

Three Studies on Drinking Game Behavior among College Students

by

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Abstract

The majority of college students consume alcohol. Some college students consume heavily and these abusive patterns of alcohol use can be associated with substantial negative consequences. Drinking game participation has increased in popularity among college students and is associated with high levels of alcohol consumption and an increased likelihood of incurring alcohol-related problems. A review of the literature provided suggestions for future research that could aid in understanding how drinking game participation contributes to high-risk or problematic alcohol consumption and served to inform the three studies conducted to examine drinking game behavior among college students.

Study one was conducted in order to obtain self-report data on the prevalence of drinking game participation among undergraduate students attending National Alcohol Screening Day. A large percentage of the sample for Study 1 reported lifetime and recent drinking game participation. Males were more likely to report recent participation and reported higher levels of consumption while playing drinking games. Drinking game participants were more likely to experience a range of alcohol-related problems, and the relationship between drinking game participation and alcohol-related problems was mediated by weekly alcohol consumption. Study two was conducted in order to develop and implement a laboratory-based Simulated Drinking Game Procedure to study risky alcohol consumption levels while participating in drinking games. Results of Study 2 indicated that participation in beer pong can lead to rapid consumption of alcohol and an associated rise in Blood Alcohol Concentration (BAC), with particularly high

risk associated with singles matches during which participants achieved average BAC's well over the legal limit after just 20 minutes of play. Results also highlighted additional risks for female participants associated with participation in drinking games. Study three was conducted in order to extend the Simulated Drinking Game Procedure to examine alcohol consumption across different types of drinking games. Results indicated that consumption levels and estimated BAC vary by game type and that females obtained consistently higher BACs than males in each game type played. Evaluation of the results of these three studies may serve to inform future research in this area.

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Chapter One: Drinking Game Behavior among College Students

College student alcohol consumption is prevalent and related to a range of alcohol-related negative consequences. The current review examines the literature on college student drinking game participation, an identified environmental context that appears to predict high-risk alcohol use among college students and increase the likelihood of experiencing negative alcohol-related consequences. Limitations of the literature area and future directions for research were identified that served to inform the three studies conducted. Each study is presented with a review of relevant background literature and a discussion of the limitations and future directions that are specific to the study. A comprehensive discussion section follows the presentation of the three studies that may serve to inform future research in this area.

Prevalence and Patterns of College Student Alcohol Consumption

The majority of college students consume alcohol. Multiple studies have concluded that four out of five college students consume alcohol (O'Malley & Johnson, 2002; Knight et al., 2002; Wechsler et al., 2002; Wechsler et al., 2003). When alcohol is consumed at a low to moderate level, the drinker does not typically incur significant alcohol-related consequences. Elevated levels of alcohol use can, however, be associated with substantial negative consequences for the drinker and for those in their environment.

Two out of five college students engage in heavy episodic alcohol consumption, or binge drinking (O'Malley & Johnson, 2002; Wechsler, Lee, Kuo, & Lee, 2000; Wechsler et al., 2002; Wechsler et al., 2003). Binge drinking is a common problem on most college campuses and is

linked to increases in alcohol-related problems and an increased tolerance to alcohol, which may be indicative of alcohol abuse or dependence. Wechsler, Davenport, Dowdall, Moeykens, and Castillo (1994) defined binge drinking as consuming an amount of alcohol that is large enough to place the drinker at an elevated risk of suffering negative alcohol-related consequences and to place others in their environment at a higher risk of suffering secondhand effects of the alcohol consumption. Binge drinking has also been defined as the consumption of five or more consecutive standard alcoholic beverages for a male or the consumption of four or more consecutive standard alcoholic beverages for a female (Wechsler & Isaac, 1992). This definition has been criticized as vague, as it does not take into account factors such as weight, typical drinking pattern, and time course of consumption. Despite these flaws, the “5/4 drink” definition of binge drinking has been used in many large-scale studies on college student alcohol use (i.e. O’Malley & Johnston) and in the majority of articles reviewed in this document. As such, when binge drinking is referenced this is the definition that will be used. The frequency of binge drinking, as defined above, has emerged as a significant predictor of alcohol-related consequences (Borsari, Neal, Collins, & Carey, 2001), which highlights the need for interventions for college students that address the frequency of binge drinking episodes and the related negative consequences.

The 1993 Harvard School of Public Health College Alcohol Study (CAS; Wechsler et al., 1994) surveyed students at 140 colleges and universities in the United States in an effort to gather nationwide prevalence data on college student drinking patterns. Results of this study indicated that 15.6% of college students abstain from alcohol, 40.3% of students consume alcohol at a moderate level, 24.6% of students reported occasional heavy episodic alcohol use, and 19.5% reported frequent heavy episodic alcohol use. Wechsler et al. (1994) defined frequent

heavy episodic alcohol use as three or more occasions of heavy episodic drinking, or binge drinking, over the most recent two-week period. This elevated quantity and frequency of alcohol use is typically predictive of an increased risk of incurring alcohol-related negative consequences.

Alcohol-related Consequences for College Student Alcohol Users

There are many short-term alcohol-related consequences for college students, ranging in severity from relatively low levels of alcohol-related problems to severe levels of alcohol-related problems. Psychosocial disruptions are often indicative of low levels of alcohol-related problems, whereas consequences such as low-level health problems, attempts to regulate or control drinking behavior, and psychosocial consequences that impact others directly may be indicative of a more moderate level of alcohol-related problems (Neal, Corbin, & Fromme, 2006). Severe levels of alcohol-related problems are typically characterized by dependence symptoms such as withdrawal, reliance on alcohol to facilitate interactions, excessive alcohol-related behavior, interventions about alcohol use by friends or family members, and legal problems (Neal et al., 2006). This continuum of alcohol-related problems appears to be consistent across a variety of measures of alcohol-related consequences (Kahler, Strong, Read, Palfai, & Wood, 2004; Neal et al., 2006). The majority of the literature to be examined for the purposes of this research proposal focuses exclusively on the short-term effects of college student alcohol use and participation in drinking games; therefore, these short-term effects will be the predominant focus.

The acute anxiolytic effects of alcohol may also increase the risk of certain problems by reducing anxiety-related behavioral inhibition (Caldwell, Wallace, & Taylor, 2004). When under the influence of alcohol, individuals may be more likely to engage in behaviors that present

significant health risks, such as: smoking, unprotected sex, driving while under the influence of alcohol, and polysubstance use (Caldwell et al., 2004). In addition to the behavioral disinhibition related to health risks, individuals may also be more likely to engage in socially unacceptable behavior, such as: acts of aggression, violence, and antisocial behavior (Caldwell et al., 2004).

In addition to these short-term consequences of elevated alcohol consumption levels, many long-term risks of alcohol use are also present. Chronic alcohol use leads to tolerance, or decreased responding to alcohol after repeated exposure, and dependence, or a developed need for alcohol as a result of prolonged use (Meyer & Quenzer, 2005). This physical dependence may lead to severe withdrawal symptoms when alcohol use is terminated. Additionally, chronic alcohol use affects multiple organ systems. Chronic alcohol use causes changes in the brain to occur, such as: enlarged ventricles, smaller overall brain mass, personality changes caused by shrinkage of tissue in the frontal lobe, memory disturbances caused by shrinkage of tissue in the medial temporal lobe structures, and deficits in coordination caused by cerebellar loss (Meyer & Quenzer, 2005). In the cardiovascular system, chronic alcohol use has been correlated with high blood pressure, stroke, and enlargement of cardiac muscle tissue, and within the reproductive systems chronic alcohol use may cause reduced sperm production and impotence in males and disruptions in ovarian functioning and a higher likelihood of developing menstrual disorders in females (Meyer & Quenzer, 2005). Chronic alcohol use is also associated with several liver disorders, including: fatty liver, alcoholic hepatitis, and alcoholic cirrhosis (Meyer & Quenzer, 2005). These long-term consequences of chronic alcohol use have not been the focus of the early literature on environmental predictors of college student drinking such as drinking game participation; however, the severity of these consequences highlights a need for additional research in this area. Given the potential severity of alcohol related consequences, and the link

between binge drinking and negative consequences, it is important to identify variables and environmental contexts that may facilitate binge drinking and increase the risk of alcohol-related consequences.

Review of the Literature on Drinking Game Participation

In a college environment, there are many occasions that appear to foster elevated alcohol consumption levels. These include alcohol use on the twenty-first birthday, drinking while watching collegiate sporting events or tailgating, Spring Break alcohol consumption, and participation in drinking games (Adams & Nagoshi, 1999; Josiam, Hobson, Dietrich, & Smeaton, 1998; Neal, Sugarman, Hustad, Caska, & Carey, 2005; Neighbors, Oster-Aaland, Bergstrom, & Lewis, 2006). Drinking games reportedly facilitate relaxation and disinhibition, enhance enjoyment of celebratory events, allow college students the opportunity to fit in with peer-aged individuals, and facilitate sexual contact (Johnson, Hamilton, & Sheets, 1999). The majority of drinking games are structured to ensure that all participants will become intoxicated within a short period of time. Drinking games are often organized around rules that ensure that participants will consume higher amounts of alcohol than is typical or intended. Those individuals who choose not to drink during a game are frequently subject to heckling and the disapproval of their peers (Borsari, 2004), and as such the pressure to drink large quantities of alcohol is quite high during drinking game participation (Green & Grider, 1990).

Drinking games have progressively increased in popularity over the past decade. Douglas (1987) reported that the drinking game subculture is on the rise in college and university settings, with increases in the number of games in existence, variety of games available, and frequency of game play compared to past decades. Entire vocabularies have been developed to describe participation in these drinking games, which suggests that drinking games have become a social

institution in the college student lifestyle (Adams & Nagoshi, 1999). Due to the increased alcohol-related risks associated with the high levels of alcohol consumed during these games, this environmental context has been the focus of several recent studies. College students who participate in drinking games while in an alcohol consumption setting will typically consume more alcohol than those individuals in the same setting who choose not to participate in drinking games (Pederson, 1990). This may be due to what Green and Grider (1990) referred to as a reversal of competence. Often drinking game participants consume more alcohol than originally intended due to alcohol impairment that affects their ability to follow the rules of the game, perform verbal or motor tasks, or self-regulate their alcohol intake.

Prevalence, Patterns and Consequences of Alcohol Consumption during Drinking Game Participation

Participation in drinking games is more prevalent in first and second year college students than more advanced students, and most of these first and second year students are under the legal age to consume alcohol (Adams & Nagoshi, 1999; Douglas, 1987; Newman, Crawford, & Nellis, 1991). Drinking games are an important factor in the socialization of first year college students into heavy, episodic alcohol use (Adams & Nagoshi, 1999). This finding may be due in part to the inaccurate normative assumptions that entering college students have about alcohol use and drinking game participation in the college environment. Adams and Nagoshi (1999) reported that college students under the age of nineteen reported significantly higher frequency of drinking game participation than college students age nineteen or older; however, college students age nineteen or older reported a higher quantity of alcohol consumed on occasions that they participated in drinking games.

Multiple studies indicate that between fifty percent and sixty-two percent of college students report recent participation in drinking games (Johnson, Wendel, & Hamilton, 1998; Nagoshi, Wood, Cote, & Abbit, 1994). Frequency and quantity of alcohol use have been reported to be a significant predictor of drinking game participation (Borsari, Bergen-Cico, & Carey, 2003), and thus college students who report a high frequency and quantity of typical alcohol consumption will likely report a high frequency of drinking game participation and consume high quantities of alcohol while participating. Engs and Hanson (1993) found that 66% of light drinkers and 94% of heavy drinkers participated in drinking games at least once during the previous 12 months. College students who participate in drinking games are also at a higher risk of experiencing negative alcohol-related consequences (Adams & Nagoshi, 1999; Johnson & Cropsey, 2000). A study conducted by Johnson et al. (1998) indicated that negative alcohol-related consequences such as missed classes, hangovers, sexually abusive behavior, and physical altercations are significantly associated with drinking game participation in college students.

Types of Drinking Games

As previously noted, drinking games share common features that lead to increased alcohol consumption and increased risk for a range of alcohol-related problems; however, several distinct categories of drinking games have emerged as these games increase in popularity. Borsari (2004) reported that drinking games are classified into six categories: motor skill games, cognitive skill games, gambling games, media games, team games, and consumption games. What follows is a brief discussion of the specific features of the various types of drinking games.

Motor skill games. Motor skill games require that participants perform a motor skill task, and the failure to complete the task adequately results in being forced to drink a predetermined

amount of alcohol (Borsari, 2004). A commonly played motor skill game is Quarters, which requires the player to bounce a quarter into a shot glass within a predetermined amount of time in order to avoid a drinking penalty (Griscom, Rand, Johnson, & Rand, 1988). A second popular motor skills game is Beer Pong, which is played using a ping-pong table with 6-10 sixteen ounce cups of beer arranged in a triangle at each end of the table. Each cup contains between four and twelve ounces of beer, depending on the rules determined by the players. Players take turns attempting to accurately toss a ping-pong ball into the opposing players' cups. When a ball goes in, the opposing team must drink the contents and remove the cup from the table. The team that has all cups removed from the table first loses the game and has consumed between 24 and 120 ounces of beer in the process (Griscom et al., 1988). These games require motor coordination and accurate aim, which become impaired as the players become intoxicated resulting in additional penalty drinks.

Cognitive skill games. Cognitive skills games typically involve the performance of various verbal or memory tasks, and players that are unable to perform the tasks are required to drink. Verbal skill games require that participants repeat phrases or sequences of words that increase in difficulty as the game progresses and individuals become more intoxicated (Borsari, 2004). A commonly played verbal skill game is Buzz, which requires players take turns counting up from one and replace the number seven, the number eleven, any number that is a multiple of seven and eleven, and numbers containing a seven with the word 'buzz' which causes the direction of the game play to reverse (Griscom et al., 1988). Similarly, memory skill games require that participants hold and retain information in order to perform recall tasks. For example, Memory involves players turning over two cards from a face down pile and trying to make a match (i.e. a six and a six). If the participant is successful they get to select another

player to drink. If the participant is unsuccessful, then they are required to take a drink themselves. Any mistake made in a verbal or memory skill game requires each game player to drink a predetermined amount of alcohol. This game requires concentration and automaticity that become impaired as the participants become intoxicated, thus resulting in additional penalty drinks for all players.

Gambling games. Gambling games typically employ playing cards or dice to determine the amount that each participant must drink (Borsari, 2004). Because a game of chance provides an equal probability of winning for all participants regardless of skill or level or intoxication, these games are very popular among college students. A commonly played gambling game is Three Man, in which the players take turns rolling two dice while adhering to rules about what happens when particular combinations of numbers are rolled. The Three Man is commonly the player who becomes intoxicated at the most rapid rate, since the rules of the game dictate that this player drinks the most frequently. The role of Three Man may be passed to another player by rolling a three (or a die combination totaling three). These types of games result in rapid intoxication of all players regardless of skill level.

Media games. Media games center around words or phrases in television programs, movies, or song lyrics (Borsari, 2004). Each time the word or phrase is heard, all players must consume a predetermined amount of alcohol. Penalty drinks may be assigned if a player misses a drinking cue. Many of these media games result in players consuming a high number of drinks over a short period, thus resulting in the rapid intoxication of all players.

Team games. Team games typically consist of two or more teams that compete to determine the amount of alcohol that the losing team will have to consume (Borsari, 2004). These games typically are speed-based and can result in many alcoholic drinks being consumed

in a short amount of time for the members of the losing team, which will impair them in future rounds. Some of the previously described games, like Beer Pong, are often played with teams. Thus, like motor skill games, some team games require motor coordination and accurate aim, which become impaired as the players become intoxicated.

Consumption games. Consumption games typically require participants to drink as much alcohol as possible in a predetermined amount of time or in a predetermined style (Borsari, 2004). A commonly played consumption game is the 100 Minute Club, which requires players to consume a one-ounce shot of beer every minute for one hundred minutes. Successful completion of the 100 Minute Club results in consuming 100 ounces of beer over one hour and forty minutes, and many players are unable to complete the game due to rapid intoxication or nausea (Griscom et al., 1988).

Gender Implications for Drinking Game Participants

While some studies indicate that women may adopt a bystander perspective rather than participate in drinking games (e.g. Rhoads, 1995), several researchers have found that women report frequent drinking game participation. Some findings indicate that female college students do not participate in drinking games as often as their male counterparts (Clapp, Shillington, & Segars, 2000; Engs, Diebold, & Hanson, 1996; Johnson et al., 1998); however, recent findings suggest that male and female college students may participate in drinking games at a similar frequency (e.g., Pedersen & LaBrie, 2006) or that female college students may even participate in drinking games more often than their male counterparts (Borsari et al., 2003). In addition to the similar reported frequency of participation by male and female college students, both populations also report a similar quantity of alcohol consumed (Pedersen & LaBrie, 2006). This finding is troubling because females metabolize alcohol at a slower rate than males, and are

subject to higher levels of impairment and higher blood alcohol concentrations than their male counterparts when consuming an equivalent quantity at an equivalent frequency (NIAAA, 1999).

Despite the similar frequency of drinking game participation and quantity of alcohol consumed while playing reported by both male and female students, female students report more alcohol-related consequences related to their participation in drinking games than male students (Pedersen & LaBrie, 2006). These findings may be due in part to the increased sexual risks for female drinking game participants or a tendency for male players to structure the game so that female players become intoxicated quickly. Johnson and Stahl (2004) reported that some male college students view drinking games as a way to intoxicate women in order to facilitate sexual contact. Abbey (2002) reported that less than five percent of sexual assault victims are males, thus the majority of the literature related to alcohol-related sexual assault in a college environment is focused on college age female victims and college age male perpetrators. In a study of nationally representative survey of college students, fifty-four percent of college age women reported experiencing some form of sexual assault, with fifteen percent of the sample meeting legal criteria for completed rape (Koss, Gidycz, & Wisniewski, 1987). Approximately fifty percent of sexual assaults on college and university campuses are associated with elevated alcohol use by both the perpetrator and the victim (Abbey, 2002).

Zamboanga, Bean, Pietras, and Pabon (2005) reported that female college student involvement in drinking games is based in part on their positive alcohol expectancies. One alcohol expectancy that proved to be predictive of number of drinking games played was the expectancy of “liquid courage,” which Zamboanga et al. (2005) defined as feeling brave or daring after consuming alcoholic beverages. These feelings of disinhibition may be particularly relevant to drinking game play in games that require potentially embarrassing self-disclosure (i.e.

I Never...) or displays of motor skills either individually or within a team (i.e. Beer Pong, Flip Cup, and Quarters). Zamboanga et al. (2005) reported that drinking game participation was associated with substantial alcohol-related problems for female college students, a finding which highlights the potential health risks for female drinking game participants.

