.513**	.413**	.441**

[†] Reverse coded

* $p < .05$

** $p < .01$

Table 8: Correlations Between Total Scores on All Measures and Drinking Outcomes

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Measures	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Direct Attitudes	15.14 (5.27)	.519**	.579**	.522**	.563**	.473**	.486**
Indirect Attitudes	-21.71 (43.64)	.387**	.485**	.404**	.504**	.315**	.391**
Direct PBC	36.54 (6.80)	.182**	.141**	.119**	.148**	.229**	.120*
Indirect PBC	10.20 (49.35)	.047	.024	.023	.033	-.020	-.021
Direct Norms1	8.83 (3.88)	.386**	.379**	.418**	.431**	.317**	.380**
Direct Norms2	25.53 (21.73)	.402**	.456**	.511**	.520**	.420**	.383**
Motives Scale	112.88 (40.44)	.415**	.465**	.428**	.495**	.352**	.436**
R^2- All Measures	-	.438**	.528**	.474**	.562**	.348**	.422**

Note. Direct Norms1 is the summation of the first three Direct Norms Items. Direct Norms2 is the product of the fourth and fifth Direct Norms items.

* $p < .05$

**$p < .01$

Table 9: Item Analysis for Indirect Attitudes

Statistics for Indirect Attitude Scale	12	-21.71	1904.18	43.64

	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	-1.81	-11.03	9.75	20.78	-.88	60.33
Item Variances	49.95	32.12	86.25	54.12	2.69	274.19
Inter-Item Correlations	.20	-.09	.73	.823	-8.19	.039

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
Attitude1: Sociability	-30.16	1599.47	0.41	0.53	0.727
Attitude2: Lowered inhibitions	-17.68	1540.48	0.38	0.20	0.734
Attitude3: Enjoyable buzz	-29.58	1538.25	0.50	0.59	0.715
Attitude4: At-ease; Stress-free	-31.46	1605.48	0.43	0.67	0.725
Attitude5: Justify my behavior	-22.89	1765.48	0.20	0.12	0.749
Attitude6: Fit in	-25.61	1723.85	0.28	0.34	0.742
Attitude7: Impaired decision making	-10.98	1604.09	0.38	0.32	0.731
Attitude8: Negative bodily consequences	-10.68	1689.70	0.33	0.40	0.737
Attitude9: Emotional instability	-13.79	1658.78	0.46	0.44	0.724
Attitude10: Victimization risk	-12.51	1655.46	0.42	0.48	0.727
Attitude11: Behave aggressively	-14.75	1674.10	0.43	0.40	0.727
Attitude12: Hook-up	-18.72	1586.06	0.40	0.21	0.729

	Alpha	Standardized Item Alpha
Reliability Coefficients	0.748	0.751

Table 10: Correlations Between Drinking Outcomes and Indirect Attitude Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Attitude1	8.56 (7.50)	.252**	.313**	.256**	.310**	.165**	.258**
Attitude2	-4.03 (9.26)	.163**	.246**	.195**	.244**	.069	.241**
Attitude3	8.02 (7.76)	.397**	.504**	.396**	.507**	.353**	.441**
Attitude4	9.74 (7.15)	.298**	.349**	.266**	.373**	.196**	.310**
Attitude5	1.24 (6.07)	.017	.092*	.043	.098*	.072	.079
Attitude6	4.04 (6.21)	.057	.099*	.038	.122**	.013	.020
Attitude7	-10.60 (7.84)	.247**	.289**	.320**	.275**	.198**	.274**
Attitude8	-10.88 (6.37)	.127**	.092*	.133**	.105**	.128*	.102
Attitude9	-7.96 (5.63)	.188**	.215**	.196**	.243**	.149**	.169**
Attitude10	-9.10 (6.17)	.186**	.243**	.213**	.251**	.220**	.203**
Attitude11	-6.90 (5.59)	.143**	.204**	.144**	.195**	.094	.117*
Attitude12	-2.93 (7.95)	.199**	.288**	.175**	.322**	.288**	.328**

* $p < .05$

** $p < .01$

Table 11: Item Analysis for Subjective Norms

Statistics for Sub Norm Scale	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	3.02	2.57	3.68	1.11	1.43	0.32
Item Variances	2.36	1.50	2.79	1.29	1.86	0.26
Inter-Item Correlations	0.30	0.18	0.55	0.36	3.00	0.01

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
SubNorm1: Important people think I should consume alcohol	11.42	18.79	0.37	0.16	0.665
SubNorm2: Expected to consume alcohol	12.52	15.81	0.56	0.38	0.574
SubNorm3: Social pressure to consume alcohol	12.43	17.16	0.46	0.31	0.623
SubNorm4: Number of occasions friends drink	12.53	20.05	0.41	0.22	0.649
SubNorm5: Number of drinks friends consume per occasion	11.49	18.13	0.41	0.23	0.649

	Alpha	Standardized Item Alpha
Reliability Coefficients	0.684	0.684

Table 12: Correlations Between Drinking Outcomes and Direct Norms Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Norm1[†]	3.62 (1.63)	.366**	.354**	.403**	.430**	.288**	.334**
Norm2	2.56 (1.67)	.384**	.378**	.402**	.388**	.311**	.398**
Norm3	2.67 (1.67)	.160**	.160**	.182**	.198**	.168**	.182**
Norm4	4.51 (2.56)	.384**	.328**	.502**	.382**	.354**	.273**
Norm5	4.96 (2.45)	.391**	.532**	.452**	.625**	.349**	.385**

[†] Reverse coded

* $p < .05$

**$p < .01$

Table 13: Item Analysis for Direct Perceived Behavioral Control

Statistics for Direct Perceived Behavioral Control	7	36.54	46.28	6.80

	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	5.22	3.85	6.46	2.61	1.68	1.29
Item Variances	2.78	1.35	4.15	2.81	3.09	1.58
Inter-Item Correlations	0.27	-0.04	0.78	0.83	-17.96	0.06

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
PBC1: Able to consume when desired	32.31	35.12	0.29	0.24	0.678
PBC2: Can drink to desired intoxication	31.75	32.12	0.52	0.57	0.599
PBC3: Accurately determine level of intoxication	32.06	31.95	0.53	0.52	0.597
PBC4: Can refuse a drink	30.22	37.12	0.47	0.50	0.627
PBC5: Decision to drink is up to me	30.09	38.15	0.47	0.65	0.631
PBC6: Amount consumed is up to me	30.12	37.92	0.48	0.66	0.629
PBC7: Know alcohol concentration of consumed beverages	32.69	38.49	0.15	0.08	0.722

	Alpha	Standardized Item Alpha
Reliability Coefficients	0.677	0.720

Table 14: Correlations Between Drinking Outcomes and Direct Perceived Behavioral Control Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
PBC1	4.24 (2.04)	.281**	.309**	.263**	.285**	.250**	.279**
PBC2	4.79 (1.83)	.296**	.329**	.281**	.354**	.344**	.293**
PBC3	4.45 (1.85)	.235**	.282**	.211**	.285**	.274**	.227**
PBC4	6.31 (1.31)	-.038	-.079*	-.130**	-.104**	-.039	-.119*
PBC5	6.44 (1.18)	-.062	-.115**	-.157**	-.137**	-.090	-.239**
PBC6	6.40 (1.19)	-.062	-.190**	-.138**	-.155**	-.037	-.202**
PBC7	3.85 (2.04)	-.064	-.157**	-.076	-.147**	-.017	-.096

* $p < .05$

**$p < .01$

Table 15: Item Analysis for Indirect Measure of Perceived Behavioral Control

Statistics for Indirect PBC Scale	12	12.06	2832.26	53.22

	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	1.01	-5.21	11.07	16.28	-2.12	18.73
Item Variances	66.98	13.48	99.80	86.32	7.40	621.73
Inter-Item Correlations	0.23	-0.02	0.50	0.53	-22.46	0.02

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
PBC1: Play drinking games	13.30	2426.38	0.47	0.28	0.761
PBC2: Certain of tolerance	11.36	2291.59	0.47	0.27	0.762
PBC3: Know drinking limits	0.99	2550.88	0.26	0.24	0.782
PBC4: Pressure from friends to drink	11.57	2237.21	0.52	0.33	0.754
PBC5: Notice impairment	14.43	2260.36	0.50	0.32	0.757
PBC6: Friends provide feedback on level of intoxication	5.50	2566.40	0.27	0.24	0.780
PBC7: Uncertain about concentration of my drinks	13.43	2426.83	0.48	0.28	0.761
PBC8: Consume alcohol at a fast rate	17.27	2367.19	0.50	0.41	0.757
PBC9: Attend special events where alcohol is provided	9.61	2445.51	0.47	0.28	0.762
PBC10: Happy mood when drinking	9.22	2487.65	0.29	0.19	0.781
PBC11: Pregame before parties	12.97	2352.55	0.57	0.41	0.751
PBC12: Sad mood when drinking	12.99	2713.69	0.26	0.15	0.780

