Using the Theory of Planned Behavior to Predict Alcohol Consumption among College Students on Game Day
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Abstract
This study examined the utility of the Theory of Planned Behavior (TPB) in predicting alcohol consumption on game day among college students. Data were collected from a random sample of 740 college students who completed an anonymous online survey. Survey items assessed participants' motivations for consuming alcohol and the total number of drinks consumed on game day.

With the exception of Perceived Behavioral Control (PBC), each of the TPB constructs was statistically significant in predicting alcohol consumption. Behavioral Intentions to drink alcohol on game day predicted behavior. Intentions, in turn, were predicted by Attitude Toward the Behavior and Subjective Norm constructs. The TPB proved useful in explaining alcohol use on game day with college students. However, the applicability of the PBC construct within the TPB model remains in question. Additional research with more effective PBC measures is needed before more definitive statements can be made concerning the TPB's efficacy in predicting college student alcohol consumption on game day.

Keywords: alcohol, Theory of Planned Behavior, college student, celebratory event, high-risk drinking

Introduction
According to the Carnegie Foundation for the Advancement of Teaching, high-risk drinking represents the greatest single problem that America's universities must address (1). High-risk drinking or heavy episodic drinking is defined as the consumption of at least five or more alcoholic drinks in a row for men or four or more alcoholic drinks for women, at least once in the previous two weeks (2). Student death, injury, poor academic performance, property damage, vandalism, strained campus-community relations, and negative publicity are all issues related to alcohol abuse that university presidents and other senior administration officials must manage (3). Further, based on the Diagnostic and Statistical Manual of Mental Disorders (4th ed.), nearly one-third of college students meet the criteria for a formal diagnosis of alcohol abuse, and one in 17 can be classified as alcohol dependent (2). Ironically, epidemiological studies show that college-bound high school students drink less than their non-college-bound peers. However, upon arriving at institutions of higher education, college students drank more than their same age counterparts who did not attend college (4).

A particular area of concern on campuses involves the alcohol consumption patterns among college students during home football games also known as “Game Day.” While a vast array of research exists on alcohol use and the associated negative outcomes related to high-risk drinking, a dearth of information exists pertaining to the specific drinking behaviors of college football fans on game days. Neal and Fromme’s two year study, perhaps the most comprehensive research to date on the subject, examined the drinking behaviors of freshmen who attended the University of Texas. They implemented a web-based alcohol and drug survey semiannually and tracked students with a 30-day daily self-monitoring instrument at randomly assigned start dates. Relative to non-game Saturdays, student alcohol use was greater during both home and away games. The authors surmised that increased alcohol consumption occurred regardless of whether students attended the game. However, the increased drinking resulted only when school was in session, not during holiday or semester breaks (i.e., bowl games). High profile games against national and conference rivals resulted in more drinking than games against less competitive
teams. On average, more drinking occurred during away games than home games. The authors speculated that the game itself serves as a protective factor, because university policy prohibits alcohol consumption within the stadium, with the exception of luxury boxes.

Glassman and colleagues conducted a study assessing game day alcohol related behaviors and attitudes towards specific prevention initiatives. The results indicated that over half of college football fans surveyed reported that they do not typically drink on game day. Fans who did drink reported that they drank significantly more on game day than they did the last time they partied or socialized. Overall, males drank considerably more than females on game day. In addition, the more fans drink the less likely they are to support game day interventions. Nondrinkers were the most supportive of game day interventions followed by moderate drinkers, whereas heavy drinkers showed the least support. Compared to non-students, students were more supportive of designated tailgating areas where open containers are permitted. Not surprisingly, students were less supportive of increasing underage drinking enforcement efforts than non-students. The authors suggested that significant public support exists for prevention initiatives, and decreasing alcohol consumption on game day is fundamental to reducing the school's high-risk drinking rate during the fall semester.