Particular types of drinking games have been shown to place female participants at greater risk for incurring alcohol-related consequences (Zamboanga, Leitkowski, Rodriguez, & Cascio, 2006). Initial research by Zamboanga et al. (2006) examined these differences by examining popularity level of different types of drinking games, types of alcoholic beverages typically consumed by type of drinking game played, and the differences in participants' intoxication level by type of drinking game played in a sample of 164 female college students at a women's college. Results indicated that participants who played consumption drinking games reported higher levels of intoxication than those who played other types of drinking games (Zamboanga et al., 2006). This finding indicates that students who play consumption-based drinking games may be at a higher risk to incur alcohol-related health consequences than students who play other types of drinking games.

Zamboanga et al. (2006) also reported that team drinking games and gambling games were the most commonly played drinking games in their sample of female students; however, participants who engaged in team drinking games reported consuming only soft liquor while participants who played gambling games reported consuming both soft and hard liquor. Participants who engaged in gambling games reported higher levels of intoxication than participants who engaged in team games, which is likely due to the consumption of hard liquor in addition to soft liquor while participating in gambling games. Zamboanga et al. (2006) reported that high-risk alcohol use was associated with the use of both soft and hard liquor

during drinking game play, higher rates of drinking game participation, higher levels of alcohol consumption while participating in drinking games, and higher intoxication levels.

Rationale for the Three Studies Conducted

Several research design limitations have been addressed in previous sections; however, some broad limitations of the existing research methodology have been noted during this review of the literature. The prevalence of drinking game participation and patterns of consumption during game play seems to be quite variable in the existing literature and seem to vary by site of data collection. Researchers should collect initial data on the prevalence of drinking game participation and patterns of consumption during game play to verify that these data are consistent with the existing estimates and in order to inform their research design. Additionally, information is needed on various game types in order to determine which games are most commonly played. This preliminary data could provide future research directions on the types of drinking games that would be most relevant to model in a laboratory setting. Study one aims to meet these needs and serves to inform the two subsequent studies presented.

The majority of the research on drinking game participation has been conducted using retrospective self-report data. Research on the reliability and validity of self-report data has demonstrated that respondents may unconsciously distort their results, specifically to questions that they do not have immediate access to, for example the number of times they have consumed alcohol in the past 30 days (Turner, Lessler, & Gfroerer, 1992; Turner & Martin, 1981, 1985). Additionally, conscious distortions may be a problem when asking participants for information about alcohol use due to societal stigmas about high levels of alcohol use. Research that is designed specifically to examine drinking game participation and that utilize alternatives to retrospective self-report data are warranted in order to fully understand the predictive utility of

drinking games and the associated risks for college students. The methodology that seems best suited for examining this specific context is direct laboratory observation as the drinking games are played. This data collection strategy may provide more reliable data on levels of alcohol consumed during these games.

Lab-based Observation of Alcohol Consumption

A lab-based observation of students' alcohol consumption during drinking games could serve to assist researchers in the collection of more reliable alcohol consumption levels. Because of the legal and ethical risks associated with naturalistic observation of alcohol consumption in a bar setting, it is often more feasible for researchers to recreate the drinking environment in a controlled laboratory setting. Collins, Parks, and Marlatt (1985) utilized the Behavioral Alcohol Research Laboratory (BARLAB) to study college student drinking in a controlled laboratory setting that was designed to simulate an actual bar. The BARLAB was designed to measure the effects of social interaction style and modeling effects of consumption on the rate of consumption for 52 male University of Washington fraternity members in a manufactured bar setting. Collins et al. (1985) designed the BARLAB based upon actual bars and taverns, complete with a functional bar, tables, music, and a two-way mirror carefully disguised as a back-bar mirror, which was used for minimizing the presence of research coding procedures. Participants reported that the BARLAB environment was similar to their experience in a real bar, that the social atmosphere was similar to what they had experienced in a real bar, and that their consumption rate was similar to their consumption levels in a real bar (Collins et al., 1985). A bar setting manufactured within a research lab may still be susceptible to concerns about external validity. However, previous research suggests that designing the setting to be as realistic as possible can minimize this concern.

In the current review of the literature, the majority of studies conducted have relied upon self-report instruments as the primary vehicle for data collection. Simulated laboratory designs of drinking environments, such as bars, have proven to be quite effective at gathering real time data on actual alcohol consumption levels (i.e., Collins et al., 1985). Researchers may be better able to assess differences in drinking behavior in the previously examined environmental contexts by directly observing the drinking behavior of college students in simulated environments. This direct observation may serve to minimize the reporting bias and recall inaccuracies associated with the self-report of alcohol consumption. It would seem that observing patterns of alcohol consumption during a drinking game would be one of the more feasible drinking contexts to recreate in a laboratory setting. The aim of study two was to initiate the development of a Simulated Drinking Game Procedure (SDGP), a safe, efficient, and alcohol-free laboratory protocol for studying drinking game behavior. Study three aimed to extend the SDGP to a variety of drinking games in order to obtain comparisons of risk by drinking game type.

Chapter Two: Drinking Game Participation among Undergraduate Students attending National
Alcohol Screening Day (Study 1)

Day-Cameron, J. M., Heidelberg, N., Simmons, L., Lyle, S. B., Mitra-Varma, K., &
Correia, C. J., (Manuscript Submitted for Publication)

Abstract

Drinking game participation has increased in popularity among college students and is associated with increased alcohol consumption and alcohol-related problems. The current study investigated drinking game participation among 133 undergraduates attending National Alcohol Screening Day (NASD) in April of 2007. A large percentage of our sample reported lifetime (77%) and recent (52%) drinking game participation. Males were more likely to report recent participation and reported higher levels of consumption while playing drinking games. Drinking game participants were more likely to experience a range of alcohol-related problems, and the relationship between drinking game participation and alcohol-related problems was mediated by weekly alcohol consumption. These results suggest that drinking game participation is a risk factor for elevated levels of alcohol consumption and alcohol-related problems. Programs should be developed to educate students about the risks of drinking game participation, and prevention programs like NASD should address drinking games.

Drinking Game Participation among Undergraduate Students attending National Alcohol Screening Day (Study 1)

Drinking games have progressively increased in popularity over the past several decades (Borsari, 2004). Douglas (1987) reported that the drinking game subculture is on the rise in college and university settings, with increases in the number of games in existence, variety of games available, and frequency of game play compared to past decades. Entire vocabularies have been developed to describe participation in these drinking games, which suggests that drinking games have become a social institution in the college student lifestyle (Adams & Nagoshi, 1999). The increased popularity of drinking games has led to qualitative and empirical research designed to better understand the social and health-related consequences of drinking games.

Drinking games reportedly facilitate relaxation and disinhibition, enhance enjoyment of celebratory events, allow college students the opportunity to fit in with peer-aged individuals, and facilitate sexual contact (Johnson, Hamilton, & Sheets, 1999). While a variety of drinking games exist, the vast majority are structured to ensure that participants will become intoxicated within a short period of time. Drinking games are often organized around rules ensuring that participants will consume higher amounts of alcohol than is typical or intended. High levels of alcohol consumption during some drinking games may also be facilitated by what Green and Grider (1990) refer to as a reversal of competence, or the fact that alcohol intake and impairment affects a participant's ability to follow the rules and verbal or motor tasks that make up the game, which in turn leads to additional alcohol consumption, greater levels of impairment, and

difficulties self-regulating their alcohol intake. Those participants who choose not to follow the rules or drink during a game are frequently subject to heckling and the disapproval of their peers (Borsari, 2004), and as such the pressure to drink large quantities of alcohol is quite high during drinking game participation (Green & Grider, 1990).

Prevalence and Patterns of Alcohol Consumption during Drinking Game Participation

Multiple studies indicate that between 50% and 62% of college students report recent participation in drinking games (Johnson, Wendell, & Hamilton, 1998; Nagoshi, Wood, Cote & Abbit, 1994). Frequency and quantity of alcohol consumption are significant predictors of drinking game participation (Borsari, Bergen-Cico, & Carey, 2003); thus, college students who report a high frequency and quantity of typical alcohol consumption tend to report a high frequency of drinking game participation and consume high quantities of alcohol while participating. Engs and Hanson (1993) found that 66% of light drinkers and 94% of heavy drinkers participated in drinking games at least once during the previous 12 months. College students who participate in drinking games while in a setting where alcohol is consumed will typically drink more alcohol than those individuals in the same setting who choose not to participate in drinking games (Pedersen, 1990).

Drinking games may be an important factor in the socialization of first year college students into heavy, episodic alcohol use (Adams & Nagoshi, 1999). Participation in drinking games is more prevalent in first and second year college students than more advanced students, and most of these first and second year students are under the legal age for alcohol consumption (Adams & Nagoshi, 1999; Douglas, 1987; Newman, Crawford, & Nellis, 1991). Adams and Nagoshi (1999) reported that college students under the age of nineteen reported significantly higher frequency of drinking game participation than college students age nineteen or older;

however, college students age nineteen or older reported a higher quantity of alcohol consumed on occasions when they participated in drinking games.

College students who participate in drinking games are at a higher risk of experiencing negative alcohol-related consequences (Adams & Nagoshi, 1999; Engs & Hanson, 1993; Johnson & Cropsey, 2000). A study conducted by Johnson et al. (1998) indicated that negative alcohol-related consequences such as missed classes, hangovers, sexually abusive behavior, and physical altercations are significantly associated with drinking game participation in college students. Zamboanga, Leitkowski, Rodriguez, and Cascio (2006) reported that the frequency of drinking game participation, the amount of alcohol consumed while playing, and the type of alcohol beverage consumed were all associated with hazardous alcohol use among female college students. The existing research has not yet investigated the pathways or mechanisms through which drinking game participation increases the severity of alcohol-related problems. For example, it is unclear if drinking game participation increases risk by increasing the amount of alcohol consumed, or if drinking game participation has a unique relationship with alcohol-related problems that is independent of other markers of typical or high-risk alcohol consumption.

Gender Implications for Drinking Game Participants

While some studies indicate that women may adopt a bystander perspective rather than participate in drinking games (Rhoads, 1995), several studies have found that women report frequent drinking game participation. Some findings indicate that female college students do not participate in drinking games as often as their male counterparts (Clapp, Shillington, & Segars, 2000; Engs, Diebold, & Hanson, 1994; Johnson et al., 1998); however, recent findings suggest that male and female college students may participate in drinking games at a similar frequency

(Pederson & LaBrie, 2006) or that female college students may even participate in drinking games more often than their male counterparts (Borsari et al., 2003). In addition to the similarity in the reported frequency of participation by male and female college students, both populations also report a similar quantity of alcohol consumed (Pederson & LaBrie, 2006). This finding is troubling because females metabolize alcohol at a slower rate than males and are subject to higher levels of impairment and higher blood alcohol concentrations than their male counterparts when consuming an equivalent quantity over an equivalent timeframe (NIAAA, 1999).

At least one study found that female students reported more alcohol-related negative consequences associated with their participation in drinking games than male students (Pederson & LaBrie, 2006). This finding may be due in part to the increased sexual risks for female drinking game participants or a tendency for male players to structure the game so that female players become intoxicated quickly. Johnson and Stahl (2004) reported that some male college students view drinking games as a way to intoxicate women in order to facilitate sexual contact. In a nationally representative survey of college students, fifty-four percent of college age women reported experiencing some form of sexual assault, with fifteen percent of the sample experiencing an event that met legal criteria for completed rape (Koss, Gidycz, & Wisniewski, 1987). Approximately fifty percent of sexual assaults on college and university campuses are associated with elevated alcohol use by both the perpetrator and the victim (Abbey, 2002). These findings highlight the potential for drinking game participation to increase the risk of unplanned or unwanted sexual encounters due to high levels of intoxication.

Current Study

Research has indicated that participation in drinking games among college students is associated with increased alcohol consumption and alcohol-related negative consequences. The

present study was designed to study drinking game behavior among a sample of college students presenting for an alcohol assessment and brief feedback session while attending National Alcohol Screening Day (NASD), an event that is designed to raise public awareness about the health-related consequences of drinking. NASD also provides a unique opportunity to identify and intervene with at-risk drinkers (Benson, Ambrose, Mulfinger, & Correia, 2004; Greenfield et al., 1999; Henslee et al., 2006). The study was designed to assess the prevalence and correlates of drinking game participation among a sample of NASD participants. The study also compares the frequency of alcohol related consequences among NASD participants as a function of whether or not they reported recently playing drinking games. Finally, we sought to determine the relative contribution of drinking game participation in the prediction of alcohol-related problems when other markers of typical and high-risk drinking are included in the model. In collecting this data, we hoped to add to a growing literature on drinking game behavior among college students. We also sought to collect specific information about the prevalence of drinking game participation among college students attending NASD, with the goal of determining the suitability of using this type of screening event as a platform for providing education and interventions aimed at decreasing the associated risks of drinking game participation.

Method

Participants

The participants were undergraduate students at a large southeastern university who attended National Alcohol Screening Day activities (n=133) in exchange for extra credit in their courses. Participants were at least 19 years old (68% female, average age 20.0). After completion of normal NASD activities, students were handed a flyer indicating the opportunity to participate in the current research project. The flyer indicated that the study was being conducted in another

room within the clinic where NASD was being held and that participants would receive additional extra credit in exchange for their participation.

Procedures

All study procedures were approved by the university's IRB. NASD participants who expressed an interest in the research study were given an informed consent letter to read, followed by a packet of surveys to be completed anonymously. All participants were also given a referral sheet containing contact information for alcohol-related services in the community.

Measures

General information questionnaire. The demographic information questionnaire included items regarding gender, age, completed education, membership with a Greek organization, ethnicity, race, and current residence. This information was used for descriptive purposes (see Appendix D, Measure 1).

DDQ. The Daily Drinking Questionnaire (DDQ) was used to assess the average quantity of alcohol, as well as the maximum amount of alcohol, participants consumed for each day of the week during the past four weeks (see Appendix D, Measure 2). The DDQ uses an open-ended calendar to assess both average and maximum consumption patterns. We also employed a series of 9 open-ended questions to assess the types of alcohol consumed (i.e., beer, wine, hard liquor, and mixed drink) and the number of episodes of binge drinking in the past 28 days. The DDQ has shown reliability and validity in use with undergraduate college students (Collins, Parks, & Marlatt, 1985).

RAPI. A modified version of the Rutgers Alcohol Problem Index (RAPI) was used to assess negative consequences experienced as a result of alcohol use (see Appendix D, Measure 3). The RAPI is a 23 item, self-report measure that requires participants to respond to statements

based on how many times they have experienced a particular problem in the past month. Responses are indicated using a five-point Likert scale (0=never, 1=1-2 times, 2=3-5 times, 3=6-10 times, 4=more than 10 times). Scores could range from 0 to 92, with higher scores are indicative of more severe alcohol-related problems. Internal consistency has been found to be adequate in previous studies ($r = .77-.82$; White & Labouvie, 1989). Internal reliability in the current study was .87.

Drinking game questionnaire. This 27-item questionnaire was used to assess participation in and drinking behaviors related to drinking games (Borsari & Carey, 2000). Forced choice (e.g., yes-no questions) and open-ended (e.g. “How many times...”) questions were asked regarding lifetime participation, and about various aspects of participation over the last month, including the frequency of participation, the duration of a typical game, types (beer, liquor, wine, or mixed drinks) and quantity of alcohol typically consumed while playing drinking games, the maximum amount of alcohol consumed while playing a drinking game, and the types of drinking games played. This questionnaire divided drinking games into five categories, and offered descriptions and examples of each. These categories included Consumption Games, Skill Games, IQ Games, Unity Games, and Team Games. Participants indicate whether or not they played each type of game, and the number of times they played, over the past 30 days (see Appendix D, Measure 4).

Results

The descriptive data (i.e., mean, standard deviation, minimum, and maximum) for the primary study variables are presented in Table 1-1. Of our sample, 77% reported drinking game participation at least once in their lifetime, and 52% reported playing a drinking game in the last 30 days. Males (62%) were significantly more likely to report recent drinking game participation

than females (42%; $X = 4.67$, $p = .031$). There were differences in the types of games recently played; team games (86%) and skill games (75%) were more popular than unity (28%), consumption (25%), and IQ games (17%). Among the participants who reported recent drinking game participation, males and females did not significantly differ in the frequency of participation in the last month ($M = 4.76$) or in the duration of the games ($M = 2.03$ hours). However, males reported consuming significantly higher amounts of alcohol during a typical occasion of drinking game participation (males = 5.88 vs. females = 3.50, $t = 4.68$, $p < .001$). Males also reported consuming significantly higher maximum amounts of alcohol during an occasion of drinking game participation (males = 7.54, females = 4.79, $t = 3.27$, $p = .002$).

Correlations between drinking game behavior and more general alcohol use variables are presented in Table 1-2. These analyses revealed that the frequency of drinking game participation, the average amount of alcohol consumed while playing drinking games, and the maximum amount of alcohol consumed while player drinking games were all significantly correlated with a range of drinking variables. Most notably, the frequency of drinking game participation and the maximum amount consumed while playing a drinking game were associated with the severity of alcohol related problems.

Additional analyses were conducted to better understand the relationship between drinking game participation and alcohol-related problems. A series of t-test were used to compare participants who reportedly played a drinking game in the last 30 days ($n = 63$) to those who reported recent alcohol consumption but denied playing a drinking game over the last 30 days ($n = 39$) across each of the 23 problems on the RAPI and the total score. As depicted on Table 1-3, participants who reportedly played a drinking game reported higher overall RAPI

scores ($t = 3.52, p = .001$). Participants who reportedly played a drinking game also reported higher frequency on 9 of the 23 RAPI items.

A stepwise regression analysis was also conducted to better assess the relationship between drinking game participation and alcohol-related problems (Table 1-4). The severity of alcohol related problems, as measured by the RAPI, was used as the criterion variable. In step one, gender did not account for a significant amount of variance. In step 2, the frequency of drinking game participation during the past month brought the amount of variance accounted for up to 16%, $F(2, 59) = 5.46, p = .007$. In step three, the addition of the number of drinks consumed during a typical week and the number of binge drinking episodes during the past 28 days brought the amount of variance accounted for up to 28%, $F(4, 57) = 5.56, p = .001$. Drinks consumed during a typical week emerged as the lone significant predictor in the final model. The pattern of bivariate relationships and finding from the regression analyses suggest that the relationship between recent drinking game participation and the severity of alcohol-related problems is mediated by the effects of the number of drinks consumed during a typical week (e.g., frequency of drinking game participation, typical weekly consumption, and binge drinking were all correlated with alcohol-related problems; frequency of drinking game participation was no longer predictive of alcohol-related problems when typical weekly consumption and frequency of binge drinking was entered into the model; see Baron & Kenny, 1986, for description of mediation).

