ENVIRONMENTAL AND DISPOSITIONAL FACTORS RELATED TO COLLEGE STUDENTS' ALCOHOL CONSUMPTION DURING TWENTY-FIRST BIRTHDAY CELEBRATIONS

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ABSTRACT

Three studies were conducted to investigate dispositional and environmental factors related to alcohol consumption during 21st birthday celebrations, and test an internet-based intervention designed to reduce alcohol consumption during 21st birthday celebrations (21BDCs). Results of Study 1 indicated the majority of alcoholic beverages (79.3%) are consumed rapidly. Rapid consumption was positively related to drinking history and normative perceptions, and negatively related to perceptions of behavioral control. The relation between sociocultural beliefs and rapid consumption are mediated by normative perceptions and perceptions of behavioral control.

The major objectives of Study 2 were to explore: a) 21BDC planning behaviors and the physical and social 21BDC environment, b) the relation between intoxication and planning behaviors, celebratory behaviors, and the 21BDC environment, and c) the frequency of various alcohol-related negative outcomes. Results indicate 26.4% of the participants exceeded an eBAL of .26. Intoxication during 21BDCs is enabled by the availability of free drinks, and having a friend to look after oneself or monitor alcohol consumption does not lead to lower levels of intoxication. The most frequent negative outcomes were hangovers, blackouts and vomiting, with 50% of celebrants experiencing at least one of these outcomes.

Study 3 tested a web-based intervention designed to reduce intoxication and negative outcomes during 21BDCs. The intervention was implemented four weeks before the 21st birthday, was designed to: a) change perceptions of drinking norms during 21st birthday celebrations, b) increase perceptions of behavioral control over alcohol consumption, and c) counter social pressures to consumer alcohol during the weeks leading up to the celebration. Results indicated no significant reductions in number of alcoholic beverages consumed, intoxication or negative outcomes, as compared to a traditional 21st birthday card intervention and no-intervention controls. While students were not motivated to implement many of the suggested harm-reduction strategies, there was a significant increase in the consumption of food and non-alcoholic beverages among participants receiving the web-based intervention. Development and implementation of effective interventions to reduce intoxication during 21BDC remains a significant challenge.

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DEDICATION

The would like to dedicate this work to my mother and father, Don and Carol Clarke who made all of this possible with their constant love and support. A would also like to recognize my Zen Brothers who may have thought this day would never come.

INTRODUCTION

The economic costs attributable to alcohol misuse in the U.S. are currently estimated at $185 billion per year (Hanson & Li, 2003). Excessive alcohol consumption among college students continues to be one of the most serious public health problems confronting the college campus and its surrounding community (Wechsler, Dowdall, Maener, Gledhill-Hoyt, & Lee, 1998; Wechsler, Lee, Kuo, & Lee, 2000; Wechsler & Wuethrich, 2002). For example, survey research suggests: a) 80% to 90% of all college students consume alcoholic beverages (Johnston, O'Malley, & Bachman, 2000), b) approximately 44% of college students report at-risk drinking (Wechsler *et al*., 2000), c) many students drink with the explicit intention to become intoxicated (Glindemann, Geller, & Ludwig, 1996; Wechsler, Lee, Seibring, Nelson, & Kuo, 2002), d) 34.2% of underage students and 28.6% of students aged 21-23 reported being drunk three or more times in the past month (Wechsler *et al*., 2002), and e) 13% of students who consumed alcohol reported believing they had a drinking problem (Wechsler *et al*., 2002).

At-Risk Alcohol Consumption

One of the most common measures of "at-risk" drinking is the consumption of five or more drinks in a sitting by men and the consumption of four or more drinks in a sitting by women. Recent studies indicate approximately 43% of college students engage in at-risk drinking, with about 22% reporting frequent at-risk drinking (Wechsler *et al*., 1998; 2000; Wechsler *et al*., 2002). At-risk drinking in college has been associated with being single, male, and a member of a Greek social organization, and having engaged in at-risk drinking in high school (Wechsler *et al*, 1998; 2000). Unfortunately, most studies indicate no change in the percentage of students engaging in at-risk drinking over the last 20 years (Gonzalez & Boughton, 1994; Magner, 1988; Tryon, 1992; Wechsler *et al*, 1998; 2000; Wechsler *et al*., 2002).

Alcohol-Related Negative Outcomes

Many students who use alcohol excessively suffer from a variety of negative consequences, including interference with academics, conflict with friends, unplanned and/or at-risk sexual activity, property damage, drinking and driving, health deficits, and a variety of undesirable social interactions (Anderson, 2001; Clarke, 2000; Lewis, Malow, & Ireland, 1997; Meilman, 1993; Perkins, 2002; Presley, Meilman, & Lyerla, 1993, 1995; Poulson *et al*., 1998; Wechsler *et al*., 1998). Research has shown that males experience more negative consequences than females (Clarke, 1993; Wechsler *et al*., 1998). Men typically have many more problems related to public deviance and damage to others because of drinking. However, this gender difference disappears when examining damage to self and more private matters such as personal injury, decreased academic performance, and unintentional sexual activity (Lo, 1996; Perkins, 1992).

Secondary negative outcomes. Secondary outcomes, or indirect effects, of excessive alcohol consumption are also problematic for college students and members of the community in which they live. Secondary effects occur when an individual's alcohol consumption interferes with the quality of life among other members of the community. Research indicates 77% of college students experience secondary negative outcomes related to alcohol consumption (Wechsler *et al*., 2000). The most frequently reported secondary outcomes are interruption of sleep or studying, inconvenient care for an intoxicated person, and feeling insulted and/or humiliated by an intoxicated person (Wechsler *et al*., 1998, 2000; Wechsler *et al*., 2002).

Driving under the influence (DUI). Perhaps one of the most serious alcohol-related problems affecting oneself and others is DUI. According to NHTSA, an estimated 17,448 people were killed in alcohol-related traffic crashes in 2001, accounting for approximately 41% of all

traffic fatalities. In Virginia alone, approximately 36% of all traffic fatalities in 2001 were alcohol-related (NHTSA, 2002). Surveys conducted in 1999 revealed that in the previous year more than two million American college students drive while under the influence of alcohol, and over three million rode in a car with a driver who was intoxicated (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002). In addition, college students who are at-risk drinkers are more likely than were other students to drive while under the influence of alcohol (Wechsler & Wuethrich, 2002).

Gender Differences

Although the prevalence of drinking among college men and women is approximately equal, men are more likely to drink to excess and engage in at-risk drinking (Naimi *et al*., 2003; O'Malley & Johnston, 2002). Johnston *et al*. (2002) found 48% of college men reported having engaged in at-risk drinking, compared to 36% of college women. In addition, research indicates men are two and a half times more likely than women to report consuming ten or more drinks per week (26% vs. 10%; Presley, Meilman, & Cashin, 1996), and college men are more likely than college women to consume alcohol with a specific intention of becoming intoxicated and experience alcohol-related problems (Glindemann *et al.*, 1996; Presley, Meilman, & Lyerla, 1993; Wechsler *et al*., 1998). Moreover, young men (under 24 years) are twice as likely as were young women to report behaviors that would result in a diagnosis of alcohol dependence (Knight *et al*., 2002). It is important to note that most of this research involved self-report measures, and women appear to be less willing than men to identify a problem as alcohol-related, and are more hesitant to classify themselves as heavy drinkers (Wechsler, Dowdall, Davenport, & Rimm, 1995).

Celebratory Drinking

The phenomenon of intensive celebratory drinking for designated holidays and events is not new, and was characteristic of the Roman Empire, Middle Ages and the Renaissance (Csikszentmihalyi, 1968). Such "fiesta drinking" (Partanen, 1991) is typically characterized by the "ritualization of drinking and its ceremonial use" (Room & Makela, 2000, p. 480) which usually results in a dampening effect on extreme drunkenness. However, in environments absent of strong norms against drunkenness, celebratory drinking may include and even facilitate extreme levels of drunkenness. The college environment may be such an "over-permissive" culture, in which "the cultural attitude is permissive to drinking, behaviors which occur when intoxicated, and to drinking pathologies" (Pittman, 1967, p. 5).

College students indicate they often become intoxicated when celebrating specific occasions (Klein, 1992; Roche & Watt, 1999). In recent years, a number of these celebratory contexts and events have been investigated, including Halloween (Glindemann, Wiegand & Geller, in press; Miller *et al*., 1991; Miller, Jasper, & Hill,1993), St. Patrick's Day (Glindemann *et al*., in press), football tailgating (Clarke *et al*., 2004; Neighbors, Oster-Aaland, Lewis, & Bergstrom, 2006; Neal, Sugarman, Hustad, Caska, & Carey, 2005), spring break (Apsotolopoulos *et al*., 2002; Gonzalez, 1986; Lee, Maggs, & Rankin, 2006; Smeaton, Josiam, & Dietrich, 1998), the end of a semester (Michigan State University, 2002a), and 21st birthdays (Neighbors, Oster-Aaland, Bergstrom, & Lewis, 2005; Neighbors *et al.,* 2006; Smith, Bogle, Talbott, Gant, & Castillo, 2006).

Results of these and other studies indicate certain events and contexts may involve higher levels of risk for heavy alcohol consumption and related negative outcomes. Given the potential for harm from extreme single-occasion alcohol consumption (Hingson *et al*., 2002; Wechsler,

Molnar, Davenport, & Baer, 1999), it is important to identify situational and dispositional factors (Forsyth & Handleby, 1987) that support or facilitate high-risk celebratory consumption.

Twenty-first birthday celebrations. The 21st Birthday celebration (21BDC) concerns college alcohol-abuse prevention professionals, yet has received limited attention in the research literature. This is considered a critical time when college students engage in high levels of alcohol consumption, putting themselves at risk for negative outcomes, including alcohol overdose. This is supported by survey research (Neighbors *et al*., 2005, 2006) and numerous newspaper reports of alcohol overdoses associated with 21BDCs (see Hill & Riquier, 2005). Specifically, Neighbors *et al*. (2005) found 72% engaged in high single-occasion alcohol consumption (5 or more drinks for men, four or more for women), and nearly 25% reached an estimated blood alcohol level of .26 or higher. Smith *et al*. (2006) found students consumed more alcohol during their 21BDCs than on either a typical or a peak-drinking day during the month prior to this occasion. It is clear alcohol consumption during 21BDCs poses a significant risk to some college students.

Environmental Management of Alcohol Consumption

While traditional approaches to prevention have tacitly accepted the world as it is and then tried to persuade individuals to resist its temptations, the environmental approach seeks to change the "world," at least in the context of the relevant local environment, in an attempt to facilitate beneficial change (DeJong , 1998). This prevention strategy, based on the public health model, typically targets three elements: the user, the agent (alcohol), and the environment (Kuh, 1994). Much less is currently known about the role of the environmental context than the user and the agent. Three lines of research have provided some preliminary findings relevant to this approach to reducing alcohol use. They include a series of field experiments on: a) environment-

behavior relationships at university parties, b) the effectiveness of server intervention, and c) the availability of non-alcoholic beverage and food.

University parties. Two studies (Kalsher & Geller, 1990; Russ & Geller, 1988) showed that the simple environmental stimulus of a brand label for beer has significant impact on drink choice and subsequent intoxication. Specifically, ongoing beer choices at a fraternity party matched taste preference (in a blind taste test) when the beer brands were unlabeled. When kegs were labeled by beer type (regular, light, or low alcohol), partygoers preferred beers with higher alcohol content (regular and light). Low alcohol beer was only consumed in quantity in an unlabeled condition. Thus, serving low alcohol beer only reduced intoxication when subjects were unaware of the beer brand. This supports the conclusion of Glindemann *et al.* (1996) that many students consume alcohol with the intention of becoming intoxicated.

Geller, Kalsher, and Clarke (1991) systematically manipulated the alcohol content of beverages available at two fraternity parties. Either regular or low alcohol drinks were served. Results indicated that when a lower-alcohol beer (3% alcohol) and weaker mixed drinks (7/8 ounce of alcohol per drink) were introduced into a party setting , college students did not "titrate" and increase their consumption to reach a "desired" level of intoxication. Therefore, students exited this party with significantly lower BACs than they did when leaving a party where drinks contained standard alcohol concentrations. Only one party participant commented that the drinks were weak.

Geller and Kalsher (1990) investigated the influence of bartenders versus self-service on the consumption of beer and mixed drinks at a fraternity party. Results indicated that beer drinkers randomly assigned to the self-serve condition drank beer at higher rates than beer drinkers served by bartenders. In contrast, individuals who chose to consume mixed drinks

became significantly more intoxicated in the Bartender condition than in the Self-Serve condition. Using a response-cost model, the authors concluded partygoers drank more beer when serving themselves because the self-service of beer was faster and more convenient than getting service from a bartender. On the other hand, preparing a mixed drink requires some knowledge and inconvenience, and bartenders decreased this response cost.

*Server intervention***.** Most server intervention programs teach hosts of parties and servers of alcohol to identify warning signs that indicate overindulgence and to use a variety of impairment-reduction tactics to prevent or reduce intoxication. Intervention tactics include offering food, delaying the service of an alcoholic beverage, offering non-alcoholic beverages, and advising a person not to drive. Evaluations of these programs in bar settings indicate they can effectively reduce intoxication (Geller, Russ, & Delphos, 1987; McKnight, 1991; Russ & Geller, 1987; Saltz, 1987).

Although the evaluations of server-intervention programs indicated this approach could lessen intoxication and the potential for DUI, it was concluded, "effects will be transitory if the behaviors taught during training are not supported by the environmental context in which they occur" (Geller, 1990, p. 268). For example, Geller suggested that instituting a mandatory gratuity might decrease waitpersons' concerns about reductions in tips associated with "cutting-off" a patron. Server intervention is especially advantageous because it occurs within the drinking environment, and the strategy for intervening can be tailored to each drinker (Geller *et al*., 1987). However, to be effective, this approach requires high quality training and motivation on the part of the server.

Availability of food. The presence of food in a drinking setting can have a beneficial effect on participant intoxication and alcohol-related problems. A study using an objective

measure of intoxication (i.e., BAC readings from breathalyzers) found that subjects who ingested food prior to consuming alcohol had lower BACs than those who did not ingest food (Millar, Hammersley, & Finnigan, 1992). The authors concluded that food consumption might reduce the adverse effects of alcohol intoxication. In another study, college students were surveyed about at-risk drinking occasions and the influence of contextual characteristics on alcohol-related problems (Clapp, Shillington, & Segars, 2000). The students reported that having food available was instrumental in protecting them against intoxication and subsequent alcohol-related problems.

Availability of non-alcoholic beverages. The presence of non-alcoholic beverages is also an environmental variable with obvious potential for reducing intoxication and related negative outcomes. A comprehensive study of college-student drinking and alcohol-related outcomes suggested future prevention efforts include the increased availability of non-alcoholic beverages (Millar, 1999). More specifically, an alcohol-abuse prevention program in a university residence hall (Mills, 1983) and at a bar frequented by undergraduate students (Brigham, Meier, & Goodner, 1995) reduced the number of alcohol-related negative outcomes. A component of each of these intervention programs was the convenient availability of non-alcoholic drinks.

Conclusion. Studies on the relation among alcohol use, negative outcomes and social and situational factors of the drinking environment are scarce. Indeed, the conclusion more than a decade ago, that "comparatively little research has addressed the environmental determinants of drinking in naturalistic settings" (Geller, 1990, p. 265) is relevant today. This is unfortunate, considering that the environmental context within which drinking occurs can have a dramatic impact on alcohol consumption and subsequent risk for negative outcomes.

Theoretical Foundations

Interventions to reduce at-risk alcohol use during 21BDCs (Neighbors *et al*., 2005; Smith *et al*., 2006) have focused on the severity of the consequences of at-risk drinking and correcting misperceptions concerning alcohol consumption during 21BDCs. These strategies typically address important outcomes such as alcohol overdose and drinking and driving. In contrast, the proposed research is guided by two theories with a much broader perspective, social influence theory and the theory of planned behavior. This theoretical underpinning will highlight the important role of attitudes, normative beliefs, social influences and behavioral control in forming behavioral intentions, and ultimately taking preventive actions to reduce high-risk drinking and concomitant negative outcomes.

*Social influence***.** Social or peer influence has long been identified as a critical determinant of individual behavior (Ehrlich, 1969; Fishbein, 1973), behavioral intentions (Ajzen & Fishbein, 1973), and the onset of alcohol use (Dishion & Loeber, 1985; Graham, Marks, & Hansen, 1991; Huba & Bentler, 1982; Huba, Wingard, & Bentler, 1980). In their "Theory of Reasoned Action" (TRA), Ajzen and Fishbein (1973) propose the most relevant predictor of a person's behavior is behavioral intention. A number of researchers have found alcohol consumption intentions predict both self-reported (Wall, Hinson, & McKee, 1998; O'Callaghan, Chant, Callan, & Baglioni, 1997) and actual intoxication (Glindemann *et al*., 1996). According to the TRA, intent to use alcohol is a function of: a) expected consequences of use, b) the value attributed to these consequences, c) perceived expectations of various reference groups concerning use of alcohol (normative and informational influence), and d) motivation to comply with normative expectancies concerning alcohol use.

Theory of Planned Behavior. The Theory of Planned Behavior (TPB; Ajzen, 1988, 1991) is a model developed to examine and describe how attitudes guide behavior. The TPB is an extension of the TRA (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) that includes control belief and perceived behavioral control. The rationale behind adding the construct of perceived behavioral control was it would allow prediction of behaviors not under complete volitional control. Perceived behavioral control provides information about possible constraints on action as perceived by the individual who will perform the action, and explains why intentions do not always predict behavior.

The TPB has received substantial attention in the literature as a comprehensive attitude-behavior model. Armitage and Conner (2001) integrated and reviewed research addressing the TPB from 185 published studies. The authors found support for the use of the TPB in predicting intention and behavior, with 39% of the variance in intention and 27% of the variance in behavior accounted for by the TPB. Research on alcohol use also supports the TPB, indicating the theory can be used to predict both intended and actual alcohol consumption among adults (Schlegel *et al*., 1992) and college students (McMillan & Conner, 2003; Murgraff, McDermott, & Walsh, 2001; Wall, *et al*., 1998).

Overview of Research

The aims of the current research project were to: a) identify dispositional and environmental factors related to alcohol consumption during 21BDCs, and b) evaluate an internet-based intervention designed to reduce alcohol consumption during 21BDCs. The first study investigated the relation between rapid alcohol consumption during 21BDCs and sociocultural beliefs, social norms, and perceptions of behavioral control. The second study investigated the relation between intoxication levels during 21BDCs and environmental and

social factors. The final study evaluated the effectiveness of a traditional 21st birthday card intervention and an internet-based intervention designed to: a) increase personal control over the planning of the celebration, b) counter social influences, and c) correct misperceptions concerning alcohol consumption during 21BDCs.

STUDY 1: RAPID ALCOHOL CONSUMPTION DURING 21ST BIRTHDAY CELEBRATIONS: THE ROLE OF CULTURAL BELIEFS, NORMS, AND BEHAVIORAL CONTROL

Abstract

High levels of intoxication and negative outcomes have been associated with 21st birthday drinking. There is a lack of information about factors related to 21st birthday drinking, and a lack of effective interventions to address this high-risk event. This study explored relations among dispositional factors and alcohol consumption during 21st birthday celebrations. The participants (n = 152, 57.2% women) attended a large, four-year college in the Mid-Atlantic region of the United States. Within ten days of celebrating their 21st birthday, participants completed an on-line questionnaire about their birthday celebrations that included measures of recent drinking history, sociocultural beliefs, normative perceptions, behavioral control, and rapid consumption of alcohol. The majority of alcoholic beverages (79.3%) were consumed rapidly, and men rapidly consumed 3.7 more alcoholic beverages than did women. Rapid consumption was positively related to drinking history and normative perceptions, and negatively related to perceptions of behavioral control. The relation between sociocultural beliefs and rapid consumption was mediated by normative perceptions and perceptions of behavioral control. In environments absent of strong beliefs and norms against drunkenness, celebratory drinking among those with low perceptions of behavioral control includes rapid consumption of alcohol and extreme levels of drunkenness. Rite-of-passage beliefs and general drinking norms about 21st birthday drinking may not directly affect behavior, but rather play a role in the development of context-specific perceptions of behavioral control. Interventions designed to address 21st birthday drinking should address perceived and actual behavioral control over consumption.

Introduction

Given the lack of research on 21BDCs, focus groups with 32 college students who had their 21BDC within the prior month were used to identify variables for the present study. Results of these focus groups indicated: a) rapid consumption of alcohol (i.e., shots and chugging) is common during celebrations; b) a belief 21BDCs and concomitant intoxication is traditional and a rite-of-passage to full adulthood; c) a belief nearly everyone consumes alcohol during their celebration, and that most students become intoxicated; d) the perception many students reach very high levels of intoxication, often as a result of attempting to consume 21 alcoholic beverages; and e) a lack of control over the amount of alcohol consumed during the celebration, because of social pressures to become intoxicated.

A study of bachelorette parties (Montemurro & McClure, 2005) confirms many of our focus group observations. The bachelor/bachelorette party is similar in context to 21BDCs, as they are both rare events. One only turns 21 once, and at the time, the bachelor/bachelorette party is considered a once-in-a-lifetime event. Montemurro and McClure (2005) conducted a qualitative study of bachelorette parties with structured interviews. The bachelorette party is described as an "event in which it is expected and planned that women will become intoxicated" (p. 279). Results indicated that: a) alcohol is central to the celebration (i.e., 83% of celebrations involved alcohol consumption), b) the goal is to become intoxicated, c) there are strong pressures for all participants to consume alcohol, and d) it is believed high levels of intoxication are not only acceptable, but also required. These results indicate there can be strong beliefs about the role of alcohol in celebrations, social norm that support heavy consumption, and social pressures that can undermine behavioral control over consumption.

Research on sociocultural factors related to alcohol use has focused mostly on advertising and the media (see Vicary & Karshin, 2002). While research on the relation between beliefs and alcohol consumption among college students indicate motivations (Baer, Stacy, & Larimer, 1991; Cary & Correia, 1997) and expectancies (Stacy, Widaman, & Marlatt, 1990; Wood, Nagoshi, & Dennis, 1992) are important predictors of alcohol consumption, sociocultural beliefs about alcohol have received limited attention. While limited, findings suggest heavier consumption is related to more liberal beliefs concerning campus attitudes about drinking (Perkins & Berkowitz, 1986) and an upward bias in sociocultural expectations for alcohol use in specific settings (Wild, 2005). In addition, research suggests more liberal sociocultural beliefs concerning consumption may be related to the development of more permissive social norms (e.g., Perkins & Berkowitz, 1986), and perceived norms are a stronger predictor of alcohol consumption among students who endorse more liberal attitudes about drinking (Perkins & Wechsler, 1996),

Results of our focus groups suggest the belief that alcohol use during 21BDCs is a "rite-of-passage" to full adulthood may be a significant factor in the high rates of drinking during 21BDCs. While no U.S. studies on alcohol use as a rite-of-passage could be found, Norwegian-based research suggests alcohol use can play a central role in rite-of-passage rituals to adulthood (Sande, 2002). Moreover, intoxication to celebrate is a key symbol of the youth culture during the transition to adulthood (Beccaria & Sande, 2003). In the U.S., the 21st birthday is a major step in the transition to adulthood, and thus sociocultural beliefs about the role of alcohol and intoxication during these celebrations might be an important factor in alcohol-use decisions on this occasion.

Considerable research has been conducted on normative perceptions about alcohol consumption (e.g., Perkins, 1997; Perkins, Meilman, Leichliter, Cashin, & Presely, 1999). These studies consistently find college students' perceptions of typical drinking within their own social groups to be significantly higher than self-reports of actual consumption (see also Baer *et al*., 1991; Prentice & Miller, 1994). These misperceptions lead some to accept at-risk consumption as normative, and thereby enable high levels of consumption (e.g., Bosari & Carey, 2001; Perkins, 1997; Perkins *et al*., 1999). In a study of 21BDCs, Neighbors *et al*. (2006) found that misperceptions concerning peer alcohol consumption are context-specific, as participants overestimated the typical quantity consumed by other students celebrating their 21st birthday. In addition, the perceived quantity norm was positively correlated with quantity of alcohol consumed and estimates of blood alcohol level.

Research on social norms also indicates the referent group used to measure the alcohol consumption norm can affect the relation between normative perceptions and alcohol consumption. For example, Maddock and Glanz, (2005) found the perceived alcohol consumption norms of proximal referents (i.e., most friends) mediated the relation between more global consumption norms (i.e., typical student at the university) and reported alcohol consumption. In addition, same-gender norms are a better predictor of alcohol use than gender-nonspecific norms (Thombs, Ray-Tomasek, Osborn, & Olds, 2005), and a stronger predictor of alcohol use among women (Lewis & Neighbor, 2004). Thus, consistent with social comparison (Festinger, 1954) and social-impact theories (Latane, 1981), more specific and proximal referents have a greater influence on behavior (Lewis & Neighbor, 2004).

Perceptions of control over behavior can also be useful in predicting behavior in specific contexts and situations (Ajzen, 1988, 1991). Lower levels of perceived behavioral control over

amount of alcohol consumed is related to greater intended and reported alcohol consumption among both adults (Schlegel, D'Avernas, Zanna, & DeCourville, 1992) and college students (McMillan & Conner, 2003; Murgraff *et al*., 2001; Wall *et al*., 1998), and predicts a greater frequency of alcohol-related negative outcomes (Nagoshi, 1999). In addition, heavier drinkers report less control over their alcohol consumption in a number of situations and environments (Shim & Maggs, 2005). Thus, low perceived behavioral control over consumption may indicate an inability to resist normative pressures to consume alcohol in high-use environments.

Summary and Hypotheses

Our review of the literature indicated rapid consumption of alcohol has received little attention, and we found no published studies of rapid consumption in celebratory settings and contexts. To address this gap in the literature, the current study explored the role of rapid alcohol consumption during 21BDCs. It was hypothesized: a) rapid consumption of alcohol would be prevalent during the celebrations; b) individuals with a history of heavier drinking and men, as compared to woman, would consume more alcohol rapidly, and thus consume more alcohol; and c) more alcohol would be consumed during the celebration than during the heaviest drinking occasion in the month prior to the 21BDC.

Our review also indicates that context-specific beliefs about alcohol consumption may be an important factor related to high single-occasion alcohol consumption. Given the lack of empirical data about event-specific sociocultural beliefs, alcohol consumption norms, and perceived behavioral control over celebratory alcohol consumption, this study was designed to increase understanding of these factors. It was hypothesized that: a) heavier drinkers, and men as compared to women, would have more permissive sociocultural beliefs regarding alcohol consumption; and b) those with more permissive beliefs would consume more alcohol at a rapid

rate. It was also hypothesized: a) stronger sociocultural beliefs about alcohol during 21BDCs would be related to greater misperceptions of alcohol consumption norms; and b) those with stronger beliefs about alcohol use as a rite-of-passage and norms that are more permissive of heavy consumption will have higher levels of rapid consumption.

The current study also explored two social norms concerning 21BDC consumption: a) an estimate of same-gender consumption, and b) a more general measure of perceptions about alcohol consumption and intoxication during 21BDCs. It was hypothesized: a) heavy drinkers would overestimate both the general and specific same-gender consumption norm; b) more permissive general norms would be related to greater misperceptions of the actual drinking norm; and c) the specific same-gender norm would be a stronger predictor of alcohol consumption than the more general norm. Consistent with previous research, it was also hypothesized: a) heavier drinkers, and men as compared to women, would have the most permissive social norms regarding alcohol consumption; and b) more permissive normative perceptions would be related to higher levels of rapid consumption.

While low perceived behavioral control has been identified as a risk factor in high single-occasion drinking, interventions designed to reduce alcohol consumption during 21BDCs have failed to include intervention components that address behavioral control (see Atkin 2002; Neighbors *et al*., 2005; Smith *et al*., 2006). Low levels of perceived and actual behavioral control among those celebrating 21BDs may be one reason these interventions have been unsuccessful. The current study was designed to explore the role of behavioral control in the drinking patterns of those celebrating 21BDs. It was hypothesized: a) heavier drinkers would have lower levels of behavioral control, and b) lower behavioral control would be related to rapid consumption of alcohol.

Method

Participants and Setting

The setting was a large, four-year university in the Mid-Atlantic region of the United States. One-Hundred-Sixty-Four college students (93 women and 71 men) completed an on-line informed consent and survey, with a return rate of 43.2% (n = 380). Entry in a raffle for $250 was used as an incentive to motivate survey completion.

Procedure

A hyperlink to a internet-based consent and survey was emailed to 380 participants (190 men and 190 women) who had recently celebrated their 21st birthday. Participants were recruited two days following their birthday, and two reminders were sent via email at two-day intervals. Since our pilot work indicated multiple 21BDCs were common, participants were instructed:

> "If you had just one 21st birthday celebration, then please answer the following questions about that celebration. If you had a 21st birthday celebration with your parents/family, and an additional celebration with friends, then please answer the following questions about your celebration with friends. If you had multiple birthday celebrations with friends, answer the following questions about the largest celebration you had."

