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Event-specific risk and ecological factors associated with prepartying among heavier drinking college students

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Abstract

Using event-specific data, the present study sought to identify relevant risk factors and risky drinking patterns associated with prepartying. Analyses focused on drinking outcomes as a function of drinking game playing and the social context on occasions where prepartying did and did not occur. This research utilized a representative two-site sample of prepartiers who also reported a heavy episodic drinking event in the past month ($n = 988$). Results revealed that during a preparty event, participants drank significantly more, reached higher blood alcohol levels (BALs), and experienced significantly more negative consequences compared to the last occasion that they drank but did not preparty. Students who played drinking games when they prepartied had higher BALs and experienced more negative consequences than those who did not play drinking games. Whether females prepartied in a single-sex or coed setting had little effect on their BALs. For males, however, their BALs were greater when they prepartied in a coed setting compared to a single sex setting. Moreover, participants reported more negative consequences when they prepartied in a coed setting than in a single-sex setting. Finally, regression analyses demonstrated that participants' BAL, frequency of prepartying, and the interaction between BAL and frequency of prepartying all uniquely contributed to the prediction of event-specific alcohol-related negative consequences. As BAL increased, the number of negative consequences increased more sharply for those who prepartied infrequently, compared to those who prepartied frequently. Analyses were examined as a function of gender which revealed important gender effects and interactions. Interventions can be designed to intervene with high-risk prepartiers by using BAL education emphasizing the impact of time-limited prepartying drinking.

Keywords

Alcohol; college students; preparty; event-specific; blood alcohol levels; risk factors

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1. Introduction

Alcohol use remains an enduring concern among college students with nearly two-thirds of the college population reporting drinking in the past month (O'Malley & Johnston, 2002). As part of efforts to better address problematic drinking within college students, researchers have begun to target specific, high-risk drinking behaviors. One such factor receiving increased attention is "prepartying." Prepartying (aka, pregaming, frontloading, prebaring, etc.) is defined as "the consumption of alcohol prior to attending an event or activity (e.g., party, bar, concert) at which more alcohol may be consumed" (Pedersen & LaBrie, 2007, p. 238). Prepartying likely originated from tailgating parties (i.e., drinking before sporting events; Vicary & Karshin, 2002). However, this practice has expanded in the college environment, with 64% to 75% of drinkers reporting participating in prepartying and prepartying preceding up to 45% of all drinking events (DeJong, DeRicco, & Schneider, 2010; LaBrie & Pedersen, 2008; Pedersen, LaBrie, & Kilmer, 2009; Pedersen, LaBrie, & Lac, 2008). Prepartying has also been shown to mediate the relationship between positive alcohol expectancies and risky drinking behaviors (Zamboanga, Schwartz, Ham, Borsari, & Van Tyne, 2010). These statistics are quite concerning as preparty drinking is distinct and more risky than non-preparty drinking, with prepartying being linked to higher overall alcohol consumption and increased negative alcohol-related consequences (Kenney, Hummer, & LaBrie, 2010).

1.1 Preparty drinking

Preparty drinking is markedly different from students' typical drinking patterns. As such, it is necessary to understand how specific, event-level preparty behaviors differ from more general drinking behaviors. Alcohol research typically assesses aggregate drinking data, using measures such as the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985) to assess consumption over time. While indices such as the DDQ may be appropriate for understanding general drinking patterns and tendencies, they cannot capture specific behaviors of interest such as prepartying. For example, aggregate measures may be able to offer conclusions such as "individuals who engage in prepartying typically experience more consequences," however, general measures would not be able to conclude that "on days that a student engages in prepartying, he or she experience more consequences" (for review of the merits of event-level data in alcohol research, see Neal et al., 2006). Previous studies have successfully utilized event-level data to document increased risk during specific drinking events such as holidays (e.g., New Years; Neighbors et al., 2011), school breaks (e.g., Spring Break; Lee, Lewis, & Neighbors, 2009), sporting events (e.g., football tailgating; Neighbors, Oster-Aaland, Bergstrom, & Lewis, 2006) and other traditionally heavy drinking events (e.g., 21st birthdays; Brister, Sher, & Fromme, 2011; Neighbors et al., 2006).