Reliability Coefficients	Alpha	Standardized Item Alpha
	0.781	0.783

Table 16: Correlations Between Drinking Outcomes and Indirect Perceived Behavioral Control Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
PBC1[†]	-1.34 (7.49)	.088*	.119**	.109**	.117**	.119*	.122*
PBC2	0.61 (9.86)	.079*	.021	.064	.042	.066	-.062
PBC3	10.83 (8.22)	.157**	.146**	.049	.125**	.122*	.115*
PBC4[†]	0.30 (10.04)	-.008	-.053	.008	-.035	-.045	-.073
PBC5	-2.41 (9.81)	.010	-.041	.011	-.025	-.020	.007
PBC6	6.58 (7.62)	.054	.041	.003	.046	-.039	-.066
PBC7	-1.30 (7.31)	-.042	-.055	-.047	-.040	-.104	-.079
PBC8[†]	-5.14 (8.24)	.049	.096*	.100*	.105*	.000	.054
PBC9	2.39 (7.23)	-.096*	-.090*	-.129*	-.128*	-.122*	-.088
PBC10	2.91 (9.04)	.022	-.026	-.008	-.024	-.033	-.078
PBC11[†]	-1.04 (7.60)	.111**	.099*	.116*	.111**	.057	.006
PBC12	-1.01 (3.89)	.053	.042	.043	.038	-.064	-.114*

[†] Reverse coded

* $p < .05$

** $p < .01$

Table 17: Item Analysis for Conformity Motive Subscale

	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	2.32	1.83	3.38	1.56	1.85	0.28
Item Variances	2.04	1.29	2.80	1.50	2.16	0.32
Inter-Item Correlations	0.50	0.37	0.68	0.31	1.83	0.01

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
Motive1: All my friends are drinking	15.14	54.35	0.59	0.41	0.877
Motive3: Don't want to be only sober one	15.68	53.06	0.65	0.47	0.870
Motive6: It looks cool	16.69	59.05	0.65	0.51	0.870
Motive9: Impress people	16.66	58.78	0.66	0.53	0.869
Motive14: So others will not give me a hard time	16.43	55.27	0.69	0.50	0.864
Motive21: Blend in with crowd	16.30	54.69	0.72	0.58	0.861
Motive26: Fit in with a group	16.40	54.20	0.73	0.59	0.860
Motive38: Because my date is drinking	16.31	56.88	0.58	0.36	0.876

	Alpha	Standardized Item Alpha
Reliability Coefficients	0.883	0.888

Table 18: Item Analysis for Self-Medication Motives

	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	2.42	1.31	3.55	2.24	2.71	0.58
Item Variances	2.00	0.52	3.17	2.65	6.05	0.62
Inter-Item Correlations	0.38	0.09	0.74	0.65	8.10	0.02

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
Motive4: Helps me relax	35.16	186.11	0.67	0.60	0.902
Motive7: Stressed about school	35.64	185.63	0.66	0.63	0.902
Motive10: Depressed	37.04	202.16	0.46	0.44	0.908
Motive12: Boring to be sober	35.48	187.28	0.56	0.42	0.906
Motive16: Easier to talk to people	35.08	182.85	0.71	0.68	0.900
Motive18: Not getting along with friends	37.25	206.35	0.42	0.46	0.909
Motive22: Having bad day	36.31	189.89	0.61	0.46	0.904
Motive28: Makes me peaceful	36.04	188.33	0.67	0.55	0.902
Motive29: Makes me brave	36.12	188.33	0.67	0.53	0.902
Motive32: Makes me funnier	35.34	182.85	0.72	0.66	0.900
Motive33: Makes me calmer	36.03	190.57	0.64	0.49	0.903
Motive37: Allows me to express feelings	36.24	188.71	0.67	0.50	0.902
Motive39: School is too demanding	36.29	189.69	0.63	0.55	0.903
Motive42: Let myself down	36.99	198.58	0.55	0.53	0.906
Motive43: Students do not like me	37.22	209.23	0.39	0.50	0.910
Motive44: Trouble sleeping	37.17	205.67	0.39	0.35	0.910

	Alpha	Standardized Item Alpha
Reliability Coefficients	0.910	0.909

Table 19: Item Analysis for Thrill-Seeking Motives

Statistics for Thrill Seeking Subscale	20	55.94	420.65	20.51		
	Mean	Minimum	Maximum	Range	Max/Min	Variance
Item Means	2.80	1.36	4.22	2.86	3.11	0.72
Item Variances	2.32	0.77	3.05	2.28	3.97	0.38
Inter-Item Correlations	0.41	0.08	0.81	0.73	10.54	0.02

Item Total Statistics	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item Total Correlation	Squared Multiple Correlation	Alpha If Item Deleted
Motive2: Like the feeling	52.25	373.09	0.69	0.69	0.932
Motive5: Nothing else to do	53.10	379.81	0.57	0.36	0.935
Motive8: It's fun	51.73	369.81	0.74	0.78	0.931
Motive11: Fun to do something illegal	54.11	394.59	0.48	0.37	0.936
Motive13: Relationship troubles	54.30	401.08	0.39	0.33	0.937
Motive15: Celebrating	51.99	380.10	0.61	0.54	0.934
Motive17: Rebelling against parents	54.59	408.78	0.31	0.35	0.938
Motive19: Having a good day	52.51	377.23	0.66	0.56	0.933
Motive20: Increase odds of hooking up	54.03	388.84	0.55	0.52	0.935
Motive23: Get most out of party	52.67	367.54	0.79	0.73	0.930
Motive24: Lets me take risks	53.50	379.09	0.68	0.55	0.933
Motive25: Limited drinking opportunity	53.61	387.79	0.50	0.33	0.936
Motive27: Makes everything more fun	52.46	365.60	0.83	0.76	0.930
Motive30: Makes me a better lover	54.06	391.37	0.54	0.44	0.935
Motive31: Makes me more outgoing	52.34	368.35	0.74	0.69	0.931

Motive34: Makes me more energetic	52.78	372.66	0.73	0.67	0.932
Motive35: Make me more creative	53.57	384.70	0.61	0.48	0.934
Motive36: Makes other sex more attractive	53.99	388.64	0.55	0.51	0.935
Motive40: Make most out of night	52.67	365.75	0.80	0.74	0.930
Motive41: Because alcohol is available	52.71	373.26	0.72	0.57	0.932

	Alpha	Standardized Item Alpha
Reliability Coefficients	0.937	0.934

Table 20: Correlations Between Drinking Outcomes and Total Score on Motive Subscales

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Conformity	2.31 (1.06) †	.192**	.248**	.214**	.249**	.141*	.176**
Self -Medication	2.41 (0.92) †	.361**	.401**	.378**	.422**	.273**	.360**
Thrill -Seeking	2.80 (1.03) †	.462**	.524**	.477**	.568**	.403**	.505**
Motivation Total	N/A	.416**	.466**	.431**	.496**	.352**	.436**

†Means reflect average response per sub-scale item (Range: 1-6)

* $p < .05$

** $p < .01$

Table 21: Correlations Between Drinking Outcomes and Conformity Motive Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Motive1	3.39 (1.67)	.278**	.320**	.306**	.351**	.193**	.214**
Motive3	2.83 (1.66)	.190**	.229**	.213**	.261**	.131*	.168**
Motive6	1.82 (1.13)	.096*	.144**	.133**	.114**	.107	.144*
Motive9	1.86 (1.15)	.097*	.149**	.117**	.166**	129*	.160**
Motive14	2.08 (1.40)	.064	.111*	.065	.071	.024	.055
Motive21	2.21 (1.40)	.137**	.155**	.126**	.149**	.009	.091
Motive26	2.13 (1.43)	.075	.146**	.099*	.129**	.107	.115*
Motive38	2.22 (1.45)	.177**	.193**	.170**	.192**	.142*	.105

* $p < .05$

** $p < .01$

Table 22: Correlations Between Drinking Outcomes and Self -Medication Motive Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Motive4	3.47 (1.60)	.307**	.379**	.325**	.401**	.222*	.305**
Motive7	2.98 (1.64)	.250**	.248**	.239**	.263**	.163**	.212**
Motive10	1.61 (1.13)	.010	.031	.052	.051	.034	.000
Motive12	3.14 (1.77)	.334**	.436**	.330**	.462**	.173**	.375**
Motive16	3.53 (1.67)	.346**	.438**	.379**	.468**	.251**	.423**
Motive18	1.40 (0.91)	.058	.011	.068	.012	.057	.039
Motive22	2.32 (1.52)	.239**	.224**	.257**	.225**	.213**	.173**
Motive28	2.61 (1.48)	.251**	.309**	.283**	.349**	.213**	.287**
Motive29	2.52 (1.48)	.284**	.346**	.296**	.347**	.201**	.260**
Motive32	3.29 (1.66)	.361**	.418**	.402**	.453**	.325**	.422**
Motive33	2.61 (1.44)	.263**	.300**	.264**	.310**	.189**	.244**
Motive37	2.38 (1.47)	.256**	.275**	.296**	.310**	.259**	.241**
Motive39	2.34 (1.49)	.175**	.225**	.192**	.217**	.133*	.160**
Motive42	1.65 (1.17)	.027	.093*	.057	.070	.041	.051
Motive43	1.34 (0.80)	.055	-.001	.079*	-.019	.010	.001
Motive44	1.48 (1.02)	.124**	.055	.122**	.060	.046	.081