Discussion

Summary of Results

Participation in drinking games has been identified in previous research as a high-risk event that is associated with elevated levels of alcohol use and use-related negative

consequences. The current study was designed to further explore patterns of alcohol consumption and types of drinking games played among students attending National Alcohol Screening Day. Our results indicated that 77% of our sample reported lifetime drinking game participation, and 52% reported more recent drinking game participation. Team games and skill games were the most frequently endorsed type of recently played drinking game. Consistent with previous studies (Adams & Nagoshi, 1999; Johnson et al., 1998; Engs & Hanson, 1993; Johnson & Cropsey, 2000), variables designed to assess drinking game participation were correlated with the severity of alcohol-related problems. Students who attended NASD and reported recent drinking game participation were also more likely to experience specific alcohol-related problems, including difficulties managing responsibilities, interpersonal difficulties, blackouts, and symptoms of alcohol dependence (e.g., tolerance, withdrawal, attempts to control drinking). Drinking game participation did not add unique variance to the prediction of alcohol related problems in our sample. Instead, the results suggested that drinking game participation was indirectly related to alcohol-related problems through increased weekly alcohol consumption. These findings indicate that effective educational efforts and interventions aimed specifically at highlighting the risks associated with drinking game participation and the relationship between drinking game participation and the amount of alcohol consumed may be warranted in order to communicate this elevated risk to college students.

Previous studies have reported mixed findings on potential gender differences in drinking game behavior among college students (Borsari et al., 2003). In our sample of NASD participants, males were more likely than female participants to report recent drinking game participation. While the difference was statistically significant, it is worth noting that over forty percent of our female participants endorsed playing drinking games. Among those participants

who reported playing drinking games over the past 30 days, male and female participants reported equivalent frequency of participation; however, males consumed significantly higher amounts of alcohol during drinking game participation.

Limitations of the Current Study

The results of the current study need to be considered in the context of several potential limitations. First, like most of the existing research on drinking games, our results are based on self-reported behavior. Second, our sample was largely female and Caucasian. Relatedly, all of our participants were offered extra credit in exchange for attending NASD and additional credit for participating in the current study. These factors call into question the likelihood that our sample is representative of students who attend NASD on other campuses, both in terms of demographics and participation in drinking games. Additional research will be needed to obtain a better understanding of the true prevalence of drinking game behavior among students attending events like NASD. However, given our results and the available data on rates of drinking game participation among college students, it seems likely that most campus-based NASD events will attract a significant number of students who play drinking games and are at risk for experiencing the associated negative consequences.

Treatment Implications

Our results suggest that events like National Alcohol Screening Day attract a fairly high percentage of students who participate in drinking games and that the prevalence of drinking game participation among screening day participants is similar to prevalence rates reported in other studies (Borsari et al., 2003). Our findings also indicate that a sizable proportion of both male and female students attending NASD are participating in drinking games, and that their participation is increasing their likelihood of experiencing alcohol related problems. When taken

as a whole, the findings suggest that NASD could be used as a platform to intervene with students who play drinking games, with the goal of increasing their awareness of the risk factors associated with drinking games participation and decreasing the associated harm.

Our study did not investigate the use of specific interventions to reduce the frequency or consequences of drinking game participation. However, previous research on more general approaches to reducing college student drinking can inform the types of interventions that might be applied to drinking games. One of the most widely researched treatment approaches for college student drinkers is the use of personalized feedback (Dimeff, Baer, Kivlahan, & Marlatt, 1999; Walters, 2000). Although the content of the feedback varies across studies, typical components include a summary of the participant's drinking patterns and how their use of alcohol compares to campus or national norms, discussion of negative alcohol-related consequences, didactics (e.g., blood alcohol concentration, calories consumed), and a review of moderation strategies (Walters & Neighbors, 2005). Recent studies suggest that personalized feedback can be successfully incorporated into NASD (Benson et al., 2004; Henslee et al., 2006). Future research is needed to determine if personalized feedback could be specifically tailored to reduce the frequency and negative consequences of drinking game participants among students attending NASD, and among more general groups of students. Although interventions designed to specifically address drinking game behavior have not been developed, at least one study has reported a link between normative beliefs regarding drinking game behavior and actual behavior (Pederson & LaBrie, 2008). These findings suggest including a component that challenges normative beliefs about the prevalence of drinking games into a personalized feedback might be an effective way of reducing actual rates of participation (Borsari & Carey, 2003; Perkins, 2002).

Data on the unique risks drinking games might pose to female students suggests that research on interventions designed specifically for women is also warranted.

Chapter Three: Development of a Simulated Drinking Game Procedure to Study Risky Alcohol

Use (Study 2)

Correia, C. J., & Cameron, J. M., (Manuscript Submitted for Publication)

Abstract

The aim of the current study was to initiate the development of a Simulated Drinking Game Procedure (SDGP), a safe, efficient, and alcohol-free laboratory protocol for studying drinking game behavior. Fifty-two undergraduates completed the SDGP in a laboratory session, where participants played singles and/or doubles games of beer pong. Water was substituted for alcohol in all of the games. The number of drinks consumed during matches and 20-minute play periods were coded during each session and software was used to estimate the peak BAC a participant would achieve if they had consumed actual alcohol while participating in the SDGP. Results indicated that participation in beer pong can lead to rapid consumption of alcohol and an associated rise in BAC, with particularly high risk associated with singles matches during which participants achieved average BAC's well over the legal limit after just 20 minutes of play. Results also highlight additional risks for female participants associated with participation in drinking games.

Development of a Simulated Drinking Game Procedure to Study Risky Alcohol Use (Study 2)

According to a recent National Survey on Drug Use and Health (SAMHSA, 2004), young adults aged 18-25 report higher rates of binge drinking and heavy drinking than any other age group. Each year, approximately 1700 undergraduates at colleges and universities in the United States die as a result of an unintentional alcohol-related injury (Hingson, Heeren, Winter, & Wechsler, 2005). The rate of alcohol-related fatalities, along with the full spectrum of physical and psychological consequences of alcohol use, has led some to declare that alcohol use is the single most serious public health problem confronting American colleges (Ham & Hope, 2003).

Recent studies have focused on environmental contexts that are associated with heavy drinking among college students. Spring break (Smeaton, Josiam, & Dietrich, 1998), tailgating (Neighbors et al., 2006), watching sporting events (Neal et al., 2005), 21st birthdays (Neighbors, Spieker, Oster-Aaland, Lewis, Bergstrom, 2005), pregameing (Borsari et al., 2007) and playing drinking games (Borsari, 2004) have all been identified as potential risk factors for high levels of alcohol consumption and experiencing negative consequences. Drinking games are designed to foster rapid intoxication, and several features of drinking games make it likely that players will consume more alcohol than they normally would or originally intended. These features include rules that dictate rates of consumption, peer pressure to follow the rules, and the ability for players to “assign” other players to drink (Borsari, 2004). Both the desire to become quickly intoxicated and the ability to intoxicate other players for a variety of reasons (e.g., competition,

initiate new players, resolve non-game-related conflicts, facilitate sexual contact) have been routinely identified as important motives for playing drinking games (Johnson & Sheets, 2004).

Multiple studies indicate that between 50% and 62% of college students report recent participation in drinking games (Day-Cameron et al., 2009; Johnson, Wendel, & Hamilton, 1998; Nagoshi, Wood, & Cote, 1994). Frequency and quantity of alcohol consumption are significant predictors of drinking game participation (Borsari, Bergen-Cico, & Carey, 2003; Day-Cameron et al., 2009; Polizzotto, Saw, Tjhung, Chua, & Stockwell, 2007); thus, college students who report a high frequency and quantity of typical alcohol consumption tend to report a high frequency of drinking game participation and consume high quantities of alcohol while participating. Participation in drinking games at a party is also predictive of blood alcohol concentration (Clapp, Min, Shillington, Reed, & Croff, 2008). College students who participate in drinking games are at a higher risk of experiencing negative alcohol-related consequences (Adams & Nagoshi, 1999; Engs & Hanson, 1993; Johnson & Cropsey, 2000; Zamboanga, Leitkowski, Rodriguez, & Cascio, 2006).

Drinking game research has established the various types of drinking games, the prevalence and outcomes of participation, the motives for playing, and some of the associated negative outcomes (Borsari, 2004). However, research on drinking games has relied almost exclusively on retrospective self reports (see Clapp et al., 2008, for a notable exception). Thus, while participants have been asked to recall how much alcohol they consume during occasions on which they participate in a drinking game, no published studies have reported efforts to systematically observe drinking behavior and quantities of liquid consumed during drinking games. The aim of the current study was to initiate the development of a Simulated Drinking Game Procedure (SDGP), a safe, efficient, and alcohol-free laboratory protocol for studying

drinking game behavior. The current report details the procedure and provides estimates on the amount of alcohol consumed and the blood alcohol concentration (BAC) obtained while playing a popular drinking game. Analysis focused on how game parameters and the gender of the participants influenced the estimated alcohol-related outcomes.

Method

Participants

Undergraduates (N = 1020) from a large land-grant university in the southeast were screened through an on-line survey primarily designed to identify potential participants for the laboratory sessions. Survey participants who reported playing Beer Pong at least once during the past 30 days (n = 408) were sent an e-mail inviting them to participate in a single laboratory session during which they would play an alcohol-free version of beer pong. Fifty-two undergraduates signed up for and completed one of the available sessions, with between two and four participants attending each session. Twelve participants (50% female) played both a singles and a doubles game. Forty participants (50% female) played in either a singles (n = 20) or a doubles (n=20) game.

Procedure

All study procedures were approved by the university's IRB. Participants were provided an opportunity to provide informed consent before completing the online survey and again before the laboratory session. All participants were weighed, administered a BAC test to ensure they had not consumed any alcohol prior to the session, provided with a brief overview of the drinking games rules, and then given a 5-minute warm-up period to become accustomed to the gaming table. Participants then took part in the SGDP consisting of an alcohol-free version of Beer Pong. This game was selected because it is popular on college campuses (Borsari, 2004)

and relatively easy to code in terms of liquid consumption. Most standard Beer Pong rules were followed, with the exception that water was used instead of beer. Games were played on a regulation-sized table with a set of ten 16 ounce plastic cups filled with 4 ounces of water placed in a triangular pattern at each end of the table. Games were played using either two individual players (“singles game”) or two teams consisting of two players each (“doubles game”). Players took turns “shooting” by attempting to throw a ping-pong ball across the table and into one of their opponent’s cups. If a player’s shot landed in an opponent’s cup, the opponent was instructed to immediately drink the contents of the cup. The cup was then removed from the table and game play continued. The object of the game is to remove all of the cups on the opponent’s side of the table, and thus have them consume the liquid in each cup, before they are able to remove your cups.

Each SDGP game lasted for at least 20 minutes and until a player had won a match (e.g., if a player won in 15 minutes, they started a new match and played for 5 more minutes; if after 20 minutes no player had won a match they continued to play until the end of the match). This allowed for an assessment of how much liquid was consumed during both a typical match (“Match Play”) and during a set period of time (“20 Minutes of Play”).

Data Coding and Analysis

Research assistants were trained to record the number of times a participant was instructed to drink while playing the Simulated Drinking Game Procedure. A commercially available BAC program (DUI Professional Alcohol Analysis software, Version 3.021; Meta Progress, Inc., 1998) was used to estimate the peak BAC a participant would achieve if he or she had consumed actual alcohol while participating in the SDGP. All estimates were based on the participant’s gender, weight, the amount of time each match or gaming period lasted, and the

assumptions that each drink consisted of 4 ounces of light beer and that all participants had consumed a “light meal” before participating in the drinking game.

Results

Analyses were conducted to compare the number of time the rules of the game dictated that each player was to drink the contents of their cup and the resulting estimated BAC as a function of two game parameters (singles vs. double, match play vs. 20 minutes of play) and the gender of the participant. Table 2-1 presents data for the 12 participants who played both a singles and a doubles match. Paired samples t-tests confirmed that participants consumed more drinks and achieved higher estimated BAC's during singles games than during doubles games. This pattern was true for both match play and for the 20-minute game periods. A similar pattern of data was seen when using independent samples t-test to compare the 20 participants who only participated in singles games to the 20 participants who only participated in doubles games. These results are presented in Table 2-2.

Table 2-3 presents an analysis of gender difference for the 40 participants who participated in either a singles or doubles game. Males and females were instructed to consume a similar number of drinks across all gaming conditions. For both the singles and doubles games, females achieved higher estimated BAC's. Differences in BAC were seen for both match play and for the 20-minute game periods.

Discussion

The current study was the first to collect systematic laboratory-based data on drinking game behavior. The study demonstrates how the SDGP can be used to generate estimates of how much alcohol is consumed and the associated obtained BAC during a popular drinking game. The findings suggest that participation in beer pong can lead to rapid consumption of alcohol and

an associated rise in BAC. The level of intoxication was particularly high in singles matches, during which participants achieved average BAC's well over the legal limit after just 20 minutes of play. These results are consistent with previous research identifying drinking games as a high-risk event associated with rapid intoxication and a range of potentially negative outcomes. Our findings also highlight some of the risks associated with drinking games for female participants. Females obtained estimated BAC's that were consistently higher than their male counterparts, despite the fact that both genders consumed similar amounts of alcohol. Our findings are consistent with a previous survey study in suggesting that males and females drink similar amount of alcohol when playing drinking games (Pederson & LaBrie, 2006). The gender differences are interesting in light of research on the reasons why males play drinking games, which include getting other players drunk and increasing the likelihood of having a sexual encounter with other participants (Johnson & Sheets, 2004).

Additional research is needed to verify that our procedure can be used to estimate alcohol consumption across a range of drinking games, especially in light of recent research on the how various drinking games differ in terms of level of intoxication, type of alcohol consumed, and motivation to play (Zamboanga, Calvert, O'Riordan, & McCollum, 2007). It is also worth noting that our assumptions regarding aspects of game play (e.g., four ounces of light beer in each cup, 10 cups per side) and participants (consumed a light meal) impacted our BAC calculations. Variations on the rules ("house rules") could drastically alter the levels of alcohol consumption and the resulting BAC. Our procedure is also limited to analyzing drinking that resulted from following the rules of the game. In actual games, it is likely that some participants refuse drinks that the rules of the game assign to them, whereas others may consume additional

alcohol while playing the games. Research designed to verify the validity of our model and the overall procedure is clearly needed.

The fact that our participants did not consume any alcohol is both a strength and a limitation of the current study. We were able to generate estimates of alcohol consumption and BAC without exposing our participants to any of the risks associated with drinking games, thus making the SDGP appropriate for research with underage drinkers. This feature is particularly relevant given recent research on the prevalence and social functions of drinking games among underage high school and college students (Adams & Nagoshi, 1999; Borsari, Bergen-Cico, & Carey, 2003; Douglas, 1987; Newman, Crawford, & Nellis, 1991).

Despite these strengths, our alcohol free SDGP does not allow us to disentangle how the alcohol-related (e.g., the taste and behavioral effects of alcohol consumption) and alcohol-free (e.g., competition, social interaction) aspects of the game contribute to the overall experience. For example, several games likely involve a “reversal of competence,” which reflects that notion that alcohol intoxication makes it less likely that participants will be able to meet the demands of the game, which leads to further alcohol consumption (Green & Grider, 1990; Borsari, 2004). Actual alcohol consumption is also likely to influence the social dynamics of the game, an important factor for games in which players designate which players have to consume alcohol. In addition to the role of alcohol, future studies should also investigate the role of other social or setting variables. The gender composition of the participants, the presence and behavior of non-players, and the physical environment could all have an impact on the behavior of the drinking game participants. Finally, there are a host of individual difference variables that could be incorporated into laboratory-based research on drinking games, including the drinking and drinking game history of the participants, the personality of the participants, and their motives or

reasons for playing. A program of behavioral research that includes both simulated and actual drinking games and incorporates a range of environmental and individual difference variables will likely be needed to fully understand the appeal, social and affective benefits, and risk of participating in drinking games.

Chapter Four: Estimated Alcohol Consumption and Blood Alcohol Concentration across Three
Types of Drinking Games using the Simulated Drinking Game Procedure (Study 3)

Cameron, J.M., Leon, M., & Correia, C.J. (Manuscript in Preparation)

Abstract

The majority of college students consume alcohol. Some college students consume heavily and these abusive patterns of alcohol use can be associated with substantial negative consequences. A large literature has been devoted to understanding how individual difference variables may predict elevated levels of alcohol consumption and related problems; however, several recent studies have focused on environmental contexts that predict high-risk alcohol consumption, such as participation in drinking games. A review of the literature provided suggestions for future research that could aid in understanding how drinking game participation contributes to high-risk or problematic alcohol consumption and highlighted the need for a laboratory-based study of estimated alcohol consumption levels. An initial laboratory investigation into the Simulated Drinking Game Procedure revealed elevations in estimated BAC during a motor skills game. The present study extended the Simulated Drinking Game Procedure to obtain information about how these drinking games compare across game type in terms of the amount of liquid consumed, the rate of consumption, differences in BAC elevation, and other risks to the participant. Additionally, we examined the role of gender and previous experience in these types of drinking games.

Chapter 4: Estimated Alcohol Consumption and Blood Alcohol Concentration across Three Types of Drinking Games using the Simulated Drinking Game Procedure (Study 3)

Multiple studies indicate that the majority of college students report recent participation in drinking games (Johnson, Wendel, & Hamilton, 1998; Nagoshi, Wood, & Cote, 1994). College students who participate in drinking games are at a higher risk of experiencing negative alcohol-related consequences (Adams & Nagoshi, 1999; Johnson & Cropsey, 2000). The majority of data available on the prevalence of drinking game participation and the consequences of play have been based upon broad categories of drinking games. Recent research examining the specific prevalence and risks of drinking game subtypes have indicated that these games tend to vary in popularity, competitiveness level, intoxication level, duration of game play, and motives for playing (Zamboanga et al., 2006; Zamboanga et al., 2007).

Types of Drinking Games

Borsari (2004) reported that drinking games may be classified into six distinct categories: motor skills, cognitive/verbal skills, gambling/chance, media, team, and consumption. While drinking games share many collective features that lead to elevated alcohol consumption and alcohol-related problems, several distinct categories of drinking games have emerged as these games have increased in popularity. Very little is known about the specific risks by drinking game type, which seems to be an important area of future research as the popularity of these game types may vary by location.

Motor skill games. Motor skill games require that participants perform a motor skill task, and the failure to complete the task adequately results in being forced to drink a predetermined amount of alcohol (Borsari, 2004). A commonly played motor skill game is Beer Pong, which is played using a ping-pong table with 6-10 sixteen ounce cups of beer arranged in a triangle at each end of the table. Each cup contains between four and twelve ounces of beer, depending on the rules determined by the players. Players take turns attempting to accurately toss a ping-pong ball into the opposing players' cups. When a ball goes in, the opposing team must drink the contents and remove the cup from the table. The team that has all cups removed from the table first loses the game and has consumed between 24 and 120 ounces of beer in the process (Griscom, Rand, Johnson, & Rand, 1988). These games require motor coordination and accurate aim, which become impaired as the players become intoxicated resulting in additional penalty drinks.

Cognitive skill games. Cognitive skills games typically involve the performance of various verbal or memory tasks, and players that are unable to perform the tasks are required to drink. Memory skill games require that participants hold and retain information in order to perform recall tasks. For example, Memory involves players turning over two cards from a face down pile and trying to make a match (i.e. a six and a six). If the participant is successful they get to select another player to drink. If the participant is unsuccessful, then they are required to take drink themselves. Any mistake made in a cognitive skill game requires each game player to drink a predetermined amount of alcohol. This game requires concentration and automaticity that become impaired as the participants become intoxicated, thus resulting in additional penalty drinks for all players.