Measures

The survey assessed: a) sociocultural beliefs about alcohol use during 21BDCs as a "rite-of-passage," b) general and specific perceptions of the social norms for 21BDC alcohol consumption, c) perceived behavioral control over celebratory alcohol consumption, d) recent history of alcohol consumption, e) alcohol consumption during the celebration, and f) gender.

Rite-of-passage beliefs. Participants rated their agreement (from 1: strongly disagree, to 5: strongly agree) with five items about alcohol consumption and intoxication on one's 21BDC

as traditional and a rite of passage. (e.g., "I believe consuming alcohol on one's 21st birthday is a right of passage"). Cronbach's Alpha = .83.

Perceptions of social norms. Five items were used to assess: a) the general norm regarding alcohol consumption for 21BDCs, and b) the participant's estimate of the number of alcoholic beverages consumed by other same-gender students during their 21BDCs. For the general norm participants rated four items (from 1: strongly disagree, to 5: strongly agree) concerning their own and friends' beliefs about consuming alcohol and getting drunk during 21BDCs (e.g., "I believe almost everyone gets drunk to celebrate their 21st birthday"). Cronbach's Alpha = .79. The single-item same-gender norm was defined as the number of alcoholic beverages the typical same-gender student at their college is believed to consume during their 21BDC.

Perceived behavioral control. Participants rated (from 1: very easy, to 6: very difficult) how easy/difficult it would have been to perform the following preventive behaviors during their celebration: a) not consume any alcohol, b) consume three or fewer alcoholic beverages, c) pace alcohol consumption to one drink per hour, d) resist pressures to do a shot, e) resist pressures to chug a beer, f) turn down offers of alcoholic beverages, g) ask someone not to buy me an alcoholic beverage, and h) alternate alcoholic/non-alcoholic beverages. Cronbach's Alpha = .93.

Celebratory alcohol consumption. Measures of 21BDC alcohol consumption included self-reports of the total number of alcoholic beverages consumed (one drink was defined as a 12 oz. beer, 4 oz. glass of wine, 1 shot of 80 proof liquor, or a 12 oz. wine cooler), as well as those consumed rapidly (i.e., shots/shooters, beers/mixed drinks chugged, and beers shotgunned/funneled). A measure of rapid consumption was calculated by summing the number of shots/shooter, beers/mixed drinks chugged, and beers funneled/shotgunned.

Drinking history and drinker type. Drinking history was the sum of the standardized scores (z-scores) for self-reported consumption during the 30-days before their 21BDC. Items included: a) average weekly frequency of consumption, b) average number of drinks consumed each week, and c) rate of consumption (i.e., drinks/hour) during the heaviest drinking occasion. Cronbach's Alpha = .80. Separate interquartile percentiles were calculated for each gender; and drinker type was based on these same-gender interquartile ranges: 1) light ($\leq 25^{th}$ percentile), 2) moderate ($> 25^{th}$ and $< 75^{th}$ percentile, and c) heavy drinkers ($\geq 75^{th}$ percentile). Table 1 summarizes drinking behaviors by drinker type and gender, during the month prior to their 21BDC.

Statistical analysis included analysis of variance (ANOVA), t-tests, forward stepwise regression, and Chi-Square. Follow-up tests on main effects used Tukey's honestly significant difference (HSD), and in a few cases t-tests. When Levene's Test for Equality of Variance indicated error variance was not equal across groups, either Dunnett's C or t-tests that do not assume equal variance was calculated.

Results

Twelve participants (6 men and 6 women) were omitted from the data analysis because of multiple missing values. Of the remaining 152 participants, 92.1% reported they had a 21BDC. The 12 participants who did not celebrate have a 21BDC (eight men and four women) were eliminated from further analysis, leaving 140 participants (83 women and 57 men).

Rite-of-Passage Beliefs

Overall, 72.1% of participants scored at or above the median scale value of 15 (*Range*: 5 – 25), with a mean of 17.4 (*SD* = 4.25). A 2 Gender (men vs. women) x 3 Drinker Type (light vs. moderate vs. heavy) ANOVA indicated a main effect for Drinker Type, $F(2,134) = 26.79$, $p <$

.001. As shown in Table 1, follow-up analysis indicated light drinkers were less likely to believe it is a rite of passage to get drunk during 21BDCs than moderate and heavy drinkers, $p < .05$.

Alcohol Consumption

Overall, 97.9% of participants who had a 21BDC consumed alcohol during this celebration. On average, participants reported consuming 9.8 (*SD* = 6.64), alcoholic beverages (*Range*: 0 - 35), and consumed significantly more alcohol than during their heaviest drinking occasion throughout the 30-days before their 21BDC ($M = 8.7$, $SD = 6.39$), $t(136) = 3.26$, $p < .01$. A 2 Gender x 3 Drinker Type ANOVA indicated a main effect for Gender, $F(1,134) = 40.98$, $p < .001$, and Drinker Type, $F(2,134) = 47.24$, $p < .001$. Follow-up analyses indicated significant differences among all Drinker Types, $p < .05$. As shown in Table 1, those with a history of heavier alcohol consumption consumed the greatest number of alcoholic beverages, followed by moderate, and then light drinkers, and men consumed more than women.

As depicted in Figure 1, there was also a Gender x Drinker Type interaction, $F(2,134) = 3.93$, $p < .05$). To determine the source of the interaction, t-tests were performed comparing men and women's alcohol consumption for each level of Drinker Type. For light drinkers, there was no significant difference in the reported number of alcoholic beverages consumed by men and women, $p > .20$. In contrast, among moderate and heavy drinkers, men reported consuming significantly more alcohol than did women, $t(45.4) = 6.93$, $p < .001$, and $t(22) = 3.29$, $p < .01$, respectively (see Table 3 for means and standard deviations).

Consumption of 21 drinks. Overall, only 7.9% of participants (10 men and one woman) reported consuming 21 alcoholic beverages, seven heavy, three moderate and one light drinker. Overall, 54.5% of those who consumed 21 alcoholic beverages were heavy drinking men.

Rapid consumption. Overall, participants reported rapidly consuming an average of 7.8 (*SD* = 6.33) alcoholic beverage (*Range*: 0 - 27), and rapid consumption was correlated with overall consumption, $r = .80$, $p < .001$. The mean number of rapidly consumed drinks included 5.3 (*SD* = 4.93) shots/shooters, 2.4 (*SD* = 3.05) beers/mixed drinks chugged, and 0.1 (*SD* = 0.54) beers shotgunned/funneled. Of the total number of alcoholic beverages consumed, 79.3% were consumed rapidly. In addition, 88.8% of participants consumed at least one drink rapidly.

A moderated regression analysis was performed to predict number of alcoholic beverages consumed rapidly. Predictors were tested in three blocks, using forward stepwise procedures at each step: 1) drinking history and gender were tested in the first block; 2) right-of-passage beliefs, general alcohol consumption norm, same-gender-drinking norm, and perceived behavioral control were tested in the second block; and 3) all 2-way interactions were tested in the third block.

As shown in Table 2(A), drinking history and gender accounted for 37.9% of the variance in rapid consumption, and perceived behavioral control and the same-gender social norm accounted for an additional 12.7% of the variance. Follow-up analysis indicated significant differences in rapid consumption among all drinker types, $p < .05$. As shown in Table 1, heavier drinkers rapidly consumed a greater number of drinks than moderate and light drinkers, and men consumed more drinks rapidly than did women. In addition, lower perceived behavioral control was related to increased rapid consumption, and the same-gender norm was a stronger predictor of rapid consumption than the general alcohol consumption norm.

Perceived Behavioral Control

A moderated regression analysis, conducted with perceived behavioral control as the criterion variable, followed the procedures outlines previously for predicting rapid consumption.

As shown in Table 2(B), rite of passage beliefs and the general alcohol consumption norm accounted for 19.9% of the variance in perceived behavioral control, after controlling for drinking history. Follow-up analysis indicated light drinkers had greater perceptions of perceived behavioral control than moderate and heavy drinkers, $p < .05$ (see Table 1). In addition, the general alcohol consumption norm was a stronger predictor of perceived behavioral control than the specific same-gender norm.

Perceptions of Drinking Norms

General alcohol consumption norm. Overall, 85.7% of participants scored at or above the median scale value of 12 (*Range*: 4 - 20), with a mean = 15.0 (*SD* = 3.25). A 2 Gender x 3 Drinker Type ANOVA indicated a main effect for Drinker Type, $F(2,134) = 8.15$, $p < .001$. As shown in Table 1, follow-up analysis indicated light drinkers were less likely to believe drinking and getting drunk is normative for 21BDCs than moderate and heavy drinkers, $p < .05$.

Estimated self vs. same-gender peer consumption. To compare participants' estimated alcohol consumption for self versus same-gender peers, a 2 Consumption Estimate (self vs. peer) x 2 Gender x 3 Drinker Type mixed-model ANOVA was calculated. Results indicated a Consumption Estimate x Gender x Drinker Type interaction, $F(2,134) = 3.25$, $p < .05$. Follow-up analyses used a series of t-tests comparing estimated self versus peer consumption for each level of Gender and Drinker Type.

As reported in Table 3 and depicted in Figure 1, light-drinking men and women, and moderately drinking women reported significantly lower consumption for self than for peers. In contrast, among moderate drinking men and heavy drinking men and women, alcohol consumption for self was not significantly different from the estimated consumption of peers. Thus, participants who consumed the most alcohol during their celebration had a more

permissive same-gender norm, consistent with the amount of alcohol they consumed during the celebration.

Misperceptions in same-gender alcohol consumption among peers. As depicted in Figure 1, a measure of misperceptions of alcohol consumption among same-gender peers was calculated by subtracting mean same-gender alcohol consumption for self (see dashed lines in Figure 1) from the estimated same-gender consumption for peers. An underestimation of peer alcohol consumption is reflected as a negative misperception score. A moderated regression analysis was conducted with misperceptions of alcohol consumption among same-gender peers as the criterion. The analysis followed the procedures outlined previously for predicting rapid consumption.

As shown in Table 2(C), results indicated drinking history and gender accounted for 22.8% of the variance in normative misperceptions. In addition, after controlling for drinking history and gender, the general alcohol consumption norm accounted for only 3.2% of the variance in normative misperceptions. Those with a history of heavier consumption and a more permissive general alcohol consumption norm were more likely to overestimate same-gender alcohol consumption. However, rite-of-passage beliefs were unrelated to misperceptions, and women had greater misperceptions than men (see Table 1).

To determine if participants' misperceptions were significantly different from zero, a series of one-sample t-tests were conducted for each level of Gender by Drinker Type. As depicted in Figure 1, results indicated the misperceptions were significantly different from zero (ps < .001) for moderate $t(42) = 5.23$, and heavy drinking women $t(19) = 5.17$, and for heavy drinking men, $t(14) = 6.73$. While the alcohol consumption of moderate drinking women was normative, they over-estimated the same-gender norm.

Discussion

Consistent with expectations, most students had a 21BDC, with alcohol consumption. As found in previous research on 21BDC alcohol consumption, average consumption was relatively high (Neighbors *et al*., 2005, 2006), and significantly greater than the highest level of consumption during the month before their birthday (Smith *et al*., 2006). An examination of recent drinking history indicated a strong positive relation between drinking history and alcohol consumption during the celebration. In addition, greater alcohol consumption by men, and among moderate and heavy drinkers indicates the environmental and social context of 21BDCs have the greatest influence on the alcohol consumption patterns of men and heavier drinkers. Thus, interventions to prevent alcohol abuse during 21BDCs should target heavier drinking men.

While there has been some concern over the consumption of 21 alcoholic beverages for one's 21BDC (i.e., Reha, 2004; Schevitz, 2000), only 7.9% of students (mostly heavy drinking men) reported consuming 21 alcoholic beverages. We expected to find this practice more prevalent, but even at this low percentage, as many as 150,000 students per year (based on data from U.S. Census, October, 2004) are putting themselves at significant risk for serious alcohol-related negative outcomes during their 21BDC. Perhaps more important than consuming 21 drinks, was the high percentage of alcoholic beverages consumed rapidly, and the high percentage of participants who practiced this risky behavior. These findings confirmed our hypothesis that rapid consumption is pervasive during 21BDCs, and is an important aspect of ritualized drinking on these occasions.

The high levels of rapid consumption highlights the need to address rapid consumption when designing interventions to reduce alcohol consumption during 21BDCs. Interventions to prevent alcohol abuse during 21BDCs need to target the context of the celebration, especially

influential peers and/or family members, and the drinking setting (i.e., bar environment). Environmental management strategies need to be developed that address situational factors unique to 21BDC settings, especially factors related to rapid consumption. For example, strategies for training bar personnel could be modeled after successful server intervention programs (see Russ & Geller, 1987), and include strategies to: a) decrease the number of free drinks provided by bar and wait staff, b) increase consumption of non-alcoholic beverages, and c) limit consumption by celebrants.

The positive relation between rapid alcohol consumption and heavier alcohol consumption over the month before the celebration indicates general patterns of consumption are strongly related to celebratory consumption. In addition, our finding that men reported greater rapid consumption of alcohol than did women indicates previously reported gender differences during 21BDC alcohol consumption (Neighbors *et al*., 2005, 2006; Smith *et al*., 2006) may be the result of greater rapid consumption by men. These findings also support previous observations that heavier drinkers and men are at greatest risk for high single-occasion alcohol consumption (Wechsler *et al*., 2000, 2002), and rapid alcohol consumption is a significant contributor to the high levels of intoxication found during 21BDCs. Research on rapid alcohol consumption in celebratory and non-celebratory contexts is needed to inform the development of interventions to reduce high single-occasion alcohol use.

The strong negative relation between perceived behavioral control and rapid consumption indicates people's perception of control over their alcohol consumption is an important determinant of alcohol consumption during 21BDCs. These findings are consistent with self-reports from our focus groups, and support a prior qualitative investigation of bachelorette parties (Montemurro & McClure, 2005). In addition, these findings replicate previous research

on general patterns of alcohol consumption (e.g., McMillan & Conner, 2003; Murgraff *et al*., 2001; Wall, *et al*., 1998), and extend those findings to a specific celebratory event. Further research should explore perceived behavioral control during other celebrations, and the relation between context-specific and more general behavioral control over alcohol consumption.

Results also indicated the same-gender drinking norm was positively related to rapid alcohol consumption. These findings provide further evidence for the importance of event- and context-specific norms (Wild, 2002) in celebratory settings (Neighbors *et al*., 2006), and extend previous observations of the unique contribution of gender-specific norms in predicting alcohol consumption (Korcuska & Thombs, 2003; Lewis & Neighbor, 2004, Thombs *et al*., 2005) to a celebratory occasion. While further research is needed to determine if these findings generalize to celebrations beyond ones' 21st birthday, it seems clear a more permissive normative perception is a risk factor for high single-use consumption during 21BDCs. Future research should also explore the relation of general normative perceptions of alcohol use to event-, context-, and behavior-specific norms in other celebratory situations.

Our findings also confirm and extend previous findings of an attitudinal dimension of alcohol consumption behaviors that is context specific (Greenfield & Room, 1997; Room & Roizen, 1973), defining acceptable alcohol-use behaviors and intoxication levels (Gaines, 1981; Harford & Gaines, 1981). Specifically, beliefs about 21BDCs indicate a culture that views alcohol consumption during 21BDCs as a "rite-of-passage" and supports excessive alcohol consumption and intoxication. While these beliefs related directly to an individual's recent history of greater alcohol consumption, they were not related to rapid alcohol consumption after accounting for drinking history. In addition, the positive relation between rite-of-passage beliefs and perceived behavioral control suggests perceived behavioral control mediates the relation

between cultural beliefs and rapid alcohol consumption during 21BDCs. Thus, in the case of celebratory drinking, rite-of-passage beliefs may not directly affect behavior, but rather play an important role in the development of context-specific perceptions of perceived behavioral control. Indeed, research on the relation between attitudes and behavior indicate the importance of behavioral control in predicting both intentions and behavior (Ajzen, 1988, 1991).

While general alcohol consumption norms for 21BDC drinking was positively correlated with number of alcoholic beverages consumed rapidly, they did not predict rapid consumption after accounting for drinking history, gender, perceived behavioral control, and the more specific same-gender drinking norm. The positive relation between perceived behavioral control and a general 21BDC drinking norm suggests perceived behavioral control mediates the relation between rapid alcohol consumption during 21BDCs and the general drinking norm. Thus, as with rite-of-passage beliefs, general drinking norms for 21BDCs may also play a role in the development of context-specific perceptions of perceived behavioral control.

Future research using a longitudinal approach is needed to confirm our findings that event-specific perceptions of behavioral control mediate the relation between celebratory alcohol consumption and event-specific sociocultural beliefs and general consumption norms. Overall, these findings suggest interventions designed to reduce high single-occasion celebratory drinking should not only focus on changing perceptions of behavioral control, but also address perceptions related to sociocultural beliefs and alcohol consumption norms.

Consistent with previous research (Agostinelli & Miller, 1994; Bosari & Carey, 2001; Perkins, 1997; Perkins *et al*., 1999), the estimates of alcohol consumption among same-gender peers by students with a history of heavier alcohol consumption, overestimated actual consumption and were not significantly different from estimates of their own consumption.

These results also support recent findings that event-specific norms for 21BD and tailgating can predict alcohol consumption in those contexts (Neighbors *et al*., 2006), as well as the need to develop interventions to correct normative misperception of alcohol consumption in various celebratory settings and contexts.

Contrary to expectations, there was no interaction between rite-of-passage beliefs and norms concerning consumption, indicating perceived norms did not justify or exacerbate heavy drinking among those more accepting of the belief alcohol use is a rite-of-passage during 21BDCs. While previous research (Perkins & Wechsler, 1996) indicates perceived norms are a stronger predictor of alcohol consumption among students who endorse attitudes that are more liberal about drinking, these findings indicate drinking context may play a role. Specifically, alcohol consumption norms may have a more direct effect on behavior in situations or settings where liberal beliefs concerning drinking are based on culturally defined expectations and values (cf., MacAndrew & Edgerton, 1969).

STUDY 2: THE ENVIRONMENTAL AND SOCIAL CONTEXT OF COLLEGE STUDENTS' TWENTY-FIRST BIRTHDAY CELEBRATIONS

Abstract

The major objectives of this study were to explore: a) 21BDC planning behaviors and the physical and social 21BDC environment, b) the relation between intoxication and planning behaviors, celebratory behaviors, and the 21BDC environment, and c) the frequency of various alcohol-related negative outcomes. Results indicate the average estimated blood alcohol level (eBAL) was higher than in other college settings, as 26.4% of the participants exceeded an eBAL of .26. Intoxication during 21BDCs is enabled by the availability of free drinks, and having a friend to look after oneself or monitor alcohol consumption does not lead to lower levels of intoxication. Results also suggest that college students may have little motivation to reduce their alcohol consumption during 21BDCs. The most frequent negative outcomes were hangovers, blackouts and vomiting, with 50% of celebrants experiencing at least one of these outcomes. Interventions need to be implemented much earlier than current 21st birthday card interventions, involve parents, and provide information about countering social pressures to become intoxicated. The high levels of intoxication and frequency of negative outcomes indicate that 21BDCs are one time when college students are at significant risk for negative outcomes that could result in serious physical injury and even death. While many students are at risk, harm-reduction strategies need to be developed to target men and heavy drinkers. Interventions should address factors related to both the planning of 21BDCs and the physical and social environment. An increase in research is needed to address this partially dangerous drinking context.

Introduction

A review of observational studies on alcohol consumption in barroom and party settings indicates a number of environmental and social factors are related to alcohol consumption, including age, gender, group size and composition, and length of stay. With regard to age, research indicates younger individuals: a) consume alcohol in larger groups (Cutler & Storm, 1975; Hunter, Hannon & Marchi, 1982; Sommers, 1965); b) prefer beer to spirits (Plant, Kreitman, Miller & Duffy, 1977); and c) prefer pitchers to bottles of beer (Geller, Russ & Altomari, 1986), possibly because beer is a cheaper alternative to spirits (cf. Babor, Mendelson, Uhly & Souza, 1980). These findings indicate, given the young age of individuals participating in 21BDCs, the size of groups may be relatively large. In regards to drink choice, results of focus groups conducted to identify variables for the current study indicated most alcoholic beverages are not purchased by the celebrant and consumption of spirits is high relative to other drinking occasions. These findings suggest that celebrants might consume more spirits than beer.

The size of the drinking group and group composition are also related to alcohol consumption behaviors. Group size is positively correlated with both number of alcoholic beverages consumed (Kessler & Gomberg, 1974; Sykes, Rowley, & Schaefer, 1993; Sommers, 1965) and estimated intoxication (Cutler & Storm, 1975). In addition, a higher proportion of young men and heavy drinkers in groups are related to greater alcohol consumption among all group members (Sykes *et al*., 1993). Overall, these findings indicate that larger groups tend to consume more alcohol and having a greater proportion of young males and heavy drinkers in a drinking group increases the alcohol consumption of all group members.

Length of stay in the drinking environment is positively correlated with: a) number of drinks consumed (Graves, Graves, Semu, & Ah Sam, 1982; Kessler & Gomberg, 1974; Plant *et*

al., 1977; Sommer, 1965), b) blood alcohol levels (Geller *et al*., 1986), and c) a greater proportion of heavy drinkers (Sykes *et al*., 1993). Findings concerning gender and length of stay have been mixed. For example research in bar settings indicate women stay longer than men (Geller *et al*., 1986; Sykes, Rowley & Shaefer, 1990), while research in party settings indicate men stay longer than women (Clarke, Glindemann & Geller, 2005; Geller *et al*., 1986). These findings suggest alcohol consumption is related to length of stay and possibly group size, as larger groups tend to stay longer in the drinking environment. In addition, the effect of group size on number of drinks consumed may be mediated by length of stay.

As with survey research, observational studies of alcohol consumption indicate: a) men consume a greater number of alcoholic beverages than women in both bar (Geller *et al*., 1986; Hunter *et al*., 1982) and fraternity party settings (Clarke *et al*., 2005), b) men consume alcohol at a faster rate than women (Geller *et al*., 1986; Rosenbluth, Nathan & Lawson, 1978), and c) women are more likely to be observed not consuming any alcohol (Clarke *et al*., 2005; Sykes et al., 1990). In addition, men, prefer beer to spirits, while women prefer spirits to beer (Plant et al., 1977). While gender differences in number of drinks consumed are well documented in the literature, when differences in body size and composition are taken into account, or measures of blood alcohol are taken, gender differences appear small (Glindemann, Geller, Clarke, Chevallier, & Pettinger, 1998).

Overall, research indicates the drinking environment has a significant impact on the drinking behavior and level of intoxication in both bar and party settings (Geller & Kalsher, 1990; Geller, Kalsher & Clarke, 1991; Kalsher & Geller, 1990; Russ & Geller, 1988). Both the physical and social context provides cues to bar patrons and partygoers concerning the type of behaviors expected (cf. Graham, 1985). In addition, the cues and events that occur within the

drinking environment can negate any beneficial effects of proactive messages presented outside the drinking environment (Geller, 1986). Thus, interventions that focus specifically on the drinking environment may be more effective at reducing alcohol abuse than those that target a population more generally (e.g., mass media campaigns). The current study was designed to identify specific environmental factors that might be targeted to reduce alcohol consumption among 21st birthday celebrants.

Given the lack of research on 21BDCs, focus groups with 32 college students who had their 21BDC within the prior month were used to identify variables for the present study, including planning for the celebration, consumption of food and alcoholic and non-alcoholic beverages, and the physical and the social context of the celebration. Results concerning planning for the celebration indicated: a) planning typically began two to four weeks before the celebration, b) students often left the planning of their celebration to friends, c) students reported giving up plans to moderate their alcohol consumption because of social pressures to drink; d) friends numerous comments about their expectations concerning the amount of alcohol they will be expected to consume and expected level of intoxication; and e) some students intentionally increase their alcohol consumption during the weeks leading up to the celebration to increase their tolerance.

Results concerning consumption of food and non-alcoholic and alcoholic beverages indicated: a) most participants consumed food before their celebration; b) few reported consuming any non-alcoholic beverages, and those who did, consumed very few; c) the perception that many students participate in the crawl and attempt to consume 21 alcoholic beverages, although few actually reported these behaviors; and d) the consumption of more spirits than typically consumed.

Results concerning the drinking environment indicated: a) a large number of celebrations occurred in bars/restaurants; b) many individuals had a friend they counted on to look after them during the celebration; c) there were substantial social pressures to consume alcohol and become intoxicated; d) alcoholic beverages were purchased for the 21st birthday celebrant by friends, bar/wait staff, and even strangers; and e) few celebrants had to pay for alcoholic beverages.

Overview of Objectives and Hypotheses

The major objectives of this study were to explore: a) 21BDC planning behaviors and the physical and social 21BDC environment, b) the relation between intoxication and planning behaviors, celebratory behaviors, and the 21BDC environment, and c) the frequency of various alcohol-related negative outcomes. While this study was exploratory, there were also a number of hypotheses developed from a review of the literature and preliminary focus groups.

Planning behaviors. Information concerning when and how college students plan their 21BDCs may inform the design of interventions to reduce alcohol consumption on 21st birthdays. For example, the time course of planning behaviors could provide valuable information concerning the timing of an intervention, as interventions that occur early in the planning process may have the greatest influence on the formation of alcohol consumption intentions. In addition, information about who is involved in the planning process, and other social influences in the weeks leading up to the celebration may also inform the development of effective interventions.

The current study sought to answer the following questions: a) When did planning begin, who was involved in planning, and what was discussed during the planning process?; b) To what extent do college students get in "drinking shape" in preparation for their 21BDC?; and c) What planning behaviors are related to lower levels of intoxication? Two hypotheses were tested: a) individuals who discussed alcohol consumption and intoxication during the planning process will

be more intoxicated during their celebrations, and b) individuals who reported getting into drinking shape will be more intoxicated during their 21BDC than those who did not.

Celebratory environment. A better understanding of the celebratory environment and how these factors are related to intoxication levels would also inform the development of interventions to reduce alcohol consumption during 21BDCs. For example, an understanding of the typical drinking environment and various social influences that occur during the celebration could guide the development of strategies for: a) modifying the drinking environment, b) countering social influences related to increased alcohol consumption, and c) supporting behaviors that result in lower levels of intoxication.

The current study sought to answer the following questions concerning the 21BDC environment: a) When and where do 21st birthday celebrations occur?; b) Who attends these celebrations?, c) How much social support is there for moderating alcohol consumption during the celebration?; d) Who pays for alcohol during the celebration?; e) Do celebrants attempt to turn down alcoholic beverages during their celebration, and how successful are they?; and f) How is the celebration environment related to levels of intoxication?

The following hypotheses were also tested. First, consuming alcohol for a shorter period, having a parent at the celebration, having a friend to look after the celebrant and having a friend to make sure the celebrant does not consume more alcohol than intended will be related to lower levels of intoxication. Second, among individuals who consumed alcohol, those who report not buying any drinks and having a bartender buy them a drink will have higher levels of intoxication. Finally, those who turned down drinks and asked others not to buy them a drink will have lower levels of intoxication.

Previous research indicates the consumption of food and non-alcoholic beverages may be a protective factor related to lower levels of intoxication. Thus, answers to the following questions were sought: a) How much food do celebrants consume before and during their 21BDC?; b) How many non-alcoholic beverages are consumed during the 21BDC?; and c) How is food and non-alcoholic beverage consumption related to alcohol consumption? In addition, it was hypothesized increased food and non-alcoholic beverage consumption will be related to lower levels of intoxication.

Alcohol consumption behaviors. Study 1 indicated most celebrants consumed alcoholic beverages rapidly and the majority of alcoholic beverages were consumed rapidly. Two behaviors that might be related to this finding are: a) attempting the crawl (having a drink in all of the downtown bars, usually 13 to 17 establishments), and b) attempting to consume 21 alcoholic beverages. Thus, answers to the following questions were sought: a) What is the intoxication level of celebrants?; b) How many participants attempt to consume 21 drinks and the crawl?; c) Do celebrants consume more alcohol than they intended?; d) Who is more likely to consume more alcohol than they intended?; and e) Do celebrants wish they had consumed more or less alcohol during their 21BDC?

The following hypotheses were tested: a) attempting to consume 21 alcoholic beverages and attempting the crawl will be related to higher levels of intoxication, and b) men and those with a history of heavier drinking will be more likely to attempt 21 drinks and the crawl.

Alcohol-related negative outcomes. Given the high levels of alcohol consumption reported during 21BDCs and the high percentage of alcoholic beverages that are consumed rapidly, it is likely many 21st birthday celebrants experience negative outcomes. Thus, answers to

two questions were sought: a) What is the frequency of various alcohol-related negative outcomes?; and b) Who is most likely to experience alcohol-related negative outcomes?