To date, a lack of research exists utilizing health behavior theory to elucidate or predict alcohol use on game day. The Theory of Reasoned Action (TRA) and its extension - the Theory of Planned Behavior (TPB) - constitute an effective and well researched model for explaining health behavior. TRA/TPB incorporate relationships among beliefs, attitudes, intentions, and behavior (7). Theoretically, attitude (Attitude Toward the Behavior) and perceived acceptance of a behavior (Subjective Norm) influence a person's intention to engage or disengage in a behavior (Behavioral Intention). Behavioral Intention in turn, influences a person's decision to perform or refrain from the behavior of interest. The theory later expanded by adding Perceived Behavioral Control to the model (8). This enhancement allowed researchers to examine behaviors that are not totally volitional by taking into account factors such as resources and opportunities.

According to TPB, the construct Attitude Toward the Behavior represents an individual's beliefs about the behavior coupled with the weighted evaluations of those outcomes. Behavioral Beliefs and Evaluation of Behavioral Outcomes constitute two indirect measures (sub-scales which link related concepts to the direct measures) which comprise the Attitude Toward the Behavior (ATB) construct. Behavioral Beliefs signify one's attitude towards performing a behavior. Evaluation of Behavioral Outcomes concerns the relative importance or assessment of engaging in the behavior of interest.

The Subjective Norm construct concerns peoples' beliefs about whether most referents (influential persons such as a family member, best friend, or spouse) approve or disapprove of their behavior, as well as how motivated they are to comply with referents' expectations. Normative Beliefs and Motivation to Comply constitute the two indirect measures within the Subjective Norm construct. A person's Normative Beliefs depend on whether specific referents approve or disapprove of the behavior, whereas Motivation to Comply involves the individual's concern about what the specific referent thinks. For example, a male college student may perceive that his best friend approves of his drinking heavily and may be very motivated to drink heavily to comply with this belief. However, this same student may have a significant other who disapproves of his drinking heavily, but he may be less motivated by this referent. The Subjective Norm concerns an individual's overall assessments of whether key referents approval of the behavior of interest coupled with the Motivation to Comply with these referents.

The constructs that comprise Perceived Behavior Control (PBC) include Control Beliefs and Perceived Power (both indirect measures). Control Belief is the assessment one makes about the presence or absence of facilitators and barriers to performing the behavior. Perceived Power is the evaluation of each condition making the behavior more or less difficult. The construct of PBC is the overall assessment of one's power or control to perform or discontinue the behavior. According to Bandura, the PBC construct is analogous to self-efficacy's contribution to the Social Cognitive Theory (10). Finally, the most important determinant of behavior is Behavioral Intention, a person's likelihood of performing a behavior. In general, Behavioral Intention characterizes an individual's plan or probability of performing a behavior. Attitude, norms, and perceived control over the behavior each shape Behavioral Intention. The amount of influence each of these constructs has on Behavioral Intention differs among various populations and behaviors.

Several studies used the TRA/TPB to explain and predict alcohol consumption among college students. In a cross-sectional study, Wall, Hinson, and McKee employed the Theory of Planned Behavior to predict alcohol consumption among undergraduate students of legal drinking age (11). Consistent with Schlegel's and associates research (12), they found that the TPB was superior to the TRA in predicting problem drinking. Similarly, Norman and colleagues created a series of indirect measures for each construct as outlined in the TPB. Positive and negative Behavioral Beliefs, Normative Beliefs, and Control Beliefs were utilized. The regression analysis revealed the variables under consideration explained 38% of the variance in the frequency of heavy episodic drinking. Perceived Behavioral Control and positive Control Beliefs were the only significant independent predictors (13).

Conversely, in a series of three studies with undergraduates, Trafimow found that Attitude Toward the Behavior was a better predictor of drinking Intentions than Subjective Norms or Perceived Behavioral Control (14). Among other studies concerning college students and alcohol use, the TPB did not significantly add predictive powers above and beyond the TRA (15). Furthermore, Johnston and White
studied first-year female undergraduate students enrolled in an introductory psychology class at a large Australian university. Their results indicated only three statistically significant measures predicted high-risk drinking, including Beliefs about the costs associated with high-risk drinking (having a hangover feeling sick, damaging health, behaving embarrassingly), Evaluation of the Benefits of drinking (relaxing/unwinding, having fun/socializing, reducing inhibitions), and Normative Beliefs (how key referents think about engaging in high-risk drinking). In this study perceived control was not statistically significant (16).