Gambling games. Gambling games typically employ playing cards or dice to determine the amount that each participant must drink (Borsari, 2004). Because a game of chance provides an equal probability of winning for all participants regardless of skill or level or intoxication, these games are very popular among college students. A commonly played gambling game is Three Man, in which the players take turns rolling two dice while adhering to rules about what happens when particular combinations of numbers are rolled. The Three Man is commonly the player who becomes intoxicated at the most rapid rate, since the rules of the game dictate that this player drinks the most frequently. The role of Three Man may be passed to another player by rolling a three (or a die combination totaling three). These types of games result in rapid intoxication of all players regardless of skill level.

Media games. Media games center around words or phrases in television programs, movies, or song lyrics (Borsari, 2004). Each time the word or phrase is heard, all players must consume a predetermined amount of alcohol. Penalty drinks may be assigned if a player misses a drinking cue. Many of these media games result in players consuming a high number of drinks over a short period, thus resulting in the rapid intoxication of all players.

Team games. Team games typically consist of two or more teams that compete to determine the amount of alcohol that the losing team will have to consume (Borsari, 2004). These games typically are speed-based and can result in many alcoholic drinks being consumed in a short amount of time for the members of the losing team, which will impair them in future rounds. Some of the previously described games, like Beer Pong, are often played with teams. These games require motor coordination and accurate aim, which become impaired as the players become intoxicated.

Consumption games. Consumption games typically require participants to drink as much alcohol as possible in a predetermined amount of time or in a predetermined style (Borsari, 2004). A commonly played consumption game is the 100 Minute Club, which requires players to consume a one-ounce shot of beer every minute for one hundred minutes. Successful completion of the 100 Minute Club results in consuming 100 ounces of beer over one hour and forty minutes, and many players are unable to complete the game due to rapid intoxication or nausea (Griscom et al., 1988).

Very little is known about differences between games or specific risks by game type. Existing research in this area has demonstrated that various drinking games may differ in terms of level of intoxication, type of alcohol consumed, and motivation to play (Zamboanga, et al., 2007). Additional studies are warranted that examine the impact that these different types of drinking games can have on alcohol consumption.

Initial Implementation of the Simulated Drinking Game Procedure

In the initial investigation of the Simulated Drinking Game Procedure (Correia et al., manuscript under review), undergraduate participants were screened through an on-line survey, and those who had played drinking games within the past 30 days were invited to take part in an alcohol-free version of beer pong. Beer pong was selected because it has been identified as a popular drinking game among college students, and because the rules lend themselves to standardization and careful observation of drinking behavior. The frequency and quantity of liquid consumption was recorded for 20-minute periods of game play during which players completed at least one doubles or singles match. The number of drinks consumed during each 1-minute interval and the total amount of liquid ounces consumed were recorded for each participant. A commercially available blood alcohol concentration (BAC) program (DUI

Professional Alcohol Analysis software, Version 3.021; Meta Progress, Inc., 1998) was used to estimate the peak BAC a participant would achieve if he or she had consumed actual alcohol while participating in the Simulated Drinking Game Procedure. All estimates accounted for the participant's gender, weight, the amount of time each match or gaming period lasted, and the assumptions that each drink consisted of 4 ounces of light beer and that all participants had consumed a "light meal" before participating in the drinking game.

T-tests confirmed that participants consumed more drinks and achieved higher estimated BAC's during singles games than during doubles games. This pattern was true for both match play and for the 20-minute game periods. A similar pattern of data was seen when comparing the 20 participants who only participated in singles games to the 20 participants who only participated in doubles games. For both the singles and doubles games, females achieved higher estimated BAC's. Differences in BAC were seen for both match play and for the 20-minute game periods.

The study conducted by Correia et al. (2009) was the first to collect systematic laboratory-based data on drinking game behavior. Although still in the preliminary stages, this research demonstrates that the Simulated Drinking Game Procedure can be used to generate estimates of how much alcohol is consumed and the associated obtained BAC during a popular drinking game. Additional research is needed to verify that the SDGP can be used to estimate alcohol consumption across a range of drinking games, especially in light of recent research on the how various drinking games differ in terms of level of intoxication, type of alcohol consumed, and motivation to play (Correia et al., 2009; Zamboanga, Calvert, O'Riordan, & McCollum, 2007). The findings also highlight some of the risks associated with drinking games for female participants. Females obtained estimated BAC's that were consistently higher than

their male counterparts, despite the fact that both genders consumed similar amounts of alcohol. The gender differences are interesting in light of research on the reasons why males play drinking games, which include getting other players drunk and increasing the likelihood of having a sexual encounter with other participants (Johnson & Sheets, 2004). Additional research on the sexual risks of drinking game participation for female college students appears to be warranted given the report of motivation to intoxicate others as a major reason for participation in drinking games for male college students.

Extension of the Simulated Drinking game Procedure to Assess Estimated Alcohol Consumption and Blood Alcohol Concentration across Three Types of Drinking Games

The present study compared estimated alcohol consumption and BAC's across a range of drinking games, which allowed us to understand how the parameters and demands of various games influence patterns of alcohol consumption. Similar to the initial investigation of the Simulated Drinking Game Procedure, we implemented the present study without using actual alcohol so that we are able to generate estimates of alcohol consumption and BAC without exposing our participants to any of the risks associated with drinking games. Participants participated in multiple types of drinking games so that we could obtain comparisons of risk by drinking game type. The games participants played were selected from three popular types of drinking games: motor skill games, cognitive skill games, and gambling games.

The hypotheses for the present study were largely descriptive, which seemed appropriate given the very limited research that has been conducted on college student participation in drinking games and the associated risks. First, we hoped to obtain information about how these drinking games compare across game type in terms of the amount of liquid consumed and differences in BAC elevation. Second, we estimated that female participants would have higher

BACs than male participants in all types of drinking games played, which would highlight additional risks for female drinking game participants. Third, we examined the role of previous experience in these types of drinking games. For example, we examined whether previous experience playing beer pong indicated that the player would drink less over the course of the game. If experience does factor into overall intoxication level, this finding could highlight additional risks for inexperienced players.

Method

Participants

Undergraduates (N = 545) were screened through an on-line survey primarily designed to identify potential participants for the laboratory sessions. The only selection criteria for Phase I of the study was that all participants had to be 19 years or older to participate. In order to participate in Phase II of the study, participants had to report at least one lifetime incidence of drinking game participation, report participation in a drinking game in the past 28 days, and report consumption of at least one alcoholic beverage in the past 28 days. Survey participants who met these criteria (n = 371) were sent an e-mail inviting them to participate in a single laboratory session during which they would play alcohol-free versions of the three drinking games. Ninety-two undergraduates signed up for and completed one of the available sessions, with between eight and twelve participants attending each session. Sixty-two percent (N=57) of the sample was female and forty percent (N=37) of the sample reported affiliation with a Greek social organization.

G-Power software was used to calculate the sample size required to conduct the analyses for Phase II of the present study (Buchner, Erdfelder, & Faul, 1997). The sample size estimate was based on $\alpha = .05$ and a power estimate $\geq .80$ for the proposed three factors repeated

measures ANOVA and regression series. Based on these input variables, we determined that a sample of at least 68 participants would provide adequate power for the ANOVA and the regression analyses. Thus, the sample size for Phase II of the present study (N=92) should generate adequate power.

Measures

General information questionnaire. The demographic information questionnaire included items regarding sex, age, years of school completed, membership with a Greek organization, ethnicity, race, and current residence. This information was used for descriptive purposes (see Appendix D, Measure 1).

Substance use quantity and frequency. We used the Daily Drinking Questionnaire (DDQ; Collins, et al, 1985) to assess the average quantity of alcohol, as well as the maximum amount of alcohol, participants consumed during the previous 28 days (see Appendix D, Measure 2). Participants indicated how much alcohol they consumed during a typical week, the maximum number of drinks they consumed during the last 28 days, the number of days out of the last 28 on which they consumed alcohol, the types of alcohol consumed (i.e., beer, wine, hard liquor, and mixed drink), and the number of episodes of binge drinking in the past 28 days.

Substance use related problems. We assessed use-related problems with a modified version of the Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989; see Appendix D, Measure 3). The scale consisted of 23 items assessing presence or absence of specified problems with alcohol over the individual's lifetime. Ratings were provided on a 5-point Likert scale (*0 = never, 1 = 1-2 times, 2 = 3-5 times, 3 = 6-10 times, 4 = more than 10 times*). Scores could range from 0 to 92, with higher scores being indicative of more severe alcohol-related problems. Previous measures of internal consistency have been adequate ($r = .77-.82$; White &

Labouvie, 1989), and the RAPI displayed adequate 1-month test-retest reliability in a sample of college students ($r = .72$; Borsari & Carey, 2000). Predictive validity of the measure is supported by relationships with other use-related problems, such as intoxicated driving (Johnson & White, 1989). Sample items include “felt physically or psychologically dependent on alcohol or other drugs,” “neglected your responsibilities,” and “felt that you needed more alcohol or other drugs than you used to use in order to get the same effect.”

Drinking game participation. The 27-item Drinking Games Questionnaire was used to assess participation in and drinking behaviors related to drinking games (Borsari & Carey, 2000). Questions were asked regarding lifetime participation and various aspects of participation over the last month, including: the frequency of participation, the duration of a typical game, types (beer, liquor, wine, or mixed drinks) and quantity of alcohol typically consumed while playing drinking games, the maximum amount of alcohol consumed while playing a drinking games, and the types of drinking games played (see Appendix D, Measure 4).

Participation in different types of drinking games. This 12-item questionnaire was used to assess participation in the six categories of drinking games: motor skill games, cognitive skill games, gambling games, media games, team games, and consumption games (see Appendix D, Measure 5). This questionnaire assessed participation in these six categories of drinking games in two ways. First, participation in a specific game for each category was assessed via an item such as: “Some drinking games require that you can display motor skills while playing. For example, in Beer Pong you need to be able to aim a ping pong ball into the opposing players' cups in order to win. Have you ever played Beer Pong?” Second, overall participation in the category of drinking games was assessed via questions such as: “Beer Pong is not the only drinking game

that tests motor skills. Other types of motor skills games include: Quarters, Flip Cup, Thumper, and Jenga. Have you ever played any of these games or another type of motor skills game?"

Procedure

During Phase I of the present study, participants completed a packet containing the previously described questionnaires addressing substance use and other topics via an online data collection system. After providing demographic information to verify that participants were over the age of 19, participants completed the previously described measures in an online format in exchange for a one-hour of extra credit for use in their psychology or statistics courses.

Participants were provided an opportunity to provide informed consent before completing the online survey, and all participants were made aware that they might be selected to participate in the second phase of the study. Data provided during Phase I of the present study was used to select participants for Phase II.

Participants who met the selection criteria for Phase II were extended an invitation via e-mail to log in to the online data collection system and register for the lab component of the study. Participants were invited in three groups of four (12 total participants per session) and participated in three different periods of drinking game play during Phase II: a 20-minute round of Beer Pong, a 20-minute round of Three Man, and a 20-minute round of Memory. If all of the invited participants did not attend the scheduled session, participants played in two groups of 4 (8 total participants per session) in order to keep the four-person groups consistent throughout data collection. A total of nine sessions were conducted, with five of the sessions conducted with 12 total participants and four of the sessions conducted with 8 total participants. The 20-minute play periods were designated to allow comparison among drinking game types, and the 20-minute period might mean that participants will be playing multiple games (i.e. the Memory

game is completed in 15 minutes and participants are asked to begin a second game in order to obtain a full 20-minute sample).

Upon arrival at the lab sessions, participants were provided with an opportunity to provide informed consent and they completed the measures on substance use quantity and frequency and drinking game participation for a second time. The additional measures were completed because of a range in the amount of time between Phase I completion and Phase II sign-ups. All participants were weighed at the beginning of the session in order to calculate their estimated Blood Alcohol Concentration (BAC) after the session. Each participant was administered a BAC test to ensure they had not consumed any alcohol prior to the session, provided with a brief overview of the drinking games rules (see Appendix B, Figures 4-6), and then given a 5-minute warm-up period to become accustomed to the rules of each drinking game and meet other players. The drinking games played in Phase II were played using water rather than beer in order to minimize risks to participants and allow for a broader sample.

Each lab session was conducted in a space that contained three distinct gaming areas, one for each type of game that was played. Each participant was assigned to a group of four that rotated through each of the drinking game stations so that each group had a chance to play every game. Social interaction was possible within each group of four and also within the overall group of eight to twelve participants. Four undergraduate research assistants were present at each session in order to disseminate the rules of each game, facilitate game play, answer participant questions, record consumption levels (see Appendix B, Figures 1-3 for sample coding sheets), and time gaming periods. Each participant was provided with water to drink according to the rules of the game; however, due to the large amount of water consumed throughout the session participants were provided with the option to either drink the water or pour the water into a

pitcher when game rules dictated that it was their turn to drink. During game play, participants periodically paused the game briefly to refill their cups or consume available snacks in order to mimic an actual drinking game environment and to avoid inflating estimated consumption levels. Background music was played during each session in order to create a more realistic environment for participants.

Beer Pong was played using a ping-pong table with 10-sixteen ounce cups arranged in a triangular pattern at each end of the table. Each cup contained four ounces of liquid. Players took turns attempting to accurately toss a ping-pong ball into the opposing players' cups. When a ball went in to a cup, the opposing team was instructed to consume the contents and remove the cup from the table. The object of the game is to remove all of the cups on the opponent's side of the table before they are able to remove all of your cups. The team that had all of their cups removed from the table first lost the game and had consumed 40 ounces of liquid in the process. This drinking game measured motor skills and also incorporated a team component. This game was selected because it is popular on college campuses (Borsari, 2004) and because it is one of the most frequently played drinking games on the Auburn University campus (Day-Cameron, et al., 2009).

In Three Man, the players were given two dice and took turns rolling while adhering to rules about what happens when particular combinations of numbers are rolled. Each player rolled a single die until one player rolled a three. This player was designated as the Three Man until that player rolled a three or a die combination totaling three, at which point they were able to select a new Three Man. The Three Man was commonly the player who became intoxicated at the most rapid rate, since the rules of the game dictated that this player consumed drinks at the highest frequency. As such, rolling a three (or a die combination totaling three) was something

that the Three Man was instructed to watch for closely in order to pass this title to another player. Once a Three Man was selected, each player took turns rolling both dice. The rules for this game were as follows:

- A roll totaling seven indicated that the player to the right of the roller must take a one-ounce drink
- A total of eleven indicated that the player to the left of the roller must take a one -ounce drink
- A total of nine is a social drink indicating that all players must take a one -ounce drink
- A total of three or a dice roll where a three is showing on one or both die indicated that the Three Man must take a one -ounce drink
- A combination of a one and four indicated that all players should place their thumbs on the floor and the last player to do so must take a one -ounce drink
- A combination of a one and a five indicated that all players should place their left index finger to the side of their nose and the last player to do so must take a one -ounce drink
- A roll of doubles meant that the roller may pass the dice to the player of their choice. The selected player was required to roll both dice and drink the difference between the two die rolls (i.e. if the player rolled a one and a five, they were instructed to drink four one - ounce drinks)

This drinking game was based on chance, and also measured a social component of drinking game play as the players were able to assign drinks to other players.

To play Memory, a 52-card deck of standard playing cards was arranged face down on a table. Each player was instructed to turn over one card, and the player with the highest card went first. The cards were returned to the face down pile and play began when the first player turned

over two cards and tried to make a match (i.e. a five and a five). If the participant was successful they were able to select another player to take a one -ounce drink. If they drew a matching pair of the same color (i.e. a five of spades and a five of clubs), then they were able to select two other players to take a one -ounce drink or assign a two-ounce drink to a single player. If the participant was unsuccessful, then they were required to take a one -ounce drink and the next player took their turn. This drinking game was based on memory skill, and also measured a social component of drinking game play as the players were able to assign drinks to other players.

Data Coding

Research assistants were trained to record the number of times a participant was instructed to drink while playing the three games selected for Phase II of the present study. Three coders were present at each data collection session, with one coder assigned to each game type. Each coder used a game-specific coding sheet (see Appendix C for examples) that required them to tally the total drinks per minute that were to be consumed. In order to ensure that timing was uniform across coders, a fourth research assistant was assigned as the timer and announced each minute as it passed so that the three coders knew when to begin coding for the next minute of game play. A commercially available BAC program (DUI Professional Alcohol Analysis software, Version 3.021; Meta Progress, Inc., 1998) was used to estimate the peak BAC a participant would achieve if he or she had consumed actual alcohol while participating in the SDGP. All estimates were based on the participant's gender, weight, the amount of time each match or gaming period lasted, and the assumptions that all participants had consumed a "light meal" before participating in the drinking game, that each drink in Beer Pong consisted of 4

ounces of light beer, and that each drink in Three Man and Memory consisted of 1 ounce of light beer.

Results

Summary of Descriptive Data for Drinking Game Groups

The drinking game group minimum, maximum, mean, and standard deviation was calculated for each game played in order to determine whether group affiliation was a factor in total consumption and estimated BAC after participating in each of the three drinking games. A summary of the mean liquid consumption, minimum consumption, and maximum consumption for the full sample, as well as the mean liquid consumption for each of the 23 groups of four participants is presented in Table 3-1. A similar summary of the BAC's across the full sample and for the 23 groups is presented in Table 3-2.

Comparison across Drinking Game Types

As specified in the first hypothesis for the proposed study, we hoped to obtain information about how these drinking games compared across game type in terms of the amount of liquid consumed and differences in estimated BAC. Two separate repeated measures ANOVAs were used to examine the effects of the Simulated Drinking Game Procedure. For each dependent variable (total ounces of liquid consumed and estimated BAC), we conducted an ANOVA using game type (motor vs. cognitive vs. gambling) as the within-subject factor and drinking game group membership effects (group 1 through 23) as the between-subjects factor.

Results of the first repeated measures ANOVA indicated that total ounces consumed varied as a function of game type [$F(2, 138) = 117.50, p < .001$]. Pairwise comparisons revealed that the number of ounces consumed while playing Three Man (43.39) was significantly higher than the number of ounces consumed while playing Memory (31.33) and Beer Pong (30.61) ($p <$

.001; Table 3-3). Differences in ounces consumed between Beer Pong and Memory were not significant. The interaction term comparing game type to group membership effects was also significant [$F(44, 138) = 3.72, p < .001$], indicating that the effects of game type varied across the 23 participant groups.

Results of the second repeated measures ANOVA indicated that estimated BAC also varied as a function of game type, [$F(2, 138) = 104.881, p < .001$]. Pairwise comparisons revealed that the estimated BAC obtained while playing Three Man (0.074) was significantly higher than the estimated BAC obtained while playing Memory (0.048) and Beer Pong (0.046) ($p < .001$; Table 3-3). Differences in estimated BAC between Beer Pong and Memory were not significant. The interaction term comparing game type to group membership effects was also significant [$F(44, 138) = 3.395, p < .001$], again indicating that the effect of game type varied across the 23 participant groups.