* $p < .05$

** $p < .01$

Table 23: Correlations Between Drinking Outcomes and Thrill-Seeking Motive Items

		Alcohol History (r- values)		Drinking Intentions (r- values)		Self-reported Drinking (r- values)	
Item	M (SD)	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed	Drinking Occasions	Number Consumed
Motive2	3.67 (1.68)	.486**	.578**	.498**	.615**	.386**	.536**
Motive5	2.87 (1.73)	.335**	.320**	.325**	.344**	.238**	.310**
Motive8	4.19 (1.69)	.462**	.595**	.489**	.631**	.430**	.556**
Motive11	1.82 (1.27)	.079*	.123**	.143**	.176**	.085	.090
Motive13	1.63 (1.15)	.102**	.097*	.136**	.119**	.096	.067
Motive15	3.93 (1.62)	.387**	.428**	.405**	.447**	.302**	.354**
Motive17	1.35 (0.86)	.040	.059	.075	.066	.096	.068
Motive19	3.43 (1.60)	.422**	.434**	.437**	.460**	.346**	.389**
Motive20	1.90 (1.38)	.251**	.303**	.223**	.315**	.178**	.262**
Motive23	3.27 (1.66)	.365**	.445**	.375**	.479**	.317**	.425**
Motive24	2.44 (1.49)	.214**	.316**	.242**	.320**	.159**	.180**
Motive25	2.32 (1.55)	.004	.155*	.054	.180**	.033	.098
Motive27	3.48 (1.65)	.367**	.496**	.415**	.519**	.370**	.492**
Motive30	1.87 (1.28)	.160**	.243**	.262**	.283**	.253**	.262**
Motive31	3.60 (1.74)	.351**	.423**	.356**	.442**	.312**	.407**
Motive34	3.15 (1.62)	.345**	.390**	.359**	.422**	.282**	.358**
Motive35	2.36 (1.43)	.215**	.283**	.248**	.288**	.272**	.299**
Motive36	1.94 (1.38)	.187**	.247**	.216**	.279**	.212**	.261**
Motive40	3.27 (1.70)	.378**	.452**	.403**	.488**	.323**	.414**
Motive41	3.24 (1.62)	.342**	.421**	.348**	.443**	.239**	.384**

* $p < .05$

** $p < .01$

Table 24

Pearson Correlations between drinking intentions and self-reported drinking in Phase II

	Self-Reported Drinking in Phase II		
Intentions	Drinking Occasions	No. Drinks Consumed	Drinking Total
Intended Number of Drinking Occasions	.688**	.660**	.681**
Intended Number of Drinks	.542**	.783**	.661**
Intention Total	.629**	.741**	.760**

**$p < .01$

Table 25: Measured Structural Equation Modeling Variables: Correlations, Means, and Standard Deviations

		datt2	datt3	iatt1	iatt3	iatt4	dnorm1	dnorm2	dnorm4	dnorm5	dpbc1	dpbc2	dpbc3	conftot	smedtot	tseektot	intocsn	intnumcn	avocsn2	avnumcn2
datt2	Good v. Bad	-																		
datt3	Pleasant-Unpleasant	.704**	-																	
iatt1	Sociability	.277**	.345**	-																
iatt3	Enjoyable Buzz	.419**	.555**	.550**	-															
iatt4	At-ease; Stress Free	.309**	.405**	.603**	.632**	-														
dnorm1	Important people think I should	.380**	.387**	.202**	.389**	.249**	-													
dnorm2	I am expected to consume alcohol	.251**	.297**	.236**	.354**	.257**	.414**	-												
dnorm4	Number of Occasions Friends Drink	.113*	.158**	.052	.203**	.104	.250**	.279**	-											
dnorm5	Number of drinks friends consume per occasion	.207**	.282**	.121*	.338**	.180**	.288**	.318**	.509**	-										
dpbc1	Able to consume when desired	.355**	.375**	.192**	.262**	.230**	.357**	.241**	.211**	.224**	-									
dpbc2	Can drink to desired intoxication	.404**	.520**	.245**	.379**	.342**	.323**	.221**	.188**	.235**	.432**	-								
dpbc3	Accurately determine level of intoxication	.332**	.427**	.127*	.290**	.196**	.282**	.156**	.152**	.195**	.316**	.720**	-							
conftot	Conformity Motive	.198**	.211**	.319**	.287**	.243**	.262**	.345**	.183**	.166**	.196**	.173**	.081	-						
smedtot	Self-Medication Motive	.303**	.369**	.379**	.449**	.455**	.259**	.319**	.210**	.225**	.224**	.218**	.159**	.695**	-					
tseektot	Thrill-Seeking Motive	.404**	.516**	.457**	.580**	.479**	.363**	.409**	.235**	.280**	.270**	.324**	.222**	.670**	.849**	-				
intocsn	Intended Number of Drinking Occasions	.363**	.443**	.242**	.457**	.272**	.414**	.359**	.451**	.423**	.337**	.340**	.240**	.209**	.335**	.458**	-			
intnumcn	Intended Number of Drinks per Occasion	.407**	.508**	.317**	.559**	.381**	.413**	.389**	.344**	.579**	.325**	.371**	.258**	.235**	.412**	.571**	.699**	-		
avocsn2	Self-reported Number of Drinking Occasions	.371**	.428**	.165**	.355**	.194**	.289**	.308**	.357**	.347**	.253**	.343**	.275**	.154**	.268**	.389**	.691**	.557**	-	
avnumcn2	Self-reported Number of Drinks per Occasion	.361**	.427**	.249**	.437**	.305**	.347**	.399**	.264**	.387**	.230**	.302**	.231**	.183**	.364**	.495**	.661**	.786**	.628**	-
	Mean	3.70	4.46	8.79	7.97	10.06	3.54	2.45	4.52	4.86	4.29	4.90	4.57	18.28	37.90	54.38	2.66	3.48	2.32	3.30
	Std. Dev.	1.57	1.80	7.36	7.25	6.53	1.57	1.61	2.60	2.34	2.06	1.82	1.85	8.19	14.07	19.56	2.07	2.38	2.37	2.55

* $p < .05$

** $p < .01$

Figure 1: Theory of Planned Behavior Model

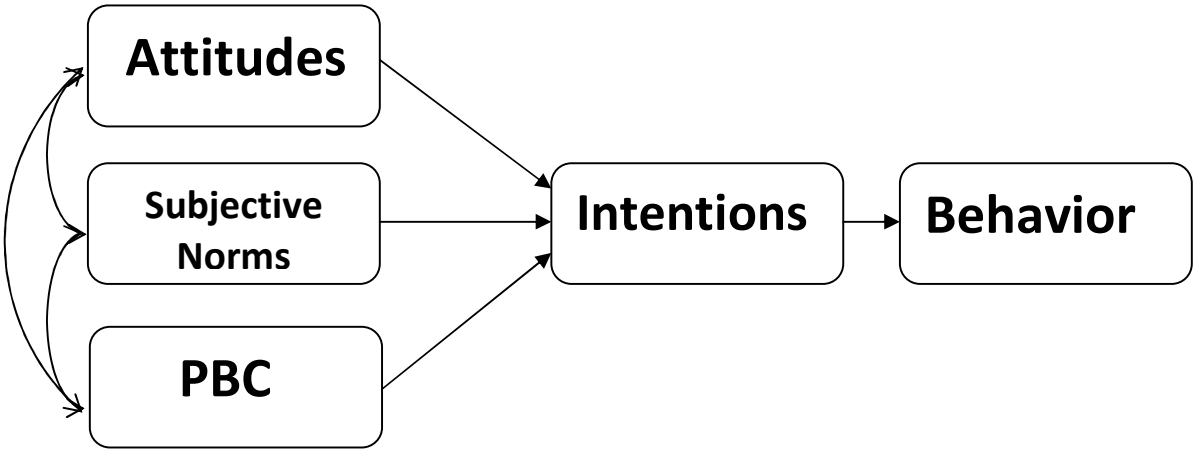


Figure 2: Proposed Model with Motivation

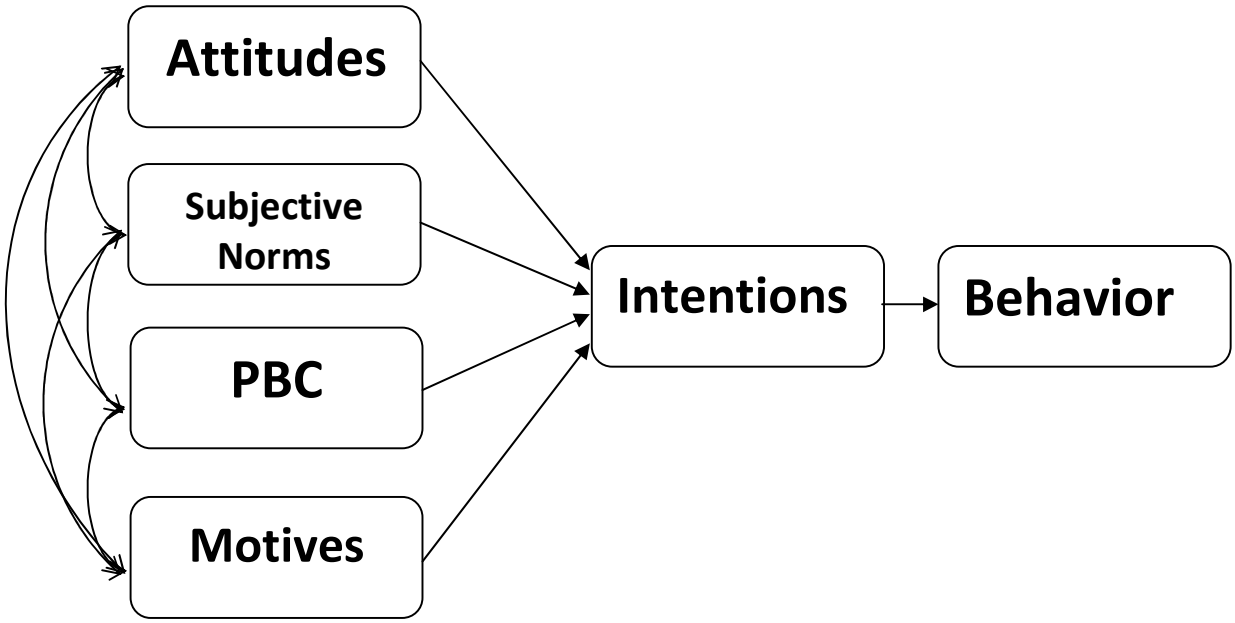


Figure 3: Mean Gender Differences Across Alcohol History, Drinking Intentions, and Self-Reported Drinking