The following hypotheses were tested: a) men will be more likely to experience each of the negative outcomes; b) men will experience a greater number of alcohol-related negative outcomes than women; and c) drinking history will be positively correlated with number and frequency of alcohol-related negative outcomes.

Method

Participants and Setting

The setting was a large, four-year university in the Mid-Atlantic region of the United States. A total of 164 college students (93 women and 71 men) completed an on-line informed consent and survey, with a return rate of 43.2% (n = 380). Entry in a raffle for $250 was used as an incentive to motivate survey completion.

Procedure

A hyperlink to a internet-based consent and survey was emailed to 380 participants (190 men and 190 women) who had recently celebrated their 21st birthday. Participants were recruited two days following their birthday, and two reminders were sent via email at two-day intervals. Since our pilot work indicated multiple 21BDCs were common, participants were instructed:

> "If you had just one 21st birthday celebration, then please answer the following questions about that celebration. If you had a 21st birthday celebration with your parents/family, and an additional celebration with friends, then please answer the following questions about your celebration with friends. If you had multiple birthday celebrations with friends, answer the following questions about the largest celebration you had."

Measures

The survey assessed: a) planning of the 21BDC, b) the celebration environment, c) alcohol consumption during the 21BDC, d) alcohol-related negative outcomes, h) perceptions of personal consumption, i) recent drinking history, j) gender, k) time spent consuming alcohol (i.e., start and end time), and l) current weight.

Planning for 21BDC. Participants reported: a) when they began planning (three months or more before, one month before, two weeks before, one week before, less than a week before, or no planning); b) who was involved in planning by selecting all that apply: myself, best friend, other close friends, significant other, parent(s)/guardian(s), sibling(s), and members of a group I belong to); c) planning behaviors by selecting all that apply: whether participant would drink and/or get drunk, whether they would have food, and arranging transportation); and d) whether they attempted to get into "drinking shape" (i.e., increasing tolerance before the 21BDC by increasing consumption during the weeks before the 21BDC).

21BDC environment. Participants reported: a) when they celebrated (a few days before birthday, the day before, on birthday, the Thursday after, or the weekend after); b) where they celebrated by selecting all that apply: bar, restaurant, your residence, parent's residence, residence other than your own or parent's, and fraternity or sorority house; c) who attended by selecting all that apply: close friends, significant other, parent/guardian, friends I grew up with, siblings, and instructor/professor; d) food consumed within two hours before and during the 21BDC (0: none, 1: very little, 2: snack, 3: lunch, 4: heavy lunch, 5: dinner, or 6: heavy dinner); e) number of non-alcoholic beverages consumed (one drink was defined as 12 oz. of water. soda, juice, or other non-alcoholic beverage); and f) the social environment (see below).

Regarding the social environment, participants reported: a) the gender mix of the group celebrating (i.e., mostly men, mostly women, or a mix of men and women); b) social support for moderating alcohol consumption by selecting all that apply: had a friend I counted on to look after me, had a friend I counted on to make sure I did not drink more than I wanted; c) whether others paid for alcoholic beverages by selecting all that apply: didn't pay for any alcoholic beverages, at least one bartender bought me a drink; and d) attempts to moderate alcohol consumption by selecting all that apply: turned down one alcoholic drink, turned down an alcoholic drink on a number of occasions, asked at least one person to not buy me an alcoholic beverage, and at least one person got me a drink after I had asked them not to.

Celebratory alcohol consumption. Self-reports of the number of standard drinks of alcohol consumed (one drink was defined as a 12 oz. beer, four oz. glass of wine, one shot of 80 proof liquor, or a 12 oz. wine cooler). Participants were also asked to indicate whether they attempted to consume 21 alcoholic beverages and whether they participated in the "crawl" (having a drink in all of the downtown bars, usually 13 to 17 establishments). The number of hours spent consuming alcohol, gender and weight were also collected in order to estimate blood alcohol levels.

Alcohol-related negative outcomes. Participants reported whether they experienced any of the following as a result of their alcohol consumption (yes vs. no): a) hangover, b) nausea/vomiting, c) did something I now regret, d) had a memory loss (blackout) for part of the evening, e) damaged property or got into other mischief, f) got in an argument or fight, g) got hurt or injured, h) drove a car while under the influence of alcohol, and i) got a ride from someone who was under the influence of alcohol.

Perceptions of personal consumption. Participants reported whether they: a) consumed more alcohol than intended, and b) wished they had consumed no alcohol, less alcohol, more alcohol, or the same amount of alcohol during their celebration.

Recent history of alcohol consumption. Participants were asked to indicate their alcohol consumption during the 30-days before their 21BDC, including: a) average weekly frequency of drinking, b) average number of alcoholic beverages consumed each week, c) number of drinks consumed on their heaviest drinking occasion, and d) how long they consumed alcohol on their heaviest drinking occasion.

Drinker type. A measure of drinker type was calculated by summing the standardized measures of self-reported alcohol consumption during the 30-days before their 21BDC. Items included: a) average weekly frequency, b) average weekly consumption, and c) the rate of alcohol consumption (drinks/hour) on the heaviest drinking occasion. Separate scores and interquartile percentiles were calculated for each gender, and Drinker Type was defined by the gender-specific interquartile ranges: 1) light ($\leq 25^{th}$ percentile), 2) moderate ($> 25^{th}$ and $< 75^{th}$ percentile, and c) heavy drinkers ($\geq 75^{th}$ percentile).

Estimated blood alcohol level. Estimated blood alcohol level (eBAL) was calculated using the procedures outlined by the National Highway Traffic Safety Administration (NHTSA, 1994). Total body water was estimated based on the equations in Watson, Watson and Batt (1980). The estimated elimination rate for alcohol was based on an average elimination rate (ER) of 0.15, the generally accepted average for both genders (Stowell & Stowell, 1998; Watson, 1989; Winek & Murphy, 1984). Since we had information on average alcohol consumption over the last 30 days, we used this data to adjust the elimination rate based on reported average weekly quantity and frequency. The frequency and quantity scores were converted to z-scores

and then averaged. This z-score was then multiplied by the standard deviation in ER (*SD* = .0021) reported by Jones and Andersson (2003), and added to the average ER of .015. The final elimination rates had a mean = 0.0151 (*SD* = 0.00194, *Range*: 0.0126 - 0.0214). eBAL was then calculated as follows: (reported number of alcoholic beverages consumed x instantaneous eBAL per standard drink) - (elimination rate x hours spent drinking). A minimum of one-hour was assigned to participants who reported a shorter duration of drinking. Negative eBALs generated by the calculation were assigned a value of zero.

Statistical analysis included analysis of variance (ANOVA), t-tests, forward stepwise regression, and Chi-Square. Follow-up tests on main effects used Tukey's honestly significant difference (HSD), and in a few cases t-tests. When Levene's Test for Equality of Variance indicated error variance was not equal across groups, either Dunnett's C or t-tests that do not assume equal variance was calculated.

Results

Twelve participants (6 men and 6 women) were omitted from the data analysis because of multiple missing values. Of the remaining 152 participants, 92.1% reported they had a 21BDC. The 12 participants who did not celebrate have a 21BDC (8 men and 4 women) were eliminated from further analysis, leaving 140 participants (83 women and 57 men).

Estimated blood alcohol level. The mean eBAL was .182 (*SD* = .132; Range: .000 -.538), and 26.4% exceeded an eBAL of .26, with no gender differences, $X^2(1) = 1.32$, $p > .20$. Results of a 2 Gender x 3 Drinker Types ANOVA indicated a main effect for Drinker Type $F(2, 134) = 24.64$, $p < .001$. Follow-up analysis indicated a significant difference among all Drinker Types, with heavy drinkers having the highest eBAL (*M* = .281, *SD* = .133), followed by moderate (*M* = .181, *SD* = .106) and then light drinkers (*M* = .086, *SD* = .104), $p < .05$.

Planning for 21 BDCs

Timing. As shown in Table 4, results of a 6 Time Frame (three month vs. one month vs. two weeks vs. one week vs. less than one week vs. no planning) x 2 Gender Chi-Square indicated that women began planning for their 21BDC earlier than men, $X^2(5) = 13.71$, $p < .05$. A 6 Time Frame x 3 Drinker Type (light vs. moderate vs. heavy) Chi-Square indicated that heavy drinkers were more likely to plan their 21BDC, than moderate and light drinkers, and moderate and heavy drinkers began planning earlier than light drinkers, $X^2(10) = 19.25$, $p < .05$.

People involved. Participants reported that different types of individuals were involved in the planning of their celebrations, including themselves (56.4%), close friends (67.1%), best friend (38.6%), significant other (21.4%), parent/guardian (19.3%), members of a group they belong to (15.0%), and siblings (14.3%). Results of 2 Gender x 2 Person (involved vs. not involved) Chi-Squares for each type of individual involved in planning indicated no significant differences, *p*s > .20. As shown in Table 5, results of 3 Drinker Type x 2 Planning Chi-Squares for each type of individual involved indicated that light drinkers were more likely to have a parent involved in the planning of their 21BDC, followed by heavy, and then moderate drinkers.

Planning topics. During the weeks before their 21BDC, 74.6% of participants reported having conversations concerning whether they would drink, 40.7% whether they would get drunk, 17.9% how much they would drink, 52.1% transportation, and 40.7% food. Results of 2 Gender x 2 Discussion (yes vs. no) Chi-Squares for each planning topic indicated no significant differences, *p*s > .05. As shown in Table 5, results of 3 Drinker Type x 2 Discussion Chi-Squares for each planning topic indicated heavy drinkers were more likely to have discussed whether they would drink, whether they would get drunk, how much they would drink, transportation, and food during the celebration.

Getting in "drinking shape." For some participants (12.1%), preparation for their 21BDC included getting into "drinking shape." As shown in Table 5, results of a 3 Drinker Type x 2 Drinking Shape (yes vs. no) Chi-Square indicated significant differences among all drinker types, with heavy drinkers most likely to report getting into drinking shape, followed by moderate and then light drinkers.

Predicting intoxication. A regression analysis was performed to predict eBAL. Predictors were tested in two blocks, using forward stepwise procedures at each step: 1) to control for drinking history and gender, they were tested in the first block; and 2) all of the planning variables were tested in the second block. Dichotomous variables were dummy coded as 1 (men/involved/yes) or 0 (women/not involved/no). Timing of planning was coded from 5 (three-months or more) to 0 (no planning).

As shown in Table 6, drinking history accounted for 23.0% of the variance in eBAL, and having a discussion concerning drinking during the celebration accounted for an additional 4.4% of the variance. Table 6 also shows all significant zero-order correlations between specific planning behaviors and eBAL, and the partial correlations controlling for drinking history.

21BDC Environment

When they celebrated. Most participants celebrated on their actual birthday (59.0%), while 12.2% celebrated the day before (legal in our state), 2.2% the Thursday after, and 15.8% during the weekend after their 21st birthday. Because of participants celebrating either before or after their actual birthday, 57.9% of the 21BDCs occurred on weekend nights and an additional 19.7% on Thursday nights.

Location. On average, participants reported celebrating in 1.9 (*SD* = 0.89, *Range*: 1 - 5) of the six different locations surveyed, including a bar (73.6%), a restaurant, (43.6%), your

residence (35.7%), residence other than yours or a parent/guardian (24.3%), parent/guardian residence (5.7%), and a fraternity or sorority house (3.6%). Results of 2 Gender x 2 Location (yes vs. no) Chi Squares for each drinking location indicated no significant differences, *p*s > .05. As shown in Table 5, results of 3 Drinker Type x 2 Location Chi Squares for each location indicated that light drinkers were less likely to report celebrating in a bar, than moderate and heavy drinkers.

Persons attending. Participants reported a wide variety of individuals attended their 21BDC, including significant other (33.6%), friends I grew up with (27.9%), parent/guardian (19.3%), siblings (21.4%), and instructor/professor (1.4%). As shown in Table 5 results of 3 Drinker Type x 2 Attended (yes vs. no) Ch-Squares for each type of person attending the 21BDC indicated that light drinkers were more likely to report celebrating with their parents, and heavy drinkers were more likely to report celebrating with friends they grew up with.

Gender mix and size of celebration groups. Overall 82.7% of the celebration groups were mixed gender groups, with 9.4% containing a majority of men and 7.9% containing a majority of women. Results of a one-way ANOVA on eBAL indicated the main effect for Gender Mix (mostly men vs. mostly women vs. mix of men and women) was not significant, p < .20. The correlations between group size and time spent drinking and eBAL were not significant, *p* > .20.

Hours spent drinking. Results of a t-test indicated men spent more hours consuming alcohol (*M* = 5.6; *SD* = 3.20) than did women (*M* = 4.3; *SD* = 2.32). *t*(87.1) = 2.54, *p* < .05. There was a significant correlation between hours spent consuming alcohol and drinking history (*r* = .53) and eBAL (*r* = .34), *p*s < .001.

Support from friends. A majority of participants (60.7%) reported they had a friend they counted on to "look after them" during their 21BDC, and 31.4% reported having a friend they

counted on to ensure they did not drink more than they wanted. As shown in Table 2.B, results of a 3 Drinker Type x 2 Social Support (yes vs. no) Chi-Squares indicated heavy drinkers were more likely to report having a friend looking after them, than moderate and light drinkers. Results of 2 Gender x 2 Social Support Chi Squares indicated that women were more likely than men (38.6% vs. 21.1%) to have social support for not drinking more than they wanted, $X^2(1) = 4.80$, $p < .05$. Of those participants who reported having social support for not drinking more than they wanted ($n = 44$), 20.5% reported they consumed more than they wanted.

Paying for and receiving alcoholic beverages. In regards to paying for alcohol, 71.4% of participants reported they did not pay for any alcoholic beverages, and 32.9% indicated at least one bartender bought them a drink. As shown in Table 5, results of 3 Drinker Type x 2 Pay (yes vs. no) Chi-Squares indicated heavy drinkers were most likely to report having a bartender buy them a drink, followed by moderate and then light drinkers. Overall, 27.9% of participants reported turning down at least one alcoholic beverage, with 18.6% turning down two or more alcoholic beverages. In addition, 13.6% reported they asked at least one person not to buy them an alcoholic beverage. These attempts to moderate consumption were often unsuccessful, as 68.4% of participants who reported asking someone not to get them an alcoholic beverage ($n = 33$) still received at least one of those alcoholic beverages.

Twenty-one alcoholic beverages and the crawl. Overall, 11.4% of participants reported attempting to consume 21 alcoholic beverages and 28.6% reported attempting the crawl. Results of a 2 Gender x 2 Attempt 21 (yes vs. no) Chi Square indicated men were more likely than women to attempt consuming 21 alcoholic beverages (21.1% vs. 4.8%), $X^2(1) = 8.80$, $p < .01$. As shown in Table 2.B, results of a 3 Drinker Type x 2 Attempt 21 (yes vs. no) Chi Square indicated that heavy drinkers were more likely to attempt consuming 21 alcoholic beverages than moderate

and light drinkers. In addition, a 3 Drinker Type x 2 Crawl (yes vs. no) Chi Square indicated light drinkers were less likely to attempt the crawl than moderate and heavy drinkers.

Predicting intoxication. A regression analysis was performed to predict eBAL. Predictors were tested in two blocks, using forward stepwise procedures at each step: 1) to control for drinking history and gender, they were tested in the first block; and 2) all of the environmental variables were tested in the second block. Dichotomous variables were dummy coded as 1 (yes) or 0 (no).

As shown in Table 6, after controlling for drinking history, participating in the crawl, attempted 21 drinks, celebrating in a parent/guardian's residence, having at least one bartender buy a drink accounted for an additional 16.9% of the variance in eBAL. Table 6 also shows all significant zero-order correlations between specific celebration environment variables and eBAL, and the partial correlations (controlling for drinking history).

Consumption of Food and Non-Alcoholic Beverages

Food. Most participants (84.3%) reported consuming at least a dinner-sized amount of food the evening of their 21BDC, with 64.0% consuming at least a dinner-sized amount of food before their 21BDC, and 26.6% during their 21BDC. While few participants (4.3%) reported consuming no food in the two hours before their 21BDC, 32.4% reported not consuming any food during the celebration and 49.6% reported consuming a snack or less during their 21BDC. Results of a 2 Gender x 3 Drinker Type ANOVA on food consumed during the celebration indicated a significant main effect for Drinker Type, $F(2, 133) = 8.46$, $p < .001$. Follow-up analysis indicated that light drinkers reported consuming more food during their 21BDC ($M = 3.3$, $SD = 2.15$) than both moderate ($M = 1.8$, $SD = 1.87$) and heavy drinkers ($M = 1.5$, $SD = 2.02$), $p < .05$.

Non-alcoholic beverages. On average, participants reported consuming 2.5 (*SD* = 3.44) 12 oz. non-alcoholic drinks during their 21BDC, with 19.3% not consuming any non-alcoholic beverages and 20.7% consuming more than three. Reported number of non-alcoholic beverages consumed was not significantly correlated with gender, drinking history or estimated eBAL, $p < .20$.

Predicting intoxication. A regression analysis was performed to predict eBAL. Predictors were tested in two blocks, using forward stepwise procedures at each step: 1) to control for drinking history and gender, they were tested in the first block; and 2) food before and during the 21BDC, and non-alcoholic beverage consumption were tested in the second block. As shown in Table 6, after controlling for drinking history, food consumption before the celebration accounted for an additional 2.8% of the variance in eBAL. Table 6 also shows the significant zero-order and partial correlations (controlling for drinking history) with eBAL.

Outcomes of the 21BDC

Alcohol-related negative outcomes. As shown in Table 7, the most frequent negative outcomes were hangover, blackout, and vomiting. The nine negative outcomes were summed to create a measure of total negative outcomes. Results of a 2 Gender x 3 Drinker Type ANOVA indicated a main effect for Drinker Type, $F(2, 134) = 16.32$, $p < .001$. Follow-up analysis indicated significant differences among all Drinker Types, with heavy drinkers reporting the greatest number of negative outcomes ($M = 2.1$, $SD = 1.33$), followed by moderate ($M = 1.5$, $SD = 1.35$), and then light drinkers ($M = 0.4$, $SD = 0.92$), $p < .05$.

As shown in Table 7, follow-up analyses using 3 Drinker Types x 2 Negative Outcome (yes vs. no) Chi-Squares for each negative outcome indicated significant differences for

hangover, memory loss, vomiting, regretted action, and riding with someone who was under the influence of alcohol.

Reflections on alcohol consumption. A majority of participants (74.3%) indicated they consumed the amount of alcohol they wished, while 12.1% wished they had consumed more alcohol, 12.1% less alcohol, and 1.4% not consumed any alcohol. Overall, 21.4% of participants indicated they consumed more than they intended. Of those who reported consuming more than they intended (n = 30), only 40.0% reported they wished they had consumed less alcohol during their celebration.

Discussion

This study was designed to examine the planning for and the physical and social environment of 21BDCs, and the relation between these factors and eBAL. In addition, the frequency of various negative outcomes and perceptions of personal alcohol consumption were studied. Consistent with Neighbors *et al*. (2005), the average eBAL was higher than those found in other college settings (i.e., pedestrians in a downtown setting, fraternity and non-fraternity parties (see Glindemann *et al*., 1998; Glindemann & Geller, 2003), and there were no gender differences in intoxication level. In addition, 26.4% of the participants exceeded an eBAL of .26, a level that could result in respiratory paralysis that could be fatal (Berger, 2000).

As indicated by research on alcohol consumption at fraternity parties (Clarke *et al*., 2005; Geller *et al*., 1986), men spent more time consuming alcohol than did women. In addition, increased time spent consuming alcohol was related to a history of heavier drinking and higher eBALs. These findings are consistent with previous research indicating increased length of stay is related to consuming a greater number of drinks (e.g., Graves *et al*., 1982; Kessler & Gomberg, 1974; Plant *et al*., 1977) and higher blood alcohol levels (Geller *et al*., 1986). Overall,

these results indicate increased time spent drinking among heavier drinkers and men may be a factor in high single-occasion alcohol consumption during 21BDCs. Interventions to decrease alcohol consumption on these occasions should target these students by encouraging them to limit the length of their celebrations.

Planning the Celebration

Results concerning the timeframe for planning 21BDCs indicated the majority of college students begin planning their celebration one to four weeks before their 21st birthday. Thus, interventions designed to influence the planning process need to be implemented much earlier than current 21st birthday card interventions, which typically occur within a week of students' 21st birthday. In addition, women and moderate and heavy drinkers were more likely to plan for their 21BDC, and to begin the planning process earlier than men and light drinkers. These findings indicate earlier planning may not be a significant factor in reducing alcohol consumption, as results concerning intoxication indicated those with a history of heavier alcohol consumption had the highest levels of intoxication. What may be more important is the type of planning that occurs.

With regard to who is involved in the planning process, it is noteworthy close friends were more likely to be involved than was the person celebrating their 21st birthday. In addition, light drinkers were more likely to have a parent or guardian involved in the planning of their 21BDC. Greater involvement by parents or guardians in the planning process was most likely related to findings that light drinkers were more likely to have their 21BDC at a parent's or guardian's residence, and that having a 21BDC in this environment resulted in lower levels of intoxication. Interestingly, light and heavy drinkers were more likely to involve a sibling in the planning process, and siblings were more likely to attend the 21BDC. While the current study

provides no information on why these differences were found, future research might focus on identifying specific roles siblings play in planning and attending the 21BDC.

Overall, these findings indicate that both the individual who is experiencing their 21BDC and parents could be more involved in the planning process. This may be particularly important if the celebrant is considering moderating their consumption or is concerned about social pressures to consume large amount of alcohol. Encouraging parents to become more involved in 21BDCs, or students to involve their parents, may decrease intoxication during 21BDCs. While these results are encouraging, their may be significant barriers to motivating students to involve their parents. In addition, students reported in focus groups that while they celebrated with parents, they often had a second 21BDC with just friends. In addition, an intervention, which included sending letters to parents alerting them to the dangers of high-risk alcohol consumption during 21BDCs, had no effect on college students alcohol consumption (Atkin *et al*., 2002).

Overall, most celebrants indicated they had discussion with others related to them consuming alcohol at their 21BDC, and to a lesser extent discussions concerning the amount of alcohol they would consume and getting intoxicated. In all cases, individuals with a history of heavy alcohol consumption were more likely to have these discussions than were moderate and light drinkers. In addition, among the planning behaviors, having a discussion concerning whether the celebrant would drink was the best predictor of intoxication. Celebrants could interpret conversations about alcohol consumption and intoxication as social pressure to consume alcohol and become intoxicated, creating high expectations concerning the amount of alcohol to consume. Thus, interventions targeting the planning process should provide students with information that could be used to counter social pressures and lower expectations concerning their alcohol consumption during their celebration. One other planning behavior that

may need to be targeted is discussions concerning transportation. While most heavy drinkers discussed transportation plans, these discussions were much less likely among moderate and light drinkers.

Finally, the planning behavior with the highest potential for producing harm is getting into "drinking shape," so the celebrant could handle more alcohol during their 21BDC. While less than 15% of students attempted to get into drinking shape, heavier drinkers were much more likely to engage in this behavior than were either moderate or light drinkers. Clearly, educating students about the dangers of extreme levels of intoxication and the practice of increasing tolerance in order to consume more alcohol needs to be addressed.

21BDC Environment

Many students whose birthday fell on a "school night," waited to have their 21BDC on a Thursday, Friday or Saturday night. As a result, almost 60% of the 21BDCs were on a weekend night and an additional 20% were on a Thursday, which is considered the beginning of the weekend for many college students. Most 21BDCs included celebrating in a bar, and the celebrations typically included a number of locations, including restaurants and private residences. In addition, heavy and moderate drinkers were more likely to celebrate in a bar than were light drinkers, and drinking in a bar was positively related to intoxication, even after controlling for drinking history.

Since many 21BDCs occurred in bar and restaurant setting, and those who celebrated in a bar had higher levels of intoxication than those who did not, interventions to reduce high single-occasion alcohol consumption should target these environments. As suggested in Study 1, interventions could include server intervention training (e.g., Russ & Geller, 1987) that: a)

decreases the number of free drinks provided by bar and wait staff, b) increases consumption of non-alcoholic beverages, and c) limits consumption by celebrants.

Despite concerns in the media ((i.e., Reha, 2004; Schevitz, 2000) and among prevention professionals concerning the consumption of 21 alcoholic beverages during 21BDCs, only 11% of participants attempted to consume 21 alcoholic beverages. In contrast, attempting the crawl was more frequent than attempting 21 drinks. Results also indicated men and heavy drinkers were more likely to attempt consuming 21 alcoholic beverages, with both moderate and heavy drinkers more frequently attempting the crawl. Overall, these findings indicate men and heavy drinkers, and to a lesser extent moderate drinker, should be targeted with interventions to reduce their participation in the consumption of 21 alcoholic beverages and participating in the crawl. Both of these behaviors are particularly dangerous and among environmental factors, engaging in these behaviors was the best predictor of high levels of intoxication

Social environment. The most significant social factor related to intoxication, was the purchasing of alcoholic beverages by a bartender. While these findings suggest reducing the number of alcoholic beverages purchased by bartenders and wait staff may be an effective environmental strategy for reducing intoxication, 70% of celebrants indicated they did not pay for any alcohol. Thus, it is unclear whether this strategy would actually reduce alcohol consumption, as free alcohol is readily available. What seems clear is that excessive consumption during 21BDCs is enabled by the availability of free drinks. Especially if access to drinks requires no response cost (i.e., drinks brought to the celebrant), and is influenced by the principles of scarcity and reciprocity (i.e., free drinks are rarely available, repayment is made by consuming the beverage).

Some celebrants indicated they attempted to offset the availability of free drinks by either asking others not to purchase an alcoholic beverage for them or refusing a drink that are purchased for them. However, these strategies were used by less than 20% of celebrants, and these attempts at moderation were more often than not unsuccessful. It seems these attempts to moderate alcohol consumption during 21BDCs are typically ignored, and have no effect on intoxication levels. These findings indicate access to free alcohol and social norms that encourage bartenders, and may actually require friends, to purchase an alcoholic beverage for the celebrant are strong social forces leading to extreme levels of intoxication. Thus, any intervention does not address these environmental and social factors is unlikely to be successful.

The other social factor related to intoxication was having a friend to look after oneself during the 21BDC. While most celebrants reported having a friend "look after them" during their 21BDC, this did not necessarily lead to moderation of alcohol consumption. Results indicated having a friend to look after oneself was positively related to intoxication. Thus, contrary to expectations having a friend to look after oneself was related to higher levels of intoxication, indicating the role of this person was not to moderate consumption. Rather, this person's role may have been to ensure the safety of a celebrant who intended to become intoxicated.

Additionally, almost one-third of celebrants reported having a friend they counted on to ensure they did not drink more than they intended. However, celebrants reporting they had someone to ensure they did not consume more alcohol than they intended, were just as likely to report consuming more alcohol than intended than those who did not have this type of social support. While it would seem intuitively beneficial to involve trusted friends in managing risk during 21BDCs, merely having a friend involved in monitoring the celebrant's activities did not lead to moderation of alcohol consumption. These findings indicate to benefit those with

intentions of drinking in moderation, there is a need for better communication between the celebrant and friends regarding their role and responsibilities.

Consumption of food and non-alcoholic beverages. One important factor in reducing intoxication during 21BDCs is consumption of food and non-alcoholic beverages. While most celebrants consumed at least a dinner-sized meal prior to their celebration, only 50% reported consuming at least a snack during their celebration. In addition, consuming more food during the celebration was related to lower levels of intoxication. While this may only indicate less intoxicated celebrants were less focused on alcohol consumption, it does suggest consumption of food could be a protective factor (see Clapp *et al*., 2000; Millar *et al*., 1992). Thus, interventions to reduce intoxication during 21BDCs might focus on increasing food consumption during the celebration.

Finally, consumption of non-alcoholic beverages was surprisingly low; indicating college students may be relatively unaware that alcohol consumption causes dehydration and consumption of water can protect one against hangovers. Clearly, this area deserves further attention, as there are no published studies concerning college students' knowledge about the diuretic affects of alcohol and use hydration as a harm-reduction strategy to decrease hangovers.

Perceptions of Consumption and Negative Outcomes

Most celebrants reported that they consumed the amount of alcohol they wished and did not consume more than they intended. Few celebrants indicated they wished they had consumed less alcohol, and just as many celebrants reported wishing they had consumed more alcohol. Perhaps most telling, only 5% of celebrants indicated they consumed more alcohol than intended. These findings indicate college students may have little motivation to reduce their

alcohol consumption during 21BDCs, which will make the success of any prevention efforts difficult.