As a way of following up on the significant interaction effects, two one-way ANOVA's were conducted to examine whether group membership effects contributed to the total liquid consumption and the estimated BAC obtained from each of the three drinking games. Results indicated that the total ounces consumed while playing Beer Pong [$F(22, 69) = 11.730, p < .001$] and estimated BAC obtained while playing Beer Pong [$F(22, 69) = 2.640, p < .001$] varied significantly as a function of group. The total ounces consumed while playing Three Man also varied significantly as a function of group [$F(22, 69) = 1.833, p < .05$]; however, the estimated BAC obtained while playing Three Man was not significant. Results indicated that the total ounces consumed while playing Memory [$F(22, 69) = 2.179, p < .01$] and estimated BAC obtained while playing Memory [$F(22, 69) = 2.248, p < .01$] varied significantly as a function of group.

Predictors of Gaming Outcomes: The Effects of Gender and Experience

We also examined the role of gender and previous experience in these three types of drinking games at the group level. We calculated Pearson correlations to assess relationships between gender, consumption, and previous experience (see Table 3-4 for relevant correlations). Gender was calculated as the number of male participants in each of the 23 groups. Lifetime and recent experience within each of the three groups was also based on the experience within each of the groups. The gender composition of the group was not correlated with the Beer Pong consumption variables or the drinks consumed while playing Three Man; however, gender was positively correlated with the estimated BAC obtained while playing Three Man, the drinks consumed while playing Memory, and the estimated BAC obtained while playing Memory. The consumption variables and previous experience variables were not correlated with one another for Beer Pong, Three Man, or Memory.

Regression Analyses Examining the Role of Gender and Previous Experience

We also examined the role of gender and previous experience in these three types of drinking games using a series of regression analyses. These analyses investigated these relationships for the entire sample of 92 participants and did not account for the other players in their group. We estimated that female participants would have higher BACs than male participants in all types of drinking game played, which would highlight additional risks for female drinking game participants. In terms of previous experience, we hoped to determine whether previous experience playing one of these types of games indicated that the player would drink less over the course of the game. If experience factored in to overall intoxication level, this finding would highlight additional risks for inexperienced players.

In series 1, we used the estimated amount of alcohol consumed playing the motor skills game (Beer Pong) as our dependent variable. The independent variables were entered in steps. First, we introduced gender. Second, we introduced previous experience playing Beer Pong and the frequency of participation in this drinking game in the past 30 days. Third, we introduced previous experience playing any type of motor skills game and the frequency of participation in these types of drinking games in the past 30 days. We predicted that gender would not be a significant predictor of estimated alcohol consumption, however, we predicted that previous experience playing Beer Pong or other motor skills games would be a significant predictor of estimated alcohol consumption. Consistent with the first hypothesis for series 1, gender was not a significant predictor of estimated alcohol consumption while playing Beer Pong. Contrary to the second hypothesis for series 1, previous experience playing Beer Pong or other motor skills games were not a significant predictor of estimated alcohol consumption while playing Beer Pong. The results of this regression are presented in Table 3-5.

In series 2, we used the estimated BAC obtained while playing the motor skills game (Beer Pong) as our dependent variable. The independent variables were entered in steps. First, we introduced gender. Second, we introduced previous experience playing Beer Pong and the frequency of participation in this drinking game in the past 30 days. Third, we introduced previous experience playing any type of motor skills game and the frequency of participation in these types of drinking games in the past 30 days. We predicted that both gender and previous experience playing Beer Pong or other motor skills games would be significant predictors of estimated BAC. While all models were significant [Model 1, $F(1, 90) = 19.241, p < .001$; Models 2-3, $p < .01$], gender proved to be the only significant predictor ($p < .001$) of the estimated BAC obtained during Beer Pong participation and accounted for approximately 18%

of the variance in the final model [$F(5, 86) = 3.762, p < .01$]. Previous experience playing Beer Pong or other motor skills games was not a significant predictor of the estimated BAC obtained while playing Beer Pong. The results of this regression are presented in Table 3-6.

In series 3, we used the estimated amount of alcohol consumed playing the gambling/chance game (Three Man) as our dependent variable. The independent variables were entered in steps. First, we introduced gender. Second, we introduced previous experience playing Three Man and the frequency of participation in this drinking game in the past 30 days. Third, we introduced previous experience playing any type of gambling/chance game and the frequency of participation in these types of drinking games in the past 30 days. We predicted that neither gender nor previous experience playing Three Man or other gambling/chance games would be significant predictors of estimated alcohol consumption. The results of series 3 were consistent with our hypotheses. Neither gender nor previous experience playing Three Man or other gambling/chance games were significant predictors of the estimated alcohol consumption while playing Three Man. The results of this regression are presented in Table 3-7.

In series 4, we used the estimated BAC obtained while playing the gambling/chance game (Three Man) as our dependent variable. The independent variables were entered in steps. First, we introduced gender. Second, we introduced previous experience playing Three Man and the frequency of participation in this drinking game in the past 30 days. Third, we introduced previous experience playing any type of gambling/chance game and the frequency of participation in these types of drinking games in the past 30 days. We predicted that gender would be a significant predictor of estimated BAC. We predicted that previous experience playing Three Man or other gambling/chance games would not be a significant predictor of estimated BAC. The results of series 4 were consistent with our hypotheses. While all models

were significant [Model 1, $F(1, 90) = 35.700, p < .001$; Models 2-3, $p < .001$], gender proved to be the only significant predictor ($p < .001$) of the estimated BAC obtained during Three Man participation and accounted for approximately 31% of the variance in the final model [$F(5, 86) = 7.717, p < .001$]. Previous experience playing Three Man or other gambling/chance games was not a significant predictor of the estimated BAC obtained while playing Three Man. The results of this regression are presented in Table 3-8.

In series 5, we used the estimated amount of alcohol consumed playing the cognitive skills game (Memory) as our dependent variable. The independent variables were entered in steps. First, we introduced gender. Second, we introduced previous experience playing Memory and the frequency of participation in this drinking game in the past 30 days. Third, we introduced previous experience playing any type of cognitive skills game and the frequency of participation in these types of drinking games in the past 30 days. We predicted that gender would not be a significant predictor of estimated alcohol consumption, however, we predicted that previous experience playing Memory or other cognitive skills games would be a significant predictor of estimated alcohol consumption. Consistent with the first hypothesis for series 5, gender was not a significant predictor of estimated alcohol consumption while playing Memory. Contrary to the second hypothesis for series 5, previous experience playing Memory or other cognitive skills games were not a significant predictor of estimated alcohol consumption while playing Memory. The results of this regression are presented in Table 3-9.

In series 6, we used the estimated BAC obtained while playing the cognitive skills game (Memory) as our dependent variable. The independent variables were entered in steps. First, we introduced gender. Second, we introduced previous experience playing Memory and the frequency of participation in this drinking game in the past 30 days. Third, we introduced

previous experience playing any type of cognitive skills game and the frequency of participation in these types of drinking games in the past 30 days. We predicted that both gender and previous experience playing Memory or other cognitive skills games would be significant predictors of estimated BAC. Gender was a significant predictor of the estimated BAC obtained while playing Memory. While all models were significant [Model 1, $F(1, 90) = 41.303.001$; Models 2-3, $p < .001$], gender proved to be the only significant predictor ($p < .001$) of the estimated BAC obtained during Three Man participation and accounted for approximately 33 of the variance in the final model [$F(5, 86) = 8.251, p < .001$]. Previous experience playing Memory or other cognitive skills games was not a significant predictor of the estimated BAC obtained while playing Memory. The results of this regression are presented in Table 3-10.

Discussion

The present study served as an extension of the research conducted by Correia et al. (manuscript in review) to collect systematic laboratory-based data on drinking game behavior. The study demonstrates that the SDGP can be used to generate estimates of how much alcohol is consumed and the associated obtained BAC during multiple types of drinking games. Via the present study, we hoped to obtain information about how drinking games compared across game type in terms of the amount of liquid consumed and differences in estimated BAC. Our results indicated that total consumption varied as a function of game type, with higher total consumption during Three Man than Memory and Beer Pong. These results indicate that drinking games vary by type in terms of total liquid consumption. This finding is consistent with previous literature that is based on self-reported consumption levels while playing drinking games (i.e. Zamboanga et al., 2007); however, the present study is the first to demonstrate these differences in the laboratory and may provide more accurate estimates due to the elimination of the problems

associated with the self-report of drinking behaviors (i.e. Turner & Martin, 1981, 1985; Turner, Lessler, & Gfroerer, 1992). Estimated BAC also varied as a function of game type. The estimated BAC obtained while playing Three Man (0.074) was significantly higher than the estimated BAC obtained while playing Memory (0.048) and Beer Pong (0.046). Differences in estimated BAC between Beer Pong and Memory were not significant, indicating that drinking games that are based solely on chance and do not involve a motor or cognitive skill component tend to progress more quickly and result in higher total consumption and BAC at the end of game play.

In addition to the effects that the drinking game being played had on consumption and estimated BAC, our results indicated that group membership effects also contributed to the total ounces consumed and the estimated BAC obtained from each of the three drinking games. The total consumption and estimated BAC obtained while playing Beer Pong varied significantly as a function of group. Results indicated that the total drinks consumed and estimated BAC obtained while playing Memory also varied significantly as a function of group. Total ounces consumed while playing Three Man varied significantly as a function of group; however, the estimated BAC obtained while playing Three Man was not significant. We examined the role of gender and previous experience in these three types of drinking games in order to determine why the game being played and group membership effects seemed to affect consumption and estimated BAC.

We estimated that female participants would have higher estimated BACs than male participants in all types of drinking game played. Results indicated that estimated BACs were higher for female participants across game type, despite the fact that both males and females consumed similar amounts of alcohol. These findings are consistent with previous self-report research (Pederson & LaBrie, 2006), and previous laboratory-based research (Correia &

Cameron, 2009) suggesting that males and females drink similar amount of alcohol when playing drinking games. The gender differences are also of interest given the research on male motives for drinking game participation, which include intoxicating other players and facilitating sexual contact with other participants (Johnson & Sheets, 2004).

In terms of previous experience, we hoped to determine whether previous experience playing one of these types of games indicated that the player would drink less over the course of the game. Results indicated that previous experience playing the three games used in the present study had no impact on total drink consumption or estimated BAC obtained while participating in the SDGP. This finding was surprising given that two of the three games used require some degree of motor or cognitive skill to play the game. Our alcohol free SDGP does not allow us to measure the effects of the “reversal of competence,” which reflects that notion that alcohol intoxication makes it less likely that participants will be able to meet the demands of the game, which leads to further alcohol consumption (Green & Grider, 1990; Borsari, 2004). It is possible that gaming experience may lead to behavioral tolerance that counteracts the effects of reversal of competence. In order to fully examine whether previous experience factors in to overall alcohol consumption and BAC, future research should incorporate lab administration of alcohol during drinking game participation.

Neither gender nor previous experience served to completely explain why group membership effects and the drinking game being played seemed to affect consumption and estimated BAC. It is possible that this is due to measurement difficulties of the role of previous experience in an alcohol-free simulation of drinking games. Another possibility is that the social dynamics of the game dictated some of these differences. Our data coding procedure provided data on the number of drinks consumed per 20-minute play period per game; however, future

studies could benefit from a comprehensive coding strategy in order to examine aspects of social dynamics that could influence consumption and estimated BAC. For example, it might be interesting to examine the number of drinks consumed per minute compared to the number of words spoken by participants per minute. Anecdotally, the chattiness of a group seemed to affect how quickly the game progressed and the amount of consumption that took place. Future research designed to quantify these social dynamics appears to be warranted.

Our laboratory design makes several assumptions that may limit the generalizability of our findings to the natural setting. First, our assumptions regarding consumption (four ounces per cup in Beer Pong, one ounce per drink in Three Man and Memory) are deliberately on the low side to avoid inflation of consumption data. It is likely that naturalistic drinking games do not adhere to these low limits and participants may tend to drink more than they realize due to overfilling of cups and consumption of additional alcohol while playing the games. For some participants, the reverse may be true as our design does not allow for protective factors such as refusing drinks. Variations on the rules (“house rules”) could drastically alter the levels of alcohol consumption and the resulting BAC. Research designed to verify the validity of our model and the overall procedure is warranted.

The absence of alcohol consumption in our design is both a strength and a limitation of the current study. The lack of alcohol consumption appeared to limit us in our ability to quantify the influence of previous experience on drinking game performance. Future studies aimed at understanding the contribution of previous experience should be examined using a balanced placebo design of alcohol administration in order to differentiate between the pharmacological effects of alcohol and the psychological expectancy effects that may accompany the belief that alcohol has been consumed. A strength of our alcohol-free design is that we were able to

generate estimates of alcohol consumption and BAC without exposing our participants to any of the risks associated with drinking games. The absence of alcohol administration makes the SDGP appropriate for research with underage drinkers, which appears to be relevant given recent research on the prevalence and social functions of drinking games among underage high school and college students (Adams & Nagoshi, 1999; Borsari, Bergen-Cico, & Carey, 2003; Douglas, 1987; Newman, Crawford, & Nellis, 1991). Based upon results of the present study as well as the results of previous implementations of the SDGP (Correia & Cameron, 2009), it appears that the next logical step for this line of research is to extend the SDGP to include the administration of alcohol in the laboratory while participants play drinking games.

Chapter Five: Contributions and Limitations of the Three Studies on Drinking Game Behavior among College Students

The three studies conducted for this dissertation were designed to address several notable limitations in the existing literature on drinking game participation among college students. The existing data on the prevalence of drinking game participation and patterns of consumption during game play were quite variable in the existing literature, thus initial data on the prevalence of drinking game participation and patterns of consumption during game play were collected via study one in order to verify that these data were consistent with the existing estimates and in order to inform the design of subsequent research. Additionally, data was collected on various game types in order to determine which games were most commonly played to provide future research directions on the types of drinking games that would be most relevant to model in a laboratory setting. Studies two and three were designed specifically to examine drinking game participation and utilize a data collection method other than retrospective self-report data in order to fully understand the predictive utility of drinking games and the associated risks for college students. The laboratory-based methodology provided an accurate means of assessing the total liquid consumption while participating in these drinking games as well as provided the methodological groundwork for future studies that address novel components of the drinking game experience.

Results of the Three Studies Conducted

Study One: Drinking Game Participation among Undergraduate Students attending National Alcohol Screening Day

Study one was designed to explore patterns of alcohol consumption and types of drinking games played among students attending National Alcohol Screening Day (NASD). NASD was chosen because it provided a large sample of college student alcohol users, and since the event proved to elicit a sample of college students who reported regular drinking game participation then the national event could be used in the future as a means to provide a brief, psychoeducational intervention aimed at drinking game participation. Additionally, study one provided the groundwork for the selection of popular drinking games for study two and study three, and provided estimates of alcohol consumption while playing drinking games.

The results of study one indicated that the majority of college students sampled via NASD reported at least one incidence of lifetime drinking game participation. Approximately half of the sample reported recent drinking game participation. Team games and skill games were the most frequently endorsed type of drinking game played and these two types of games were also endorsed as the most recently played types of drinking games. Students who attended NASD and reported recent drinking game participation were also more likely to experience specific alcohol-related problems, including difficulties managing responsibilities, interpersonal difficulties, blackouts, and symptoms of alcohol dependence (e.g., tolerance, withdrawal, attempts to control drinking). Drinking game participation did not add unique variance to the prediction of alcohol related problems in our sample. The results suggested that drinking game participation was indirectly related to alcohol-related problems through increased weekly alcohol consumption. These findings indicate that educational efforts and interventions aimed at

communicating the risks associated with drinking game participation and the relationship between drinking game participation and the amount of alcohol consumed in a typical week may be warranted in order to inform college students of elevated risks.

In our sample of NASD participants, males were more likely than female participants to report recent drinking game participation. While the report of female participants playing drinking games was lower than that of their male counterparts, over forty percent of our female participants endorsed lifetime participation in drinking games. Among those participants who reported playing drinking games over the past 30 days, male and female participants reported equivalent frequency of participation; however, males consumed significantly higher amounts of alcohol during drinking game participation.

Study Two: Development of a Simulated Drinking Game Procedure to Study Risky Alcohol Use

Study two was the first study designed to collect laboratory-based data on drinking game participation and associated behaviors. Simulated laboratory designs of drinking environments have proven to be an effective means of gathering real time data on actual alcohol consumption levels (i.e., Collins et al., 1985). The aim of study two was to initiate the development of a Simulated Drinking Game Procedure (SDGP). The SDGP would serve as a safe, efficient, and alcohol-free laboratory protocol for studying drinking game behavior.

This study demonstrates how the SDGP can be used to generate estimates of alcohol consumption and the associated obtained BAC during participation in the popular drinking game, Beer Pong. The findings suggest that participation in beer pong leads to rapid, elevated alcohol consumption and an associated spike in BAC. Our findings also highlight specific risks for female participants associated with drinking game participation. Females obtained estimated BAC's that were consistently higher than their male counterparts, despite the fact that both male

and female participants consumed similar amounts of alcohol. The gender differences are interesting in light of research on the reasons why males play drinking games, which include getting other players drunk and increasing the likelihood of having a sexual encounter with other participants (Johnson & Sheets, 2004).

Study Three: Estimated Alcohol Consumption and Blood Alcohol Concentration across Three Types of Drinking Games using the Simulated Drinking Game Procedure

Study three aimed to extend the SDGP to a variety of drinking games in order to determine whether the laboratory model extended to drinking games other than Beer Pong and to obtain comparisons of risk by drinking game type. The study demonstrated that the SDGP can be used to generate estimates of how much alcohol is consumed and the associated obtained BAC during multiple types of drinking games. Study three also provided an initial examination of the risks and differences in consumption by drinking game type.

Results indicated that the total number of ounces consumed during drinking game participation varied as a function of game type, with the highest total ounces consumed during Three Man, followed by Memory and Beer Pong. The differences in consumption between Three Man and the other two games were significant, indicating that drinking games vary by type in terms of total ounces consumed. Estimated BAC also varied as a function of game type. The estimated BAC obtained while playing Three Man was significantly higher than the estimated BAC obtained while playing Memory and Beer Pong. These differences indicated that drinking games that are based solely on chance, such as Three Man, tend to progress more quickly and result in higher total alcohol consumption and elevations in BAC at the end of game play.

Results of study three also indicated that group membership effects contributed to the total ounces consumed and the estimated BAC obtained from each of the three drinking games.

The total ounces consumed and estimated BAC obtained while playing Beer Pong and Memory varied significantly as a function of group. The total drinks consumed while playing Three Man varied significantly as a function of group; however, the estimated BAC obtained while playing Three Man was not significant. Results indicated that estimated BAC was higher for female participants across game type, despite the fact that both males and females consumed similar amounts of alcohol.