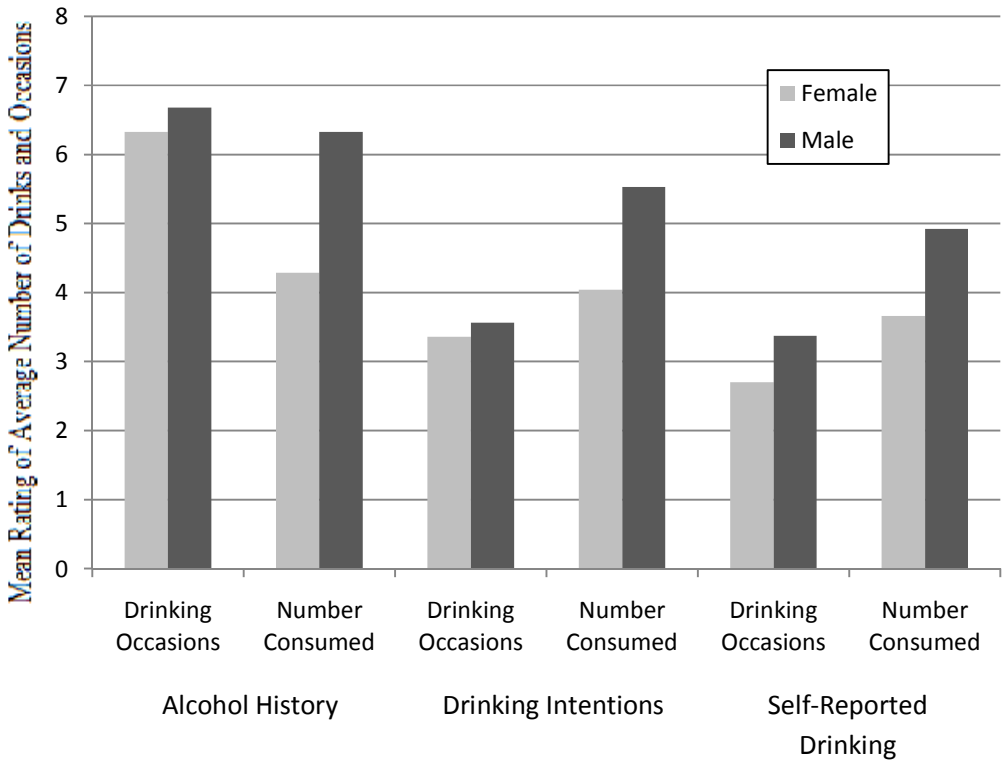


Figure 4: Average Number of Drinking Occasions per Month as a Function of Gender and Class

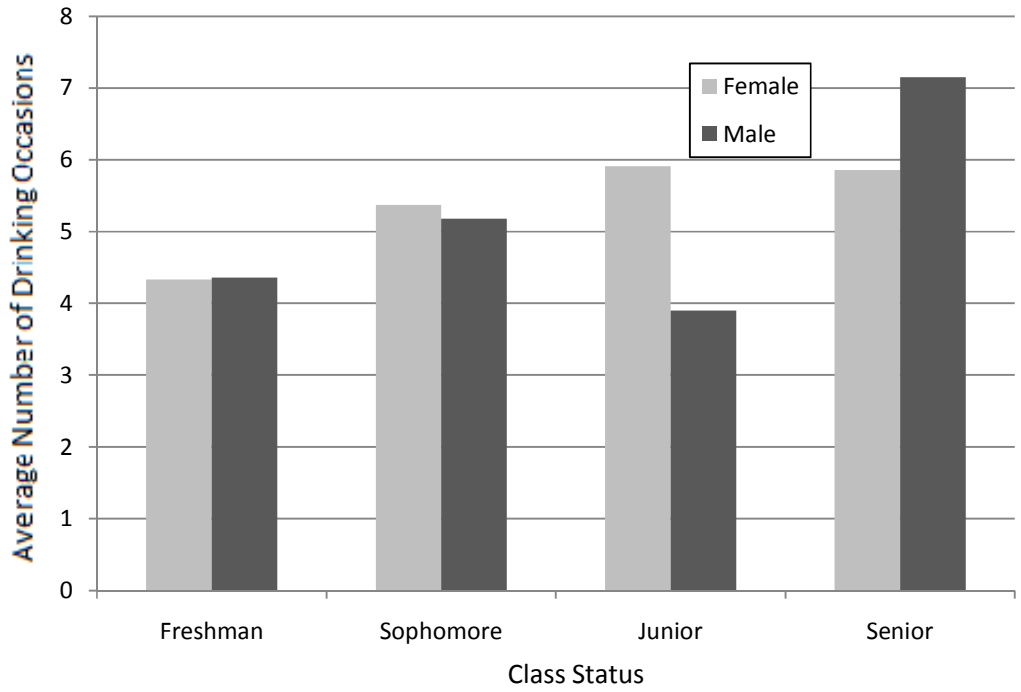


Figure 5: Average Number of Drinks Consumed per Drinking Occasion as a Function of Gender and Class