The most frequent negative outcomes were hangover, blackout, and nausea/vomiting, with heavy drinkers reporting the greatest number of negative outcomes. Among heavy drinkers, more than half reported having a hangover and/or blackout, and nearly half reported experiencing nausea or vomiting. As in other settings, the heaviest drinkers are at greatest risk for alcohol-related negative outcomes. However, the relatively high percentage of heavy and moderate drinkers who had a blackout and experience nausea or vomiting is cause for concern, and indicates that 21BDCs may be a particularly risky environment. These findings suggest that steps need to be taken to reduce alcohol consumption during 21BDCs. It is surprising that there are not more injuries and deaths associated with 21st birthday drinking, and prevention and medical professionals should consider developing systems to more closely track adverse outcomes associated with 21BDCs and other celebratory occasions.

Conclusions

The high levels of intoxication and frequency of negative outcomes indicate that 21BDCs are one time when college students are at significant risk for negative outcomes that could result in serious physical injury and even death. For example, one in four students were at risk for alcohol overdose, and half experienced a blackout for all or part of the evening. While many students designate a friend to look after them, it is unclear whether this strategy actually reduces harm or merely increases perceptions of safety and invulnerability. Even when students indicated they had a friend to make sure they did not drink more than they intended, many still consumed more than they intended and their levels of intoxication were similar to others who did not use

this strategy. Clearly an increase in research is needed to address this partially dangerous drinking context.

While most students are at risk, harm-reduction strategies need to be developed to target men and heavy drinkers. These interventions could address a number of factors related to planning and the physical and social environment, including: a) motivating students to become more involved in planning; b) countering social pressures to consume alcohol during the weeks leading up to the 21BDC; c) educating students about the dangers of extreme intoxication, increasing tolerance to enable higher levels of consumption, attempting to consume 21 drinks, and participating in the crawl; d) targeting bars and restaurants with educational and environmental interventions, particularly on Thursday thru Saturday nights, reducing the length of 21BDCs; e) reducing access to free alcoholic beverages during 21BDCs by targeting other individuals attending the 21BDCs; and f) increasing consumption of food and non-alcoholic beverages during 21BDCs.

STUDY 3: EVALUATION OF AN INTERNET-BASED INTERVENTION TO REDUCE COLLEGE STUDENTS ALCOHOL CONSUMPTION DURING 21ST BIRTHDAY CELEBRATIONS

Abstract

This study tested a web-based intervention designed to reduce intoxication and negative outcomes during 21BDCs. The intervention was implemented four weeks before the 21st birthday, was designed to: a) change perceptions of drinking norms during 21st birthday celebrations, b) increase perceptions of behavioral control over alcohol consumption, and c) counter social pressures to consumer alcohol during the weeks leading up to the celebration. Results indicated no significant reductions in number of alcoholic beverages consumed, intoxication or negative outcomes, as compared to a traditional 21st birthday card intervention and no-intervention controls. While students were not motivated to implement many of the suggested harm-reduction strategies, there was a significant increase in the consumption of food and non-alcoholic beverages among participants receiving the web-based intervention. Given the intense social pressures to consume alcohol and low motivation among college students to implement harm-reduction strategies the development and implementation of effective interventions to reduce intoxication during 21BDC remains a significant challenge. Alcohol abuse prevention specialists should consider targeting the drinking environment and other individuals attending 21BDCs to change the physical and social connect of 21BDCs.

Introduction

Numerous universities have acknowledged the excessive amount of high-risk drinking among students celebrating their 21st birthdays. For example, 85 colleges and universities have implemented programs that send prevention materials to college students in the form of a 21st birthday card. While these 21st birthday card interventions have been popular, there have been few evaluations of their effectiveness. Three unpublished (Atkin *et al*., 2002; Bonday, personal communication, February 26, 2006; Fernandez, 2000) and two published evaluations (Neighbors *et al*., 2005; Smith *et al*., 2006) of 21st birthday interventions could be found. All of the interventions evaluated were a 21st birthday cards and an insert including harm-reduction information that was mailed to college students during the week preceding their 21st birthday. The birthday card insert typically contains information about: a) the dangers of alcohol overdose and drinking and driving, b) 21st birthday drinking norms, and c) the benefits of consuming food and non-alcoholic beverages before and during the 21BDC.

A number of different combinations of information have been tested including: a) gender-specific drinking norms and information concerning alcohols effects (Atkin *et al*., 2002); b) a wallet-size informational card containing estimates of blood alcohol concentration, effects of different BAC levels, and responsible drinking tips (Bonday, 2006); c) instructions on partying safe during 21st birthday celebrations, 21st birthday drinking norms, and how to help a friend who drank too much (Fernandez, 2000), and d) 21st birthday drinking norms only (Neighbors *et al*., 2005; Smith *et al*., 2006). In addition, Atkin *et al*. (2002) included a letter to parents addressing the dangers of alcohol overdose during 21st birthday celebrations as part of a birthday card intervention.

Results of these studies indicated alcohol consumption was relatively high, typically an average of nine to thirteen alcoholic beverages for men and six to nine for women. Alcohol consumption during 21st birthday celebrations was also significantly higher than the heaviest drinking occasion during the month before their birthday (Smith *et al*., 2006). Comparisons between control conditions and the various interventions indicated no significant differences in alcohol consumption or negative outcomes. One positive note was students' positive response to the programs, indicating students embrace the "idea" of receiving a birthday card to remind them of the potential dangers of high-risk drinking and prompt preventive action (Atkin *et al*., 2002; Bonday, 2006; Neighbors et al., 2005).

Overall, these findings are disappointing, especially when one considers the widespread use of this intervention approach on college campuses. None of the evaluations showed significant decreases in alcohol consumption, and at best caused some students to contemplate a change in drinking behavior and to be more likely to consider the potential risks of alcohol overdose. While current 21st birthday interventions focus on a number of important issues (i.e., alcohol overdose, rapid consumption, correcting misperceptions of social norms, drinking and driving, consumption of food and non-alcoholic beverages, and having someone look after you), they ignore a number of important factors identified in Study 1 and 2. Specifically, current interventions may occur after high-risk drinking intentions are already well formulated and negative social pressures have already eroded perceptions of behavioral control over alcohol consumption.

Another weakness of current 21st birthday celebration interventions is the absence of some potentially effective harm-reduction strategies, including: 1) countering negative social influences, 2) enhancing positive social influences, 3) requesting social support for low-risk

choices, 4) changing drinking environments, 5) engaging in alternative activities, and 6) using self-management strategies. Study 1 and 2 also indicated 21st birthday celebrations should also include information to motivate students not to get into "drinking shape, attempt the "crawl," or consume 21 drinks.

Finally, while most current 21st birthday interventions incorporate a social norms component, there is an absence of other theory-based components. Most interventions seem to focus on changing perceptions of severity, without any evidence this is the most important predictor of alcohol consumption behavior during 21st birthday celebrations. For example, a large body of research indicates social influence, attitudes concerning preventive behaviors, expected positive consequences of consuming less alcohol, perceptions of behavioral control, barriers to taking preventive actions, and behavior-focused intentions are important predictors of behavior. Thus, prevention professionals should consider a wider variety of theory-based approaches when designing interventions to reduce high-risk drinking during 21st birthday celebrations.

As indicated in Study 1, many coming-of-age drinkers have begun to form their celebratory intentions as early as one month prior to their 21st birthday. Therefore, current 21st birthday card interventions are not achieving their full potential because they are being implemented too late in the planning process. To address this gap, the current study evaluated a prevention website created to provide information to assist in planning 21BDCs, and is made available to students four weeks prior to their 21dt birthday. Because moderation of alcohol consumption requires knowledge about and skills to implement harm-reduction strategies well before their 21BDC, it was believed this approach would be more effective than current 21st birthday card interventions. Perhaps most importantly, social influences during the weeks leading up to the celebration may create expectations concerning alcohol consumption and

influence drinking intentions. Thus, individuals intending to moderate alcohol consumption during their celebration would need to apply skills to counter social pressures to consume alcohol during the weeks leading up to the 21BDC.

Hypotheses

The current study had a no-intervention control group that was compared to two intervention strategies: a) a traditional 21st birthday card intervention, and b) a harm-reduction website made available four weeks before college students 21st birthday. A number of hypotheses were developed based on Studies 1 and 2 and a review of the research literature. It was hypothesized that compared to individuals in the 21st birthday card intervention and control conditions, individuals who received the web-based intervention would: a) increase their perceptions of behavioral control, b) decrease their perceptions of the amount of alcohol consumed during 21BDCs, c) decrease their drinking intentions; d) consume less alcohol, consume fewer drinks rapidly, and be less intoxicated; e) be less likely to participate in the crawl and attempt to consume 21 alcoholic beverages; f) consume more food an non-alcoholic beverages; and g) experience fewer alcohol-related negative outcomes.

Method

Participants

Recruitment. A sample of 1867 college students from a University in the mid-Atlantic region of the U.S. were selected based on the day of their 21st birthdays. All students who had a birthday during the first twelve weeks of two semesters and while school was in session were recruited by: a) sending a letter to their home address two months before their 21st birthday, b) sending an email with a link to the informed consent and survey at 32 and 10 days before their 21st birthday and two days following their 21BDC, and c) sending two email reminders to non-

responders at two day intervals. Participants received $10 for each survey completed. Overall, 721 (309 men and 412 women) completed the baseline survey, yielding an initial participation rate of 38.6%.

Assignment to conditions. Participants were then randomly assigned to one of three conditions as follows: a) 20% (*n* = 144) were assigned to the website condition, b) 35% (*n* = 252) were assigned to the birthday card only condition, and c) 45% (*n* = 325) were assigned to the control condition. Overall, 81.1% of participants that completed the baseline survey (n = 585) completed all three surveys, including 72.9% (*n* = 105) in the website condition, 81.3% (*n* = 205) in the birthday card only condition, and 84.6% (n = 275) in the control condition. A 2 Gender x 3 Condition (control vs. birthday card only vs. website/birthday card) ANOVA on drinking history score (see measures section below) indicated no significant difference, *p*s > .20. Thus, on response bias was evident.

Interventions

Two interventions were tested. The first intervention was a 21st birthday card only condition, which included a 21st birthday card with an information card insert that was mailed to participants seven days before their 21st birthday (see Appendix D). The second intervention had three components: a) a website containing harm-reduction strategies, b) four emails sent to participants over the 28 days before their 21st birthday containing limited harm-reduction information and directed participants to the website, and c) a 21st birthday card with an information card insert which supported information on the website sent seven days before their 21st birthday (see Appendix D).

Development of the intervention materials. The content and layout of the website, birthday card, and birthday card inserts were developed via focus groups with college students

who either were turning 21 within the next 3 months or had turned 21 within the past 3 months. Three sets of focus groups were conducted, and participants were paid $15 as an incentive.

The first set of focus groups (six groups, with a range of three to eight participants per group and a total of 15 men and 17 women) was used to gain initial ideas concerning the content and design of the intervention materials. During the second set of focus groups (ten sessions with a total of 26 men and 54 women), intervention materials were reviewed by participants, and they were given the opportunity to suggest changes to the materials. During the third set of focus groups (two sessions, one with 12 and one with 15 participants, with a total of 11 men and 16 women) the website was reviewed and participants where given the opportunity to suggest changes to the design and content.

Four graduate research assistants were trained to facilitate focus groups. Each graduate research assistant received approximately four hours of training. The focus group procedures were piloted on four groups of undergraduate research assistants. For each focus group, one graduate research assistant facilitated the group, while an undergraduate research assistant took systematic notes. All participants in the focus groups remained anonymous. Each focus group was audio taped, with the verbal permission of all participants. Focus groups lasted approximately 90 minutes.

The protocol for the first two sets of focus groups was as follows. First, the facilitator set the tone for the focus group by: a) reviewing the purpose and goals of the focus group; b) setting ground rules, such as no “put downs”, one person talks at a time and group consensus is not necessary; and c) explaining that although notes would be taken no names would be used (approximately ten minutes). At this point confidentiality and anonymity were discussed and

each participant signed an informed consent form. Then the discussion began as questions were asked of participants (approximately 35-50 minutes; see Appendix C).

Following the discussion, the facilitator provided a summary of themes and/or opinions of the group by capturing common themes while still acknowledging differing points of view. The facilitator verified their description was correct and sounded complete. In the closing section: a) (approximately 5 minutes) participants were encouraged to add anything to the topic, b) contact information was given, c) the facilitator reminded participants not to discuss any views or comments by other participants after leaving the room, and d) the participants were paid and then dismissed. After the participants left, the facilitator and undergraduate research assistant reviewed the recorded notes and offered some general observations of the group such as patterns that emerged, common themes, and any new questions that arose.

During the third set of focus groups, participants were given 45 minutes to browse through each page of the website and make comments concerning the content and design. They were encouraged to critically evaluate the content and suggest specific information to be added or deleted. The facilitator then lead a 45-minute discussion, reviewing each web page, Notes from these focus groups can be found in Appendix C.

Following each set of focus groups, changes were made to the intervention materials. For example, the 21st birthday card underwent a complete revision following the second set of focus groups. While the participants liked the "You're the Director" theme in the original materials, there was a consensus that: a) the school mascot be used on the birthday card, b) the focus be on a movie premiere, and c) a movie theatre marquee with a red carpet should be depict. Overall, the participants liked the materials on the website and found them intere3sting and informative.

A number of small changes to the content were made, mostly to: a) reduce the amount of information, b) include graphics, and make the look and feel more exciting.

Website intervention. The major goals of this intervention was to: a) change perceptions of drinking norms during 21st birthday celebrations, b) increase perceptions of behavioral control over alcohol consumption, and c) counter social pressures to consume alcohol during the weeks leading up to the celebration. This was accomplished by: a) prompting participants to become more involved in the planning of their 21BDC, b) motivating participants to begin planning early, c) providing strategies for countering social pressures, and d) offering specific harm-reduction strategies for reducing both alcohol consumption during the 21BDC and related negative outcomes.

The final version of the website (see Appendix D) contained nine sections: a) Welcome (home page); b) 21st Birthday Drinking Myths and Facts; c) Part 1: "Direct" Your Own Celebration; d) Part 2: Avoid Negative Outcomes; e) Part 3: Drink Water and Consume Food to Reduce Hangovers; f) Part 4: Ready, Set, Go!; g) Do You Really Know How Much You're Drinking?; h) Alcohol Poisoning and Overdose; and i) Stay in the Pleasure Zone. Each page also contained the following social norming message: "68% of students surveyed had 12 or fewer drinks when celebrating their 21st birthday."

The web page titled "21st Birthday Drinking Myths and Facts" contained gender-specific information concerning alcohol consumption based on baseline surveys administered during the first six months of the study. Males were directed to a site for "guys" and women were directed to a site for "gals," each containing gender-specific facts concerning alcohol consumption during 21BDCs at the University. There was also information concerning three risk reduction strategies:

a) avoiding the crawl, b) turning down drinks, and c) taking control over the planning of the celebration.

The web page titled “Part 1: “Direct” Your Own Celebration” contained information about creating a personalized birthday experience, including: a) planning early, b) deciding what you will do and how much you will drink, c) communicating your plan to friends, and d) creating moderate drinking influences. There was also a section on choosing alcoholic beverages based on alcohol content that encouraged making low-alcohol drink choices to reduce intoxication.

The web page titled “Part 2: Avoid Negative Outcomes” contained information about: a) reducing peer pressure by countering social pressures in the weeks leading up to the 21BDC; and b) being proactive by letting others know drinking preferences, countering comments by friends, limiting the size of the celebration, and enlisting friends to support your plan. The webpage also encouraged celebrants to enlist friends to: a) be a non-drinking driver, b) provide water and food, c) support drinking intentions, d) limit shots, e) support turning down drinks, f) consume drinks for them, g) ask people not to buy drinks, and h) talk to the server concerning drinking preferences.

The web page titled “Part 3: Drink Water and Consume Food to Reduce Hangovers” contained information about alcohols affects on dehydration and the relation between dehydration and hangovers. The page also contained information about the affect of food consumption on intoxication, and recommended eating a large meal before the celebration and snacking throughout the evening.

The web page titled “Part 4: Ready, Set, Go!” contained information about working one’s plan during he 21BDC by: a) talking to wait staff, b) being firm about drinking choices, c) asking friends to purchase food and get water, d) sharing drinks with friends, and e) leaving drinks on

the table. Celebrants are also warned intoxication can undermine their plan, and encouraged participants to avoid negative outcomes by keeping their BAL below .06.

The web page titled "Do You Really Know How Much You're Drinking?" contained information about: a) factors that affect intoxication levels (i.e., weight, body fat, gender, and metabolism), b) the average elimination rate for alcohol (i.e., ½ ounce of pure alcohol per hour), c) how to calculate standard drinks, and d) how to estimate BAL.

The web page titled "Alcohol Poisoning and Overdose" contained information about: a) BAL levels that can result in alcohol overdose, b) who is at greatest risk for alcohol overdose, c) the early signs indicating risk for alcohol overdose (i.e., drinking quickly, vomiting, and use of stimulants), d) first aid in cases of overdose, and e) what to do when not seeking medical attention.

The web page titled "Stay in the Pleasure Zone" contained information about: a) the relation between BAL and negative outcomes; and b) specific guidelines for staying in the pleasure zone (BAL ≤ .06), including eating food, staying hydrated, pacing consumption, avoiding multiple shots, having a non-drinking driver, and having a designated drinker to consume some drinks for the celebrant.

21st birthday card. The birthday card was designed to be similar to those used in other intervention programs. The final version of the card (see Appendix D) contained a picture of the school mascot outside a movie theatre with a marquee that said "Coming Soon: Your 21st Birthday Celebration; Directed by <<First and Last Name>>." There was also a handwritten note that said "Happy Birthday <<First Name>>." On the inside of the card was an image of fireworks and "Cheers! To a Fun, Healthy, & Happy 21st Birthday!" printed. In addition, a note

was hand written on the inside of each card. The note said, "Here's to a fun and memorable celebration. From your Virginia Tech family!"

Information insert for birthday card only intervention condition. The insert (see Appendix D) included the following information: a) the warning signs of alcohol overdose, b) what to do if the person is not taken to the hospital. c) University norms for 21st birthday alcohol consumption, d) the importance of staying hydrated, and e) tips for moderating alcohol consumption during the 21BDC (i.e., consumption of food and non-alcoholic beverages, pacing consumption and using a non-drinking driver).

Information insert for website intervention condition. The insert for this birthday card (see Appendix D) included information about: a) having a drinking plan, b) countering pressures to drink, c) giving friends a role to play during the 21BDC, d) the importance of staying hydrated, e) tips for staying in the pleasure zone (BAL $\leq$ .06), and f) two social norms messages concerning 21st birthday alcohol consumption.

Wallet card attached to both 21st birthday card inserts. The wallet card was titled "Stop Alcohol Poisoning" (see Appendix D). The card included information on: a) the warning signs of alcohol overdose, b) what *not* do when someone is passed out, and c) how to place someone in a "recovery position" to lessen the chances of choking.

Procedure

Data were collected on three occasions: a) a baseline survey administered 32 to 28 days before their 21st birthday, b) a pre-birthday survey administered 11 to seven days before their 21st birthday, and c) a follow-up survey administered two to six days following their 21BDC. The baseline survey assessed: a) demographic information, b) recent history of alcohol consumption,

c) perceptions of the subjective norms, d) perceptions of behavioral control, and e) alcohol consumption intentions for the 21BDC.

The pre-birthday survey assessed the effects of the web-based intervention on behavioral intentions, subjective norms and perceptions of behavioral control concerning 21st birthday celebrations. The survey assessed: a) perceptions of subjective norms, b) perceptions of behavioral control, and c) alcohol consumption intentions for their 21BDC.

The follow-up survey assessed 21BDC behaviors and related outcomes, and included: a) self-reported consumption of alcoholic beverages, non-alcoholic beverages, and food; b) perceptions of behavioral control over alcohol consumption during their 21BDC; and c) alcohol-related negative outcomes. Since college students often have multiple 21BDCs, participants were instructed as follows when completing the follow-up survey:

> "If you had just one 21st birthday celebration, then please answer the following questions about that celebration. If you had a 21st birthday celebration with your parents/family, and an additional celebration with friends, then please answer the following questions about your celebration with friends. If you had multiple birthday celebrations with friends, answer the following questions about the largest celebration you had."

Measures

Recent history of alcohol consumption. Participants were asked to indicate their alcohol consumption during the 30-days before the baseline survey was administered, including: a) average weekly frequency of drinking, b) average number of alcoholic beverages consumed each week, c) number of times they engaged in at-risk drinking (five or more drinks in a sitting for men, four or more for women), and d) number of times they engaged in high-risk drinking (eight

or more drinks in a sitting for men, six or more for women). A measure of drinking history was calculated by summing the gender-specific standardized scores for these four measures.

Perceptions of social norms. On both the baseline and pre-birthday surveys participants rated four items (from 1: strongly disagree to 5: strongly agree) concerning their own and friends' beliefs about consuming alcohol and getting drunk during 21BDCs (e.g., "I believe almost everyone gets drunk to celebrate their 21st birthday"). Cronbach's Alpha was.74 for the baseline measure and .76 for the pre-birthday measure.

Perceived behavioral control. For the baseline and pre-birthday measures participants rated (from 1: very possible, to 6: very impossible) how possible/impossible it would be to perform the following preventive behaviors during their 21BDC: a) not consume any alcohol, b) consume three or fewer alcoholic beverages, c) pace alcohol consumption to one drink per hour, d) resist pressures to do a shot, e) resist pressures to chug a beer, f) turn down offers of alcoholic beverages, g) ask someone not to buy me an alcoholic beverage, and h) alternate alcoholic/non-alcoholic beverages. Cronbach's Alpha was .92 for both the baseline and pre-birthday measure.

For the follow-up measure, participants rated (from 1: very possible, to 6: very impossible) whether it was mostly up to them if they: a) consumed alcohol, b) did the crawl, c) consumed too much alcohol, d) consumed 21 drinks, e) stopped when they had enough alcohol, and f) got drunk. Cronbach's Alpha was .96.

Alcohol consumption intentions. Four measures of intended alcohol consumption were assessed: a) intended number of total standard drinks (a drink was defined as a 12 oz. beer, a four oz. glass of wine, a wine cooler, a single shot of liquor, or a single-shot mixed drink), b) intended number of shots/shooters, c) intention to attempt the crawl, and d) intention to consume 21

alcoholic beverages. Intentions regarding the crawl and 21 drinks were assessed on a 7-point Likert scale (from 1: Very Unlikely to 7: Very Likely).

Celebratory alcohol consumption. Self-reports of the number of: a) total drinks of alcohol consumed (one drink was defined as a 12 oz. beer, four oz. glass of wine, one shot of 80 proof liquor, or a 12 oz. wine cooler), b) shots/shooters consumed, and c) beers/mixed drinks chugged. A measure of rapid alcohol consumption was also created by summing the number of shots/shooters and chugged beers/mixed drinks. Participants were also asked to indicate whether they attempted to consume 21 alcoholic beverages and whether they participated in the "crawl." The number of hours spent consuming alcohol, gender and weight were also collected in order to estimate blood alcohol levels.

Consumption of non-alcoholic beverages. Participants indicated the number of 12-oz servings of non-alcoholic beverages (including water) they consumed during their 21BDC.

Consumption of food. Participants estimated on a seven-point Likert scale (0: Nothing, 1: Very Little, 2: Snack, 3: Light Lunch, 4: Lunch, 5: Heavy Lunch/Light Dinner, 6: Dinner, and 7: Heavy Dinner) their consumption of food: a) within two hours before consuming alcohol, b) during the first two hours of their 21BDC, and c) during the last hour of their 21BDC.

Alcohol-related negative outcomes. Participants reported whether they experienced any of the following as a result of their alcohol consumption (yes vs. no): a) hangover, b) nausea, c) vomited, c) did or said something I now regret, d) had a memory loss/ blackout for part of the evening, e) got in an argument or fight, f) got hurt or injured, g) drove a car while under the influence of alcohol, h) got a ride from someone who was under the influence of alcohol, i) became so drunk I ended up having a bad time, and j) got in trouble with police/university staff.

Estimated blood alcohol level. Estimated BAL was calculated using the procedures outlined in Study 2. As in Study 2, elimination rate (ER) was calculated by multiply the summed z-scores for average weekly quantity and frequency of alcohol consumption by the standard deviation in ER (*SD* = .0021) and adding this value to the average ER of .015. The final elimination rates had a mean = .0152 (*SD* = .0024, *Range*: .0120 - .0218).

Matching of Participants

Results of a 3 Condition (control vs. birthday card only vs. website) x 2 Gender ANOVA on drinking history scores indicated no significant differences, *p*s > .20. Despite this finding, examination of the means for average weekly frequency of drinking, average drinks per week, at-risk drinking occasions and high-risk drinking occasions during the previous 30 days indicated a pattern in which participants in the website condition were lower on each measure. Given this pattern, and the wide disparity in n-sizes across conditions, it was decided to match participants across conditions by gender and drinking history.

Statistical analysis included analysis of variance (ANOVA) and covariance (ANCOA), t-tests, forward stepwise regression, and Chi-Square. Follow-up tests on main effects used Tukey's honestly significant difference (HSD), and in a few cases t-tests. When Levene's Test for Equality of Variance indicated error variance was not equal across groups, either Dunnett's C or t-tests that do not assume equal variance was calculated.

Results

Visits to the 21st Birthday Website

Overall, only 56.2% of participants reported they visited the website, with 40% reported they looked through the website briefly, 11.4% reported they read some of the website, 3.8% reported they read a majority of the website, and 1.0% reported they read the entire website.

Table 8 contains the total number of "hits" for each page of the website, although participants' web surfing behavior was not tracked individually and many hits may have been by individuals not in the study. Results of a 2 Gender x 3 Condition (control vs. birthday card vs. website) Chi-Square indicated no significant differences in the percentage of men and women who visited the website. In addition, the correlation between self-reported visits to the website and drinking history, eBAL, number of drinks consumed, rapid consumption, amount of food consumed before and during the 21BDC, and number of non-alcoholic beverages consumed were not significant, *p*s > .05.

Social Norms and Perceived Behavioral Control

Perceptions of the social norm. To test for changes in perceptions of the social norm a 2 Social Norm (baseline vs. pre-birthday) x 2 Gender x 3 Condition ANCOVA was calculated using history score as the covariate. Results indicated the main effect for Social Norms and the Social Norms x Condition interaction were not significant, *p*s > .05.

Perceptions of behavioral control. To test for changes in perceptions of behavioral control over alcohol consumption a 2 Behavioral Control (baseline vs. pre-birthday) x 2 Gender x 3 Condition ANCOVA was calculated using history score as the covariate. Results indicated the main effect for Behavioral Control and the Behavioral Control x Condition interaction were not significant, *p*s > .20. To test for differences in behavioral control during the 21BDC a 2 Gender x 3 Condition ANCOVA was calculated using history score as the covariate. Results indicated the main effect for Condition and the Condition x Gender interaction were not significant, *p* > .05.

Alcohol Use Intentions

To test for changes in alcohol use intentions separate 2 Behavioral Control (baseline vs. pre-birthday) x 2 Gender x 3 Condition ANCOVA, with history score as that covariate, was calculated on intended number of drinks and shots/shooters, and intention to attempt the crawl and 21 alcoholic beverages. Results indicated that none of the main effects for Behavioral Control and none of the Behavioral Control x Condition interactions were significant, *p*s > .20.

Alcohol Use and Intoxication

Attempting the crawl and consuming 21 drinks. Overall, 8.9% of participants reported attempting to consume 21 alcoholic beverages and 20.3% reported attempting the crawl. Results of a 3 Condition x 2 Attempt 21 (yes vs. no) Chi Square indicated no significant difference in the percentage of participants attempting 21 drinks across conditions, $p > .20$. Results of a 3 Condition x 2 Attempt Crawl (yes vs. no) Chi Square indicated no significant difference in the percentage of participants attempting the crawl across conditions, $p > .20$.

Alcoholic beverages consumed. Separate regression analysis were performed to predict reported total number of alcoholic beverages consumed and number of drinks consumed rapidly. Predictors were tested in two blocks: 1) to control for drinking history and gender, they were tested in the first block using forward stepwise procedures; and 2) to test for intervention effects two variables representing the three intervention conditions were forced into the analysis in the second block. The two variables were: a) birthday card, with participants receiving a birthday card coded as +1 and those who did not coded as -1; and b) website, with those participants receiving the website intervention coded as +1 and those who did not coded as -1. Since the website intervention included mailing a 21st birthday card to participants, they were also coded +1 for birthday card.

As shown in Table 9, after controlling for drinking history and gender, which accounted for 28.5% of the variance in total number of drinks consumed, the interventions did not predict any additional variance. Similarly, after controlling for drinking history and gender, which accounted for 23.2% of the variance in number of drinks consumed rapidly, the interventions did not predict any additional variance. Table 9 also shows all zero-order correlations and partial correlations (controlling for drinking history) with each of the criterion variables.

Estimated BAL. A regression analysis performed using the procedures outlined above indicated that after controlling for drinking history, which accounted for 17.1% of the variance in eBAL, the interventions did not predict any additional variance (see Table 9).