While these studies indicate that the TPB represents an appropriate model for examining drinking patterns, the literature conveys less clarity on the extent to which Perceived Behavioral Control influences high-risk drinking behavior among college students. There are also discrepancies concerning whether Attitude Toward the Behavior or Subjective Norm represents the most powerful construct in predicting Behavioral Intention with this population and behavior. These disparate results are at least partly due to the use of different questionnaires, items, and methods to investigate very similar constructs, behavior, and population groups.

The purposes of this study were to ascertain the extent to which the TPB predicts alcohol use among college students on game day, and determine the causal relationships among the TPB variables. In addition to enhancing the limited body of knowledge in this area, the results of this study can assist campus communities in efforts to design effective interventions to prevent negative consequences of problem drinking for their students.

Methods Procedures
The Game Day Survey, approved by the University’s Institutional Review Board, was administered on November 20, 2006, the Monday after the final home football game of the season. The population for this cross-sectional research design included students enrolled at a large university in the southeast. The registrar provided a randomly selected list of e-mail addresses for 2,083 students ages 18-24. Participants received a pre-notification message one week prior to the survey implementation date and three follow up reminders in weekly increments. Participants reviewed the informed consent process and voluntarily accepted the terms before logging onto the survey. The first three, middle three, and last three students completing the incentive protocol received a $50.00 gift card to the campus bookstore. A total of 740 students responded to the anonymous electronic survey, yielding a response rate of 36%.

Participants
Table 1 contains demographic data for the participants as well as for the overall student population. Of the respondents, the majority were Caucasian (73.6%), followed by Hispanic or Latino (11.6%), Asian or Pacific Islander (6.9%), African-American (6.2%), American Indian/Alaskan Native (0.3%), and other ethnic groups (1.4%). Students were broadly distributed by grade classification (20.4% freshmen, 18.9% sophomore, 23.2% juniors, 27.2% seniors, and 10.2% graduate/professional students), and except for a fraternity or sorority (referred to as part of the campus “Greek” system). The mean age of the sample was 20.30 years (SD= 1.66), with ages ranging from 18-24 years. The sample demographics corresponded to the overall student demographic population with the exception of a slight overrepresentation of females and Caucasians.

In terms of the game day habits of college students, approximately four out of five (80.1%) participants attended at least one home game during the 2006 college football season. The overall average number of drinks consumed on game day equaled 3.9 (SD= 6.06). Finally, while participants on average spent two and a half (2.55; SD=3.25) hours drinking on game day, one in five (21.4%) participants reported drinking for five or more hours.

Measures
In this study multiple variables from the Theory of Planned Behavior (TPB) were developed using the protocol designed by Ajzen and Fishbein (7). The alcohol consumption items were modified and adapted from the standardized Core Alcohol and Drug Survey Long Form developed by Presley and colleagues (17). The Game Day Survey was reviewed by a panel of experts including a college health promotion specialist, a student affairs administrator, an alcohol and drug researcher, and a distinguished professor in the college of pharmacy. Researchers pilot tested the Game Day Survey numerous times (18,8). This study describes the results from the third iteration of the instrument.

A test-retest assessment and Cronbach’s Alpha analysis were conducted to determine the reliability of the Game Day Survey items. Overall, the test-retest results for the alcohol consumption items indicated good reliability, yielding an average of 0.77. The test-retest reliability of TPB measures was also good, yielding an average of 0.88. The internal consistency values of the scales were acceptable, ranging from good to excellent (19). The alcohol consumption reliability coefficients scale was 0.86, and the TPB scale was 0.84.