In terms of previous experience, results indicated that previous experience playing the three games used in the present study had no impact on total consumption or estimated BAC obtained while participating in the SDGP. This finding was counterintuitive given that two of the three games used require some degree of motor or cognitive skill to play the game. It is possible that this is due to measurement difficulties of the role of previous experience in an alcohol-free simulation of drinking games.

Limitations of the Three Studies Conducted

Several limitations should be noted from the three studies conducted. In study one, the use of a national campus-based screening event such as NASD may provide future directions for research and interventions aimed at drinking game participation. However, all of our participants were offered extra credit in exchange for attending NASD and additional credit for participating in study one. Additionally, our sample was predominantly composed of Caucasian females attending a large, southeastern university. These factors call into question the likelihood that our sample is representative of all students who attend NASD on campuses across the United States, both in terms of participant demographics and reported participation in drinking games.

Additional research will be needed to obtain a better understanding of the national prevalence of drinking game behavior among students attending events like NASD. However, given our results

and the available data on rates of drinking game participation among college students, it seems likely that most campus-based NASD events will attract a significant number of students who play drinking games and are at risk for experiencing the associated negative consequences.

The laboratory designs used in study two and study three made several assumptions that may limit the generalizability of our findings to the natural setting. In study two, our assumptions regarding aspects of game play (e.g., four ounces of light beer in each cup, 10 cups per side) and participants (consumed a light meal) impacted our BAC calculations. In study three, our assumptions regarding consumption (four ounces of light beer per cup in Beer Pong, one ounce of light beer per drink in Three Man and Memory) are deliberately on the low side to avoid inflation of consumption data. It is likely that naturalistic drinking games do not adhere to these low limits and participants may tend to drink more than they realize due to overfilling of cups and consumption of additional alcohol while playing the games. For some participants, the reverse may be true as our design does not allow for protective factors such as refusing drinks.

Variations on the rules (“house rules”) could drastically alter the levels of alcohol consumption and the resulting BAC. Many popular drinking games have multiple variations with different rules, and many regular drinking game participants have adapted their own “house rules” for many popular drinking games (Griscom et al., 1988). The rules used in our design were compiled based on multiple sources, and tended to exclude rules that inflated alcohol consumption and were not common to most sources. Research designed to verify the validity of our model and the overall procedure is warranted.

The absence of alcohol consumption in our design was a relevant limitation in study two and study three. The alcohol free SDGP does not allow us to disentangle how the alcohol-related (e.g., the taste and behavioral effects of alcohol consumption) and alcohol-free (e.g.,

competition, social interaction) aspects of the game contribute to the overall experience. Actual alcohol consumption is also likely to influence the social dynamics of the game, an important factor for games in which players designate which players have to consume alcohol. The lack of alcohol consumption appeared to limit us in our ability to quantify the influence of previous experience on drinking game performance. Future studies aimed at understanding the contribution of previous experience should be examined using a balanced placebo design of alcohol administration in order to differentiate between the pharmacological effects of alcohol and the psychological expectancy effects that may accompany the belief that alcohol has been consumed. One benefit to the exclusion of alcohol in study two and study three was that we were able to generate estimates of alcohol consumption and BAC without exposing our participants to any of the risks associated with drinking games, thus making the SDGP appropriate for research with underage drinkers.

Future Directions for Research

The three studies conducted lay a framework for using campus-based screening events and laboratory simulations to study drinking game behaviors, obtain estimates of the patterns of alcohol consumption during drinking game participation, and obtain prevalence rates for overall drinking game participation and for different types of drinking games. Despite the limitations noted in previous sections, the results of these three studies provide several important contributions to the literature and highlight some future directions for research.

Intervention Aims for Drinking Games

Our results suggest that campus events like National Alcohol Screening Day attract a high percentage of students who participate in drinking games. Additionally, the prevalence of drinking game participation among screening day participants is similar to prevalence rates

reported in other studies (Borsari et al., 2003). Our findings also indicate that a sizable proportion of both male and female students attending NASD are participating in drinking games, and that their participation is increasing their likelihood of experiencing alcohol related problems. When taken as a whole, the findings suggest that NASD could be used as a platform to intervene with students who play drinking games, with the goal of increasing their awareness of the risk factors associated with drinking games participation and decreasing the associated harm.

Previous research on approaches to reducing college student drinking can inform the types of interventions that might be applied to drinking games. One treatment approach for college student drinkers that might be best suited for inclusion in NASD is the use of personalized feedback. Recent research suggests that personalized feedback can be successfully incorporated into NASD (Benson et al., 2004; Henslee et al., 2006). Future research is needed to determine whether personalized feedback could be specifically tailored to reduce the frequency and negative consequences of drinking game participants among students attending NASD, and among more general groups of students.

Although interventions designed to specifically address drinking game behavior have not been developed, at least one study has reported a link between normative beliefs regarding drinking game behavior and actual behavior (Pederson & LaBrie, 2008). These findings suggest including a component that challenges normative beliefs about the prevalence of drinking games into a personalized feedback might be an effective way of reducing actual rates of participation. Data on the unique risks drinking games might pose to female students suggests that research on interventions designed specifically for women is also warranted. Given the high proportion of college students who reported recent drinking game play who participated in study one, it would seem that this is an important future area of research and early intervention.

Socialization during Consumption or Perceived Consumption

Future research should be designed to collect additional data on the effects of socialization during drinking game participation. Anecdotally, socialization appeared to play a role in the speed of drinking game play in study three. Additionally, socialization patterns among group members appeared to affect which players were assigned drinks. It also appeared as if the ratio of males to females in the group played a role in socialization patterns among group members. Study three was not designed to examine all of these socialization effects; however, the anecdotally observed socialization effects were interesting to the researchers and would likely yield informative data if examined empirically.

Previous research has demonstrated that sociability among participants in a laboratory simulation of alcohol consumption has a significant effect on the perceived alcohol consumption of participants (Collins et al., 1985). Additionally, sociability results from Collins et al. (1985) indicate that when participants were matched with a sociable confederate they tended to match their drinking, and when they were matched with an unsociable partner their consumption was uniformly high. These results in combination with the observations made during the latter two studies conducted for this project indicate that research designed to measure the effects of socialization during alcohol consumption or perceived alcohol consumption is warranted.

Using the Balanced Placebo Design to Examine the Role of Intoxication Level with Previous Experience

The alcohol free SDGP used in study two and study three does not allow us to measure the effects of the “reversal of competence,” which reflects that notion that alcohol intoxication makes it less likely that participants will be able to meet the demands of the game, which leads to further alcohol consumption (Green & Grider, 1990; Borsari, 2004). It is possible that gaming

experience may lead to behavioral tolerance that counteracts the effects of reversal of competence. In order to fully examine whether previous experience factors in to overall alcohol consumption and BAC, future research should incorporate lab administration of alcohol during drinking game participation.

A framework for collecting laboratory data on drinking game behaviors was established via the present studies. The next logical step in this line of research would be to extend the SDGP to include controlled administration of alcohol during drinking game participation.

The balanced placebo design (BPD) is often implemented in order to help researchers distinguish between the pharmacological effects of alcohol and the psychological expectancy effects that may accompany the belief that alcohol has been consumed. To measure the physiological effects of alcohol administration, half of the participants would receive an alcoholic beverage while playing drinking games and the other half would receive a non-alcoholic beverage. To measure the psychological expectancy effects, half of the participants would be told that they have consumed an alcoholic beverage and half of the participants would be told that they have consumed a non-alcoholic beverage. This yields four conditions among the participant sample: (1) told they received alcohol/received alcohol, (2) told they received alcohol/received no alcohol, (3) told they received no alcohol/received alcohol, and (4) told they received no alcohol/received no alcohol. The ability to divide participants into these conditions allows researchers to distinguish physiological effects from psychological expectancy effects. Future research that uses the SDGP framework to conduct research on college student drinking game participation using the balanced placebo design is an important area of inquiry in order to learn more about the role of previous experience.

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Appendices

Appendix A: Tables

Table 1-1.
Summary of Descriptive Data for Sample

	N	Minimum	Maximum	Mean	SD
Drinking variables					
Typical Weekly Consumption	132	0	40.5	7.58	8.83
Maximum Weekly Consumption	133	0	112.0	13.54	18.99
Binge Drinking Episodes	133	0	20.0	3.33	4.69
RAPI Total	131	0	32.0	3.6	5.29
Drinking game variables					
Frequency of Participation	64	1.0	20	4.76	4.03
Average Duration of Each Game	64	0.5	12	2.03	1.84
Average Alcohol Consumption	64	1.0	10	4.47	2.31
Maximum Alcohol Consumption	64	2.0	17	5.91	3.55
Types of games					
Consumption	64	0	20	0.81	2.67
Skill	64	0	20	2.23	3.06
IQ	64	0	5	0.31	0.89
Unity	64	0	15	0.75	2.09
Team	64	0	20	3.09	3.32

Notes. All variables assessed for the previous 28 days. Measures of alcohol consumption reported in standard drinks. Values reported under “Types of Games” represent the number of times a game from that category was played.

RAPI = Rutgers Alcohol Problem Index.

Consumption: Games where the goal is to individually consume more than other players.

Skill: Games involving physical skills when the less skilled have to consume alcohol.

IQ: Games involving quick recall of facts or words.

Unity: Games without competition and an emphasis on drinking together.

Team: Games where people play against each other in groups.

Table 1-2.
Correlations between Alcohol Consumption and Drinking Game Variables

	Binge	RAPI	Typical	Max.
Drinking Game Variables				
Frequency of Participation	.61**	.40**	.49**	.43**
Average Duration of Each Game	-.06	.01	-.00	.01
Average Alcohol Consumption	.62**	.18	.63**	.49**
Maximum Alcohol Consumption	.56**	.27*	.58**	.60**

Notes. All variables assessed for the previous 28 days.

Binge: number of days in the past month participant binge drank

RAPI: Rutgers' Alcohol Problem Index

Typical: Number of standard drinks consumed during a typical week

Max: Maximum number of drinks consumed during a week

*p < .05 ** p < .01 ***p < .001

Table 1-3.
Alcohol Related Problems and Drinking Game Participation

RAPI Item	Overall	Drinkers who played drinking games (n = 63)	Drinkers who did not play drinking games (n = 39)	T value
1. Not able to do your homework or study for a test	.26 (.53)	.40 (.61)	.05 (.22)	-4.08***
2. Got into fights, acted bad or did mean things	.25 (.50)	.37 (.55)	.08 (.35)	-3.23**
3. Missed out on other things because you spent too much money on alcohol	.24 (.57)	.33 (.65)	.08 (.35)	-2.58*
4. Went to work or school drunk	.16 (.50)	.21 (.57)	.08 (.35)	-1.41
5. Caused shame or embarrassment to someone	.23 (.44)	.27 (.48)	.15 (.37)	-1.38
6. Neglected your responsibilities	.37 (.61)	.56 (.69)	.08 (.27)	-4.93***
7. Relative avoided you	.04 (.24)	.03 (.25)	.05 (.22)	.41
8. Felt that you needed MORE alcohol than you used to use in order to get the same effect	.47 (.82)	.67 (.93)	.15 (.43)	-3.76***
9. Tried to control your drinking by trying to use only at certain times of the day or certain places	.36 (.81)	.49 (.93)	.15 (.49)	-2.40*
10. Had withdrawal symptoms, that is felt sick because you stopped or cut down drinking	.14 (.47)	.21 (.57)	.03 (.16)	-2.36*
11. Noticed a change in your personality	.21 (.59)	.23 (.64)	.18 (.51)	-.40
12. Felt you had a problem with alcohol	.10 (.39)	.11 (.44)	.08 (.27)	-.48
13. Missed a day (or part of a day) of school or work	.34 (.64)	.48 (.72)	.13 (.41)	-3.12**
14. Tried to cut down or quit drinking	.22 (.50)	.24 (.53)	.18 (.45)	-.60
15. Suddenly found yourself in a place you could not remember getting to	.20 (.53)	.29 (.63)	.05 (.22)	-2.68**
16. Passed out or fainted suddenly	.18 (.52)	.21 (.57)	.13 (.41)	-.80
17. Had a fight, argument, or bad feeling with a friend	.30 (.52)	.41 (.56)	.13 (.41)	-2.96**
18. Had a fight, argument, or bad feeling with a family member	.02 (.14)	.00 (.00)	.05 (.22)	1.43
19. Kept drinking when you promised yourself not to	.19 (.44)	.22 (.46)	.13 (.41)	-1.08
20. Felt you were going crazy	.10 (.41)	.11 (.44)	.08 (.35)	-.43
21. Had a bad time	.23 (.44)	.27 (.48)	.15 (.37)	-1.38
22. Felt physically or psychologically dependent on alcohol	.04 (.20)	.05 (.21)	.03 (.16)	-.59
23. Was told by a friend or neighbor to cut down on drinking	.10 (.33)	.10 (.35)	.10 (.31)	.11
Total RAPI Score	4.65 (5.61)	6.13 (5.99)	2.31 (4.01)	-3.52***

Notes. Table presents means and (standard deviations); *p<.05, **p<.01, ***p<.001.

Table 1-4.
Regression Analyses Predicting Alcohol-Related Problems

Dependent Variable(s)	B	SE β	B	T	Model R^2
Step 1					
Gender	-1.081	1.568	-.089	-.69	.01
Step 2					
Gender	-1.004	1.458	-.082	-.69	.16**
Frequency of Drinking Game Participation	.648	.201	.385	3.22**	
Step 3					
Gender	2.109	1.742	.173	1.21	.28*
Frequency of Drinking Game Participation	.303	.242	.180	1.25	
Typical Weekly Alcohol Consumption	.279	.120	.430	2.33*	
Frequency of Binge Drinking Episodes	.086	.204	.075	0.42	

Note. Alcohol Problems were measured with the Rutgers Alcohol Problem Index (RAPI).

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

Table 2-1.

Drink Consumption and BAC: Within Subject Comparison of Singles and Doubles Matches

	Singles (One vs. One)		Doubles (Two vs. Two)		T	P
	M	SD	M	SD		
<u>Drinks Consumed</u>						
Match Play	8.08	2.23	4.58	.67	5.63	.001
20 Minutes of Play	12.75	4.54	5.83	1.95	4.76	.001
<u>BAC</u>						
Match Play	.05	.03	.03	.01	3.24	.008
20 Minutes of Play	.15	.16	.04	.02	2.47	.031

Note. N = 12; Drinks Consumed refers to the number of time that the rules dictated that the participant was told to drink the contents of their cup; all drinks were computed as 4 ounces of light beer

Table 2-2.

Drink Consumption and BAC: Between Subject Comparison of Singles and Doubles Matches

	Singles (One vs. One) (n = 20)		Doubles (Two vs. Two) (n = 20)		t	p
	M	SD	M	SD		
<u>Drinks Consumed</u>						
Match Play	9.1	1.12	4.1	1.33	12.84	.001
20 Minutes of Play	13.6	4.01	7.6	1.85	6.08	.001
<u>BAC</u>						
Match Play	.07	.02	.02	.02	7.74	.001
20 Minutes of Play	.11	.04	.05	.03	5.05	.001

Note. Drinks Consumed refers to the number of times that the rules dictated that the participant was told to drink the contents of their cup; all drinks were computed as 4 ounces of light beer.

Table 2-3.
Gender Differences in Drink Consumption and BAC: Between Subjects Comparison

	Males (n = 10)		Females (n = 10)		T	p
	M	SD	M	SD		
<u>Singles Games</u>						
Drinks Match Play	8.70	1.25	9.50	.85	1.68	.112
Drinks 20 Minutes of Play	12.80	3.36	14.4	4.60	.88	.386
BAC Match Play	.05	.01	.08	.02	6.00	.001
BAC 20 Minutes of Play	.08	.02	.14	.04	3.74	.001
<u>Doubles Games</u>						
	M	SD	M	SD	T	p
Drinks Match Play	3.80	1.62	4.40	.97	1.01	.328
Drinks 20 Minute of Play	7.20	1.93	8.00	1.76	.97	.346
BAC Match Play	.01	.01	.03	.02	2.87	.010
BAC 20 Minutes of Play	.04	.02	.06	.03	2.46	.024

Note. Drinks Consumed refers to the number of times that the rules dictated that the participant was told to drink the contents of their cup; all drinks were computed as 4 ounces of light beer.

Table 3-1
Descriptive Data for Group Sample (Total Consumption)

	Beer Pong Consumption M(SD)	Three Man Consumption M(SD)	Memory Drinks Consumption M(SD)
Full Sample			
Mean	30.61 (7.30)	43.39 (9.00)	31.33 (7.21)
Min	16	28	20
Max	68	65	64
Groups			
1	28.00 (7.30)	43.25 (15.46)	29.50 (7.05)
2	37.00 (2.63)	35.00 (2.94)	32.25 (5.91)
3	27.00 (0.50)	42.00 (3.46)	36.75 (2.63)
4	25.00 (0.50)	46.25 (9.71)	30.50 (7.72)
5	18.00 (0.58)	35.00 (11.49)	29.00 (7.62)
6	33.00 (0.50)	41.25 (3.86)	29.00 (2.83)
7	36.00 (0.82)	49.00 (9.58)	24.00 (4.24)
8	31.00 (1.50)	55.00 (5.03)	36.00 (18.78)
9	18.00 (0.58)	32.50 (3.70)	27.00 (0.82)
10	19.00 (0.96)	36.50 (8.50)	36.50 (4.20)
11	33.00 (0.50)	53.25 (5.90)	38.25 (4.57)
12	23.00 (1.50)	39.25 (4.99)	23.00 (2.16)
13	27.00 (1.50)	44.50 (10.66)	34.00 (7.12)
14	27.00 (0.50)	42.75 (8.46)	36.50 (12.56)
15	37.00 (0.50)	47.75 (4.57)	28.00 (2.16)
16	33.00 (0.50)	44.00 (12.19)	32.00 (4.08)
17	55.00 (3.78)	44.75 (9.14)	29.75 (4.50)
18	31.00 (2.06)	46.50 (11.09)	27.25 (4.50)
19	18.00 (0.58)	42.25 (5.32)	30.50 (1.29)
20	28.00 (0.82)	41.00 (8.29)	26.00 (2.83)
21	25.00 (2.06)	43.75 (6.65)	37.00 (1.83)
22	48.00 (0.82)	43.00 (8.76)	28.25 (2.22)
23	47.00 (0.86)	49.50 (2.65)	39.50 (3.87)

Note. Full sample N=92. Group N=23 with 4 participants per group. Consumption estimates are based on the assumption that each drink consisted of 4 oz. in Beer Pong and 1oz. for Three Man and Memory. Mean, min, and max for each of the three drinking games are presented for the full sample. Mean and standard deviation are presented below for each of the 23 groups.