Food and Non-alcoholic Beverages

Consumption of food. Separate regression analysis using the procedures outlined above for reported amount of food consumed during: a) the two hours before consuming alcohol, b) the first two hours of the 21BDC, and c) during the last hour of the 21BDC. As shown in Table 9, after controlling for drinking history, the interventions accounted for 4.6% of the variance in food consumed in the two hours before consuming alcohol, 1.5% of the variance in food consumed in the first two hours of the 21BDC, and 5.7% of the variance in food consumed in the last hour of the 21BDC.

Examination of the tests on the significance of the Beta coefficients for the two intervention conditions indicated that only the website intervention accounted for significant variance in food consumed. For food consumed during the two hours before consuming alcohol, those in the website condition consuming significantly more food ($M = 4.5$, $SD = 2.31$) than those in the birthday card ($M = 4.0$, $SD = 2.26$) and control conditions ($M = 3.8$, $SD = 2.43$), $t(311) = 2.98$, $p < .01$. For food consumed during the first two hours of the 21BDC, those in the

website condition consumed significantly more food (M = 2.19, SD = 2.43) than those in the birthday card (M = 1.9, SD = 2.52) and control conditions (M = 1.5, SD = 2.63), $t(314) = 1.84$, $p < .05$ (two-sided). For food consumed during the last hour of the 21BDC, those in the website condition consumed significantly more food (M = 1.0, SD = 1.54) than those in the birthday card (M = 0.5, SD = 1.57) and control conditions (M = 0.3, SD = 1.80), $t(314) = 4.21$, $p < .001$.

Consumption of non-alcoholic beverages. As shown in Table 9, a regression analysis performed using the procedures outlined above indicated the intervention accounted for 1.8% of the variance in reported number of non-alcoholic beverages consumed. Examination of the tests on the significance of the Beta coefficients for the two intervention conditions indicated that only the birthday card intervention accounted for significant variance in food consumed. Those in the birthday card condition consuming significantly more non-alcoholic beverages (M = 3.2, SD = 3.56) than those in the control condition (M = 2.3, SD = 3.10), $t(313) = 2.20$, $p < .03$, but the website condition (M = 3.1, SD = 3.18) was not significantly different than either the birthday card or control conditions.

Alcohol-Related Negative Outcomes

A regression analysis performed using the procedures described above indicated after controlling for drinking history and gender, which accounted for 14.2% of the variance in total number of drinks consumed, the interventions did not predict any additional variance (see Table 9). Further analysis using a series of 2 Gender x 2 Negative Outcome (yes vs. no) Chi-Square indicated significant gender differences, with men more likely to experience blackouts, vomiting, and getting hurt or injured (see Table 10). In addition, recent history of alcohol consumption was positively correlated with: a) blackout, r = 38, $p < .001$; b) hangover, r = .31, $p < .001$; c) nausea,

$r = .14$, $p < .05$; d) getting hurt or injured, $r = .14$, $p < .05$; and e) getting in an argument or fight, $r = .12$, $p < .05$.

Discussion

While more than 50% of students visited the 21st birthday website, the web-based intervention had no impact on alcohol consumption, intoxication levels and negative outcomes. The only positive finding was a moderate increase in the amount of food consumed before and during the 21BDC. Consistent with previous research (Neighbors *et al*., 2005; Smith *et al*, 2006) the 21st birthday card intervention also had no impact on alcohol consumption, intoxication and alcohol-related negative outcomes. While there was a slight increase in the consumption of non-alcoholic beverages, the increase was marginal. Overall, these findings indicate current interventions to reduce intoxication and negative outcomes related to 21BDCs are ineffective.

There are a number of possible explanations for these results. First, most students who visited the website indicated they only looked at the information briefly, and the frequency of self-reported visits to the website were unrelated to any of the outcomes variables. In addition, no information was collected on how many students read the brief emails that contained links to the website. The emails did contain limited information on various harm reduction strategies and students may have read this information and decide not to visit the website. Future research should look at the effect of these emails to determine if more students visit and interact with the website if they are provided less information in the emails.

In regards to the website, there were no interactive elements on the website, so students may have found the site relatively bland. While the focus groups indicated students thought the information was informative and useful, it may be that the site needs to be more interactive to attract and hold students attention. Unfortunately, that was beyond the scope of the current

project. Future web-base prevention sites should increase the amount of interactivity to determine if this makes the information more accessible to student. Future focus groups on the website are planned and may shed further light on this issue.

A second possible reason for the negative findings is that the physical and social environment are so overwhelming that harm-reduction strategies that are considered by participants may not be practical or even possible in the actual drinking environment. Significant changes may be needed in the drinking environment, many of which have been touched on in Study 1 and 2. For example, training bar personnel to identify individuals at risk and intervene on their behalf by offering food and non-alcoholic beverages or even refusing service. Bars and restaurants might also develop a number of specialty drinks and foods that are attractive to celebrants, including non-alcoholic and low-alcohol beverages.

Another possible environmental change is to widen the lens and target other individuals attending 21BDCs. While there is no published research on the alcohol consumption behaviors of other individual attending 21BDCs, research on bachelorette parties (Montemurro & McClure, 2005) indicate these individual might be as intoxicated as the celebrant, and may also experience a variety of social pressures to consume alcohol and become intoxicated. Clearly, research is needed to provide a better understanding of other social forces at work during 21BDCs. The next step in the current research project is to provide harm-reduction information and strategies to other students attending 21BDCs.

Another strategy might be to provide some incentives for students to visit the prevention website. For example, focus groups for this project indicated that students would be interested in earning coupons for free food or activities not related to alcohol consumption during 21BDCs. While this may work, our attempts to use coupons as an incentive on an earlier project targeting

21BDCs indicated that students rarely used the coupons and were no more likely to use harm-reduction strategies when celebrating their 21BDC.

Most likely, a comprehensive approach to this issue is needed. The best strategy may be to target the celebrant, the drinking environment, and other individuals attending 21BDCs. While this approach could work, it may be necessary to do a cost benefit analysis to determine how much resources should be dedicated to addressing 21BDCs. Current interventions can cost $2000 to $5000 dollars depending on the size of the university, and funds for alcohol abuse prevention are lean on college campuses. While it is impossible to place a dollar value on a young persons life, limited prevention resources may be better spent on effective strategies that target less difficult behaviors.

GENERAL DISCUSSION

Overall, our findings confirm previous research, indicating increased alcohol consumption among college students during celebratory events and contexts. In addition, the high rates of rapid consumption suggest 21BDCs may be a "time-out" activity (MacAndrew & Edgerton, 1969) providing opportunities for deviant behavior (Montemurro & McClure, 2005). There seems to be specific times and occasions, like 21BDCs, when drunkenness is accepted as appropriate, per individual beliefs and social norms (Greenfield & Room, 1997; MacAndrew & Edgerton, 1969). Our findings indicate celebratory drinking in contexts absent of strong beliefs and norms against drunkenness, and among those with low perceptions of behavioral control includes rapid consumption of alcohol and extreme levels of drunkenness. The 21BDC is often an "over-permissive" environment in which "the cultural attitude is permissive to drinking, behaviors which occur when intoxicated, and to drinking pathologies" (Pittman, 1967, p. 5). Research on different types of celebratory events in various contexts is needed to understand how situational and dispositional factors affect alcohol abuse during 21BDCs.

Research on alcohol consumption on Halloween (Glindemann *et al*., in press; Miller *et al*., 1993) suggests merely attending a celebratory event may not be enough to cause one to engage high single-occasion alcohol consumption. Rather, some other form of participation or effort in the 21BDC is likely an important determinant of increased alcohol consumption. Individuals turning 21 are necessarily involved in the 21BDC, and therefore it is not surprising they engage in high levels of alcohol consumption. However, research is needed to determine how alcohol consumption patterns of those attending a 21BDC are similar or different from those of the person turning 21. A study of bachelorette parties (Montemurro & McClure, 2005) suggests some celebratory environments include powerful situational and dispositional factors

influencing high levels of intoxication by many, if not everyone, involved in the 21BDC. Thus, many of those attending 21BDCs could be at risk for serious negative outcomes, and prevention efforts may need to expand beyond the birthday person and target everyone attending these celebrations.

As indicated by Forsyth and Handleby (1987), an understanding of situational and dispositional factors that direct alcohol–related behaviors is the first step in developing effective prevention programs. Our findings suggest the Theory of Planned Behavior (Ajzen, 1988, 1991) could be useful for the design of interventions to reduce alcohol consumption during 21BDCs. For example, interventions designed to reduce celebratory alcohol consumption should: a) challenge permissive sociocultural beliefs about high levels of intoxication; b) reduce event-specific misperceptions of consumption norms; c) increase perceptions of and actual behavioral control over alcohol consumption; and d) decrease the amount of alcohol consumed rapidly.

Interventions for 21st Birthday Celebrations

The concern over 21BDC drinking is reflected by the fact 85 colleges and universities have implemented the Be Responsible About Drinking (BRAD) prevention program (www.brad21.org), which involves sending prevention materials to college students in the form of a 21st birthday card. Colleges continue to use these and similar programs that include a social norms component, despite lack of evidence these interventions are effective (Atkin *et al*., 2002; Neighbors *et al*., 2005; Smith *et al*., 2006). More research is needed on celebratory alcohol consumption in order to inform the development of effective interventions. Such research should focus not only on the factors identified in the current study, but should also study additional situational factors (e.g., environment, social pressures) and dispositional variables (e.g.,

perceived severity of and vulnerability to alcohol-related harm) from other theories of health behavior.

Limitations

One clear limitation of Study 1 and Study 2 is the correlational design. While cultural beliefs, perceptions of norms, and behavioral control related to alcohol consumption may likely play a causal role in determining levels of alcohol consumption during 21BDCs, the limited period in which this study was conducted does not enable testing of these causal relationships. While our results suggest cultural beliefs, perceptions of norms, and behavioral control affects alcohol consumption, it is clear drinking behavior is also influenced by perceived norms (Miller & Prentice, 1996) and perceptions of behavioral control. It is also possible college students inflate their estimates of others' alcohol consumption as a means to reduce dissonance related to their alcohol consumption behavior.

A limitation of all three studies is the exclusive use of self-report data. Reported consumption may be inaccurate, particularly for participants who consumed large amounts of alcohol. Specifically, the high-risk drinkers may have had difficulty recalling how much alcohol they drank and how long they drank. However, given the significance of the 21BDC event, many students may have been able to recall specific details about the evening because of the relative importance of this "rite-of-passage". Obviously, additional research is needed using blood alcohol levels as the dependent variable.

In addition, the samples used in these study included only students from one university, which may not be representative of others experiencing their 21BDC at other universities. Given the limited number of studies available to serve as comparisons of normative alcohol

consumption during 21BDCs (Neighbors *et al*., 2005, 2006; Smith *et al*., 2006), similar research is needed at universities with varying demographic, geographic, and cultural characteristics.

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Table 1. Summary of Measures as a Function of Gender and Drinker Type.

	Gender				Drinker Type					
	Women (n = 83)		Men (n = 57)		Light (n = 35)		Moderate (n = 70)		Heavy (n = 35)	
Measure	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.	Mean	SD.
Drinking History (Last 30-Days)										
Average Weekly Frequency	1.7	1.04	1.9	1.50	0.4	0.49	1.7	0.67	3.2	1.02
Average Drinks per Week	6.9	6.21	9.7	11.03	0.9	1.66	6.2	3.64	18.4	9.84
Drinking Rate on Heaviest Occasion	1.5	0.96	2.4	1.70	0.7	0.66	1.8	0.84	3.1	1.77
Total Alcohol Consumption	7.5*	4.88	13.2	7.33	4.5[a]	4.67	9.9[b]	5.37	14.9[c]	6.52
Rapid Alcohol Consumption	6.3*	5.18	10.0	7.19	3.2[a]	3.52	7.5[b]	5.29	12.9[c]	6.80
Belief Celebration is a Rite of Passage	17.6	4.35	17.0	4.14	13.4[a]	3.07	18.3[b]	3.33	19.4[b]	4.51
Perceived Behavioral Control	31.3	10.84	29.3	11.27	38.1[a]	10.24	29.6[b]	9.62	24.7[b]	10.38
General Alcohol Consumption Norm	15.0	3.31	14.9	3.19	13.2[a]	3.51	15.3[b]	2.64	16.0[b]	3.49
Specific Same-Gender Drinking Norm	10.7	4.50	14.7	5.36	9.9	5.06	11.9	4.47	15.7	5.22

*Significant gender difference, $p < .05$; Different alphanumeric superscripts indicate significant differences across Drinker Type, $p < .05$.

Table 2. Zero-Order and Partial Correlations with the Criterion Variables, and Results of Regression Analyses Predicting each Criterion.

A. Criterion: Rapid Alcohol Consumption	r	$r_{1.1}$ †	R^2	Adj R^2	ΔR^2	F Change	df
Drinking History	.60***	.57***	.357	.353	.357	76.13***	137
Gender	.29***	.19*	.379	.370	.022	4.84*	136
Perceived Behavioral Control	-.47***	-.35***	.454	.442	.075	18.54***	135
Specific Same-Gender Drinking Norm	.54***	.31***	.506	.491	.052	14.01***	134
Belief Celebration is a Rite of Passage	.33***	.17*	--	--	--	--	--
General Alcohol Consumption Norm	.29***	.21*	--	--	--	--	--
B. Criterion: Perceived Behavioral Control							
Drinking History	-.43***	-.42***	.187	.181	.187	31.58***	137
Gender	-.09	-.01	--	--	--	--	--
Belief Celebration is a Rite of Passage	-.48***	-.48***	.367	.358	.180	38.63***	136
General Alcohol Consumption Norm	-.45***	-.37***	.386	.372	.019	4.15*	135
Specific Same-Gender Drinking Norm	-.24*	-.08	--	--	--	--	--
C. Criterion: Normative Misperception							
Drinking History	.38***	.45***	.144	.138	.144	23.08***	137
Gender	-.19*	-.31***	.228	.217	.084	14.84***	136
General Alcohol Consumption Norm	.28**	.20*	.260	.244	.032	5.80*	136
Belief Celebration is a Rite of Passage	.22**	.03	--	--	--	--	--
Perceived Behavioral Control	-.20*	-.08	--	--	--	--	--

†Partial correlations controlling for gender and drinking history; ***$p < .001$, **$p < .01$, *$p < .05$.

Table 3. Summary of Follow-Up Analyses Comparing Estimated Alcohol Consumption for Self with Estimated Same-Gender Peer Consumption as a Function of Gender and Drinker Type.

		Estimated Self-Alcohol Consumption		Estimate of Same-Gender Consumption		Difference Score			
Gender	Drinker Type	Mean	S.D.	Mean	S.D.	Mean	S.D.	t-test	df
Women	Light	3.6	4.11	8.5	4.02	+ 4.90	4.73	4.63***	19
	Moderate	7.1†	3.61	10.6	4.00	+ 3.51	4.38	5.26***	42
	Heavy	12.0†	4.38	13.2	4.93	+ 1.13	3.82	1.32	19
Men	Light	5.6	5.25	11.7	5.82	+ 6.10	6.61	3.58**	14
	Moderate	14.4	4.65	13.9	4.52	- 0.52	5.91	0.46	26
	Heavy	18.8	7.01	19.1	3.37	- 0.30	5.52	0.21	14

† Significant gender difference, $p < .05$; ***$p < .001$; **$p < .01$.

Table 4. Cell and Cumulative Percentage for the Timeframe Participants Reported Beginning to Plan their 21st Birthday Celebrations by Gender and Drinker Type.

	Gender				Drinker Type					
	Women (*n* = 83)		Men (*n* = 57)		Light (n = 35)		Moderate (n = 70)		Heavy (n = 35)	
When Planning Began	Cell	Cum.	Cell	Cum.	Cell	Cum.	Cell	Cum.	Cell	Cum.
Three Months or More Before	9.6	9.6	5.3	5.3	0.0	0.0	11.4	11.4	8.6	8.6
One to Three Months Before	21.7	31.3	14.0	19.3	11.4	11.4	18.6	30.0	25.7	34.3
Two Weeks to One Month Before	27.7	59.0	12.3	31.6	20.0	31.4	22.9	52.9	20.0	54.3
One to Two Week Before	15.7	74.7	26.3	57.9	34.3	65.7	11.4	64.3	22.9	77.1
Less Than a Week Before	21.7	96.4	26.3	84.2	17.1	82.9	27.1	91.4	22.9	100
No Planning	3.6	100	15.8	100	17.1	100	8.6	100	0.0	100

Table 5. Percentage of Participants Reporting Various Planning Behaviors and Different Aspects of the Celebration Environment by Drinker Type.

	Drinker Type			
A. Planning Behaviors	Light ($n = 35$)	Moderate ($n = 70$)	Heavy ($n = 35$)	X^2 Value ($df = 2$)
People Involved in Planning				
Person Turing 21	57.1	52.9	62.9	0.96
Close Friends	57.1	70.0	71.4	2.14
Best Friend	40.0	32.9	48.6	2.47
Significant Other	22.9	18.6	25.7	0.76
Parent/Guardian	37.1[a]	10.0[b]	20.0[c]	11.06**
Group I Belong Too	11.4	14.3	20.0	1.06
Siblings	20.0[a]	5.7[b]	25.7[a]	8.87*
Planning Topics				
That I Would Drink	51.4[a]	78.6[b]	97.1[c]	20.66***
Getting Drunk	25.7[a]	38.6[b]	60.0[c]	8.79*
Amount I Would Consume	8.6[a]	14.3[a]	34.3[b]	9.11*
Transportation	45.7[a]	45.7[a]	71.4[b]	6.96*
Food	51.4[a]	30.0[b]	51.4[a]	6.66*
Getting in Drinking Shape	0.0[a]	12.9[b]	22.9[c]	8.64*
B. Celebration Environment				
Alcohol Consumption Locations				
Bar	42.9[a]	82.9[b]	85.7[b]	22.74***
Restaurant	54.3	42.9	34.3	2.88
Own Residence	37.1	31.4	42.9	1.37
Parent/Guardian Residence	11.4	4.3	2.9	2.92
Other Residence	17.1	30.0	20.0	2.56
Fraternity/Sorority House	0.0	4.3	5.7	1.87
Persons Attending Celebration				
Significant Other	34.3	31.4	37.1	.35
Friends I Grew Up With	17.1[a]	25.7[a]	42.9[b]	6.07*
Parent/Guardian	37.1[a]	14.3[b]	11.4[b]	9.68**
Siblings	22.9	17.1	28.6	1.87
Instructor/Professor	0.0	0.0	5.7	6.09
Support from Friends				
Friend I Counted on to Looking After Me	45.7[a]	60.0[b]	77.1[c]	7.27*
Friend to Make Sure Didn't Drink Too Much	28.6	31.4	34.3	.27
Paying For/Receiving Alcoholic Beverages				
Did Not Pay for Any Alcohol	57.1	74.3	80.0	5.04
At Least One Bartender Bought a Drink	17.1[a]	32.9[b]	48.6[c]	7.84*
Turned Down a Drink	34.3	28.6	20.0	1.81
Asked Person Not to Buy Drink	20.0	24.3	25.7	.36
Still Received Drink Not Asked For	85.7 ($n = 7$)	76.5 ($n = 17$)	88.9 ($n = 9$)	.70
Attempted to Consume 21 Alcoholic Beverages	2.9[a]	10.0[a]	22.9[b]	7.20*
Attempted to Do the Crawl	2.9[a]	34.3[b]	42.9[b]	15.96***

***$p < .001$, **$p < .01$, *$p < .05$. Different alphanumeric superscripts indicate differences across Drinker Type based on examination of the standardized residuals.

Table 6. Correlations and Partial Correlations with eBAL, and Results of Regression Analysis Predicting eBAL During 21st Birthday Celebration.

Predictor	r	$r_{1.1}$ †	R^2	Adj R^2	ΔR^2	F Change	df
Drinking History	.48***	--	.230	.224	.230	40.93***	137
Gender	.04	-.10	--	--	--	--	--
Planning Behaviors							
Discussed That I Would Drink	.37***	.24**	.274	.263	.044	8.25**	136
Discussed That I Would Get Drunk	.28**	.18*	--	--	--	--	--
Best Friend Involved in Planning	.21*	.19*	--	--	--	--	--
Discussed Transportation	.21*	.16	--	--	--	--	--
Got into Drinking Shape	.18*	.12					
Discussed Amount of Alcohol I Would Consume	.17*	.08	--	--	--	--	--
21BDC Environment							
Participated in the Crawl	.41***	.33***	.316	.306	.086	17.17***	136
Attempted 21 Drinks	.32***	.19*	.346	.331	.033	6.12*	135
Location: Parent/Guardian Residence	-.16	-.15	.378	.359	.032	6.79**	134
At Least One Bartender Bought Me a Drink	.32***	.25**	.399	.377	.022	4.84*	133
Location: Bar	.34***	.23**	--	--	--	--	--
I Had a Friend I Counted on to Look Out for Me	.31***	.20*	--	--	--	--	--
Location: Fraternity/Sorority House	.20*	.13	--	--	--	--	--
Total Places Visited During Celebration	.18*	.14	--	--	--	--	--
Not Paying for Any Alcohol	.18*	.13	--	--	--	--	--
Food and Non-Alcoholic Beverages							
Food Consumed Before Celebration	.21*	.18*	.251	.240	.028	5.02*	136
Food Consumed During Celebration	-.30***	-.19*	--	--	--	--	--
Non-Alcoholic Beverages Consumed	.01	.02	--	--	--	--	--

***$p < .001$, **$p < .01$, *$p < .05$, partial correlations were computed controlling for drinking history.

Table 7. Percentage of Participants Reporting Various Alcohol-Related Negative Outcomes by Drinker Type.

Alcohol-Related Negative Outcomes	Overall (n = 140)	Drinker Type			X^2 Value (df = 2)
		Light (n = 35)	Moderate (n = 70)	Heavy (n = 35)	
Hangover	48.6	22.9[a]	54.3[b]	62.9[b]	13.03**
Memory Loss (Blackout)	33.8	8.6[a]	37.7[b]	51.4[b]	15.28***
Nausea/Vomited	28.8	8.6[a]	33.3[b]	40.0[b]	9.82**
Hurt or Injured	7.2	2.9	7.4	11.4	1.92
Argument or Fight	6.5	0.0	7.2	11.8	4.03
Regretted Action	4.3	0.0[a]	2.9[a]	11.8[b]	6.51*
Rode With Someone Under the Influence	4.3	0.0[a]	1.4[a]	14.3[b]	11.49**
Damaged Property or Other Mischief	3.6	0.0	4.3	5.9	1.92
Drove While Under the Influence	2.1	0.0	1.4	5.7	3.07

***$p < .001$, **$p < .01$, *$p < .05$. Different alphanumeric superscripts indicate differences across Drinker Type based on examination of the standardized residuals.

Table 8. Total Number of Web-Site Hits by Web Page and Gender.

Web Page	Men	Women
Home	1323	1053
VT Drinking Facts	239	431
Pt 1 Direct	285	376
Pt 2 Assemble Cast	961	1087
Pt 3 More Water	192	310
Pt 4 Ready Set Go	192	145
Standard Drinks	437	272
Alcohol Poisoning	167	112
In The Pleasure Zone	65	36

Table 9. Zero-Order and Partial Correlations with the Criterion Variables, and Results of Regression Analyses Predicting each Criterion.

Total Alcoholic Drinks Consumed	r	$r_{1.1}$ †	R^2	Adj R^2	ΔR^2	F Change	df
Drinking History	.43***	.47***	.183	.180	.183	69.98***	313
Gender	-.27***	-.36***	.285	.280	.102	44.38***	312
Birthday Card	.01	.00	--	--	--	--	--
Website	-.02	-.04					
Rapidly Consumed Alcohol							
Drinking History	.42***	.44***	.172	.170	.172	65.19***	313
Gender	-.20***	-.28***	.232	.227	.060	24.38***	312
Birthday Card	.02	.01	--	--	--	--	--
Website	-.01	-.02					
Estimated Blood Alcohol Level							
Drinking History	.41***	.42***	.171	.168	.171	64.63***	313
Gender	-.05	-.11*	--	--	--	--	--
Birthday Card	-.01	-.01	--	--	--	--	--
Website	-.05	-.06					
Food Eaten During Two Hours Before 21BDC							
Drinking History	.16**	.09	.024	.021	.024	7.74**	310
Gender	.01	.00	--	--	--	--	--
Birthday Card	.06	.05	.055	.046	.031	5.02**	308
Website	.17**	.17**					
Food Eaten During First Two Hours of 21BDC							
Drinking History	-.15**	-.15**	.021	.018	.021	6.77**	313
Gender	.03	.05	--	--	--	--	--
Birthday Card	.06	.07	.036	.027	.015	2.36†	311
Website	.12*	.13*					
Food Eaten During Last Hour of 21BDC							
Drinking History	.06	.03	--	--	--	--	--
Gender	.02	.02	--	--	--	--	--
Birthday Card	.06	.06	.057	.051	.057	9.48***	312
Website	.23***	.23***					
Number of Non-Alcoholic Beverages Consumed							
Drinking History	.08	.08	--	--	--	--	--
Gender	-.02	-.02	--	--	--	--	--
Birthday Card	.13*	.14*	.018	.011	.018	2.82†	312
Website	.05	.05					
Total Number of Negative Outcomes							
Drinking History	.36***	.28***	.128	.125	.128	45.92***	313
Gender	-.07	-.11	.142	.136	.014	5.10*	312
Birthday Card	-.05	-.06	--	--	--	--	--
Website	-.05	-.06					

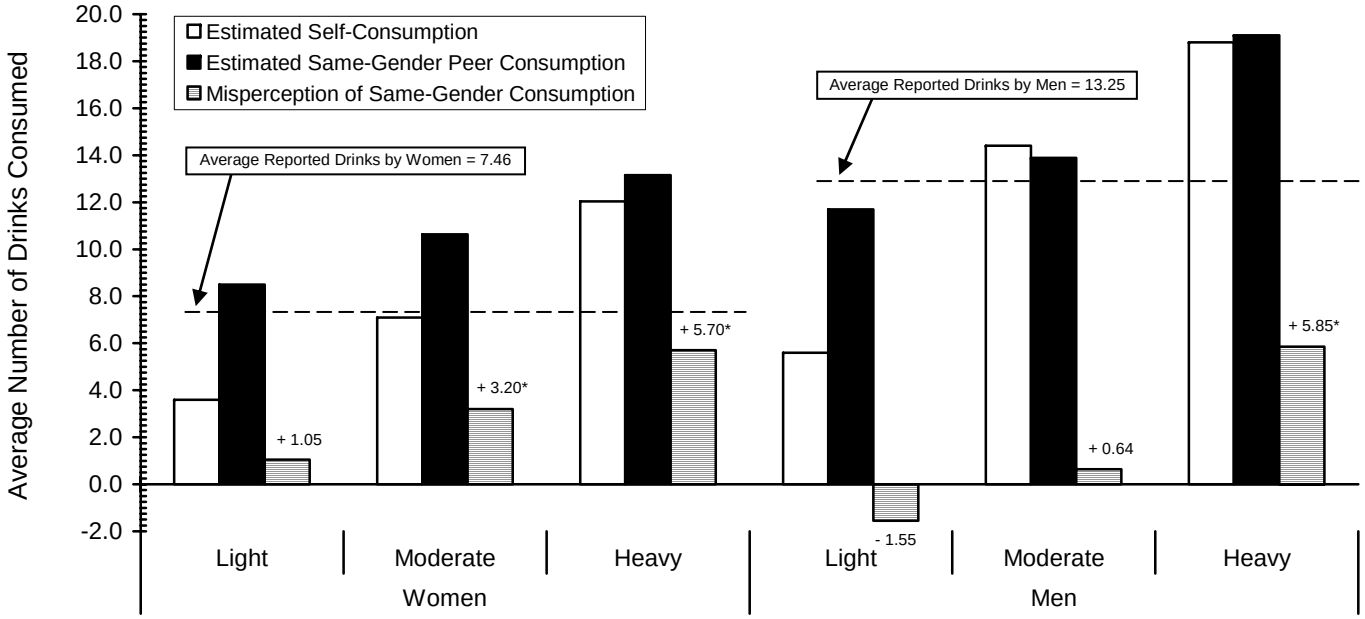
†Partial correlations controlling for gender and drinking history; ***$p < .001$, **$p < .01$, *$p < .05$, †$p < .05$ (two-sided)

Table 10. Percentage of Participants Reporting Various Negative Outcomes by Gender.