The 55 TPB survey items were developed based on a review of the literature (11, 13, 14, 20). Six items appraised Behavioral Beliefs, six items measured Evaluation of Behavioral Outcomes, six items measured Normative Beliefs, six items assessed Motivation to Comply, six items gauged Control Beliefs, six items
measured Perceived Power, and four items determined Behavioral Intention. For example, a Behavioral Belief item asked participants to indicate the likelihood that "I would have more fun if I got drunk on game day." All response options were on a seven point Likert-type scale. The alcohol consumption questions were measured by asking how many alcoholic beverages they typically consume on game day.

**Analysis**

Survey Monkey, a commercial internet survey software program, was used to collect the Game Day Survey data. Data were subsequently entered into SPSS (Statistical Package for the Social Sciences) version 14.0. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were conducted to describe the sample. All TPB items were coded 3 to -3 except the Motivation to Comply (PBC) construct (which does not enhance model fit). The simpler TRA model sufficiently reproduces the composite measures of the TPB constructs: Subjective Norm, Attitude Toward the Behavior, Perceived Behavioral Control, and Behavioral Intention. Consistent with a path analysis the following goodness-of-fit indices were calculated: Chi-square, Standardized Root Mean Square Residual (SRMR), relative fit index (RFI), Comparative Fit Index (CFI), and Root Mean Square Error of Approximation (RMSEA). To correctly utilize the TPB, Ajzen and Fishbein (7) recommend that each indirect measure be multiplied by its corresponding item in the complimentary indirect scale, and then those products should be summed together to create a composite version of the direct measure. This modeling technique served to determine whether the pattern of inter-correlations among the variables is consistent with the TPB as it relates to alcohol consumption on game day.

**Results**

**Table 2** illustrates the goodness-of-fit measures were acceptable. Although the conservative Chi-square test of model fit was statistically significant, \( \chi^2 (2) = 18.352, p < 0.001 \) the Standardized Root Mean Square Residual (SRMR) of 0.036, the relative fit index (RFI) of 0.844, and the Comparative Fit Index (CFI) of 0.972 fall all within the acceptable ranges for their respective indices (21). Since the Root Mean Square Error of Approximation (RMSEA) is a goodness-of-fit index with a known statistical distribution, the calculated value yields a p-value and a confidence interval for the population RMSEA. Hair and colleagues recommend an RMSEA less than .08 for studies with fewer than 13 observed variables and fewer than 250 observations. This analysis yielded an RMSEA of 0.161, \( p < 0.001 \) with a 90% confidence interval of (0.099, 0.223) suggesting an inadequate model fit. While the high RMSEA value warrants caution when interpreting the results from the path analysis, goodness-of-fit measures may vary from acceptable to unacceptable depending on the index used (21). Overall, the goodness-of-fit measures indicate that the TPB model represents an acceptable model for explaining alcohol consumption on game day.

**Figure 1** illustrates the standardized causal links between the TPB variables when used to predict alcohol consumption among college students on game day. In the path analysis, correlations between variables are represented by double headed arrows, and a straight line with a single arrowhead denotes a direct causal effect (22). There was a modest correlation between Attitude Toward the Behavior and Subjective Norm (\( r = 0.51, p < 0.001 \)) (19), but there were no statistically significant correlations found between PBC and the other TPB constructs. Further, intentions (Behavioral Intention) to drink alcohol on game day predicted actual behavior (\( R^2 = 0.52 \)) with a standardized path coefficient of 0.72 (\( p < 0.001 \)). Intentions, in turn, were predicted by Attitude Toward the Behavior and Subjective Norm constructs (\( R^2 = 0.54 \)), with standardized path coefficients of 0.39 (\( p < 0.001 \)) and 0.46 (\( p < 0.001 \)), respectively. In general, positive expectancies concerning alcohol use (Attitude Toward the Behavior) and perceived acceptance of drinking (Subjective Norms) predicted intentions (Behavioral Intention) to drink alcohol on game day. The path analysis indicated that Perceived Behavioral Control (PBC) did not elicit any statistically significant path coefficients between Behavioral Intentions or the behavior (number of drinks consumed on game day).