1.2 Event-level research on prepartying

Preliminary event-level research has begun to shed light on the heightened risks associated with prepartying. As the prepartying duration is limited due to the need to leave to the primary event for which prepartiers are preparing to attend, students typically consume 2 to 6 drinks on average (LaBrie, Hummer, Kenney, Lac, & Pedersen, 2011) in short periods of time (50% less than 1 hour, 90% less than 2 hours; Pedersen & LaBrie, 2007). This heavy and rapid drinking style has been credited with the elevated risk of prepartying. Three studies have found that Blood Alcohol Levels (BALs) of both men and women at preparty events approach or surpass the legal limit of .08 (LaBrie & Pedersen, 2008; Pedersen & LaBrie, 2007; Pedersen et al., 2009). This is particularly concerning as drinking commonly continues after the preparty (DeJong et al., 2010; Pedersen & LaBrie, 2007), further

elevating intoxication levels, which in turn decreases perception of risk (Fromme, Katz, & D'Amico, 1997). Preparty drinking has been linked to increased general (LaBrie & Pedersen, 2008) and specific alcohol-related consequences such as neglecting responsibilities, feeling sick, and passing out (Pedersen & LaBrie, 2007). One study found that 25% of prepartiers had experienced a blackout (i.e., a temporary period of memory loss during drinking) on a preparty night in the past month (LaBrie et al., 2011).

Women may be at elevated risk during preparty events. Both male and female college students participate equally often in prepartying (Borsari et al., 2007) but despite consuming fewer drinks than their male counterparts, women reach comparable or higher BALs when prepartying than males (LaBrie & Pedersen, 2008; Read, Merrill, & Bytschkow, 2010), due to the differential impact of alcohol on the sexes (Frezza et al., 1990; Jones & Jones, 1976). Moreover, some studies have found no significant gender differences on both general past month consequences (Pedersen et al., 2009) and event-specific consequences (LaBrie & Pedersen, 2008) between males and females. Yet even a comparable level of consequences between men and women marks a change in drinking behavior, since women generally drink less and experience fewer consequences than men (Johnston, O'Malley, Bachman, & Schulenberg, 2010; Reed et al., 2011; Wilsnack, Vogeltanz, Wilsnack, & Harris, 2000). Further research is needed to explicate these differences using validated measures of consequences at the event-level and examining how other factors may contribute to this differential risk.

1.3 Ecological perspectives

Just as event-specific perspectives of preparty events can contribute to a richer understanding of the nuances connected to this behavior, so too can ecological perspectives yield unique insight into factors that may affect the relative risks associated with participation in a preparty event. Are there certain activities that take place during preparty events that further heighten the likelihood for increased drinking and/or negative alcohol-related outcomes (i.e., consequences)? Does the social context of the preparty event play a role in the type of drinking and risk that is incurred?

1.3.1 Co-occurrence of prepartying and drinking games—One observed trend that requires further research attention is the co-occurrence of playing drinking games while prepartying. Drinking games have become a staple characteristic of the college drinking culture with over half of large college student samples reporting playing at least one of over 500 different types of drinking games in the past month (Borsari, 2004; Borsari, Bergen-Cico, & Carey, 2003). Such a high prevalence rate has been cause for growing concern as drinking games primarily serve to quickly intoxicate participants, commonly leading to increased negative alcohol-related consequences (e.g., Borsari, 2004; Hingson, Heeren, Winter, & Wechsler, 2005). Given this shared feature with prepartying, several studies have begun to assess the prevalence of game playing while prepartying.

Although prepartying and drinking games are distinct high-risk drinking activities, they are not mutually exclusive and qualitative research has suggested that drinking games are frequently played for the purpose of prepartying (DeJong et al., 2010). Early quantitative research on prepartying revealed a substantial portion of participants (approximately 45% of the sample) reported typically playing drinking games while prepartying (Pedersen & LaBrie, 2007). A follow-up study indicated a similar rate of approximately 52% of males and 40% of females who said they typically played drinking games while prepartying (Pedersen et al., 2009). Furthermore, Read and colleagues (2010) utilized a more specific assessment to illustrate that among a sample of 108 prepartiers, drinking games were *often* ($n = 44$, 41%) or *sometimes* ($n = 38$, 35%) part of prepartying. However, Borsari et al.

(2007) found that only 12% of a sample of at-risk college students participated in both prepartying and drinking games in the same event. The slightly discrepant findings yet relatively high co-occurrence of these two risky behaviors necessitates research examining whether a differential impact on alcohol-related outcomes exists as a function of drinking game involvement while prepartying.

Two studies have looked at this. Using logistic regression, the first (LaBrie et al., 2011) showed that playing drinking games while prepartying was uniquely associated with experiencing a blackout during a preparty event. The study posited that the relationship between the two was due to the possibility that some students may be unfamiliar with the acute effects of alcohol. By engaging in drinking games within the short period of the "preparty," students may not realize the intoxication levels that will be reached following time-delayed absorption. Second, playing drinking games while prepartying was found to be common among a sample of intercollegiate athletes (42% of males and 31% of females) and was linked to both increased prepartying consumption levels and general negative consequences, relative to athletes who did not report playing drinking games while prepartying (Hummer, LaBrie, & Lac, 2011).