Table 3-2
Descriptive Data for Group Sample (Estimated BAC)

	Beer Pong Est. BAC M(SD)	Three Man Est. BAC M(SD)	Memory Est. BAC M(SD)
Full Sample			
Mean	0.046 (0.027)	0.074 (0.030)	0.048 (0.024)
Min	0.000	0.019	0.008
Max	0.120	0.151	0.131
Groups			
1	0.040 (0.014)	0.073 (0.026)	0.044 (0.015)
2	0.052 (0.047)	0.046 (0.031)	0.041 (0.028)
3	0.053 (0.012)	0.093 (0.009)	0.080 (0.018)
4	0.032 (0.017)	0.077 (0.040)	0.042 (0.022)
5	0.019 (0.013)	0.053 (0.015)	0.042 (0.017)
6	0.051 (0.008)	0.069 (0.019)	0.042 (0.008)
7	0.053 (0.023)	0.078 (0.029)	0.029 (0.019)
8	0.050 (0.021)	0.103 (0.023)	0.058 (0.032)
9	0.015 (0.012)	0.043 (0.019)	0.033 (0.015)
10	0.031 (0.023)	0.080 (0.049)	0.075 (0.021)
11	0.056 (0.009)	0.103 (0.009)	0.069 (0.018)
12	0.029 (0.026)	0.059 (0.022)	0.026 (0.013)
13	0.044 (0.012)	0.088 (0.037)	0.062 (0.024)
14	0.036 (0.020)	0.070 (0.041)	0.060 (0.050)
15	0.069 (0.021)	0.095 (0.025)	0.049 (0.021)
16	0.052 (0.019)	0.074 (0.028)	0.048 (0.014)
17	0.066 (0.029)	0.047 (0.015)	0.025 (0.007)
18	0.052 (0.027)	0.086 (0.037)	0.042 (0.016)
19	0.016 (0.018)	0.066 (0.051)	0.040 (0.030)
20	0.034 (0.015)	0.058 (0.021)	0.031 (0.009)
21	0.045 (0.033)	0.086 (0.017)	0.071 (0.019)
22	0.082 (0.037)	0.066 (0.017)	0.039 (0.016)
23	0.083 (0.023)	0.087 (0.018)	0.065 (0.006)

Note. Full sample N=92. Group N=23 with 4 participants per group. Drinks were calculated as 4 oz. per drink for Beer Pong and 1oz. per drink for Three Man and Memory. Mean, min, and max for each of the three drinking games are presented for the full sample. Mean and standard deviation are presented below for each of the 23 groups.

Table 3-3

Pairwise Comparisons of Game Differences on Total Consumption and Estimated BAC

	Beer Pong	Three Man	Memory
Total Consumption	30.61 _a	43.39 _b	31.33 _a
Mean (SD)	(10.76)	(9.00)	(7.21)
Estimated BAC	0.046 _a	0.074 _b	0.048 _a
Mean (SD)	(0.027)	(0.030)	(0.024)

Note. N=92. Means in the same row that do not share a subscript differ at $p < .001$.

Table 3-4

Correlations between Total Drinks/Estimated BAC and Previous Experience at the Group Level

	Beer Pong		Three Man		Memory	
	Drinks (M)	Est. BAC (M)	Drinks (M)	Est. BAC (M)	Drinks (M)	Est. BAC (M)
Gender	-.361	.015	.094	.635**	.496*	.753**
Beer Pong Lifetime Experience	.066	.131				
Beer Pong Recent Experience	-.018	-.063				
Three Man Lifetime Experience			.269	.328		
Three Man Recent Experience			.035	-.006		
Memory Lifetime Experience					-.046	-.040
Memory Recent Experience					-.037	-.014

Note. N=23 groups. *p<.05, **p<.01.

Table 3-5
Summary of Regression Analysis Predicting Total Liquid Consumption during Beer Pong

Dependent Variable(s)	β	<i>SE</i> β	B	<i>T</i>	Model <i>R</i> ²
Step 1					.012
Gender	-.608	.577	-.110	-1.052	
Step 2					.014
Gender	-.638	.590	-.116	-1.082	
Lifetime Experience (Beer Pong)	.049	1.617	.003	.030	
30-Day Freq. of Play (Beer Pong)	-.027	.077	-.038	-.354	
Step 3					.021
Gender	-.540	.609	-.098	-.887	
Lifetime Experience (Beer Pong)	.171	1.638	.011	.104	
Frequency of Play (Beer Pong)	.002	.103	.002	.017	
Lifetime Experience (Motor Skills)	-.605	.935	-.073	-.647	
30-Day Freq. of Play (Motor Skills)	-.062	-.195	-.047	-.320	

Note. N=92.

Table 3-6
Summary of Regression Analysis Predicting Estimated BAC Obtained during Beer Pong

Dependent Variable(s)	β	$SE \beta$	B	T	Model R^2
Step 1					.176***
Gender	.023	.005	.420	4.386***	
Step 2					.177**
Gender	.023	.005	.415	4.248***	
Lifetime Experience (Beer Pong)	.000	.015	-.004	-.044	
30-Day Freq. of Play (Beer Pong)	.000	.001	-.029	-.290	
Step 3					.179**
Gender	.023	.006	.410	4.055***	
Lifetime Experience (Beer Pong)	-.001	.015	-.009	-.094	
Frequency of Play (Beer Pong)	.000	.001	-.025	-.187	
Lifetime Experience (Motor)	.004	.009	.053	.507	
30-Day Freq. of Play (Motor)	.000	.002	-.017	-.128	

Note. N=92. **p<.01, ***p<.001.

Table 3-7

Summary of Regression Analysis Predicting Total Liquid Consumption during Three Man

Dependent Variable(s)	β	$SE \beta$	B	T	Model R^2
Step 1					.027
Gender	-3.012	1.917	-.163	-1.571	
Step 2					.032
Gender	-2.889	1.945	-.157	-1.486	
Lifetime Experience (Three Man)	1.739	2.623	.082	.663	
30-Day Freq. of Play (Three Man)	-.549	1.665	-.040	-.330	
Step 3					.034
Gender	-2.857	1.966	-.155	-1.453	
Lifetime Experience (Three Man)	1.797	2.703	.084	.665	
Frequency of Play (Three Man)	-.518	1.702	-.038	-.304	
Lifetime Experience (Gambling)	-.869	2.486	-.047	-.350	
30-Day Freq. of Play (Gambling)	.562	1.213	.060	.463	

Note. N=92.

Table 3-8
Summary of Regression Analysis Predicting Estimated BAC Obtained during Three Man

Dependent Variable(s)	β	$SE \beta$	B	T	Model R^2
Step 1					.284***
Gender	.033	.006	.533	5.975***	
Step 2					.305***
Gender	.034	.006	.546	6.102***	
Lifetime Experience (Three Man)	.012	.007	.168	1.610	
30-Day Freq. of Play (Three Man)	-.005	.005	-.103	-.994	
Step 3					.310***
Gender	.034	.006	.543	6.022***	
Lifetime Experience (Three Man)	.012	.008	.161	1.504	
Frequency of Play (Three Man)	-.005	.005	-.108	-1.025	
Lifetime Experience (Gambling)	.005	.007	.076	.660	
30-Day Freq. of Play (Gambling)	-.002	.003	-.079	-.717	

Note. N=92. ***p<.001.

Table 3-9
Summary of Regression Analysis Predicting Total Liquid Consumption during Memory

Dependent Variable(s)	β	$SE \beta$	B	T	Model R^2
Step 1					.000
Gender	-.027	1.558	-.002	-.017	
Step 2					.003
Gender	-.019	1.581	-.001	-.012	
Lifetime Experience (Memory)	.650	1.676	.043	.388	
30-Day Freq. of Play (Memory)	-.282	.690	-.045	-.408	
Step 3					.021
Gender	-.107	1.595	-.007	-.067	
Lifetime Experience (Memory)	1.315	1.826	.087	.720	
Frequency of Play (Memory)	-.595	.801	-.096	-.743	
Lifetime Experience (Cognitive)	-2.282	1.892	-.156	-1.206	
30-Day Freq. of Play (Cognitive)	.739	.877	.118	.843	

Note. N=92.

Table 3-10

Summary of Regression Analysis Predicting Estimated BAC Obtained during Memory

Dependent Variable(s)	β	$SE \beta$	B	T	Model R^2
Step 1					.315***
Gender	.028	.004	.561	6.427***	
Step 2					.315***
Gender	.028	.004	.561	6.330***	
Lifetime Experience (Memory)	.001	.005	.014	.149	
30-Day Freq. of Play (Memory)	.000	.002	-.011	-.120	
Step 3					.331***
Gender	.028	.004	.551	6.181***	
Lifetime Experience (Memory)	.002	.005	.039	.394	
Frequency of Play (Memory)	-.002	.002	-.078	-.730	
Lifetime Experience (Cognitive)	-.006	.005	-.123	-1.152	
30-Day Freq. of Play (Cognitive)	.003	.002	.150	1.293	

Note. N=92. ***p<.001.

Appendix B: Figures

Figure 1: Beer Pong Coding Sheet

Date: _____

Group #: _____

Beer Pong Coding Sheet

Min	Participant A	Participant B	Participant C	Participant D
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
15				
16				
17				
18				
19				
20				

Figure 2: Three Man Coding Sheet

Date: _____

Group #: _____

Three Man Coding Sheet

Min	Participant A		Participant B		Participant C		Participant D	
	Dice Roll	Assigned	Dice Roll	Assigned	Dice Roll	Assigned	Dice Roll	Assigned
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Figure 3: Memory Coding Sheet

Date: _____

Group #: _____

Memory Coding Sheet

Min	Participant A		Participant B		Participant C		Participant D	
	Match	Non-match	Match	Non-match	Match	Non-match	Match	Non-match
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								

Figure 4: Beer Pong Rules Sheet

Basic Rules

Cups are filled with water, but all other beer pong rules are observed. The following rules should be followed during each game:

- One toss per turn
- If it sinks, you drink... If it misses, turn is over
- If cup spills, remove from play with no drink penalty
- Knock out all 10 of your opponents' cups before they take out yours

House Rules

1. No leaning - Elbow must stay behind the edge of the table
2. No bouncing - Tossing only
3. No defending your cups - Distracting is legal and even encouraged
4. Two re-racks per game - Must be called at the beginning of your turn
5. Loser gets a max of 3 rebuttal shots - Shoot until you miss

Figure 5: Three Man Rules Sheet

Each player will roll a single die until one player rolls a three. **This player will be the Three Man until that player rolls a three or a die combination totaling three, at which point they may select a new Three Man.** Once a Three Man has been selected, each player will take turns rolling both dice. The rules for this game are as follows:

- 7 = player to the right of the roller takes a two-ounce drink
- 11 = player to the left of the roller takes a two-ounce drink
- 9 = all players take a two-ounce drink
- 3 or a dice roll where a three is showing = Three Man takes a two-ounce drink
- 1 & 4 = all players should place their thumbs on the edge of the table and the last player to do so is required to take a two-ounce drink
- 1 & 5 = all players should place their left index finger to the side of their nose and the last player to do so is required to take a two-ounce drink
- Doubles = the roller gives both dice to a person of their choice. This person rolls both dice and takes the number of drinks that corresponds to the difference between the two dice (i.e. if you roll a 5 and a 3, you take 2 drinks)

Figure 6: Memory Rules Sheet

A 52-card deck of standard playing cards will be arranged face down on a table. Each player will turn over one card, and the **player with the highest card will go first**. These cards will be returned to the face down pile and play will begin the first player turns over two cards and tries to make a match (i.e. a five and a five).

- Match = select another player to take a two-ounce drink
- Match of the same color (i.e. a five of spades and a five of clubs) = select two other players to take a two-ounce drink or assign a four-ounce drink to a single player.
- No match = take a two-ounce drink and the next player takes their turn

Appendix C: Consent Forms

Information Letter
Alcohol Use and Drinking Games

You are invited to participate in a research study on college student alcohol consumption and drinking game participation. This study is being conducted by Jennifer Day and Natalie Heidelberg, graduate students in the clinical psychology program at Auburn University, and Dr. Chris Correia, an assistant professor of psychology at Auburn University. We hope to learn more about the relationship between alcohol consumption, drinking game participation, and motives for playing drinking games. You were selected as a possible participant because of your participation in the National Alcohol Screening Day activities and because you are over the age of 19. You do not have to be concerned about your alcohol use or participate in drinking games to participate in this study.

If you decide to participate then first read this information letter. After you read this form, you will be given a packet that includes several questionnaires inquiring about your drinking behaviors and drinking game participation. Completing the questionnaires will take less than one hour. After you complete the anonymous survey, you will be given an extra credit voucher, and you will have the opportunity to enter your name into a raffle for \$50. The raffle will be conducted at the end of today. You need not be present to win. The winner will be contacted and arrangements will be made for you to pick up the prize. The odds of winning will be dependent on the number of participants. We expect approximately 200 students will participate, which would make your odds of winning 1 in 200.

You may find answering questions about your drinking behaviors and drinking game participation distressing. In case you should become distressed, we will provide all students with printed information on how to contact the appropriate on-campus resources for support. You will be responsible for initiating and paying for any care. Should you need immediate assistance, counselors are present and can be contacted. Breaches of confidentiality are highly unlikely because you will not be placing your name or any other identifying information on any of the research materials. Participation in this study is completely voluntary, and you have the option to discontinue at any time. If you decide to withdraw from the study you will not be penalized, and will still receive the extra credit voucher and will be included in the raffle.

As compensation for participating in the study, you will be given an extra credit voucher and will be entered into the raffle for \$50. The extra credit voucher can be used in most psychology courses, but you may not be able to use the voucher in any of your current courses. You will also be helping us to better understand the relationship between alcohol use and drinking game participation. We cannot promise you that you will receive any or all of the compensation and benefits described.

Your name and any other identifying information will not be associated with the data collected. Information about this study may be published in a professional journal, and/or presented at a professional meeting. If so, only group data will be presented.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University or the Department of Psychology. If you have any questions, Jennifer Day (844-4823, dayjenm@auburn.edu), Natalie Heidelberg (844-4889, heidenf@auburn.edu), or Dr. Chris Correia (844-6480, correcj@auburn.edu, Department of Psychology) will be happy to answer them.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu .

HAVING READ THE INFORMATION PROVIDED YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH PROJECT. YOUR COMPLETION OF THE RESEARCH PACKET INDICATES YOUR WILLINGNESS TO PARTICIPATE.

Investigator's signature Date

Co-Investigator's signature Date

Consent Form 2: Study Two Information Letter for Phase One

Information Letter Alcohol Use and Drinking Games among College Students

You are invited to participate in a research study on college student substance use. This study is being conducted by Dr. Chris Correia, an associate professor of psychology at Auburn University, and Jennifer Day, a graduate student in the psychology department. We hope to learn more about alcohol use, and particularly participation in drinking games, among college students. You were selected as a possible participant because you are an undergraduate at Auburn University and you are at least 19 years old. You do not have to use alcohol or other drugs to participate in this study.

The on-line survey packet includes several questionnaires about your personality and your use of alcohol and other drugs. Completing the questionnaires will take approximately one hour. After you complete the survey, the Sona System (a computerized research scheduling program) will automatically grant you 1 hour of research credit. Pending your responses to these questionnaires, you may or may not be asked to participate in additional phases of this study. If you are not selected, you will not be contacted. If you are selected, you will be invited to participate in the second phase of the study. Participation in any additional research is voluntary. The details and benefits of any additional research will be specified in a separate informed consent form.

The risks of participating in this study are minimal. You may find answering questions about your personality or your use of substances distressing. In case you should become distressed, we will provide all students with information on how to contact the appropriate resources for support. You will be responsible for initiating and paying for any support. Breaches of confidentiality are highly unlikely because of the coding system that we will use. Participation in this study is completely voluntary, and you have the option to withdraw your consent to participate at any time. If you decide to withdraw from the study you will not be penalized, and will receive credit for your participation.

The direct benefit to you, the participant, is 1 hour of research participation, which earns extra credit in many psychology classes. The course instructor will assign the amount of extra credit received per hour of research participation. Extra-credit earned will be in accordance with the departmental policy. We cannot promise you that you will receive any or all of the benefits described.

Information about this study may be published in a professional journal, and/or presented at a professional meeting. If so, only group data will be presented.

We have a Confidentiality Certificate (CC) from the US government that adds special protection for the research information about you. It says we do not have to identify you, even under a court order or subpoena. Still, we may report medical information (if you need medical help), probably harm to yourself or others, or probably child abuse, and the government may see your

information if it audits us. This Certificate does not mean the government approves or disapproves of our project.

The Certificate cannot be used to resist a demand for information from personnel of the United States Government that is used for auditing or evaluation of Federally funded projects or for information that must be disclosed in order to meet the requirements of the federal Food and Drug Administration (FDA). The federal auditors can use their audit information only for audit or evaluation of the program. They can't report anything that would harm the research subjects.

You should understand that a Certificate of Confidentiality does not prevent you or a member of your family from voluntarily releasing information about yourself or your involvement in this research. Note however, that if an insurer, employer, or other person learns about your participation and obtains your written consent to receive research information, then the researchers may not use the CC to withhold this information.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University, or the Department of Psychology. If you have any questions, Dr. Chris Correia (844-6480, correcj@auburn.edu, Department of Psychology) will be happy to answer them.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH PROJECT. YOUR COMPLETION OF THE ON-LINE RESEARCH PACKET INDICATES YOUR WILLINGNESS TO PARTICIPATE.

The Auburn University Institutional Review Board has approved this document for use from 1/9/09 to 9/18/09.

Protocol #07-184 MR 0709

Consent Form 3: Study Two Informed Consent for Phase Two

INFORMED CONSENT
Development of Simulated Drinking Game Procedure

You are invited to participate in a research study designed to estimate the amount of alcohol consumed during a drinking game by using a non-alcoholic simulation procedure. This study is being conducted by Dr. Chris Correia, an associate professor of psychology at Auburn University, and Jennifer Day, a graduate student in the psychology department. You were selected as a possible participant because you are an undergraduate at Auburn University and you are at least 19 years old, and because you reported having recently consumed alcohol while playing a drinking game.

If you decide to participate, you will first be given a breathalyzer test to determine if you have recently consumed alcohol. If the test indicates recent alcohol use, or if you report using mind-altering substances earlier in the day, your session will be rescheduled. You will be asked to remain in the laboratory until you're the breathalyzer test indicates that the alcohol is out of your system. If you insist on leaving before your blood alcohol level returns to zero, then you will be instructed to call a friend or a cab to pick you up at your expense. Additionally, you will sign a waiver stating that you have been informed of the risks associated with your leaving early and have decided to do so anyway.

If you remain eligible, you will sign this informed consent, and we will record your weight. For the remainder of the laboratory session, you will participate in a Simulated Drinking Game Procedure. The procedure will closely resemble a non-alcoholic version of "beer pong," and standard beer pong rules will be observed. These rules will be explained to you by a member of the research team. You will participate in one singles match and one match as a member of a team. Each match will last 20 minutes and until a player has won a match (e.g., if a player wins in 15 minutes, you will start new match and play for 5 more minutes; if after 20 minutes no player has won a match you will continue to play until someone wins the match). Research assistants will be observing your behavior and taking notes for the duration of the session. You will NOT be asked or allowed to consume any alcohol during the session. Cups will instead be filled with a non-alcoholic beverage.