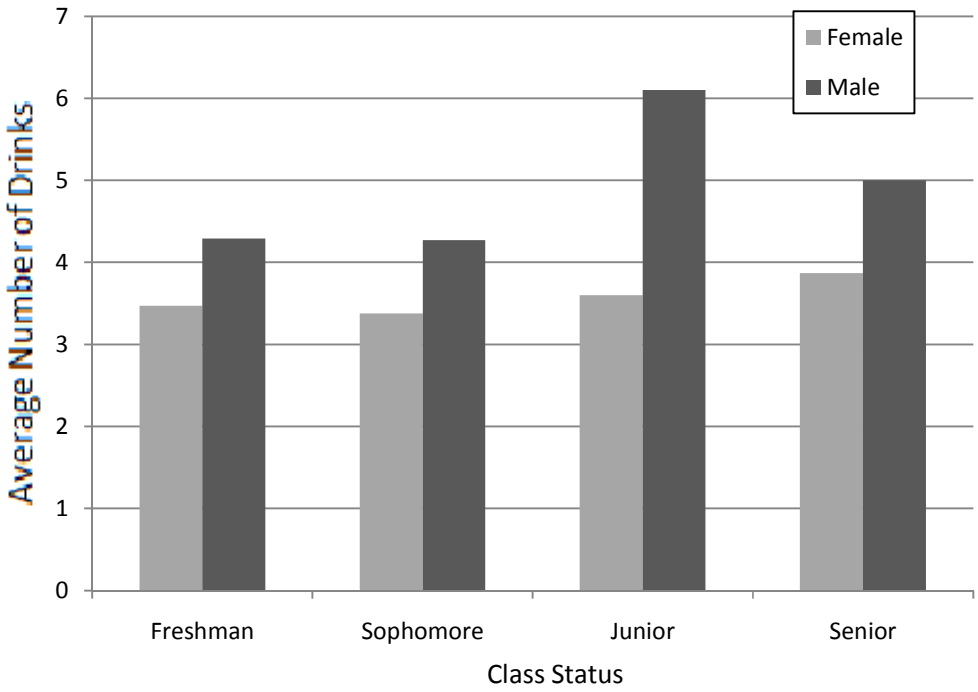
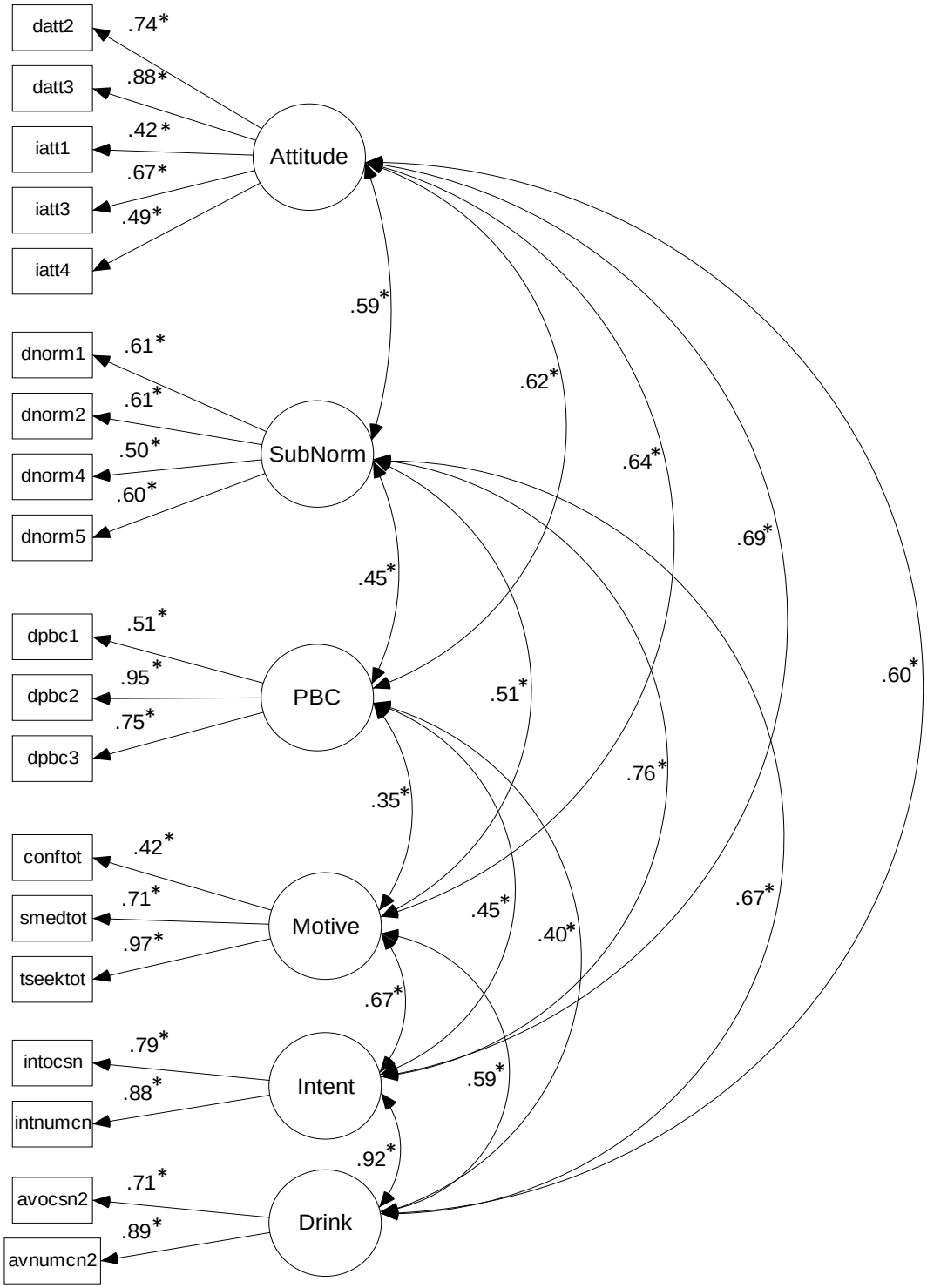
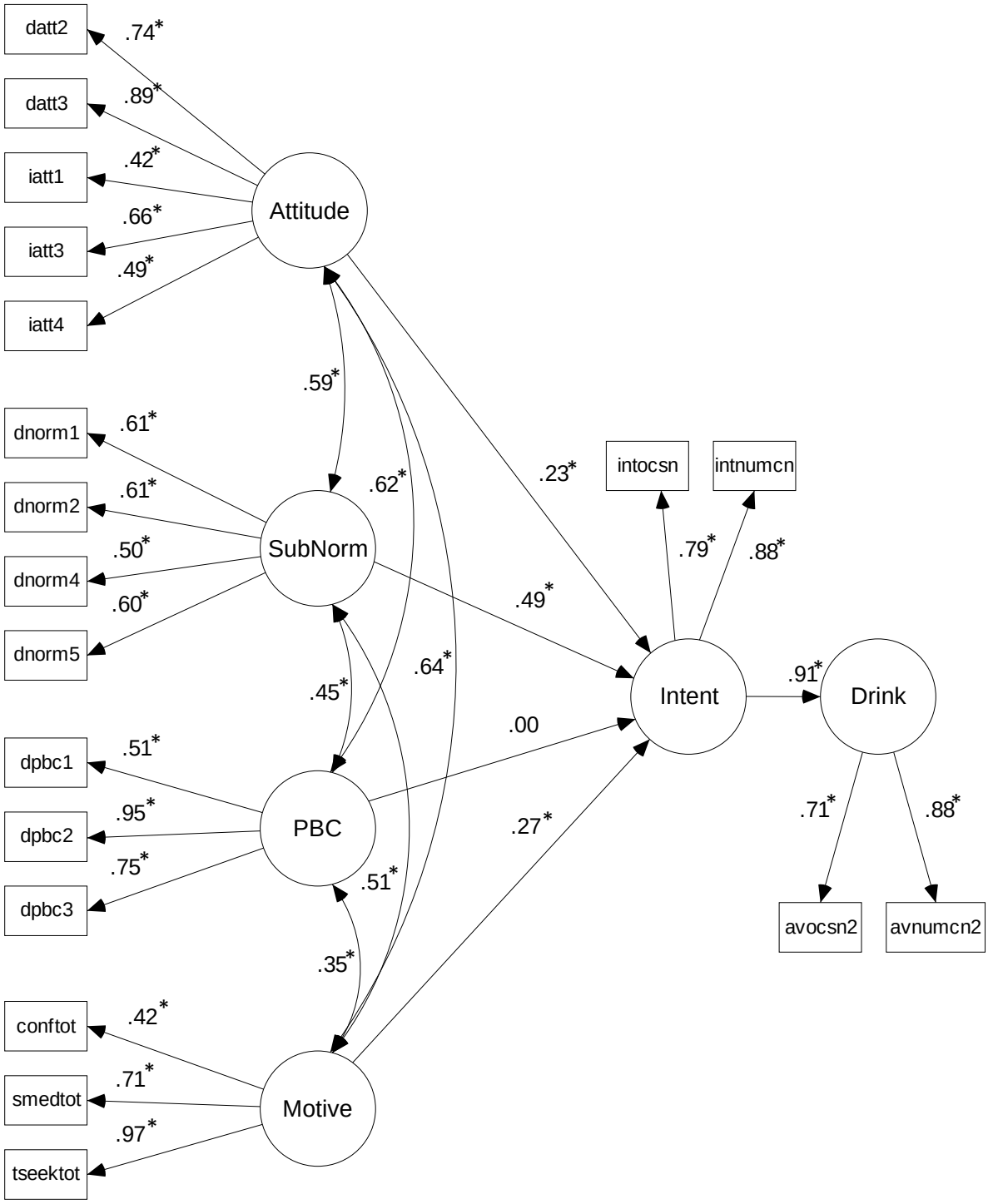


Figure 6: Measurement Model of Theory of Planned Behavior Constructs and Motivation



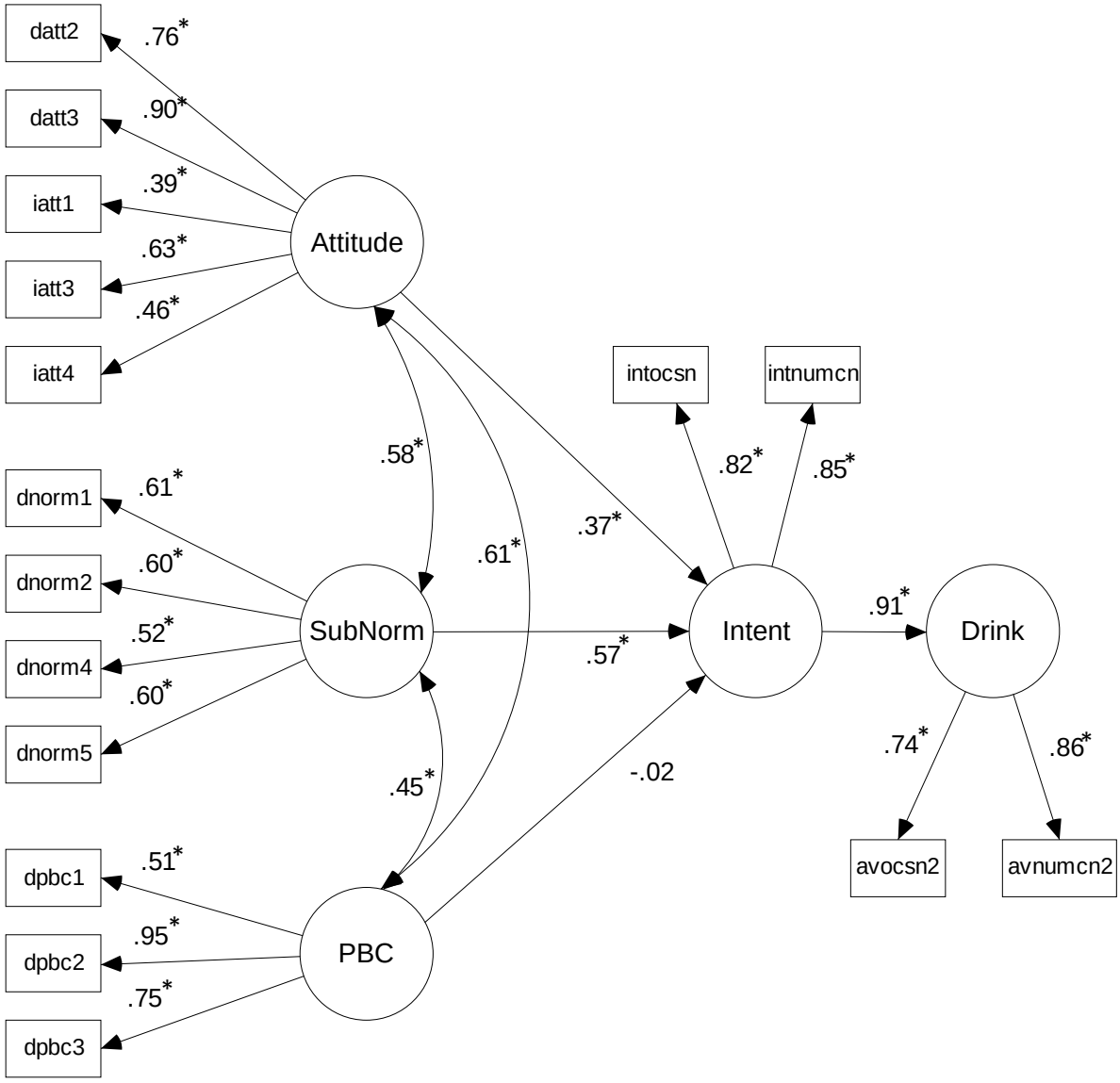
Note. For clarity, error (E) terms not displayed.
* $p < .05$