	Gender			
Negative Outcomes	Men (n = 132)	Women (n = 183)	Total (n = 315)	X^2 Value (df = 1)
Hangover	46.2	46.4	46.3	.97
Nausea	29.5	31.7	30.8	.17
Memory Loss/Blackout	35.6	24.6	29.2	4.50*
Vomited	32.6	20.2	25.4	6.18**
Did or Said Something I Now Regret	12.1	11.5	11.7	.03
Got Hurt or Injured	9.1	2.7	5.4	6.07*
Argument or Fight	3.8	6.6	5.4	1.15
Rode With Someone Under the Influence of Alcohol	2.3	4.9	3.8	1.46
Became So Drunk I Ended Up Having a Bad Time	1.5	1.6	1.6	.01
Got In Trouble With Police/University Staff	1.5	0.5	1.0	.76
Drove Under the Influence of Alcohol	0.8	1.1	1.0	.09

$^{**}p < .01$, $^{*}p < .05$.

Figure 1. Reported self-consumption of alcohol, estimates of same-gender alcohol consumption, and misperceptions of same-gender peer consumption as a function of gender and drinker type. The dotted lines depict average self-reported consumption for men and women (*Indicates misperception is significantly different from zero).



APPENDIX A

MEASURES FOR STUDY 1

Rite of Passage Beliefs

General Perception of Normative Consumption

Specific Perception of Same-Gender Alcohol Consumption

Perceptions of Behavioral Control

Celebratory Alcohol Consumption

Recent History of Alcohol Consumption

Demographics

Rite of Passage Beliefs

Indicate your agreement with the following statements about 21st Birthday Celebrations:

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I believe it is traditional to celebrate one's 21st birthday by consuming alcohol.	1	2	3	4	5
I believe it is traditional to celebrate one's 21st birthday by getting drunk.	1	2	3	4	5
I believe one's 21st birthday is a rite of passage.	1	2	3	4	5
I believe consuming alcohol on one's 21st birthday is a "rite-of-passage."	1	2	3	4	5
I believe getting drunk on one's 21st birthday is a "rite-of-passage."	1	2	3	4	5

General Perception of Normative Consumption

Indicate your agreement with the following statements about 21st Birthday Celebrations:

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I believe almost everyone consumes alcohol to celebrate their 21st birthday.	1	2	3	4	5
I believe almost everyone gets drunk to celebrate their 21st birthday.	1	2	3	4	5
My friends believe you should drink alcohol to celebrate your 21st birthday.	1	2	3	4	5
My friends believe you should get drunk to celebrate your 21st birthday.	1	2	3	4	5

Specific Perception of Same-Gender Alcohol Consumption

On average, how many alcoholic beverages do you believe other VT men consume on their 21st birthday: _____ drinks

On average, how many alcoholic beverages do you believe other VT women consume on their 21st birthday: _____ drinks

Perceptions of Behavioral Control

Indicate how easy or difficult it would it have been for you to do the following during your 21st Birthday Celebration:

	Very Easy	Easy	Somewhat Easy	Somewhat Difficult	Difficult	Very Difficult
Not consume any alcohol?	1	2	3	4	5	6
Consume three or fewer alcoholic beverages?	1	2	3	4	5	6
Pace your drinks to one drink per hour?	1	2	3	4	5	6
Resist pressures to do a shot of liquor?	1	2	3	4	5	6
Resist pressures to chug a beer?	1	2	3	4	5	6
Turn down an offer of an alcoholic beverage?	1	2	3	4	5	6
Ask someone not to buy me an alcoholic beverage?	1	2	3	4	5	6
Alternate alcoholic with non-alcoholic beverages?	1	2	3	4	5	6
Keep track of how many drinks I was having?	1	2	3	4	5	6

Celebratory Alcohol Consumption

Indicate the number of alcoholic beverages you consumed during your 21st Birthday Celebration:

Number of alcoholic beverages consumed (e.g., 3.5): _____

Indicate the number of times you did the following during your 21st Birthday Celebration:

Number of shots of liquor: _____

Number of shooters: _____

Number of 12 oz. beers chugged: _____

Number of single shot mixed drinks chugged: _____

Recent History of Alcohol Consumption

When answering the following set of questions, please think back to the month before your 21st Birthday.

On average how many time a week did you consume alcohol before you turned 21? _____ Times per week

Before you turned 21, on average how many alcoholic beverages did you consume each week? _____ Drinks per week

During the month before you turned 21, what was the greatest number of drinks you consumed on one occasion? _____ Drinks

How long was that drinking occasion? _____ Hours

Demographics

Gender:

☐ Male

☐ Female

APPENDIX B

MEASURES FOR STUDY 2

Planning for Celebration

Celebration Environment

Social Environment

Celebratory Alcohol Consumption

Perceptions of Personal Consumption

Recent History of Alcohol Consumption

Demographics

Planning for Celebration

When did planning begin for your 21st Birthday Celebration? (check all that apply)

- ☐ Three months or more before.
- ☐ One month or more before.
- ☐ Two weeks before.
- ☐ One week before.
- ☐ A few days before.
- ☐ The day before.
- ☐ The day of my birthday celebration.
- ☐ There was no planning.

Who was involved in the planning for your celebration? (check all that apply)

- ☐ Me.
- ☐ My best friend.
- ☐ My significant other.
- ☐ My parents or guardians.
- ☐ Sibling(s) or other family members.
- ☐ A group that I belong too.

What was discussed with you during the planning for your birthday celebration? (check all that apply)

- ☐ That I would drink.
- ☐ That I would get drink.
- ☐ The amount of alcohol I would consume.
- ☐ Whether we would have food.
- ☐ Transportation.
- ☐ Who would be there.

Celebration Environment

When did you celebrate your 21st Birthday? (check all that apply)

- ☐ A few days before my birthday
- ☐ The day before my birthday
- ☐ On my birthday
- ☐ The Thursday after my birthday?
- ☐ The Friday after my birthday?
- ☐ The Saturday after my birthday?
- ☐ Other (please explain): _____

Where did your 21st Birthday Celebration occur? (check all that apply)

- ☐ At a bar.
- ☐ At a restaurant.
- ☐ Where I live.
- ☐ At my parents house.
- ☐ Where my significant other lives.
- ☐ At a friends place.
- ☐ At a fraternity or sorority house.
- ☐ Other (please explain): _____

Who was at your 21st Birthday Celebration? (check all that apply)

- ☐ My close friends.
- ☐ My significant other.
- ☐ My parent(s) or guardian(s).
- ☐ Friends I grew up with.
- ☐ Sibling(s).
- ☐ My instructor(s)/professor(s).
- ☐ Other (please explain): _____

I got in "drinking shape" before my birthday celebration so I could handle more alcohol: Yes No

How many people were at your birthday celebration: _____

The group that celebrated with me included:

- ○ all men
- ○ all women
- ○ almost all men
- ○ almost all women
- ○ a mix of men and women

Approximately how much food did you consume within two hours before you started celebrating?

- ○ None
- ○ Very Little
- ○ Snack
- ○ Lite Lunch
- ○ Heavy Lunch
- ○ Dinner
- ○ Heavy Dinner

Approximately how much food did you consume during your celebration?

- ○ None
- ○ Very Little
- ○ Snack
- ○ Lite Lunch
- ○ Heavy Lunch
- ○ Dinner
- ○ Heavy Dinner

Indicate the number of non-alcoholic drinks you consumed during your 21st Birthday Celebration?

Number of non-alcoholic beverages (e.g., 2.5): _____

Social Environment

Please indicate which of the following was true concerning your 21st Birthday Celebration: (check all that apply)

- ☐ I had a friend who I counted on to look after me during the celebration.
- ☐ I had a friend who I counted to make sure I did not drink more than I wanted.
- ☐ I didn't pay for any alcoholic beverages on my birthday.
- ☐ At least one bartender bought me a drink.
- ☐ I turned down one alcoholic drink.
- ☐ I turned down an alcoholic drink on number of occasions.
- ☐ At least one person got me a drink after I had asked them not to.

Celebratory Alcohol Consumption

Indicate the number of alcoholic beverages you consumed during your 21st Birthday Celebration:

Number of alcoholic beverages consumed (e.g., 3.5): _____

At what time did you start consuming alcohol? _____ ○ a.m. ○ p.m.

At what time did you stop consuming alcohol? _____ ○ a.m. ○ p.m.

I attempted to consume 21 alcoholic beverages. Yes No

I did "the crawl." Yes No

Alcohol-Related Negative Outcomes

Following are alcohol-related experiences that some people report because of consuming alcohol. Read each item, and then indicate which of the following you experienced because of consuming alcohol during the day/night of your 21st Birthday Celebration.

I had a hangover.	Yes	No
I vomited.	Yes	No
I did something I now regret.	Yes	No
I had a memory loss (blackout) for part of the evening.	Yes	No
I damaged property or got into other mischief.	Yes	No
I got in an argument or fight.	Yes	No
I got hurt or injured.	Yes	No
I drove a car while under the influence of alcohol.	Yes	No
I got a ride from someone who was under the influence of alcohol.	Yes	No

Perception of Personal Consumption

I consumed more alcohol than I intended:

- ○ Yes
- ○ No

For my 21st Birthday Celebration, I wish I had. . (check all that apply)

- ○ not consumed any alcohol.
- ○ consumed more alcohol.
- ○ consumed less alcohol.

Recent History of Alcohol Consumption

When answering the following set of questions, please think back to the month before your 21st Birthday.

On average how many time a week did you consume alcohol before you turned 21? _____ Times per week

Before you turned 21, on average how many alcoholic beverages did you consume each week? _____ Drinks per week

During the month before you turned 21, what was the greatest number of drinks you consumed on one occasion? _____ Drinks

How long was that drinking occasion? _____ Hours

Demographics:

Gender:

- ☐ Male
- ☐ Female

Weight and Height:

This information is needed to estimate blood alcohol levels, so please be as accurate as possible:

What is your weight? Weight: _____ lbs.

What is your height? Feet: _____ Inches: _____

APPENDIX C

SUMMARY OF FOCUS GROUP QUESTIONS AND RESPONSES

Questions and Summary of Responses from First Set of Focus Groups

Questions and Summary of Responses from Second Set of Focus Groups

Summary of Comments from Third Set of Focus Groups on Website

Questions and Summary of Responses from First Set of Focus Groups

Question	General Comments/Reactions
1. What are your personal beliefs concerning the significance of the 21st birthday celebration?	*Turning 21 is considered a rite of passage. It is an issue of convenience because you can buy alcohol whenever you want. Drinking alcohol is now legal and you can go places you could not go before. Turning 21 is the last big celebration, and the celebration revolves around alcohol.*
2. What individual, social and environmental factors are related to excessive alcohol consumption during 21st birthday celebrations?	*Celebrating turning 21 is more of a social and group thing. Most are expected to drink. Non-drinkers often feel pressure to drink. There is a lot of peer pressure. Everyone buys the birthday person drinks, especially shots.*
3. What individual, social and environmental factors are related to moderating alcohol consumption during 21st birthday celebrations?	*Education can help moderate consumption. Seeing and knowing negative outcomes can help moderate. Parents are moderators. Some people will not moderate no matter what – you only turn 21 once.*
4. What are the barriers that exist to reducing alcohol use during 21st birthday celebrations?	*Biggest barrier is all of the free drinks. Peer pressure from friends is a barrier. Large groups mean more pressure and are harder to control.*
5. Are there any specific things that you would do to make sure you did not drink more than you intended during your 21st birthday celebration?	*Give some of the free drinks to friends. Avoid going with heavy drinkers. Set the limits with friends ahead of time. Eat food and drink lots of water. Keep count of drinks and drink slowly.*
6. If you were to receive a Planning Guide from the university to assist you in creating a fun, healthy and safe 21st birthday celebration: a. What would you call the guide? b. What catch phrase, title, or picture would capture your attention? c. What would get you thinking seriously about drinking less on your 21st birthday?	*Make the guide personal and bright. Include some fun facts. Include warning signs for alcohol overdose. Include educational information about alcohol consumption. Party planning tips.*
7. What types of non-drinking environments would you be willing to consider for holding your birthday celebration?	*Restaurants, bowling, laser tag, concert, sporting event, movies.*

Question	General Comments/Reactions
8. What could you say to your friends to let them know you are committed to partying positive?	*Make drinking intentions known to friends. Tell friends what you want in advance.*
9. What would you be willing to ask your friends to do to help keep you safe?	*Ask a friend to be a "babysitter". Ask friends to keep track of drinks, bring water, and give you a ride home.*
10. If you were to receive a Birthday Card from the university to assist you in creating a fun, healthy and safe birthday celebration: a. What catch phrase, title, or picture would capture your attention? b. What information do you think should be included in the card? c. What could we include in that birthday card that might limit the amount of alcohol you drink on your 21st birthday?	*Card should have a funny picture or catch phrase. Keep it positive and personal. Include strategies for saying "no", information on wallet cards, other stuff to do on your birthday, coupons, and phone numbers for cabs or free rides.*

Questions and Summary of Responses from Second Set of Focus Groups

Questions	General Comments/Reactions
1. Who is most likely to disapprove of you consuming large amounts of alcohol on your 21st birthday?	*Parents and non-drinking friends.*
2. What factors or circumstances would be the biggest cause of you consuming large amounts of alcohol on your 21st birthday?	*Peer pressure and people buying drinks for the birthday person.*
3. Which things would help you the most in executing a plan to moderate your alcohol consumption on your birthday?	*Assign a babysitter. Say what you want ahead of time to reduce peer pressure. Go out to eat. Celebrate with family.*
4. What message do you get from the image (logo)?	*That it's a big celebration. It's your birthday and it's time to have a good time. Seems like an advertisement from a company.*
5. Overall, what do you think of the images (logos)?	*Looks like an invitation. It's boring.*
6. What do you like about the images (logos)?	*It's not babyish. Fireworks and spotlight are good.*
7. What don't you like about the images (logos)?	*Too plain. Too dark. It's simplistic.*
8. What could be done to improve the images (logos)?	*Add more color. Make it more personal. Make it more humorous. Change the font.*
9. What other words could be used (bash and gala)?	*Celebration, extravaganza, event.*
10. What message do you get from the image (cover)?	*That it's a play. It's my birthday and I'm in charge. You're the director, so you're in charge of what happens.*
11. Overall, what do you think of the cover?	*It makes you want to open it. Hard to read. Design seems dull.*
12. What do you like about the cover?	*It has the right message. The director idea is good.*
13. What don't you like about the cover?	*Too busy. Don't like the ticket idea.*
14. What could be done to improve the cover?	*Put people in the seats in audience. Make the screen bigger. Change the font. Add the Hokie bird.*
15. What are some possible titles for the cover?	*"You're the director." "This is your night, direct the show." "Ticket to a good time."*

Summary of Comments from Third Set of Focus Groups on Website

PAGE: 21st Birthday Drinking Facts

- **Layout Suggestions**
  - If you could put in some graphics showing comparisons between the benefits of drinking less, that would be good. Other than that it's fairly informative and to the point.
  - Could definitely be more interesting. More pictures or graphs. It does not make me want to read it.
  - Further break it down into sections
  - Don't have entire first sentence in bold…instead come up with a title for that paragraph
  - more graphics and charts - it's boring to read the statistics, graphs would be better. Bigger hokie bird graphic - can barely read it. Different background
  - Put statistics first and then describe after. Add more graphs and pictures. Statistics are overwhelming (too many to make any stick out) Change heading color. The page consist of maroon and black; too dark.
  - Add pictures and graphs and colors and maybe some more fun statistics about what happened on some people's b'day
  - More graphics, was very organized and overall layout was neatly done
  - More colors, more graphics; it might be better to have all the statistics in a visual display like a graph; when they're just written out it makes me want to stop reading.
  - more graphics less words. Less complete sentences more bullets
  - I liked the myth vs. facts
  - For the entire site - add more party positive real photos. Way to "academic" in appearance to really capture the target audience attention.
  - Separate guys and girls facts better. Bottom for guys - titles are words above for girls titles are pictures
  - Needs more color and graphics to stand out. For example the myth and fact part can be in a more fun font.
  - make myths bolder, large. Brighter less formal colors
  - more graphics illustrating these as statistics. Bolder font, more interesting.
  - add more graphics. The risks and scoop for guys should be the same heading as the girls
  - more graphics the myths could be in bold font have more drinking facts
  - again more graphics and colors would make the page more interactive
  - needs more color, excitement and pizzazz. A lot of the information is repeated
  - Interesting but boring. Needs some graphics. I do like this page a lot!
  - so much better than last night

- **Content Suggestions**
  - I'm not sure how you can make it more fun…but it's well written and gets to the point
  - pictures and/or graphics. Little simple- easy and quick to read. Bullets or shortened facts - takes too long to read. No one wants to feel like they're reading articles for homework or that they need to know for a test 0 this is what it feels like. Info needs to be more interesting to average 21 year old - especially the ones (immature like a lot I know) that plan on getting wasted)
  - The section describing what a friend should do when looking after you didn't seem appropriate for this section
  - content was okay
  - maybe add something about the rate of hangovers the next morning
  - Delete "don't want to vomit during your celebration?"
  - Add more fun(ny) statistics
  - Very informative but the stats were a little much
  - Less complete sentences, state facts
  - Maybe put a link to here's the scoop at the end of the girl section and put the whole thing in there once. Should probably say in the intro something like (after the first sentence) "and then we will let you know the scoop"
  - More! These facts are good but not enough to serve the purpose of the page.
  - Define what "the crawl" is
  - Maybe you can put myths and facts as well as percentages of bad things that have happened to people on their 21st birthday. Also give alternatives. If they didn't do the crawl, then what did they do?
  - I like the myths. The title sentences could be bolder highlighting what to read first.
  - sentence under the crawl fact doesn't flow under the scoop - take control of the planning other should be plural
  - how many women actually did get drunk on their birthday
  - I think the content is ok
  - I thought it was interesting at first but then when I read the guys' facts the information was copied w/different statistics. The wording needs to at least change slightly from guys to girls.
  - might want to put weight and amount of beer you should drink on there. I think that is important to know.
  - Maybe put a link to here's the scoop at the end of the girl section and put the whole thing in there once. Should probably say in the intro something like (after the first sentence) "and then we will let you know the scoop"

PAGE: Part 1: Direct Your own celebration

- **Layout Suggestions**
  - The first two sections are very similar, so that makes it boring. Maybe they could be combined.

- more graphics
- more graphics!! Bigger hokie bird graphic. Different background
- Put pictures of different drinks and label when you compare them on the chart
- I like that the main ideas are listed in a bulleted style, bolded, and also in a chronological order
- Very informative, more graphics/colors/fonts needed
- I need colors. This black/maroon is way too boring
- Better
- maybe add some suggestions on what kind of plans people have made in the past. More graphics or images related to content.
- "too little info" - only because I expected the "choose alcoholic beverage Based on alcohol content" section to include specific (liquor, beer, wine) and their alcohol. Content.
- add pictures of planning…decorating etc…
- fix typos. Add more graphs like one on bottom. Better color for subtitles. I don't get the "direct" slogan explain it better
- Better text font. Maybe have pictures of the different alcoholic drinks that you have stated on the table
- change Direct to planning. Keeping it simple will help with understanding the page.
- other colors besides maroon. Too academic
- graphics, maybe just a common theme graphic on every page
- have a graphic at each step
- the table is eye catching and informative, title of page is odd kind of cheesy
- more interactive
- more pictures and colors. Combine some sections so that it's less redundant
- good stuff!
- maybe add some suggestions on what kind of plans people have made in the past. More graphics or images related to content

- **Content Suggestions**
  - Put "What I want…" section first. I like the chart of positive alternatives
  - looked good
  - "create moderate drinking influences" maybe change to "bring moderate drinkers"
  - Add examples or more suggestions. The page is dry. Dirking facts.
  - Why are the drinks you list under bad Idea bad? Maybe add some ideas for fun things to do on your bday other than drink.
  - For the guidelines w/ the alcohol I would describe why to choose beer or why light liquors over dark
  - It reminded me of doing research for school, very academic looking. I did like the bad ideas/ alternatives. The title also didn't really match what you were supposed to be doing

- It seems like the first 2 sections are the same thing but one is in question form. I skipped over the 2nd section after reading only a few ?s
- If someone has light/non-drinking parents - they won't be invited. Parents that party with their college kids like to drink enough to put up with drunk college kids
- More questions and more ways to plan a safe celebration
- some of the stuff seems pointless like the what do you want section. I do not see the purpose in that section
- add in examples on the table of kinds of drinks. Some drink for the first time during their 21st (pictures). For setting up guidelines (what I want for my 21st birthday) provide safe recommendations)
- maybe other links to other websites for more information
- under decide what you will do explain why plan early activity the following day. There is a typo in the fourth bullet under what I want
- the titles could be questions such as "how to create your own birthday experience" so that it is more of a how to manual
- the phrases at the very bottom (4) make me want to stop exploring the site because they give the impression that it's the end and there's nothing more to say, they should be moved to the last page
- I think a better word than "direct" or be used for the title of the page. Some people may be unclear about what that means
- what type and brands of alcohol will you drink
- I thought the key to creating a great experience was good
- It reminded me of doing research for school, very academic looking. I did like the bad ideas/ alternatives. The title also didn't really match what you were supposed to be doing

PAGE: Part 2: Assemble Your Cast

- **Layout Suggestions**
  - don't like the uneven lines to add people's names in are they supposed to print this out? It would be better if just bullet the roles
  - more graphics. Different background
  - typo - paragraph 1 - certainly and space before for
  - More graphics: change the title "cast your celebration" because you do that in the second part by "giving friends a role"
  - What are all the blanks? Making a cast sheet is not realistic and weird
  - more images fun fonts
  - What about sports drinks? I see that regularly…also people believe energy drinks will hydrate
  - good!
  - need more graphics!
  - for fun, add link to aquafina pub commercial
  - links to other graphs? May be helpful for visual.
  - have more bullets and less sentences

- "go ahead and chug the water, just get it in ya" - don't like that sentence. Don't wait hydrate! More fun and effective
- more interactive

- **Content Suggestions**
  - No one is going to invite their parents to their 21st birthday. Also, giving people roles to play, good idea, but is too idealistic. No guy is going to pass around a sheet with positive roles for his friends to play for him. I think you need some more realistic goals/plans.
  - I'm not sure if "appointing roles" for friends is realistic seeing as how a lot of people will be pressured by some of those same friends - plus it's hard enough for some people to find a sober driver much less a friend willing to take responsibility for your actions - yes, friends look out for you but I initially laughed at the title "appointing roles" as if forcing your friends to play mom.
  - I would take out the parents part
  - don't need to repeat the roles examples - put them into just the last section
  - not realistic. Get rid of roles
  - It mentions inviting your parents twice - that's so unlikely it seemed silly when I read it. The whole "giving friends a role" section seems repetitive since you already said it right above that as the last bulleted item.
  - Very informative and good ideas. (not as much info but good tips)
  - I think the part about giving your friends a role was repeated; only go over that once. Also, never mention parents - who is actually going to invite parents to their 21st celebration? Let's get realistic.
  - People want alcohol to hit them fast…that's why they chug/bong. Reconsider what's bolded. Feel like "reduce hangovers/negative outcomes" is becoming redundant can be reworded.
  - I like! No suggestions.
  - title of the page is to long and boring. Change it to something catchier. The water balance in our bodies part is a little confusing. Make it more simple using relaxed fun terms instead of so proper.
  - bold the most important sections
  - what are the best snacks to eat
  - maybe suggest specific foods? Breads, etc?
  - content is ok

PAGE: Part 3: Drink Water & Consume Food

- **Layout Suggestions**
  - Switch the first a. & B.
  - maybe a graphic the layout works though
  - more graphics. Different background.
  - Bold the statements "about 6 oz of water for each alcoholic beverage" and "24 oz of water before you begin drinking"
  - Bigger font size/color to make it more visually appealing

- Add more graphics and colors; also, maybe put the dangers of dehydration first, then followed by what they can do to prevent it
- more images fun fonts
- What about sports drinks? I see that regularly…also people believe energy drinks will hydrate
- good!
- need more graphics!
- for fun, add link to aquafina pub commercial
- links to other graphs? May be helpful for visual.
- have more bullets and less sentences
- "go ahead and chug the water, just get it in ya" - don't like that sentence. Don't wait hydrate! More fun and effective
- more interactive

- **Content Suggestions**
  - Good information, but I doubt people will try to drink 24 oz water before their celebration. You should mention "trying drinking at least 24 oz of water throughout the day before your crawl?
  - Not exciting but nice. Short and to the point I suppose
  - Highlight "You'll feel immediate…" Section more - maybe put at top and in color
  - content was appropriate (and not too much)
  - Show picture of the anatomy
  - I really liked the info a/b the bladder, but don't think it should be listed first. Also, you could add having a pre-bar celebration dinner under ideas for fun things to do on your bday to support eating a lot before you drink.
  - Very good! Except for the typo in the first sentence.
  - I feel like there was too much info on hydration - just state that alcohol causes dehydration, that's really all we need to know
  - People want alcohol to hit them fast…that's why they chug/bong. Reconsider what's bolded. Feel like "reduce hangovers/negative outcomes" is becoming redundant can be reworded.
  - I like! No suggestions.
  - title of the page is to long and boring. Change it to something catchier. The water balance in our bodies part is a little confusing. Make it more simple using relaxed fun terms instead of so proper.
  - bold the most important sections
  - what are the best snacks to eat
  - maybe suggest specific foods? Breads, etc?
  - content is ok
  - maybe talk about what types of food are good to eat

PAGE: Part 4: Ready, Set, Go!

- **Layout Suggestions**
  - Good amount of info, and nice quick summary of what to plan and how to achieve it
  - starts out strong…tapers into boring
  - too many sentences (more bullets) more graphics
  - more graphics. Different background
  - Add a chart comparing # of drinks and BAC with height and weight
  - typo - Get Rave Reviews" - paragraph 3, on "0your", and - and
  - Bold last bullet under "work your plan"
  - Fix typo under "Be Firm"
  - maybe suggest that the bartender/waiter bring water/soda shots later in the evening…when no one will know the difference anyway.
  - I like link to other page, more of that please. Good page for last part
  - maybe catchier sayings at the bottom - from 21st bday celebrants? Quotes:
  - less sentences more bullets
  - more interactive
  - I think there could be more to the drinks with lower alcohol content. Maybe examples

- **Content Suggestions**
  - Asking waiters or bartenders to help you not order drinks, or try to remember your limit/plan is a little presumptuous. They have a job to do, and it's not to baby-sit you. It gets busy and they will probably forget or get distracted; it's just not fair to put that responsibility on them.
  - Facts about BALs are nice but do a lot of people know while they're drinking what their BAL is? Maybe give some other types of information?
  - grammar mistake. Last two paragraphs in 1st section not needed
  - It sounded like my parents were talking to me. I don't think that talking to a bartender would help because there is usually more than 1 bartender working. They are too busy, other people may order drinks for you and they may not know.
  - Delete "just leave the drinks on the table" or elaborate what you mean
  - The section "there will be pressures" only restates exactly what was said already or that page directly above it - no need to repeat stuff exactly!
  - Very good, I would change the title of the paragraph though. It's not very capturing
  - I feel like a lot of info is repeated; try consolidating it
  - The avoiding plans 3 paragraphs at the end of the first section seemed like all the info wasn't really needed, made it wordy.
  - maybe more close to party stuff such as notes home
  - when listing BALs give equivalency in drinks (i.e. BAL of .12 equals 6 shots of vodka)
  - titles need to be more bold

- cut out the first paragraph except to avoid negative outcomes do the following
- content is ok
- (from the name ready set go no I would not think to see this info here) Under be firm, check spelling. Also I don't know if just leaving your drinks on the table is a good idea b/c by leaving them someone could put drugs in them. Just a thought???
- talking to the waitress/bartender not very realistic
- The avoiding plans 3 paragraphs at the end of the first section seemed like all the info wasn't really needed, made it wordy.