**Table 3** provides information on the direct and indirect effects on Behavioral Intent and behavior (number of drinks consumed on game day). The indirect effects on the number of drinks consumed from the constructs Attitude Toward the Behavior and Subjective Norm were significant (\( p < 0.001 \)) 0.278 and 0.350, respectively. Behavioral Intention served as the strongest predictor for the number of drinks consumed on game day and mediated the impact of the other constructs to some extent. In summary, Attitude Toward the Behavior and Subjective Norm contributed significantly to the explanatory capacity of the TPB model, while the Perceived Behavioral Control construct failed to elicit any statistically significant direct or indirect effects.

The path coefficients do not change when the PBC construct is removed from the TPB, nor do the goodness-of-fit measures vary substantially. The original Theory of Reasoned Action (TRA) does not include the PBC construct, thus its removal has precedent. A Chi-square difference test was conducted between the TPB and the TRA path analyses to determine the extent to which these two models differ. The results were not statistically significant, \( \chi^2(5) = 906, p = 0.97 \), indicating the more complex model (TPB with PBC construct) does not enhance model fit. The simpler TRA model sufficiently reproduces the observed correlations. Thus, the TRA constitutes a more parsimonious model for explaining alcohol consumption on game day.
Discussion

We examined college student alcohol consumption on "game day" at a large university in the southeast to enhance our limited understanding of this pervasive public health issue. The Theory of Planned Behavior (TPB) was employed to gain insight on the motivational factors associated with college student alcohol consumption on game day in an attempt to guide future prevention efforts. A multivariate analysis was conducted to predict alcohol use among college students on game day to determine which, if any, of the TPB constructs to utilize when designing interventions to decrease high-risk drinking by college students.

The results of the path analysis indicate that the original Theory of Reasoned Action (TRA) model may provide a better model than its extension, the Theory of Planned Behavior (TPB), for explaining alcohol consumption on game day. Behavioral Intention to get drunk on game day predicted drinking behavior. Intentions, in turn, were predicted by Attitude Toward the Behavior and Subjective Norm constructs. The Perceived Behavioral Control construct was not predictive of Behavioral Intention or self-reported drinking behavior on game day, as the TPB model suggests.

These findings are consistent with the research of O’Callaghan and colleagues who found that Perceived Behavioral Control (PBC) was not predictive of college students’ intentions to drink alcohol or of their drinking behavior. The authors speculated that because most of the participants in their study were non-problem drinkers, they experienced high perceived control over their drinking. Thus while a substantial percentage of their sample intended to drink alcohol, they perceived their alcohol consumption to be within their control (15). This may explain why the PBC failed to elicit a significant influence in their research or in the present study. For these reasons, the TPB may be less applicable than other behavioral theories in alcohol research with college students.

The items used to assess the PBC construct may provide another possible explanation for its lack of statistical significance in the current study. Accurately assessing the PBC construct remains a challenge for researchers. A meta-analysis revealed that only a limited number of studies demonstrated a significant relationship between PBC and Behavioral Intention (8). As Reinecke, Schmidt, and Ajzen found, controlling for Behavioral Intention weakens the statistical support for the PBC construct (23).

Interpreting the findings from this investigation requires theoretical considerations as well. A weakness of the TPB is the underlying assumption that behavior follows a linear course of action. However, behavior optimizes a dynamic, extremely complex phenomenon (24). Certain predictive factors are not included in the TPB. For example, the theory does not address past behavior, which serves as a strong predictor of alcohol use among college students (15). One’s attitude toward drinking may be based more on past drinking experiences than on future expectations concerning alcohol use. Perhaps it is more likely that one’s past alcohol use creates the foundation for future alcohol expectancies. A similar pattern emerges with the construct Perceived Behavioral Control. One’s previous performance of a behavior likely influences perception of personal control over the behavior, unlike the notion that Perceived Behavioral Control merely influences behavioral intention and behavior (25).