Figure 7: Predictive (Hypothesized) model for Theory of Planned Behavior with Motivation to Predict Self-Reported Drinking



Note. For clarity, error (E) terms not displayed.
* $p < .05$

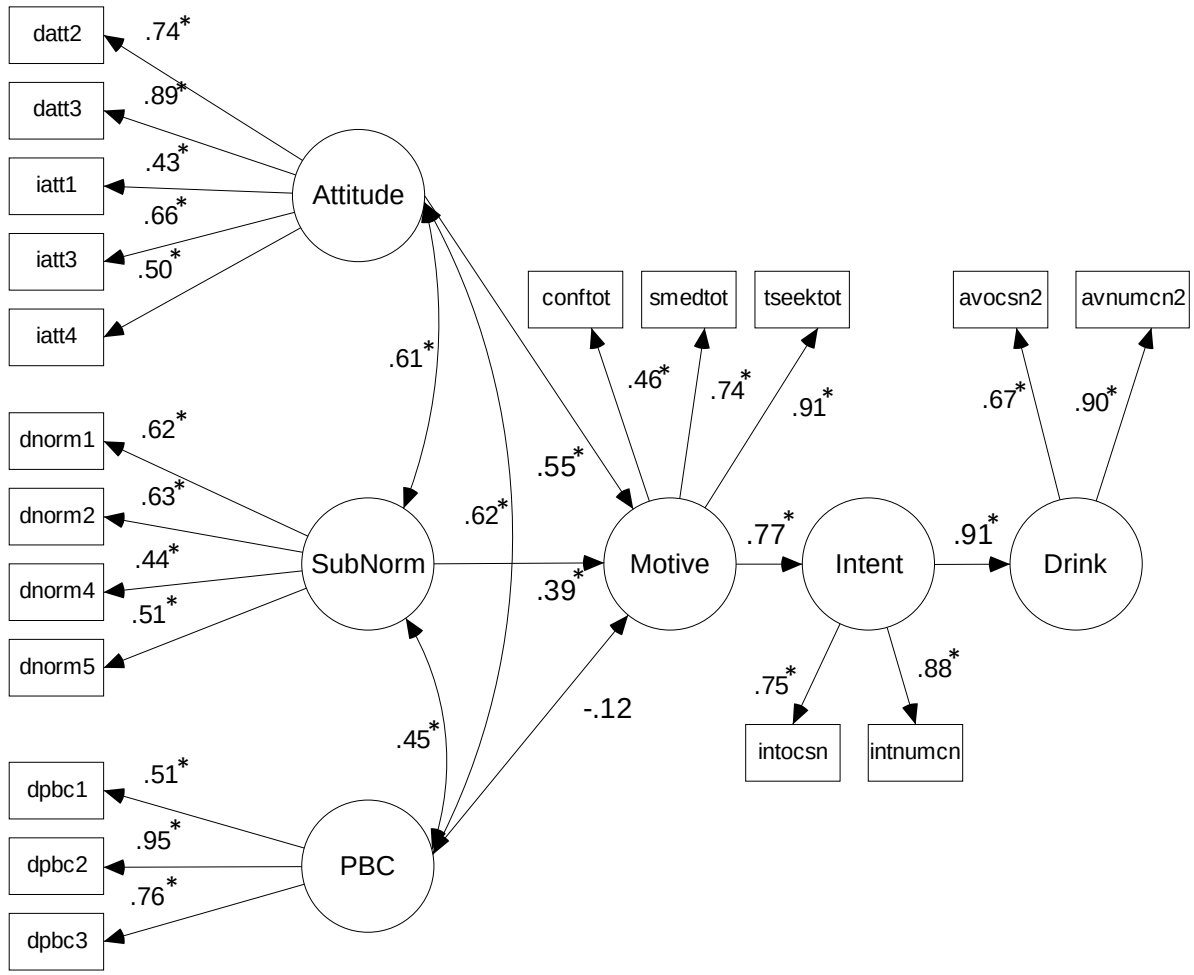
Figure 8: Predictive Model for the Theory of Planned Behavior Predicting Drinking



Note. For clarity, error (E) terms not displayed.

* $p < .05$

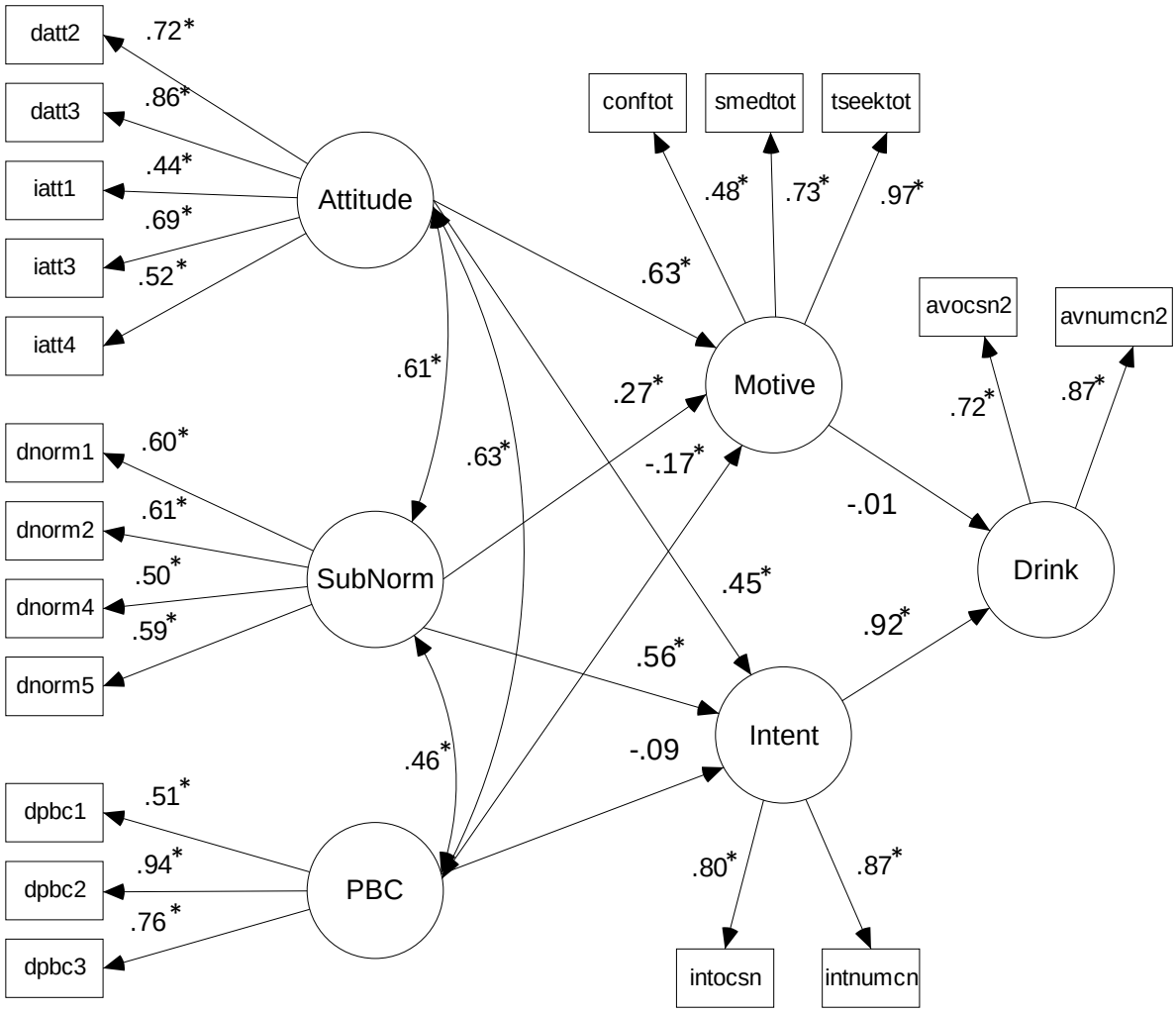
Figure 9: Structural Equation Modeling Results for Alternative Model A



Note. For clarity, error (E) terms not displayed.