PAGE: Do You Really Know How much you drink:

- **Layout Suggestions**
  - Put a calculator for BAL on that page, and just have people put in weight, drinks, etc. don't just put a calculator (regular) and presume they'll figure it out themselves.
  - equations look good and well organized
  - more graphics different background
  - Import a calculator to do the math for you, one that can calculate weight also - more fun to play with!
  - Add pictures of the drinks
  - Way too much boring information with all the math. I had to force myself to keep reading
  - Too many math equations. Maybe integrate a calculator. Where people can enter in their info and it will give them a BAL.
  - I don't know what the second section is about and I think those formulas are not equivalent. (size of drink x calc.) should put estimating BALs as the first thing on the page
  - a little redundant - add more interesting facts. Pictures! This should not seem so academic…
  - Shorten calculator part
  - Pictures showing the different drink sizes. More graphics. Also there's too much text, I got bored reading
  - add in link or embed calculator. Pictures of standard drink sizes. Drinks come in many shapes and sizes; giving an idea to how they would like may help control intake.
  - pictures!
  - use BAC instead of BAL
  - more interactive
  - I think the math equations could be more exciting. Put it inside a cup or something.
  - graphics! Maybe a easy to follow table about weight and drinks. Amount each drink has.
  - Too many math equations. Maybe integrate a calculator. Where people can enter in their info and it will give them a BAL

- **Content Suggestions**
  - Again put a BAL calculator on the page, not just a link or website reference
  - Back on part 4 page - maybe add endnote…or link to this b/c the estimation of BAL is really helpful and interesting. Add what exactly a serving is - __oz liquor, __ oz beer, __ oz wine especially maybe the average serving for really strong drinks (ie. rails, LI Ice teas, etc)
  - it would be neat if you could add some sort of calculation to figure up your own weigh/drink/hours…might help with planning
  - Standard drinks and estimating BAL are very useful and interesting
  - I was confused b/c a standard drink is usually considered 1 shot which is 1 oz, not .5? I therefore disregarded most of the info.
  - I would delete the sentence "considering these factors" (in bold) Also, it seems way too mathematical for someone browsing it. You should instead give examples like shot, shooters, beer, liquor drinks…etc.
  - I didn't like that they were requested to search on Google for the calculator
  - suggest switching BAL to BAC
  - More interesting facts…girls are always interested. In how many calories they are consuming! Most people don't realize how many calories are in alcoholic beverages.
  - have a link to a calculator instead of directions. Use BAC instead! Maybe integrate calculator on the page. Random quotation mark at the end
  - important information. Some of it was a little hard to understand because it is too wordy. BAL is more recognizable by people also. Maybe put a link to the Google website.
  - other borders. Should be a link to the calculator
  - don't put the formula w/division at all. Correct the simpler formula to x 2. give a link to an actual calculator (and there is a quotation mark missing on calculator)
  - the information about standard drinks is confusing
  - incorrect math
  - content is appropriate
  - I like BAL, but it's a little confusing because I feel that BAC is more well known
  - "estimating your BAL" was too wordy got confusing
  - I didn't like that they were requested to search on Google for the calculator

PAGE: Alcohol Poisoning & OD

- **Layout Suggestions**
  - make the graphic larger so it's easier to scan, read and learn from
  - Top - those stats run together - separate, bullet, & bold them
  - more graphics otherwise nothing - the bullets make it easier to read
  - Medical attention chart needs to be much bigger - can barely read

- The chart needs to be bigger - I can't read what to do!
- I would increase the image that is used
- Images on how it could ruin it. It would also be cool to see peoples real life stories about poisoning overdose etc. it makes it more real.
- Poster: don't seek med. attention should be larger or at least be able to click on it for a larger image. That is probably the most important thing for people to remember.
- Put shame pictures here! The pictures are too small. the images of putting someone in recovery position not legible
- make picture bigger
- more pictures different font. Have the if you don't seek medical attention graph much bigger, it is too hard to read.
- enlarge the pictures
- I like the chart on what you should do
- graphic needs to be bigger
- bolder font
- more interactive
- The picture needs to be bigger, but it is the right idea
- yeah for graphic!
- graphic too small, hard to read
- Images on how it could ruin it. It would also be cool to see peoples real life stories about poisoning overdose etc. it makes it more real.

- **Content Suggestions:**
  - Is there anything else you can do besides putting someone in recovery position or calling the hospital?
  - Not to scare students by any means but to throw a couple of facts I found interesting out there, if I designed this I would take those facts at the top and make them easier for the eye to find by doing the aforementioned and the fact about the death at the bottom. that hits home esp. since they're stats not opinions...(_% overdose - stronger - US we're trying to keep you safe)
  - Put in a chart of what each BAL means
  - I really liked that you included that reporting alcohol overdose that positive actions will be considered in court! Good thing everyone should know, since a lot of people are afraid to ask for help b/c they think they will get in trouble.
  - Very informative (and in a good way!) I'll liked d the info on "if you have puked then you've had alcohol poisoning"
  - Some of these facts should be on the fact sheet deaths due to alcohol poisoning. Remove "if you vomit, its alcohol poisoning" may be taken less seriously.
  - I liked the image if you don't seek medical attention on what you should do. Easy to understand w/ the picture
  - Can't be too positive about alcohol poisoning…I mean…it just sucks
  - good page

- don't focus so much on numbers and BALs because they don't really mean much to a lot of people
- bold the sentence about monitoring
- all different colors
- the title some of the early signs of risk include: doesn't fit the statements underneath. It doesn't complete the sentence. I feel like it is saying its okay not to seek medical attention when it is needed - not good!
- the graphic on what to do with alcohol poisoning is hard to see
- intro is kind of scary. Should be more encouraging of seeking medical attention
- content is appropriate
- I think you should put a first aid website on there and some numbers they could call in case of emergency
- bold/highlight stats so someone skimming will catch them
- I liked the image if you don't seek medical attention on what you should do. Easy to understand w/ the picture

PAGE: Stay In Pleasure Zone

- **Layout Suggestions**
  - Enlarge the graphic, it looks colorful and useful, but it's too small to read or study
  - nothing - like the graphic and the bullets
  - graph needs to be bigger - can barely read
  - The image could be bigger so you can read the chart
  - graphic is too bright and hard to read
  - graphics illegible and boring…yet informative. More w/interaction and photos.
  - make picture bigger or a thumbnail. Run thru spell-check
  - make the graph bigger so it is easier to read. The word pleasure zone is kind of confusing, I didn't really understand what you meant
  - make guidelines bigger more eye-catching
  - have an alcohol game to see what decisions are made and compare to the right decision
  - graphic isn't readable should be bigger
  - make the graphics bigger
  - This one is pretty good
  - unnecessary. It just seems redundant.
  - good for graphics and color from the graphic!
  - graphic hard to read. Bold stats
  - The image could be bigger so you can read the char
- **Content Suggestions:**
  - The picture made it more fun. It's short and to the point. The one thing I don't like is a designated drinker. That means someone else will drink the

stuff you don't want. Like it's their responsibility, also they will probably suffer unwanted consequences.
- Have a designated drinker? Odd but I guess a good idea - maybe say "give unwanted drinks to a person willing to drink them" I hope the designated drinker" doesn't feel pressured either, or sick, or hurt…
- Add the numbers for safe transportation
- I think this page is one of the best, b/c it kind of combines the main points in a very simple manner and is short!
- I would take out BAL levels and replace with number of drinks. Also, highlight hooptie and add the number
- A lot of stuff in the first section has been mentioned before, so I feel like a lot of that can be cut out.
- Repetitive of other pages
- I think it would be nice overall to have the reader be more involved w/ interactive trivia (quizzes - fun ones) games, images so they will want to read and learn the info. And hopefully remember it.
- .06…really?
- random comma at end?
- Designated drinker seems a little cheesy to me. The BALs to .06 does not make much sense b/c people will not know what their BAL is that night.
- enlarge pictures
- on the hokie side put different sayings on each section not just 68% of students…
- seems like friendly reminders or a mom talking not something drinkers haven't heard 1000 times.
- good content
- the guidelines are some of the same things that are seen on other pages but I think it is good if the person sees these guidelines many times
- I think it would be nice overall to have the reader be more involved w/ interactive trivia (quizzes - fun ones) games, images so they will want to read and learn the info. And hopefully remember it.

PAGE: Home

- **Layout Suggestions**
  - Put in graphic(s) and shorten text to make it grab people
  - more graphics in general - it will help make the page more interactive. Right now it's too serious.

- **Content Suggestions**
  - some grammar problems

APPENDIX D

INTERVENTION MATERIALS

21st Birthday Card

Alcohol Poisoning Wallet Card

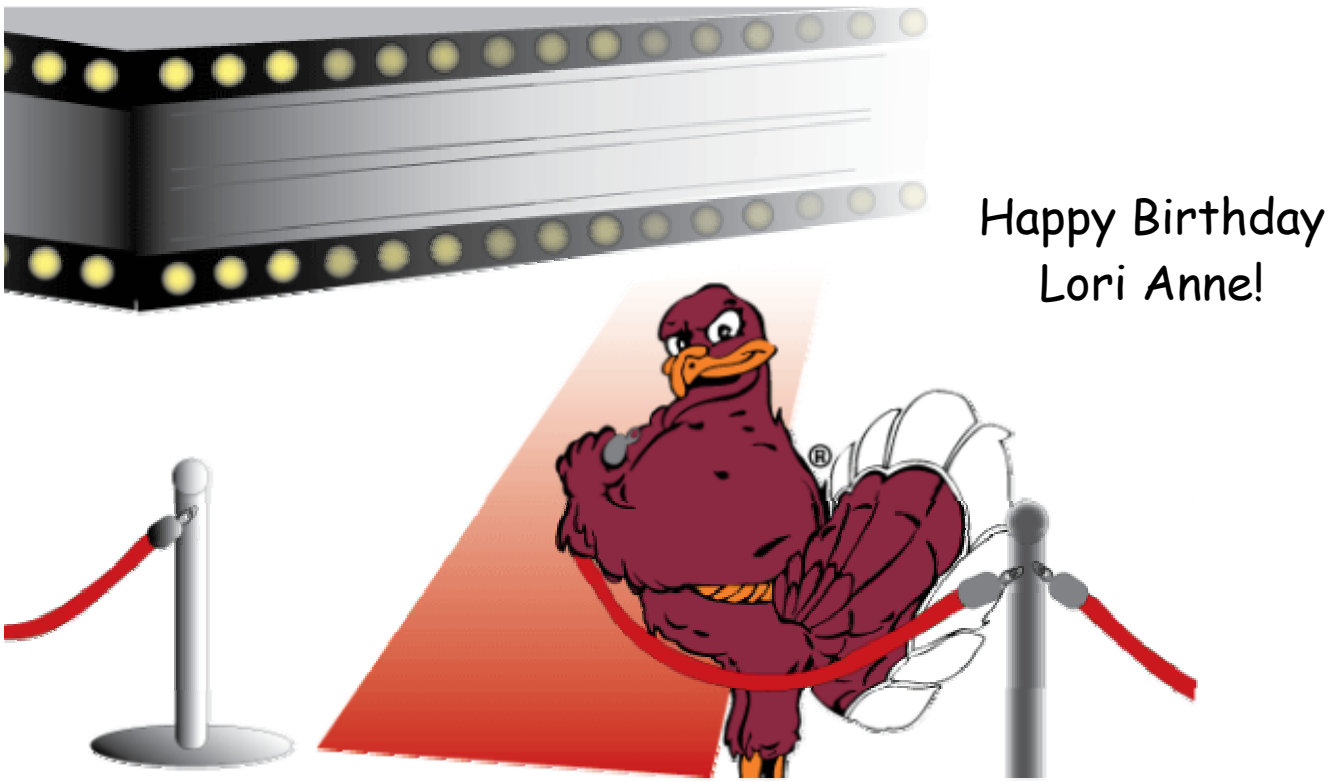
21st Birthday Card Insert for Birthday Card Only Intervention

21st Birthday Card Insert for Website Intervention

21st Birthday Emails

21st Birthday Website

21st Birthday Card



Here's to a fun and memorable birthday!
-- From Your Virginia Tech Family!

Alcohol Poisoning Wallet Card

STOP ALCOHOL POISONING

CALL FOR MEDICAL ATTENTION IMMEDIATELY if any of the following symptoms are present:

- ☐ **Respiration**... is less than 9 breaths/min.
- ☐ **Breathing**... is irregular.
- ☐ **Pulse**... is 50 or below and dropping.
- ☐ **No Pain Response**... There is no response to a shoulder pinch.
- ☐ **Unconsciousness**... If you can not wake the person.
- ☐ **You Are Worried**... at all about the state they are in.

Get Medical Attention or Contact A University Official If No One Can Stay With Them

DON'T... try to walk, run, or exercise the person.
DON'T... administer anything orally to sober the person up, only time will sober them up.
DON'T... give the person a cold shower: The shock may cause him/her to pass out.
DON'T... attempt to constrain the person.

College Alcohol Abuse Prevention Center
Schiffert Health Center • Virginia Tech

Recovery Position for Intoxicated Person

i. 
Raise closest arm above head. Prepare to roll towards you.

ii. 
Gently roll as a unit. Guard the head as you roll.

iii. 
Tilt head to maintain airway. Tuck nearest hand under cheek to maintain head tilt.

Check on Them Often!

Even if you place him or her in a correct position they may be at risk for medical complications or death. Continually monitor them and check often for signs of alcohol poisoning.

Your friend may need more than just time to sleep it off. If you are at all worried about the state they are in, get medical attention. They may have injured themselves in a fall, combined alcohol with other drugs, or have a medical problem you don't know about.

Emergency Numbers: Health Center 231-6444
Rescue Squad 911

21st Birthday Card Insert for Birthday Card Only Intervention

-- Side 1 --

EARLY WARNING SIGNS OF ALCOHOL POISONING AND OVERDOSE

Not all cases of alcohol poisoning are life threatening, so it is important to know the warning sign of alcohol overdose. In general, alcohol overdose is possible at a blood alcohol level of .28. This is equivalent to having 14 alcoholic beverages in your system. There is a 50% chance of death at a blood alcohol level of .40.

SOME OF THE EARLY SIGNS OF RISK INCLUDE:

- ✓ Drinking quickly, playing drinking games, multiple shots, and chugging or funneling drinks
- ✓ Vomiting is the body's first response to overdose

MIXING ALCOHOL AND OTHER DRUGS:

- ✓ Use of depressive drugs with alcohol can greatly increase (2x - 10x) alcohol's effects.
- ✓ Use of stimulants (including energy drinks and ecstasy) can make the person feel they can drink more, as alcohol's effects are masked, while alcohol will still depress life-sustaining functions.

WHO IS MOST AT RISK?

- ✓ Those with a high tolerance for alcohol. As you can consume more and more alcohol you come closer and closer to the amount that can cause death
- ✓ Those who drink quickly. Drinking quickly can increase blood alcohol level so rapidly that the person cannot vomit.

SPECIFIC SIGNS OF ALCOHOL OVERDOSE INCLUDE:

- ✓ Respiration is less than 9 breaths/min
- ✓ Breathing is irregular
- ✓ Pulse is 50 or below and dropping
- ✓ No Pain Response. There is no response to a shoulder pinch.
- ✓ Unconsciousness. If you can't wake the person.

WHAT TO DO:

- ✓ If any of these conditions exists or you are unsure what you should do, seek medical attention immediately.
- ✓ First, if you are at all worried about them, seek medical attention
- ✓ If you decide not to seek medical attention, then continue to monitor them until they sober up... and:
  - Place the person in a position that will reduce the possibility of choking on his or her own vomit (see attached card).
  - Once you place them in this position, continue to monitor their condition for signs of alcohol overdose.
  - Remember, even if you place them in this position, they may still be at-risk for medical complications or death.
  - Continually monitor them until they can maintain consciousness, and continue to check for signs of alcohol poisoning.
  - Make sure you check on them often.

STOP ALCOHOL POISONING

CALL FOR MEDICAL ATTENTION IMMEDIATELY if any of the following symptoms are present:

- ☐ RESPIRATION... is less than 9 breaths/min.
- ☐ BREATHING... is irregular.
- ☐ PULSE... is 50 or below and dropping.
- ☐ NO PAIN RESPONSE... There is no response to a shoulder pinch.
- ☐ UNCONSCIOUSNESS... If you can not wake the person.
- ☐ YOU ARE WORRIED... at all about the state they are in.

GET MEDICAL ATTENTION OR CONTACT A UNIVERSITY OFFICIAL IF NO ONE CAN STAY WITH THEM

DON'T... try to walk, run, or exercise the person.

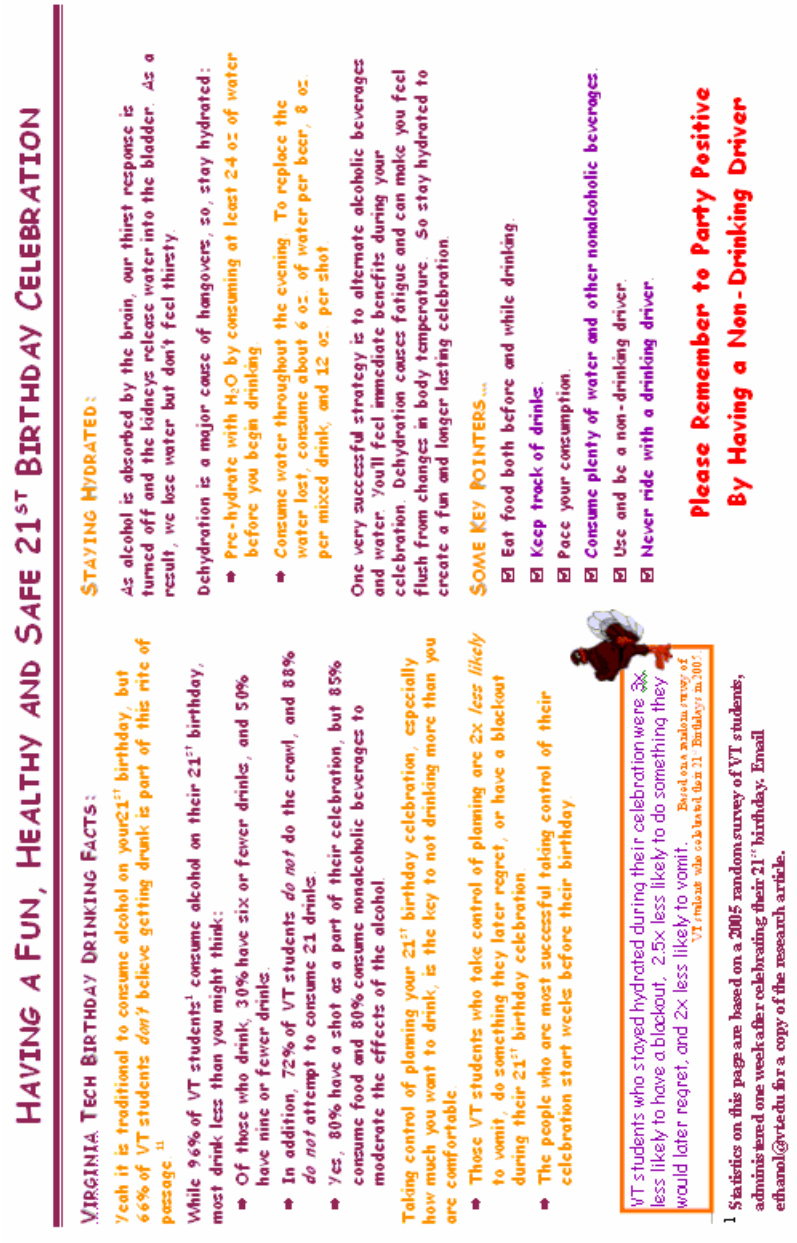
DON'T... administer anything orally to sober the person up, only time will sober them up.

DON'T... give the person a cold shower. The shock may cause him/her to pass out.

DON'T... attempt to constrain the person.

College Alcohol Abuse Prevention Center
Schiffert Health Center • Virginia Tech

-- Side 2 --



Having a Fun, Healthy and Safe 21st Birthday Celebration

Virginia Tech Birthday Drinking Facts:

Yeah it is traditional to consume alcohol on your21st birthday, but 66% of VT students don't believe getting drunk is part of this rite of passage. [1]

While 96% of VT students[1] consume alcohol on their 21st birthday, most drink less than you might think:

- Of those who drink, 30% have six or fewer drinks, and 50% have nine or fewer drinks.
- In addition, 72% of VT students *do not* do the crawl, and 88% *do not* attempt to consume 21 drinks.
- Yes, 80% have a shot as a part of their celebration, but 85% consume food and 80% consume nonalcoholic beverages to moderate the effects of the alcohol.

Taking control of planning your 21st birthday celebration, especially how much you want to drink, is the key to not drinking more than you are comfortable.

- Those VT students who take control of planning are 2x *less likely* to vomit, do something they later regret, or have a blackout during their 21st birthday celebration.
- The people who are most successful taking control of their celebration start weeks before their birthday.

VT students who stayed hydrated during their celebration were 3x less likely to have a blackout, 2.5x less likely to do something they would later regret, and 2x less likely to vomit. Based on a random survey of VT students who celebrated their 21st Birthdays in 2007.

[1] Statistics on this page are based on a 2005 random survey of VT students, administered one week after celebrating their 21st birthday. Email ethanol@vt.edu for a copy of the research article.

Staying Hydrated:

As alcohol is absorbed by the brain, our thirst response is turned off and the kidneys release water into the bladder. As a result, we lose water but don't feel thirsty.

Dehydration is a major cause of hangovers, so, stay hydrated:

- Pre-hydrate with H_2O by consuming at least 24 oz of water before you begin drinking.
- Consume water throughout the evening. To replace the water lost, consume about 6 oz of water per beer, 8 oz per mixed drink, and 12 oz per shot.

One very successful strategy is to alternate alcoholic beverages and water. You'll feel immediate benefits during your celebration. Dehydration causes fatigue and can make you feel flush from changes in body temperature. So stay hydrated to create a fun and longer lasting celebration.

Some Key Pointers...

- ☑ Eat food both before and while drinking.
- ☑ Keep track of drinks.
- ☑ Pace your consumption.
- ☑ Consume plenty of water and other nonalcoholic beverages.
- ☑ Use and be a non-drinking driver.
- ☑ Never ride with a drinking driver.

Please Remember to Party Positive

By Having a Non-Drinking Driver

21st Birthday Card Insert for Email/Website Intervention

Page 1

PLANNING A MEMORABLE CELEBRATION

HAVE A DRINKING PLAN

Choose Alcoholic Beverages Based on Alcohol Content:

- Stick with beer.
- Avoid multiple shot drinks, or don't do shots or shooters.
- If you do shots, space them out so they don't hit you fast.
- Avoid dark liquors to limit hangovers.

May be a Bad Idea	Positive Alternative
Ice Beers	Light or Regular Beer
Pale Ales	Regular Beer
Dark Liquors	Clear Liquors
Long-Island Iced Tea	Vodka-Based Drink

Remember, your plan may erode as you become more impaired, so have a friend to help you implement your plan.

Alcohol Consumption Plan:

Standard Drinks:	Low-Alcohol Beers I'll Drink:
Beers: _____	
Shots: ____	Liquor I'm Willing to Drink:
Mixed Drinks: ____	

COUNTER PRESSURES TO DRINK

Drinks purchased for your consumption, especially shots and shooters, is the major source of pressures to drink.

The keys to success are to (check those you intend to do):

- ☐ Develop strategies you can use that night to moderate the number drinks you consume.
- ☐ Invite friends who will support you in moderating your alcohol consumption.
- ☐ Ask friends to get you food and keep you hydrated with nonalcoholic beverages instead of buying you more alcohol.

Page 2

- ☐ Talk to your server and/or bartender. Let them know if you don't want shots or certain beverages and to keep the water coming.
- ☐ Be firm and unwavering in communicating what you will and will not consume.

To Counter Social Influence I Will:

- ☐ Immediately counter all comments and pressures.
- ☐ Enlist friends who support my plan and help me counter.
- ☐ Be proactive in implementing my plan.
- ☐ Limit the size of my celebration.
- ☐ Invite friends who will support my drinking in moderation.
- ☐ Give roles to my friends to create positive social pressures.

GIVE YOUR FRIENDS A ROLE TO PLAY

Enlist friends to: **Enter Friends Name Below**

- ☐ Help plan my birthday celebration; _____
- ☐ Be a non-drinking driver or call Hooptie; _____
- ☐ Keep me hydrated with plenty of water; _____
- ☐ Make sure I eat throughout the evening. _____
- ☐ Suggest low-alcohol alternatives; _____
- ☐ Talk to the server/bartender; _____
- ☐ Ask friends not to buy me alcohol; _____
- ☐ Consume some drinks for me; _____
- ☐ Ask my friends to support my plan; _____
- ☐ Monitor my drinking; _____
- ☐ Be knowledgeable about alcohol overdose; _____

VT students who stayed hydrated during their celebration were 2x less likely to have a blackout, 2x less likely to do something they later regret, and 2x less likely to vomit.

Based on a random survey of VT students who celebrated their 21st Birthdays in 2005.

Page 3

WATER: IS IT IN YA?

Dehydration is a major cause of hangovers. So, reduce hangovers by staying hydrated. To do this you will need to:

1. Pre-hydrate with H_2O by consuming at least 24 oz of water before you begin drinking.
2. Consume water throughout the evening. To replace the water lost, consume about 6 oz. of water per beer, 8 oz. per mixed drink, and 12 oz. per shot.

One very successful strategy is to alternate alcoholic beverages and water. GO ahead and chug the water, just get it in ya.

You'll feel immediate benefits during your celebration. Dehydration causes fatigue and can make you feel flush from changes in body temperature. So stay hydrated to create a fun and longer lasting celebration.

STAYING IN THE PLEASURE ZONE

- ☐ Pre-hydrate with at least 24oz of water.
- ☐ Eat before I start drinking.
- ☐ Have a big dinner.
- ☐ Eat throughout the evening.
- ☐ Consume plenty of water throughout the evening.
- ☐ Avoid rapid consumption.
- ☐ Ask selected people not to buy me a drink.
- ☐ Turn down some drinks.
- ☐ Share some of the drinks with friends.
- ☐ Have a designated drinker to consume some drinks for me.
- ☐ Leave some drinks on the table.
- ☐ HAVE A NON-DRINKING DRIVER.

68% of VT students surveyed said they had 12-or-fewer alcoholic beverages when celebrating their 21st birthday.

Based on a random survey of VT students who celebrated their 21st Birthdays in 2005.

Page 4

To remember your birthday celebration, avoid rapid and heavy consumption. Drinking quickly is the best predictor of blackouts. The probability of blackout increases rapidly at Blood Alcohol Levels above .10.

Don't let intoxication undermine your plan. As your blood alcohol level rises, your judgment and decision-making skills are affected. Having a trusted friend to help you work your plan will be useful.

You can avoid negative outcomes by keeping your Blood Alcohol Level ≤ .06. The probability of doing something you regret, vomiting, arguing or fights, and getting hurt or injured increase rapidly as Blood Alcohol Levels get above .10.

ALCOHOL POISONING AND OVERDOSE CAN RUIN YOUR CELEBRATION

Overdose becomes possible when BAL reaches .28, with 50% of people dying at BALs of .40.

Who is most at risk?

- Those with a high tolerance for alcohol. As you can consume more and more alcohol, you come closer to the amount that can cause death.
- Those who drink quickly. Drinking quickly can increase blood alcohol level so rapidly the person cannot vomit.

Early signs of risk include:

- Drinking quickly, playing drinking games, multiple shots, and chugging drinks.
- Vomiting is the body's first response to alcohol overdose.
- Use of stimulants (including ecstasy) and energy drinks can make you feel you can drink more, as alcohol's effects are masked.

STOP ALCOHOL POISONING

CALL FOR MEDICAL ATTENTION IMMEDIATELY
If any of the following symptoms are present:

- ☐ Respiration... is less than 9 breaths/min.
- ☐ Breathing... is irregular.
- ☐ Pulse... is 50 or below and dropping.
- ☐ No Pain Response... There is no response to a shoulder pinch.
- ☐ Unconsciousness... If you can not wake the person.
- ☐ You Are Worried... at all about the state they are in.

[illegible]

DON'T... try to walk, run, or exercise the person.
DON'T... administer anything orally to sober the person up, only time will sober them up.
DON'T... give the person a cold shower. The shock may cause him/her to pass out.
DON'T... attempt to constrain the person.

College Alcohol Abuse Prevention Center
Schiffert Health Center • Virginia Tech

First Email: Twenty-Seven Days Before Birthday

Subject: VT 21st Birthday Project: Birthday Planning

Dear <<firstname>>,

Thanks again for participating in our study of 21st birthday celebrations. We hope that the emails we send you over the next few weeks will be helpful in planning a fun and safe 21st birthday celebration. Our goal is to help you have fun, while avoiding such negative outcomes as vomiting, blackouts, and alcohol overdose.

Now that your birthday is just a few weeks away, you should begin thinking about your celebration. The one thing you could be doing right now to make sure you have the "perfect birthday celebration" is to begin planning. For example:

1. Decide what you want to do.
2. Set a drink limit now, so others don't end up making you drink more than you want.
3. Share your ideas with close friends who will help you pull off a great celebration.

Please take a minute to visit our website, and take a look at Part 1 to learn more about these and other suggestions:
http://www.alcohol.vt.edu/21stbirthdayguys/pt1direct.html

For some 21st birthday facts visit:
http://www.alcohol.vt.edu/21stbirthdayguys/vtdrinkingfacts.html

Second Email: Eighteen Days before Birthday

Subject: VT 21st Birthday Project : Avoiding those Negative Outcomes, only 18 days to go. .

Dear <<firstname>>,

First, you are probably beginning to experience some social pressures to drink or get drunk during your celebration. To counter these pressures you could be:

1. countering social pressures by communicating your plans and drinking intentions, and suggesting alternatives,
2. sharing your drinking preferences (e.g. drink limits, what you will and will not drink), and
3. enlisting friend to support your drinking intentions.

Second, you are probably already making plans for your 21st birthday celebration, so as you put together the cast for your celebration, assign them roles to play that will increase you enjoyment and decrease negative outcomes. For example, get some friends to be the non-drinking driver, provide you plenty of water and snacks throughout the evening, and even consume some drinks for you.