The risks of participating in this study are minimal. Breaches of confidentiality are unlikely because your identifying information will not be placed on any of the data collected during the Simulated Drinking Game Procedure. However, because you will be involved in the Simulated Drinking Game Procedure with other players, you will be responsible for protecting the identity of other participants. By signing this form, you agree to maintaining the confidentiality of others. Participation in this study is completely voluntary, and you have the option to withdraw your consent to participate at any time without penalty.

The direct benefit to you, the participant, is 1.5 hours of research participation, which earns extra credit in many psychology classes. The course instructor will assign the amount of extra credit

received per hour of research participation. Extra-credit earned will be in accordance with the departmental policy. We cannot promise you that you will receive any or all of the benefits described. Your research participation credit will be recorded in the Sona System.

Your name and any other identifying information will not be associated with the data collected. Once you decide to participate, you will be assigned a code number. All data collected will be associated with this code number. The master code list will be kept in a locked filing cabinet separate from the data. The master code list will be destroyed after data analysis is complete. This informed consent will be destroyed after three years. Information about this study may be published in a professional journal, and/or presented at a professional meeting. If so, only group data will be presented.

We have a Confidentiality Certificate (CC) from the US government that adds special protection for the research information about you. It says we do not have to identify you, even under a court order or subpoena. Still, we may report medical information (if you need medical help), probably harm to yourself or others, or probably child abuse, and the government may see your information if it audits us. This Certificate does not mean the government approves or disapproves of our project.

The Certificate cannot be used to resist a demand for information from personnel of the United States Government that is used for auditing or evaluation of Federally funded projects or for information that must be disclosed in order to meet the requirements of the federal Food and Drug Administration (FDA). The federal auditors can use their audit information only for audit or evaluation of the program. They can't report anything that would harm the research subjects.

You should understand that a Certificate of Confidentiality does not prevent you or a member of your family from voluntarily releasing information about yourself or your involvement in this research. Note however, that if an insurer, employer, or other person learns about your participation and obtains your written consent to receive research information, then the researchers may not use the CC to withhold this information.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University, or the Department of Psychology. If you have any questions, Dr. Chris Correia (844-6480, correcj@auburn.edu, Department of Psychology) will be happy to answer them.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

Participant's signature Date

Investigator's signature Date

Co-investigator's signature Date

Consent Form 4: Study Three Information Letter for Phase One

Information Sheet
Alcohol Use and Drinking Games among College Students

You are invited to participate in a research study on college student substance use. This study is being conducted by Dr. Chris Correia, an associate professor of psychology at Auburn University, and Jennifer Day, a graduate student in the psychology department. We hope to learn more about alcohol use, and particularly participation in drinking games, among college students. You were selected as a possible participant because you are an undergraduate at Auburn University and you are at least 19 years old. You do not have to use alcohol or other drugs to participate in this study.

The on-line survey packet includes several questionnaires about your personality and your use of alcohol and other drugs. Completing the questionnaires will take approximately one hour. After you complete the survey, the Sona System (a computerized research scheduling program) will automatically grant you 1 hour of research credit. Pending your responses to these questionnaires, you may or may not be asked to participate in additional phases of this study. If you are not selected, you will not be contacted. If you are selected, you will be invited to participate in the second phase of the study. Participation in any additional research is voluntary. The details and benefits of any additional research will be specified in a separate informed consent form.

The risks of participating in this study are minimal. You may find answering questions about your personality or your use of substances distressing. In case you should become distressed, we will provide all students with information on how to contact the appropriate resources for support. You will be responsible for initiating and paying for any support. Breaches of confidentiality are highly unlikely because of the coding system that we will use.

Participation in this study is completely voluntary, and you have the option to withdraw your consent to participate at any time. If you decide to withdraw from the study you will not be penalized, and will receive credit for your participation.

The direct benefit to you, the participant, is 1 hour of research participation, which earns extra credit in many psychology classes. The course instructor will assign the amount of extra credit received per hour of research participation. Extra-credit earned will be in accordance with the departmental policy. We cannot promise you that you will receive any or all of the benefits described.

Information about this study may be published in a professional journal, and/or presented at a professional meeting. If so, only group data will be presented.

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order or subpoena. Still, we may report medical information (if you need medical help), probably harm to yourself or others, or probably child abuse, and the government may see your information if it audits us. This Certificate does not mean the government approves or disapproves of our project.

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Your decision whether or not to participate will not jeopardize your future relations with Auburn University, or the Department of Psychology. If you have any questions, Dr. Chris Correia (844-6480, correcj@auburn.edu, Department of Psychology) will be happy to answer them.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone at (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH PROJECT. YOUR COMPLETION OF THE ON-LINE RESEARCH PACKET INDICATES YOUR WILLINGNESS TO PARTICIPATE.

The Auburn University Institutional Review Board has approved this document for use from 9/19/07 to 9/18/08.

Protocol #07-210 MR 0709

INFORMED CONSENT
Development of Simulated Drinking Game Procedure

You are invited to participate in a research study designed to estimate the amount of alcohol consumed during a drinking game by using a non-alcoholic simulation procedure. This study is being conducted by Dr. Chris Correia, an associate professor of psychology at Auburn University, and Jennifer Day, a graduate student in the psychology department. You were selected as a possible participant because you are an undergraduate at Auburn University and you are at least 19 years old, and because you reported having recently consumed alcohol while playing a drinking game.

If you decide to participate, you will first be given a breathalyzer test to determine if you have recently consumed alcohol. If the test indicates recent alcohol use, or if you report using mind-altering substances earlier in the day, your session will be rescheduled. You will be asked to remain in the laboratory until you're the breathalyzer test indicates that the alcohol is out of your system. If you insist on leaving before your blood alcohol level returns to zero, then you will be instructed to call a friend or a cab to pick you up at your expense. Additionally, you will sign a waiver stating that you have been informed of the risks associated with your leaving early and have decided to do so anyway.

If you remain eligible, you will sign this informed consent, and we will record your weight. For the remainder of the laboratory session, you will participate in a Simulated Drinking Game Procedure. The procedure will closely resemble non-alcoholic versions of three commonly played drinking games: beer pong, three man, and memory. The rules for each will be explained to you by a member of the research team. You will participate in each game for approximately 20 minutes. Research assistants will be observing your behavior and taking notes for the duration of the session. You will NOT be asked or allowed to consume any alcohol during the session. Cups will instead be filled with a non-alcoholic beverage.

The risks of participating in this study are minimal. Breaches of confidentiality are unlikely because your identifying information will not be placed on any of the data collected during the Simulated Drinking Game Procedure. However, because you will be involved in the Simulated Drinking Game Procedure with other players, you will be responsible for protecting the identity of other participants. By signing this form, you agree to maintain the confidentiality of others. Participation in this study is completely voluntary, and you have the option to withdraw your consent to participate at any time without penalty.

The direct benefit to you, the participant, is 1.5 hours of research participation, which earns extra credit in many psychology classes. The course instructor will assign the amount of extra credit received per hour of research participation. Extra-credit earned will be in accordance with the departmental policy. We cannot promise you that you will receive any or all of the benefits described. Your research participation credit will be recorded in the Sona System.

Your name and any other identifying information will not be associated with the data collected. Once you decide to participate, you will be assigned a code number. All data collected will be associated with this code number. The master code list will be kept in a locked filing cabinet separate from the data. The master code list will be destroyed after data analysis is complete. This informed consent will be destroyed after three years. Information about this study may be published in a professional journal, and/or presented at a professional meeting. If so, only group data will be presented.

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The Certificate cannot be used to resist a demand for information from personnel of the United States Government that is used for auditing or evaluation of Federally funded projects or for information that must be disclosed in order to meet the requirements of the federal Food and Drug Administration (FDA). The federal auditors can use their audit information only for audit or evaluation of the program. They can't report anything that would harm the research subjects.

You should understand that a Certificate of Confidentiality does not prevent you or a member of your family from voluntarily releasing information about yourself or your involvement in this research. Note however, that if an insurer, employer, or other person learns about your participation and obtains your written consent to receive research information, then the researchers may not use the CC to withhold this information.

Your decision whether or not to participate will not jeopardize your future relations with Auburn University, or the Department of Psychology. If you have any questions, Dr. Chris Correia (844-6480, correcj@auburn.edu, Department of Psychology) will be happy to answer them.

For more information regarding your rights as a research participant you may contact the Auburn University Office of Human Subjects Research or the Institutional Review Board by phone (334)-844-5966 or e-mail at hsubjec@auburn.edu or IRBChair@auburn.edu.

HAVING READ THE INFORMATION PROVIDED, YOU MUST DECIDE WHETHER OR NOT YOU WISH TO PARTICIPATE IN THIS RESEARCH STUDY. YOUR SIGNATURE INDICATES YOUR WILLINGNESS TO PARTICIPATE.

Participant's signature

Date

Investigator's signature

Date

Co-investigator's signature

Date

Appendix D: Measures

Measure 1: General Information Questionnaire

1. Please indicate your gender: _____ Male (1) _____ Female (2)
2. How old are you? _____ years.
3. How many years of school have you completed (e.g., graduated from high school = 12 years)?
_____ years.
4. Are you a member of a fraternity or sorority? _____ Yes (1) _____ No (2)
5. Please check one of the following Ethnic categories:
_____ Hispanic or Latino (1)
_____ Not Hispanic or Latino (2)
6. Please check as many of the following racial categories that apply to you:
_____ American Indian or Alaska Native
_____ Asian
_____ Black or African American
_____ Native Hawaiian or Other Pacific Islander
_____ White
7. Where do you currently reside?
_____ Off campus house or apartment (1) _____ With parents/guardians (2)
_____ Fraternity House (3) _____ Campus dormitory (4)
_____ Sorority House (5) _____ Other : _____ (6)

Measure 2: Daily Drinking Questionnaire (DDQ)

Please use the charts below to describe your recent drinking patterns. Please report your drinking in standard drinks, where 1 standard drink equals 12 ounces of beer, 4 ounces of wine, and or a 1 ounce shot of hard liquor.

For the **past month** fill in for each calendar day the number of standard drinks you **usually drink** on that day.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

Now fill in for the **past month** the **maximum number** of standard drinks you had on each calendar day.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday

- 1) During the last 28 days, on how many days did you have any alcohol to drink? _____
- 2) During the last 28 days, on how many days did you drink beer? _____
- 3) During the last 28 days, on how many days did you drink wine? _____
- 4) During the last 28 days, on how many days did you drink a shot of hard liquor? _____
- 5) During the last 28 days, on how many days did you drink a mixed-drink? _____
- 6) During the last 28 days, on how many days have you been drunk? _____
- 7) MALE ONLY: During the last 28 days, on how many days did you have 5 or more standard drinks? _____

FEMALES ONLY: During the last 28 days, on how many days did you have 4 or more standard drinks? _____
- 8) During the last 28 days, what is the largest number of standard drinks you consumed in one night? _____
- 9) Approximately how many hours did it take you to finish the largest number of drinks mentioned in #7? _____

Measure 3: Rutgers' Alcohol Problem Index (RAPI)

Instructions: Indicate if any of the following have happened during the last 28 days while you were using alcohol, or because of your alcohol use. When marking your answers, use the following code:

0 = never 1 = 1-2 times 2 = 3-5 times 3 = 6-10 times 4 = more than 10 times

1. Not able to do your homework or study for a test	0 1 2 3 4
2. Got into fights, acted bad or did mean things	0 1 2 3 4
3. Missed out on other things because you spent too much money on alcohol	0 1 2 3 4
4. Went to work or school drunk	0 1 2 3 4
5. Caused shame or embarrassment to someone	0 1 2 3 4
6. Neglected your responsibilities	0 1 2 3 4
7. Relative avoided you	0 1 2 3 4
8. Felt that you needed MORE alcohol than you used to use in order to get the same effect	0 1 2 3 4
9. Tried to control your drinking by trying to use only at certain times of the day or certain places	0 1 2 3 4
10. Had withdrawal symptoms, that is felt sick because you stopped or cut down drinking	0 1 2 3 4
11. Noticed a change in your personality	0 1 2 3 4
12. Felt you had a problem with alcohol	0 1 2 3 4
13. Missed a day (or part of a day) of school or work	0 1 2 3 4
14. Tried to cut down or quit drinking	0 1 2 3 4
15. Suddenly found yourself in a place you could not remember getting to	0 1 2 3 4
16. Passed out or fainted suddenly	0 1 2 3 4
17. Had a fight, argument, or bad feeling with a friend	0 1 2 3 4
18. Had a fight, argument, or bad feeling with a family member	0 1 2 3 4
19. Kept drinking when you promised yourself not to	0 1 2 3 4
20. Felt you were going crazy	0 1 2 3 4
21. Had a bad time	0 1 2 3 4
22. Felt physically or psychologically dependent on alcohol	0 1 2 3 4
23. Was told by a friend or neighbor to cut down on drinking	0 1 2 3 4

Measure 4: Drinking Games Measure

1. Have you ever played a drinking game?

_____ yes _____ no

2. In the past 30 days, how often did you play a drinking game?

_____ Never _____ Once _____ 2-4 times/month _____ 2-3 times/week _____ 4+ times/week

3. In the past 30 days, please indicate how long you played on a typical night when you played drinking games. Please answer in minutes and provide a single number rather than a range (i.e. 25 instead of 20-30). Answer "0" if you did not play drinking games in the past 30 days.

4. How many total drinks do you typically consume when you play drinking games? Please provide a single number rather than a range (i.e. 4 instead of 3-5). Answer "0" if you did not play drinking games during the last 30 days.

5. In the past 30 days, what was the highest number of drinks you consumed while playing a drinking game. Please provide a single number rather than a range (i.e. 4 instead of 3-5). Answer "0" if you did not play a drinking game in the last 30 days.

6. Do you typically drink beer when playing drinking games?

_____ yes _____ no

7. Do you typically drink wine when playing drinking games?

_____ yes _____ no

8. Do you typically drink shots when playing drinking games?

_____ yes _____ no

9. Do you typically drink mixed drinks when playing drinking games?

____ yes ____ no

10. In the past 30 days, have you played Consumption Games (e.g., Chugging/Power Hour/Keg Stands)?

____ yes ____ no

11. In the past 30 days, have you played Team Games (e.g., Beer Pong/Beirut/Beer Races)?

____ yes ____ no

12. In the past 30 days, have you played Media Games (e.g., Drinking each time a phrase or word is heard in a TV show, movie, or song; "Have a Drink on Me")?

____ yes ____ no

13. In the past 30 days, have you played Dice Games (e.g., 7-11/Doubles/3 Man)?

____ yes ____ no

14. In the past 30 days, have you played Card Games (e.g., Kings/Asshole/Screw the Dealer)?

____ yes ____ no

15. In the past 30 days, have you played Verbal Games (e.g., Never Have I Ever/The Name Game/Animal)?

____ yes ____ no

16. In the past 30 days, have you played Motor Games (e.g., Jenga/Quarters/Thumper)?

____ yes ____ no

17. In the past 30 days, have you played Board Drinking Games (e.g., Monopoly/Pictionary/Scrabble/Shots and Ladders)?

____ yes ____ no

18. When you play drinking games, how often do you drink more alcohol than you intended?

_____ Never _____ Sometimes _____ Half of the Time _____ Most of the Time _____
Always

19. During the past 30 days, have you engaged in unplanned sexual activity that you later regretted as a result of playing drinking games?

_____ yes _____ no

20. During the past 30 days, have you had a hangover (headache, sick stomach) the morning after playing drinking games?

_____ yes _____ no

21. During the past 30 days, have you gotten physically sick (threw up) as a result of playing drinking games?

_____ yes _____ no

22. During the past 30 days, have you found it difficult to limit how much you drank while playing drinking games?

_____ yes _____ no

23. During the past 30 days, have you have become rude, obnoxious, or insulting after playing drinking games?

_____ yes _____ no

24. During the past 30 days, have you have been unable to remember large stretches of time after playing drinking games?

_____ yes _____ no

25. During the past 30 days, have you passed out from drinking alcohol as a result of playing drinking games?

_____ yes _____ no

26. During the past 30 days, have you have driven a car when you knew you had too much to drink to drive safely after playing drinking games?

_____ yes

_____ no

27. How many times have you played Beer Pong in the last 30 days? (Please answer by typing a number, like "2")

Measure 5: Types of Drinking Games Questionnaire

Many different types of drinking games have been established over the years. The following questions ask about your participation in these different types of drinking games. If you have ever played these drinking games (even if you no longer play drinking games or if you only played once) please answer "Yes."

1. Some drinking games require that you can display motor skills while playing. For example, in Beer Pong you need to be able to aim a ping pong ball into the opposing players' cups in order to win. Have you ever played Beer Pong?

yes no

2. Beer Pong is not the only drinking game that tests motor skills. Other types of motor skills games include: Quarters, Flip Cup, Thumper, and Jenga. Have you ever played any of these games or another type of motor skills game?

yes no

3. Some drinking games require that you can display verbal or memory skills while playing. For example, in Memory you need to be able to remember the location of different face-down cards so that you can make more pairs than your opponent. Have you ever played Memory?

yes no

4. Memory is not the only drinking game that tests verbal/memory skills. Other types of verbal/memory skills games include: Categories, Questions, The Alphabet Game, and The Name Game. Have you ever played any of these games or another type of verbal/memory skills game?

yes no

5. Some drinking games are based completely on chance. For example, in Three Man you drink based on the roll of the dice and no skill is required to play. Have you ever played Three Man?

yes no

6. Three Man is not the only drinking game that is based on chance. Other types of chance/gambling games include: Kings Cup, Horse Races, 7-11-Doubles, and Suicide. Have you ever played any of these games or another type of chance/gambling game?

yes no

7. Some drinking games require that you consume large amounts of alcohol over a short period of time. For example, in Century Club you drink one shot of beer every minute for 100 minutes. Have you ever played Century Club?

yes no

8. Century Club is not the only drinking game that is based on consumption ability. Other types of consumption games include: Boat Races, Power Hour, Keg Stands, and Around the World. Have you ever played any of these games or another type of consumption game?

yes no

9. Some drinking games require that you drink based on the number of times a predetermined trigger is presented in a media context (i.e. a word in a song, an event in a TV show). For example, in Roxanne you drink every time the word Roxanne is sung in the song "Roxanne" by The Police. Have you ever played Roxanne?

yes no

10. Roxanne is not the only drinking game that is based on media cues. Other types of media games include: Have a Drink on Me, Beer or No Beer, or any game that requires drinking each time a phrase or word is heard in a TV show, movie, or song. Have you ever played any of these games or another type of media game?

yes no

11. Some drinking games require that you play in teams. For example, in Beer Relays you are a member of a relay team and have to race to reach your beer, drink it as quickly as possible, then run back and tag the next person who does the same. The first team finished wins. Have you ever played Beer Relays?

yes no

12. Beer Relays is not the only drinking game that is played in teams. Other types of team games include: Beirut, Beer Races, and Beer Pong. Have you ever played any of these games or another type of team game?

yes no