* $p < .05$

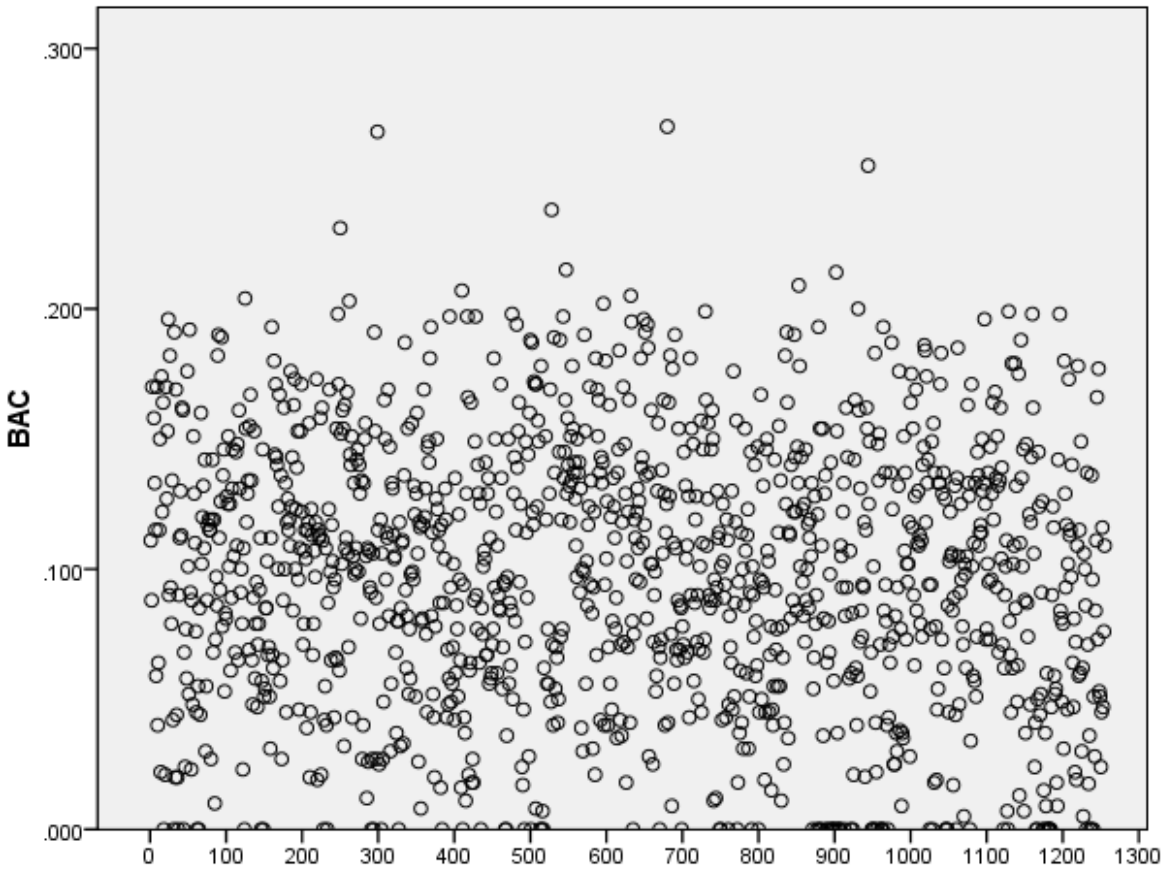
Figure 10: Structural Equation Modeling Results for Alternative Model B



Note. For clarity, error (E) terms not displayed.

* $p < .05$

Figure 11: Scatterplot of BAC in a Downtown Blacksburg Setting



Appendix A

Pre-Survey Drinking Items

General/Demographic Items

1. What are the first two letters of your mother's maiden name?
2. What are the first two letters of the city in which you were born?
3. What are the first **numbers** of the month in which you were born (ex. March-"03")?
4. What is your sex?
5. Class Standing?
6. On average, how many times to you drink alcohol each month?
7. At each of these sittings, how many drinks do you consume on average?

Attitudes: Direct

For me to consume alcohol is:

Harmful	1	2	3	4	5	6	7	Beneficial
Good	1	2	3	4	5	6	7	Bad
Pleasant	1	2	3	4	5	6	7	Harmful
Worthless	1	2	3	4	5	6	7	Useful

Attitudes: Indirect

For the following items, please use the scale below.

1: Unlikely
2:
3:
4: Neutral
5:
6:
7: Likely

a) If I consume alcohol, I will become more sociable.

1 2 3 4 5 6 7

b) If I consume alcohol, I have lowered inhibitions.

1 2 3 4 5 6 7

c) If I consume alcohol, I have a buzzed, happy feeling.

1 2 3 4 5 6 7

d) If I consume alcohol, I feel more relaxed and stress-free.

1 2 3 4 5 6 7

e) If I consume alcohol, I can justify my behavior.

1 2 3 4 5 6 7

f) If I consume alcohol, I will fit in with the group.

1 2 3 4 5 6 7

g) If I consume alcohol, my decision-making will be impaired.

1 2 3 4 5 6 7

h) If I consume alcohol, I will experience hangovers and blackouts.

1 2 3 4 5 6 7

i) If I consume alcohol, I will experience negative bodily consequences such as vomiting and stomach aches.

1 2 3 4 5 6 7

j) If I consume alcohol, I will become emotionally unstable.

1 2 3 4 5 6 7

k) If I consume alcohol, I will be at increased risk for victimization, such as physical and/or sexual assault.

1 2 3 4 5 6 7

l) If I consume alcohol, I will be more likely to behave aggressively.

1 2 3 4 5 6 7

m) If I consume alcohol, I will be more likely to hookup with someone.

1 2 3 4 5 6 7

For the following questions, please use the scale below:

-3: Extremely Undesirable
-2:
-1:
0: Neutral
1:
2:
3: Extremely Desirable

n) Becoming more sociable is:

-3 -2 -1 0 1 2 3

o) Having lowered inhibitions is:

-3 -2 -1 0 1 2 3

p) Having a buzzed, happy feeling is:

-3 -2 -1 0 1 2 3

q) Feeling more relaxed and stress-free is:

-3 -2 -1 0 1 2 3

r) Being able to justify my behavior is:

-3 -2 -1 0 1 2 3

s) Fitting in with the group is:

-3 -2 -1 0 1 2 3

t) Having my decision-making impaired is:

-3 -2 -1 0 1 2 3

u) Experiencing hangovers and blackouts is:

-3 -2 -1 0 1 2 3

v) Experiencing negative bodily consequences, such as vomiting and stomach aches is:

-3 -2 -1 0 1 2 3

w) Being emotionally unstable is:

-3 -2 -1 0 1 2 3

x) Being at increased risk for victimization, such as physical and/or sexual assault is:

-3 -2 -1 0 1 2 3

y) Behaving more aggressively is:

-3 -2 -1 0 1 2 3

z) Being more likely to hookup with someone is:

-3 -2 -1 0 1 2 3

Subjective Norms

1) Most people who are important to me think that

I should 1 2 3 4 5 6 7 I should not

regularly consume alcohol.

2) It is expected of me that I should regularly consume alcohol.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3) I feel under social pressure to consume alcohol regularly.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

4) On average, how many different occasions will people who are important to me consume alcohol over the next two weeks?

5) On average, how many drinks per drinking session will people who are important to me consume over the next two weeks?

Perceived Behavioral Control: Direct

Self-Efficacy

1) I am able to consume alcohol whenever I desire.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

2) I am confident that I can drink to my desired level of intoxication.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3) I can accurately determine my level of intoxication.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

4) I am confident I could refuse a drink if I wanted to.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Controllability

1) Whether or not I consume alcohol is completely up to me.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

2) How much alcohol I drink is completely up to me.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

3) I only consume beverages when I know there alcohol concentration.

Strongly disagree 1 2 3 4 5 6 7 Strongly agree

Perceived Behavioral Control: **Indirect**

a) I often play drinking games at a party.

Unlikely 1 2 3 4 5 6 7 Likely

b) I feel certain of my tolerance for alcohol on a given night.

Unlikely 1 2 3 4 5 6 7 Likely

c) I know my drinking limits on a given night.

Unlikely 1 2 3 4 5 6 7 Likely

d) My friends pressure me to drink.

Unlikely 1 2 3 4 5 6 7 Likely

e) I notice my (physical or cognitive) impairment when I drink.

Unlikely 1 2 3 4 5 6 7 Likely

f) My friends give me feedback or cues about my level of intoxication.

Unlikely 1 2 3 4 5 6 7 Likely

g) I am uncertain about the concentration of alcohol in my drinks (ex. Mixed drinks or oversized servings).

Unlikely 1 2 3 4 5 6 7 Likely

h) I consume alcohol at a fast rate.

Unlikely 1 2 3 4 5 6 7 Likely

i) I attend special events where alcohol is provided.

Unlikely 1 2 3 4 5 6 7 Likely

j) I am in a happy mood when I drink.

Unlikely 1 2 3 4 5 6 7 Likely

k) I pregame before attending a party.

Unlikely 1 2 3 4 5 6 7 Likely

l) I am in a sad mood when I drink.

Unlikely 1 2 3 4 5 6 7 Likely

m) While playing drinking games at a party, I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

n) When I am uncertain of my tolerance I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

o) When I know my limits I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

p) When I am peer pressured to drink I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

q) When my senses (physical or cognitive) are impaired from drinking I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

r) When I receive feedback and cues from friends about my level of intoxication I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

s) When I am unsure of the concentration of alcohol in my drink (such as: consuming mixed drinks or oversized drinks) I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

t) When I consume alcohol at a fast rate I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

u) When I attend a special event I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

v) When I am in a happy mood I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

w) When I am in a sad mood I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

x) When I pre-game before attending a party I am

Less -3 -2 -1 0 +1 +2 +3 More
Likely Likely
to maintain control of my rate/level of intoxication.