Our goal is to keep you safe during your celebration, because blackouts and alcohol poisoning can ruin your celebration, and are all to common side effects of rapid alcohol consumption during 21st birthday celebrations (see "Quick Fact" below).

Please take a minute to visit our website, and take a look at "Part 2: Assemble Your Cast" to learn more about these, and other, suggestions:
http://www.alcohol.vt.edu/21stbirthdayguys/pt2assemblecast.html

Quick Fact: A survey of more than 500 VT students who celebrated their 21st birthday celebration last semester indicated that 33% of men experienced a blackout, and 30% had an estimated blood alcohol level above .28, putting them at risk for serious complications from alcohol poisoning. So, please, take it slow, pace yourself, and take some steps to moderate consumption.

For information on calculating Blood Alcohol Levels visit:
http://www.alcohol.vt.edu/21stbirthdayguys/standarddrinks.html

Third Email: Ten Days before Birthday

Subject: VT 21st Birthday Project: Keeping Up Your Energy, only 10 days to the big event

Dear <<firstname>>,

It's probably time to start thinking about sustenance. Eating food throughout your celebration will keep up your energy level and could prevent blackouts and alcohol poisoning.

In addition, dehydration causes fatigue and can make you feel flush or nauseated from small changes in body temperature. So stay hydrated to create a fun and longer lasting celebration. The key is to:

1. Pre-hydrate with 24 oz of H2O before you begin drinking, and
2. Consume about 6 oz of water for each drink, to maintain hydration.

Don't like water? Get some soda, juice or a fun non-alcoholic drink instead.

For more info visit:
http://www.alcohol.vt.edu/21stbirthdayguys/pt3morewater.html

For info on ALCOHOL POISONING visit:
http://www.alcohol.vt.edu/21stbirthdayguys/alcoholpoisoning.html

For information on CALCULATING BLLOD ALCOHOL LEVELS visit:
http://www.alcohol.vt.edu/21stbirthdayguys/standarddrinks.html

Last Email: Three Days before 21st Birthday

Subject: VT 21st Birthday Project - Ready, Set, Go!!!

Dear <<firstname>>,

Well the big event is just around the corner, and we hope you have taken some steps to ensure a memorable 21st birthday experience.

Just a few reminders to make your celebration a pleasant and memorable time:

1. Prehydrate with plenty of water.
2. Keep the water coming all night to keep up your energy and reduce hangovers.
3. Snack on food throughout the evening.

Make sure you have someone to look after you, and consume some of those beverages for you. Pick someone you trust, and let them know what you will and will not drink, how much you intend to consume, and that you want to stay hydrated and eat plenty of food. This person's could:

1. Be the non-drinking driver;
2. Support you when you turn down a drink;
3. Consume some drinks for you; and
4. Ask people not to buy you drinks.

For more information visit:
http://www.alcohol.vt.edu/21stbirthdaygals/pt4readysetgo.html

Also make sure someone is knowledgeable about alcohol overdose by visiting:
http://www.alcohol.vt.edu/21stbirthdaygals/alcoholpoisoning.html

Have A Great 21st Birthday Celebration!

Stay Hydrated and Have A Memorable Celebration!

21st Birthday Website

-- Look and Feel of Website Design --

Home Page

HAPPY 21st BIRTHDAY!

Welcome!

Your 21st birthday is just around the corner, and we want to be a part of this celebration. So first, and foremost we want to wish you a happy birthday!!!!

Your 21st Birthday is a big event. a final passage to adulthood. And since it is your birthday, plan a celebration that you will enjoy and find memorable. Our goal is to help you avoid vomiting, blackouts, and alcohol poisoning.

You don't have to get caught up in the hype to drink more than you want; after all, it is your birthday! You certainly don't want to drink so much that you blackout and not remember the celebration, or do something embarrassing or regrettable that ruins this memorable occasion.

This site outlines some simple steps for taking the lead in deciding how much, and what, you want to drink when celebrating your 21st birthday. There is also some basic information about factors that affect blood alcohol levels, estimating your blood alcohol level and alcohol overdose.

Footer

68% of students surveyed had 12 or fewer drinks when celebrating their 21st birthday. Based on a random survey of Virginia Tech students who celebrated their 21st birthdays in 2006.

21st BIRTHDAY DRINKING MYTH AND FACTS

Facts For Gals | Facts For Guys

Virginia Tech Drinking Facts For Gals

Statistics on this page are based on a 2006 random survey of more than 500 VT students, administered one week after celebrating their 21st birthday. Email *21st_Birthday@vt.edu* for a copy of the research article.

***MYTH** vs. FACT:*

MYTH: *Getting drunk to celebrate your 21st birthday is a rite-of-passage.*

FACT: 65% of women do not believe that getting drunk to celebrate one's 21st birthday is a rite-of-passage. Yeah it may be traditional to some consume alcohol on your 21st birthday, but many VT students choose not to focus their celebration on alcohol.

MYTH: *Everybody attempts to consume 21 drinks during his or her celebration.*

FACT: 95% of women do not attempt 21 drinks. Those who attempt 21 drinks are almost assured of vomiting, blacking out, and experiencing alcohol overdose.

MYTH: *Everybody does the crawl during his or her celebration.*

FACT: 67% of women do not attempt the crawl during their 21st birthday celebration. Those who do the crawl end up drinks 50% more than those who do not.

The Risks:

- One-third of women experienced a blackout during their 21st birthday celebration. To avoid blackouts avoid drinking quickly.
- 26% of women vomited. To avoid vomiting altogether consume fewer than 6 drinks.
- 30% of women had an estimated blood alcohol level = .28, putting them at risk for serious complications from alcohol poisoning.
- To join most students who avoid these risks, take it slow, pace yourself, and take some steps to moderate consumption.

So, Here is the Scoop:

Avoid the crawl and attempting 21 drinks. To have more control over your consumption, do as most VT students, and avoid the crawl and attempting 21 drinks.

Turn down some drinks. Ask for some food or a fun non-alcoholic beverage instead. You will not be alone about half of VT student report turning down drinks or asking someone not to buy them a drink.

Take control of the planning. It is your birthday, and you are supposed to get what we want on your birthday. So let other know how much you want to drink, and what you will or will not drink.

Virginia Tech Drinking Facts For Guys

Statistics on this page are based on a 2006 random survey of more than 500 VT students, administered one week after celebrating their 21st birthday. Email *21st_Birthday@vt.edu* for a copy of the research article.

MYTH vs. FACT:

MYTH: *Getting drunk to celebrate your 21st birthday is a rite-of-passage.*

FACT: 72% of men do not believe that getting drunk to celebrate one's 21st birthday is a rite-of-passage. Yeah it may be traditional to consume some alcohol on your 21st birthday, but many VT students choose not to focus their celebration on alcohol.

MYTH: *Everybody attempts to consume 21 drinks during his or her celebration.*

FACT: 80% of men do not attempt 21 drinks. Those who attempt 21 drinks are almost assured of vomiting, blacking out, and experiencing alcohol overdose

MYTH: *Everybody does the crawl during his or her celebration.*

FACT: 77% of men do not attempt the crawl during their 21st birthday celebration. Those who do the crawl end up drinks 50% more than those who do not.

The Risks:

- One-third of men experienced a blackout during their 21st birthday celebration. To avoid blackouts avoid drinking quickly.
- 32% of men vomited. To avoid vomiting altogether consume fewer than 8 drinks.
- 30% of men had an estimated blood alcohol level = .28, putting them at risk for serious complications from alcohol poisoning.
- To join most students who avoid these risks, take it slow, pace yourself, and take some steps to moderate consumption.

So, Here is the Scoop:

Avoid the crawl and attempting 21 drinks. To have more control over your consumption, do as most VT students, and avoid the crawl and attempting 21 drinks.

Turn down some drinks. Ask for some food or a fun non-alcoholic beverage instead. You will not be alone about half of VT student report turning down drinks or asking someone not to buy them a drink.

Take control of the planning. It is your birthday, and you are supposed to get what we want on your birthday. So let other know how much you want to drink, and what you will or will not drink.

Footer

68% of students surveyed had 12 or fewer drinks when celebrating their 21st birthday. Based on a random survey of Virginia Tech students who celebrated their 21st birthdays in 2006.

PART 1: "DIRECT" YOUR OWN CELEBRATION!

You Have The Power To Create Your Own 21st Birthday Experience!

The key to creating a great experience is to:

- **Begin planning early.** Having a plan to share with others can create positive social forces that support your drinking values.
- **Decide what you will do.** To limit consumption devise some activities that don't involve drinking or plan an early activity the following day.
- **Decide how much you will drink**, what you will and will not drink, whether you will take shots, etc.
- **Communicate your plan to a friend** who will help you plan and communicate your drinking intentions to others.
- **Create moderate drinking influences**, like inviting moderate and non-drinkers, parents or guardians, or other people who will have a moderating influence.

What I Want For My 21st Birthday Experience:

Here are some things to consider:

- What are some fun things you want to do on your birthday?
- How much do you want to drink?
- Will you do shots? How Many?
- What types and brands of alcohol will you drink?
- What types and brands of alcohol will you not drink?
- Who do you want to help you plan your celebration?
- Who will look after you, and make sure you don't drink too much?

Choose Alcoholic Beverages Based On Alcohol Content

Here are some general guidelines:

- Stick with beer.
- If you do shots, space them out so they don't hit you fast.
- Avoid multiple shot drinks.
- Avoid dark liquors to reduce the hangover.

May be a Bad Idea	Positive Alternative
Ice Beers	Light or Regular Beer
Pale Ales	Regular Beer
Dark Liquors	Clear Liquors
Rail	Vodka-Based Drink
Long-Island Iced tea	Vodka-Based Drink

Remember, your plan could fall apart if you become more impaired, so have a friend to help you implement your plan and keep you safe.

Have A Great 21st Birthday Celebration!
Don't Get Caught Up In The Hype!
Enjoy A Few If You Must. But Only If It Fits Your Value System!
Have A Memorable Celebration !

Footer

68% of students surveyed had 12 or fewer drinks when celebrating their 21st birthday. Based on a random survey of Virginia Tech students who celebrated their 21st birthdays in 2006.

PART 2: AVOID NEGATIVE OUTCOMES

Reduce Peer Pressure:

Pressures to consume large quantities of alcohol often begins long before your birthday. And **if not countered early, social pressures will build and become more difficult to resist** as your birthday approaches.

The people who attend your celebration will make all the difference in having a fun time. You will certainly want to invite your best friends. But the mix of people will also determine how much you drink. For example, more people might mean more drinks you will be expected to consume and heavier drinkers might increase pressures to drink.

So the key is to **make your celebration plans and drinking intentions known early**. To counter social pressures could also:

- **Be proactive**. Make sure the celebration plan is what you want; after all, it is your birthday.
- **Let others know your drinking preferences.** Share how much you feel comfortable drinking, and what you will and will not drink.
- **Counter early and often.** Immediately counter all comments and pressures by communicating your plans and drinking intentions, and suggesting alternatives.
- **Limit the size of the celebration.** as a way to control social pressures, fewer people = less pressure.
- **Enlist a friend** to help plan your celebration and support your drinking intentions before and during your celebration.
- **Appoint roles** for friends so they support your plan

Have Friends Give You A Hand To Avoid Negative Outcomes:

See, if you **pace your consumption and only drink what you want** you can avoid negative outcomes, like blackouts and alcohol poisoning.

Pick someone you trust, maybe even a backup to give you a hand. Let them know what you will and will not drink, how much you intend to consume, and that you want to stay hydrated and eat plenty of food. This person's could:

- Be the non-drinking driver;
- Provide plenty of water, or other fun non-alcoholic drinks, throughout the evening;
- Make sure you eat food throughout the celebration;
- Support your drinking intentions;
- Limit the number of shots you consume;

- Support you when you turn down a drink;
- Consume some drinks for you;
- Ask people not to buy you drinks; and
- Talk to the server or bartender so you only get the drinks you want

Footer

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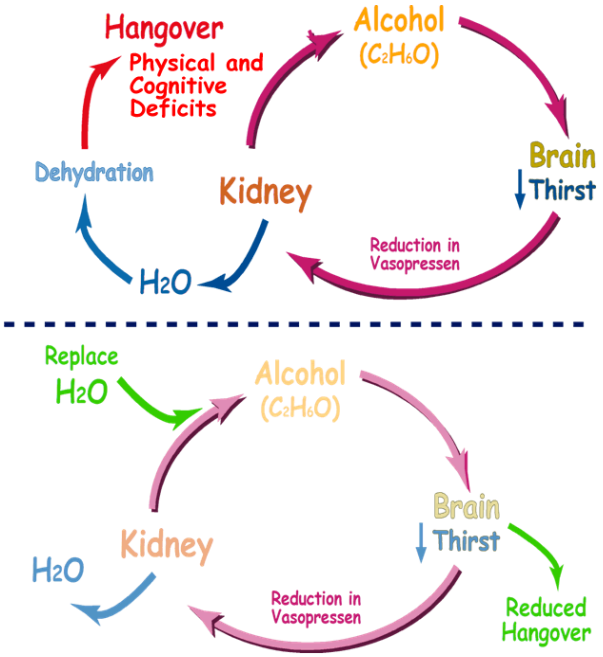
PART 3: DRINK WATER AND CONSUME FOOD TO REDUCE THE HANGOVER

Water: Is It In You?

Normally the water balance is our bodies in maintained by two opposing mechanisms:

1. The release of water into the bladder, and
2. The thirst response which increases our water intake.

As alcohol is absorbed by the brain, our thirst response is turned off and the kidneys release water into the bladder. As a result, we lose water but don't become thirsty.



Dehydration is a major cause of hangovers. So, **reduce hangovers by staying hydrated**. To do this you will need to:

1. **Pre-hydrate** with H2O by consuming at least 24 oz of water before you begin drinking.
2. **Consume water throughout the evening.** To replace the water lost, drink water often - about 6 oz. of water for each alcoholic beverage.

One very successful strategy is to alternate alcoholic beverages and water. GO ahead and chug the water, just get it in ya.

You'll feel immediate benefits from consuming plenty of water during your celebration. Dehydration causes fatigue and can make you feel flush or nauseated from small changes in body temperature. So stay hydrated to create a fun and longer lasting celebration.

DON'T WAIT… HYDRATE!!

What Are You Going To Eat?

To make sure the alcohol doesn't hit you too fast, make sure you consume plenty of food.

Consuming food slows the absorption of alcohol by causing the alcohol to be held longer in the stomach. By consuming food, you can reduce hangovers and other negative outcomes by lowering peak blood alcohol levels by 10%.

For optimal effects eat a large meal just before you begin drinking, and **snack on foods throughout your celebration**

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PART 4: READY, SET, GO!

Work Your Plan To Avoid Negative Outcomes

Counter pressures to drink during the celebration. A major source of these pressures is drinks purchased for your consumption, so use the following counter measures.

- **Talk to the waitress/bartender** and let them know your choices and limits. Especially if you don't want shots or certain beverages. Also, ask them to keep the water coming.
- **Be firm** and unwavering when turning down a drink or specific types of drinks. You can also have a friend say "no" for you. Got anybody in mind?
- **Ask friends to purchase food and get water** instead of more alcohol.
- **Share** some of the drinks with your friends.
- Just leave the drinks on the table.

If you want to remember your celebration and avoid alcohol overdose, avoid rapid and heavy consumption. Drinking quickly is the best predictor of blackouts. In addition, the probability of blackout increases rapidly at blood alcohol levels above .15.

Don't let intoxication undermine your plan. As your blood alcohol level rises, your judgment and decision-making skills are affected. Having a trusted friend to help you work your plan will be useful.

You can avoid most negative outcomes by keeping your BAL $\leq$ .06. The probability of doing something you regret, vomiting, blackouts, and getting hurt or injured increase rapidly as your blood alcohol level gets above .10. Alcohol overdose is possible at blood alcohol levels above .28.

There Will Be Pressures To Drink During The Celebration

Drinks purchased for your consumption, especially shots and shooters, is the major source of these pressures.

The keys to success are to:

- Ask friends and wait staff not to purchase alcoholic beverages for you.
- Implement strategies you can use that night to moderate the number drinks you consume. (i.e. set a drink limit, avoid shots, share drinks with your friends)
- Have a friend who will support your drinking decisions
- Ask friends to get you food and keep you hydrated throughout the evening.
- Request lower alcohol beers and vodka-based mixed drinks *(see Beverage Choices)*.

Have A Great 21st Birthday Celebration!
Stay Hydrated!
Don't Get Caught Up In The Hype!
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DO YOU REALLY KNOW HOW MUCH YOU'RE DRINKING?

Know Your Blood Alcohol Level (BAL)

A number of factors affect BAL including:

Weight. The more you weigh the more area alcohol has to go, and thus, the lower the concentration of alcohol in your body.

Body Fat. The higher your percent body fat the higher your BAL compared to someone of equal weight with less body fat. This occurs because fatty tissue absorbs 60-70% less water.

Gender. Women absorb about 5 - 10% more alcohol than men. In addition, women tend to weigh less and have a higher percentage of body fat, and thus have higher BALs.

Metabolism. While the rate at which alcohol is eliminated by the liver (1 standard drink per hour) is very similar for all people, it is affected by tolerance. Tolerance results in an increase in the elimination rate. This may surprise you, but tolerance is mostly a behavioral and neural adaptation to alcohol that has little to do with BAL.

Considering these factors we can only estimate BAL.

Think About "Standard Drinks"

The key to knowing the amount of alcohol you consume is to think in terms of “standard drinks”.

A standard drink is 0.5 oz. of pure alcohol.

This value was selected because, on average, a person’s liver can process 0.5 ounces of alcohol in one hour. This makes it easy to determine how many drinks are still in your system. For example, if you consumed 5 standard drinks over 3 hours, you would have 2 standard drinks yet to be processed by your liver.

To calculate standard drinks multiple drinks size (in ounces) by the percent alcohol by volume, and then divide by ½:

(Size of Drink X Alcohol Content) / ½.

Your can also use this simpler formula:

Size of Drink X Alcohol Content X 2.

Estimating Your BAL

The average person can eliminate one standard drink per hour (slightly faster for those with tolerance). The amount one standard drink will raise your BAL depends on weight and percent

body fat; but on average, one standard drink will raise a women's BAL by .020 and a man's BAL by .017.

To Estimate BAL:

1. Take the number of standard drinks consumed and subtract the number of hours you have been drinking.
2. Then multiply that number by either .02 or .017.

   EXAMPLE: 5 standard drinks in three hours would be:

   For a 170lb man: (5 drinks – 3 hours) x .017 = .034.

   For a 130lb women: (5 drinks – 3 hours) x .02 = .04.

For a more accurate estimate, you can use one of the many calculators available on the web. These calculators also consider weight.

To find a BAL calculator on the web:
Google™ "blood alcohol level" or "blood alcohol concentration" and "calculator.

Footer

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ALCOHOL POISONING AND OVERDOSE

...Can Ruin Your Celebration!

Overdose becomes possible when blood alcohol levels (BALs) reaches .28, with 50% of people dying at BALs of .40. In terms of number of drinks, 95% of people will be at risk for overdose after consuming 21 standard drinks in 6 or fewer hours.

Who is most at risk?

- Those with a high tolerance for alcohol. As you can consume more and more alcohol, you come closer and closer to the amount that can cause death.
- Those who drink quickly. Drinking quickly can increase BAL so rapidly the person cannot vomit.

Some of the early signs of risk include:

- Drinking quickly, playing drinking games, multiple shots, and chugging or funneling drinks.
- Vomiting is the body's first response to alcohol overdose.
- Use of stimulants (including ecstasy) and energy drinks can make you feel you can drink more, as alcohol's effects are masked

First Aid In Case of An Overdose

One of the dangers associated with excessive alcohol consumption is alcohol poisoning and even death. **If you have ever vomited because of drinking, you have experienced alcohol poisoning.**

Call for Medical Attention Immediately if your friend has any of the following symptoms:

- No pain response- if he/she does not respond to a shoulder pinch.
- Irregular breathing.
- Respiration below 9 breaths per minute.
- Pulse below 50 and dropping.

If any of these conditions exist, seek medical attention immediately. If you seek medical attention, your positive actions will be considered in any potential judicial deliberation.

If You Don't Seek Medical Attention

If you choose not to seek medical attention:

- Place the person in a recovery position (see below) designed to reduce the chances of death by choking on his or her own vomit.
- Continue to monitor them until you can wake the person, and he or she is intelligible. This could take many hours.

Even if you place him or her in a correct position, they may still be at risk for medical complications or death. So, continually monitor for signs of alcohol overdose.

You may have to monitor the person all night!

Every year numerous college students die from alcohol overdose, including a Virginia Tech student who died September 19th, 2004 from alcohol poisoning.

Footer

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STAY IN THE PLEASURE ZONE!

Staying In The Pleasure Zone Will Give You Positive Outcomes!

Research indicates you can optimize the positive effects of alcohol by keeping your blood alcohol level (BAL) less than or equal to.06. But as you drink more, and your blood alcohol level goes above .06, negative outcomes increase. At BALs above .10 negative outcomes increase rapidly.

For most people, BALs below .06 make them more social and talkative. So have a few drinks, relax and have fun.

Follow the drinking guidelines below to enjoy a Pleasure Zone Celebration and have a great 21st Birthday!

Follow These Simple Guidelines To Stay In The Pleasure Zone

- Eat plenty of food before you start drinking and **continue to eat food throughout the evening**.
- **Stay hydrated**, by drinking plenty of water, a good strategy is to go one-for one.
- Pace your consumption.
- Avoid multiple shots.
- Have a non-drinking driver (call Hooptie!).
- Have **designated drinkers** to consume those drinks you really don't want

Footer

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APPENDIX E

MEASURES FOR STUDY 3

Perception of Normative Consumption

Perceptions of Behavioral Control

Alcohol Consumption Intentions

Celebratory Alcohol Consumption

Consumption of Food and Non-Alcoholic Beverages

Alcohol-Related Negative Outcomes

Recent History of Alcohol Consumption

Demographics

Perception of Normative Consumption

Indicate your agreement with the following statements about 21st Birthday Celebrations:

	Strongly Disagree	Disagree	Not Sure	Agree	Strongly Agree
I believe almost everyone consumes alcohol to celebrate their 21st birthday.	1	2	3	4	5
I believe almost everyone gets drunk to celebrate their 21st birthday.	1	2	3	4	5
My friends believe you should drink alcohol to celebrate your 21st birthday.	1	2	3	4	5
My friends believe you should get drunk to celebrate your 21st birthday.	1	2	3	4	5

Perceptions of Behavioral Control

Indicate how easy or difficult it would it have been for you to do the following during your 21st Birthday Celebration:

	Very Easy	Easy	Somewhat Easy	Somewhat Difficult	Difficult	Very Difficult
Not consume any alcohol?	1	2	3	4	5	6
Consume three or fewer alcoholic beverages?	1	2	3	4	5	6
Pace your drinks to one drink per hour?	1	2	3	4	5	6
Resist pressures to do a shot of liquor?	1	2	3	4	5	6
Resist pressures to chug a beer?	1	2	3	4	5	6
Turn down an offer of an alcoholic beverage?	1	2	3	4	5	6
Ask someone not to buy me an alcoholic beverage?	1	2	3	4	5	6
Alternate alcoholic with non-alcoholic beverages?	1	2	3	4	5	6
Keep track of how many drinks I was having?	1	2	3	4	5	6

Alcohol Consumption Intentions

The following items ask about your current intentions concerning how much alcohol you will consume on your 21st Birthday. If you have not yet thought about the amount of alcohol you will consume, please make your best estimate.

Before today, have you thought about how much alcohol you will consume during your 21st Birthday Celebration? (select one)

- ○ Yes
- ○ No

Please indicate your current alcohol consumption intentions for your 21st Birthday Celebration:

During my 21st Birthday Celebration, intend to…	Extremely Unlikely						Extremely Likely
...attempt to consume 21 alcoholic beverages.	1	2	3	4	5	6	7
… attempt to do the crawl.	1	2	3	4	5	6	7

One drink is a 12 oz beer, a single shot mixed drink, a shot of 80 proof liquor, or 4 oz of wine

Thinking about your 21st Birthday Celebration…

How many total alcoholic beverages do you intend to consume? _____

How many non-alcoholic beverages do you intend to consume? _____

How many shots or shooters do you intend to consume? _____

How many beers or mixed drinks do you intend to chug? _____

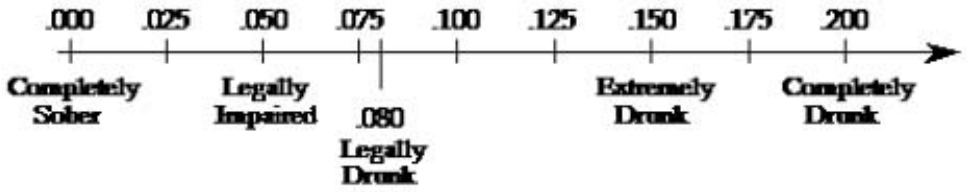
Read each of the following statements and indicate how true or false they are for you:

During my 21st Birthday Celebration, I will…	Definitely True						Definitely False
…have a friend to look after me.	1	2	3	4	5	6	7
…get pretty wasted.	1	2	3	4	5	6	7
…turn down some alcoholic beverages.	1	2	3	4	5	6	7
…resist peer pressure to consume more alcoholic beverages than I am comfortable with.	1	2	3	4	5	6	7
…have a friend help me to not consume more alcoholic beverages than I am comfortable with.	1	2	3	4	5	6	7

Read each of the statements below and indicate your agreement or disagreement with each statement:

During my 21st Birthday Celebration, I will…	Completely Disagree						Completely Agree
…drink less than my friends expect.	1	2	3	4	5	6	7
…alternate alcoholic and non-alcoholic beverages.	1	2	3	4	5	6	7
… work to minimize negative outcomes from drinking alcohol.	1	2	3	4	5	6	7
…consume enough alcohol that it is very likely I will vomit.	1	2	3	4	5	6	7
…consume enough alcohol to give me a bad hangover.	1	2	3	4	5	6	7

Using the scale below, indicate how intoxicated you intend to become during your 21st Birthday Celebration.



You can pick any number, not just those provided on the scale.
Write the number in the space at right: _____

Celebratory Alcohol Consumption

Indicate the number of alcoholic beverages you consumed during your 21st Birthday Celebration:

Number of alcoholic beverages consumed (e.g., 3.5): _____

At what time did you start celebrating? _____ ○ a.m. ○ p.m.

At what time did you stop celebrating? _____ ○ a.m. ○ p.m.

I attempted to consume 21 alcoholic beverages. Yes No

I did "the crawl." Yes No

Consumption of Food and Non-Alcoholic Beverages

Approximately how much food did you consume within two hours before you started consuming alcohol?

- ○ None
- ○ Very Little
- ○ Snack
- ○ Lite Lunch
- ○ Heavy Lunch
- ○ Dinner
- ○ Heavy Dinner

Approximately how much food did you consume during the first two hours of your celebration?

- ○ None
- ○ Very Little
- ○ Snack
- ○ Lite Lunch
- ○ Heavy Lunch
- ○ Dinner
- ○ Heavy Dinner

Approximately how much food did you consume during the last hour of your celebration?

- ○ None
- ○ Very Little
- ○ Snack
- ○ Lite Lunch
- ○ Heavy Lunch
- ○ Dinner
- ○ Heavy Dinner

Indicate the number of non-alcoholic drinks you consumed during your 21st Birthday Celebration?

Number of non-alcoholic beverages (e.g., 2.5): _____

Alcohol-Related Negative Outcomes

Following are alcohol-related experiences that some people report because of consuming alcohol. Read each item, and then indicate which of the following you experienced because of consuming alcohol during the day/night of your 21st Birthday Celebration.

I had a hangover.	Yes	No
I vomited.	Yes	No
I did something I now regret.	Yes	No
I had a memory loss (blackout) for part of the evening.	Yes	No
I damaged property or got into other mischief.	Yes	No
I got in an argument or fight.	Yes	No
I got hurt or injured.	Yes	No
I drove a car while under the influence of alcohol.	Yes	No
I got a ride from someone who was under the influence of alcohol.	Yes	No
became so drunk I ended up having a bad time		
Got in trouble with police/university staff.		

Recent History of Alcohol Consumption

When answering the following set of questions, please think back to the month before your 21st Birthday.

On average how many time a week did you consume alcohol before you turned 21? _____ Times per week

Before you turned 21, on average how many alcoholic beverages did you consume each week? _____ Drinks per week

During the month before you turned 21, what was the greatest number of drinks you consumed on one occasion? _____ Drinks

How long was that drinking occasion? _____ Hours

Demographics

Gender:

- ☐ Male
- ☐ Female

Weight and Height:

This information is needed to estimate blood alcohol levels, so please be as accurate as possible:

What is your weight? Weight: _____ lbs.

What is your height? Feet: _____ Inches: _____