Behavioral Intentions may change or evolve as students drink on game day. For instance, a student may intend to drink in moderation on game day, but as the individual consumes more and more alcohol, situational cues for behavior become more salient. The pleasure of the drug, the excitement of the game, and the immediate influence of one’s peers may shift the individual’s Behavioral Intentions and, as a result, the behavior changes as well. A respondent’s attitude, perceived acceptance of drinking, control of alcohol use, and intentions may fluctuate throughout the drinking encounter. In short, beliefs and attitudes are likely to shift before, during, and after the drinking experience. The present study, based on a simple linear model, measures the causal sequence after the entire episode and thus fails to address potential fluctuations in attitudes, beliefs, and behavior. Obtaining such information would shed additional insight into the complex and dynamic factors which influence behavior.

Finally, while the TPB allows researchers to measure systematically the role of factors perceived by respondents to be salient in their intentions and behaviors, it does not necessarily mean those perceptions are accurate. Cognitive biases among participants may result in an under- or overestimation of what truly motivates their behavior (26). For example, several key external factors may influence alcohol use on game day. The presence of law enforcement, the cost of alcohol, and the opportunity to tailgate may all impact behavior much more than respondents realize or are willing to admit. Creating interventions designed to change behavior based on respondents’ perceptions may not be optimally effective. While the Game Day Survey included items which measured participants’ perceptions, future studies should include an objective environmental assessment that more accurately measures the external influences mentioned above.

Limitations

This study has several limitations. First, self-reported data may include recall bias given that participants do not always report their behaviors or respond to questions accurately (19). Second, the modest response rate of 36% obtained for this survey may not be reflective of all students at the school; although, the sample matched the overall student population with the exception of a slight overrepresentation of females and Caucasians. Third, the large sample size may have contributed to Type II error, yielding a statistically significant Chi-square (n=316) value, suggesting poor model fit. However, when conducting a path analysis with a large sample, it is not uncommon for the Chi-square goodness-of-fit measure to be statistically significant, because the test is very sensitive to sample size (27). Fourth, the count data used
for the endogenous variable (number of drinks consumed on game day) resulted in a substantial number of abstainers and low-end drinkers, creating a positively skewed distribution, which may have contributed to the high Root Mean Square Error of Approximation value. The high RMSEA value warrants caution when interpreting the results from the path analysis, though these goodness-of-fit measures may vary from acceptable to unacceptable depending on the index used (21). Fourth, this sample was drawn from a large public university in the southeastern United States, with a staunch reputation as one of the preeminent football programs in the country as well as a standing of a "top party" school. Geographic and demographic differences may have revealed drinking patterns not representative of those at other universities. In addition, drinking rates change over time and are related to variables such as the football team's schedule (opponent), the time of day the games are played, the team's ranking, the school's football conference, the school's football history, and the weather. Fifth, the cross-sectional design employed for this study limits inferences concerning causality. It is not possible to assess whether TPB constructs (alcohol beliefs, attitudes, norms, and perceived control) lead to alcohol consumption on game day or whether previous drinking experiences influence TPB constructs. Causal relationships can only be established by using an experimental design (28).

Conclusions
To date, this is the first study to utilize a health behavior theory to examine game day drinking. The results from this exploratory study suggest that the TRA is a useful model for explaining alcohol consumption among college students on game day, while leaving in question the applicability of its extension, the TPB. Additional research with more effective PBC measures is needed before definitive statements can be made concerning the TPB's applicability in predicting college student alcohol consumption on game day.

The TRA model demonstrates a considerable degree of success in predicting alcohol consumption and in predicting Behavioral Intention in particular. The TRA's demonstrated parsimony and utility warrant its consideration when developing game day interventions. Thus prevention efforts should (a) focus on persuading students to set limits for themselves concerning their alcohol consumption on game day, (b) create attitudes and beliefs which are inconsistent with excessive alcohol consumption, and (c) highlight peer disapproval of inappropriate drinking behavior.

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References