Drinking Motivations

The following statements reflect reasons people commonly consume alcohol. Please rate how closely these statements reflect your motivations to consume alcohol over the next two weeks. Please use the following scale:

1: Strongly Disagree
2: Disagree
3: Slightly Disagree
4: Slightly Agree
5: Agree
6: Strongly Agree

Because all of my friends are drinking.
1 2 3 4 5 6

Because I like the feeling of being intoxicated.
1 2 3 4 5 6

Because I don't want to be the only sober one.
1 2 3 4 5 6

Because it helps me relax.
1 2 3 4 5 6

Because there is nothing else to do in Blacksburg.
1 2 3 4 5 6

Because it looks cool.
1 2 3 4 5 6

Because I'm stressed about school
1 2 3 4 5 6

Because its fun.
1 2 3 4 5 6

To impress people.
1 2 3 4 5 6

Because I am depressed.
1 2 3 4 5 6

Because it is exciting to do something illegal.
1 2 3 4 5 6

Because I am having relationship problems.
1 2 3 4 5 6

Because it is boring to be at a party sober.
1 2 3 4 5 6

So others won't give me a hard time about not drinking.
1 2 3 4 5 6

Because I am celebrating.
1 2 3 4 5 6

Because it makes it easier to talk to people.
1 2 3 4 5 6

Because I am rebelling against my parents.
1 2 3 4 5 6

Because I haven't been getting along with my friends.
1 2 3 4 5 6

Because I am having a good day.
1 2 3 4 5 6

To increase my chances of finding someone to hook up with.
1 2 3 4 5 6

To blend in with the crowd.
1 2 3 4 5 6

Because I am having a bad day.
1 2 3 4 5 6

To get the most out of a party.
1 2 3 4 5 6

Because it makes me willing to take risks.
1 2 3 4 5 6

Because I have limited opportunities to drink.
1 2 3 4 5 6

To fit in with a group I like.
1 2 3 4 5 6

Because it makes everything more fun.
1 2 3 4 5 6

Because it makes me feel peaceful at a party.
1 2 3 4 5 6

Because it makes me brave.
1 2 3 4 5 6

Because it makes me a better lover.
1 2 3 4 5 6

Because it makes me more outgoing.
1 2 3 4 5 6

Because it makes me funnier.
1 2 3 4 5 6

Because it makes me calmer.
1 2 3 4 5 6

To be more energetic.
1 2 3 4 5 6

Because it makes me more creative.
1 2 3 4 5 6

Because it makes the opposite sex look more attractive.
1 2 3 4 5 6

Because it allows me to express my feelings.
1 2 3 4 5 6

Because my date is drinking.
1 2 3 4 5 6

Because school is too demanding.
1 2 3 4 5 6

To make the most out of the night.
1 2 3 4 5 6

Because alcohol is available.
1 2 3 4 5 6

Because I was feeling like I let myself down.
1 2 3 4 5 6

Because other students don’t seem to like me.
1 2 3 4 5 6

Because I'm having trouble sleeping.
1 2 3 4 5 6

Intentions

How many times do you plan to consume alcohol over the next two weeks?

How many drinks to you plan to consume at each of these drinking occasions?

Phase II Drinking Items

General/Demographic Items

1. What are the first two letters of your mother's maiden name?
2. What are the first two letters of the city in which you were born?
3. What are the first **numbers** of the month in which you were born (ex. March-"03")?
4. What is your sex?
5. Class Standing?
6. Over the past two weeks, how many times did you consume alcohol?
7. At each of these sittings, how many drinks did you consume on average?

Appendix B

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent – Online TPB Alcohol Project

Principal Investigator: E. Scott Geller, PhD, Professor
Co-Investigators: Ryan C. Smith, Graduate Student
Psychology Department, Virginia Tech

I. Purpose of this Project. The purpose of this study is to examine the relationship between attitudes, social norms, perceived behavioral control, and intentions in predicting alcohol consumption. It is estimated that approximately 400 individuals will participate in this study.

II. Procedures. This study will be conducted in two online phases. In the first phase, you will be asked to complete a brief questionnaire about drinking attitudes, social norms, perceived behavioral control, and drinking intentions over the next two weeks. Questions will also be asked about high school alcohol consumption, parent/guardian attitudes, and negative consequences of alcohol consumption. Two weeks after completing the first phase, you will be asked to complete a second online survey. This survey will ask questions about your drinking behaviors over the previous two weeks. Each stage of the research will take you less than an hour.

III. Risks. If you are underage and indicate that you consumed alcohol, there will be evidence of illegal activity. However, survey data will in no way be linked to identifying information. Additionally, some of the questions may make you feel uncomfortable or possibly trigger negative memories or emotions. Please remember that below we provide a list of several services available to help you if you would like someone to talk to. While some of the agencies listed provide services free of charge, some do charge for services. If you choose to seek treatment from a provider who does charge for the services, it is your responsibility to pay for these services.

IV. Benefits. Participants who complete both phases of the study will be awarded two extra credit points through SONA for applicable classes. It is hoped that the study results will contribute to knowledge about the theory of planned behavior and drinking motivations.

V. Extent of Anonymity and Confidentiality. Your data will be kept anonymous. You will be assigned a subject code that will be used to link your two survey responses. Your subject code will not be linked with any identifying information, nor is identifying information solicited in the surveys.

VI. Freedom to Withdraw. You are free to withdraw your consent and terminate your participation at any time. You are also free to decline to answer any specific item(s) on the questionnaires.

VII. Subject's Responsibilities
I voluntarily agree to participate in this study. I have the following responsibilities:

1. Complete questionnaire items to the best of my ability
2. Contact one of the researchers if I have questions about this study
3. Participate in both phases of the study

VII. Questions/Contact Information. If you have any questions about the protection of human research participants regarding this study, you may contact Dr. David Moore, Chair Virginia Tech Institutional Review Board for the Protection of Human Subjects, telephone: (540) 231-4991; email: moored@vt.edu; address: Office of Research Compliance, 2000 Kraft Drive, Suite 2000 (0497), Blacksburg, VA 24060 or David W. Harrison, PhD, Chair Departmental Institutional Review Board, telephone: (540) 231-4422 ; email: dwh@vt.edu

If you would like to speak with a member of this research team, please contact call the Center for Applied Behavior Systems at 231-8145 or Dr. E. Scott Geller at 231-6223 or e-mail one of the researchers listed below.

E. Scott Geller, PhD esgeller@vt.edu
Ryan Smith rcsmth@vt.edu

Following are some local and national resources available to you, should you need someone to talk with about mental health services or personal problems.

ACCESS/Raft Crisis Hotline
(Emergency services clinicians)
961-8400
http://www.nrvcs.org/services.htm

Cook Counseling Center
231-6557
http://www.ucc.vt.edu

National Sexual Assault Hotline
(800) 656-HOPE
www.rainn.org/get-help/national-sexual-assault-hotline

VT Women's Center
231-7806
http://www.womenscenter.vt.edu/

Women's Resource Center of the New River Valley
639-1123
http://www.wrcnrv.org

Center for Family Services
(703) 538-8470
http://www.nvc.vt.edu/cfs

New River Valley Community Services
961-8400
http://www.nrvcs.org/

VT Psychological Services Center
231-6914
http://www.psyc.vt.edu/centers/psc/

Mental Health Association of the New River Valley
951-4990, 800-559-2800
http://www.mhanrv.org/

VirginiaTech

Appendix C

Office of Research Compliance
Institutional Review Board
2000 Kraft Drive, Suite 2000 (0497)
Blacksburg, Virginia 24060
540/231-4606 Fax 540/231-0959
e-mail irb@vt.edu
Website: www.irb.vt.edu

MEMORANDUM

DATE: March 26, 2010

TO: E. S. Geller, Ryan Smith, Rachel Miller Korn, Lara Khattar, Sheri Pegram

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires June 13, 2011)

PROTOCOL TITLE: Drinking Motivation Assessment Tool

IRB NUMBER: 10-164

As of March 25, 2010, the Virginia Tech IRB Chair, Dr. David M. Moore, approved the new protocol for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report promptly to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at http://www.irb.vt.edu/pages/responsibilities.htm (please review before the commencement of your research).

PROTOCOL INFORMATION:
Approved as: Expedited, under 45 CFR 46.110 category(ies) 7
Protocol Approval Date: 3/25/2010
Protocol Expiration Date: 3/24/2011
Continuing Review Due Date*: 3/10/2011
*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

FEDERALLY FUNDED RESEARCH REQUIREMENTS:
Per federally regulations, 45 CFR 46.103(f), the IRB is required to compare all federally funded grant proposals / work statements to the IRB protocol(s) which cover the human research activities included in the proposal / work statement before funds are released. Note that this requirement does not apply to Exempt and Interim IRB protocols, or grants for which VT is not the primary awardee.

The table on the following page indicates whether grant proposals are related to this IRB protocol, and which of the listed proposals, if any, have been compared to this IRB protocol, if required.

Date*	OSP Number	Sponsor	Grant Comparison Conducted?

*Date this proposal number was compared, assessed as not requiring comparison, or comparison information was revised.

If this IRB protocol is to cover any other grant proposals, please contact the IRB office (irbadmin@vt.edu) immediately.

cc: File