1.3.2 Social context of prepartying—The second ecological variable to examine with respect to event-level characteristics of prepartying is if the "social context" (i.e., the social environment where drinking occurs; Thombs, Wolcott, & Farkash, 1997) influences the manner of drinking during preparty events. For the purposes of this study, "social context" refers to whether students prepartied in primarily same-sex (i.e., males preparty with only other male friends; females preparty with other female friends) or coed groups. In general, college males tend to drink more than females (see Ham & Hope, 2003 for review). However, gender demographics and other factors in a social environment influence students' drinking behavior, which may extend to preparty settings. Males have reported being drunk more frequently in large coed settings compared to same-sex settings and in smaller settings with other males compared to females, while social context was not significant for females (Senchak, Leonard, & Greene, 1998). Additionally, students living in coed environments are more likely to binge drink (Wechsler, Dowdall, Davenport, & Castillo, 1995) and experience alcohol-related problems (Harford, Wechsler, & Muthen, 2002). For women, this may be a reflection of adopting the drinking habits of males. Examining the influence of social context may help clarify the nature of prepartying's risk enhancing effects. To address this, the current study examined how presence of same- or opposite-sex peers at preparty events related to drinking behavior and concomitant risk.

1.4 Limitations and extensions of previous research

Previous studies have suffered from restricted generalizability due to small sample sizes (Read et al., 2010), examined endorsements of general past month consequences (e.g., Kenney et al., 2010; Pedersen & LaBrie, 2007) or non-validated lists of consequences (e.g., LaBrie & Pedersen, 2008) as a function of preparty involvement, examined the impact of the co-occurrence of drinking games and prepartying among specific groups only (Borsari et al., 2007; Hummer et al., 2011), and failed to consider other potentially important ecological characteristics of the preparty environment. The current research utilized a large (N = 1,367) representative sample of prepartiers from two sites. It seeks to extend existing literature by utilizing event-specific variables to capture specific preparty drinking behavior and the influence of other relevant factors that likely impact alcohol-related outcomes during preparty events. To provide further insight into how the nuances of prepartying differentially impact males and females, analyses were conducted as a function of gender.

Finally, research suggests that frequency of prepartying is related to event-specific consequences. Preliminary research with women has demonstrated that less frequent and lighter drinkers may be more susceptible to increases in BALs, becoming more impaired than their more frequent and heavier drinking counterparts (Evans & Levin, 2004). Other event-level research has shown that lighter drinkers experience more consequences than heavier drinkers when consuming high levels of alcohol (Lewis, Lindgren, Fossos, Neighbors, & Oster-Aaland, 2009). To extend these initial findings, preparty frequency was introduced as a potential moderator of the impact of BALs on negative, alcohol-related consequences. On a similar note, one potentially beneficial extension of prior prepartying research is to focus on groups in the college environment who may be more likely to engage in prepartying and at a higher risk of experiencing consequences from drinking, such as students who engage in heavy episodic drinking (HED; 4+ drinks in one sitting for women and 5+ drinks in one sitting for men; (O'Malley & Johnston, 2002; Wechsler & Nelson, 2008). HED has a well-established relationship with negative consequences, impacting both the individual as well as resulting in detrimental secondhand effects on surrounding students and communities (e.g.,Wechsler et al., 2002). In the interest of maximizing impact on a subset of higher-risk drinkers for whom prepartying may be more prevalent, the current study focused on students who report meeting the threshold for HED.

1.5 Specific aims

Specific objectives of this research include the following: (1) compare event-specific BAL and consequence outcomes as a function of the last drinking occasion where participants did not preparty, during their last preparty event, as well as across the whole occasion when they last prepartied (combining the preparty event with the primary event/activity attended after prepartying); (2) compare event-specific BAL and consequence outcomes between preparty and non-preparty occasions as a function of whether or not drinking games were also played during the event; (3) compare event-specific BAL and consequence outcomes between preparty and non-preparty occasions as a function of the social context of the drinking environment (single sex / coed); and (4) examine the role of frequency of prepartying and BAL in predicting event-specific negative consequences. It was generally hypothesized that students would reach higher BALs and report more alcohol-related consequences in the prepartying contexts as opposed to the non-prepartying contexts and furthermore, that playing drinking games and drinking in coed environments would heighten such risk for both males and females. Given gender differences in the absorption of alcohol and its subsequent effects, we hypothesized that drinking game playing would manifest elevated BALs particularly for women. It was also anticipated that a greater frequency of prepartying and higher BALs would be associated with more event-specific consequences, and that the biggest relative impact of high preparty BALs would be evidenced among students who preparty infrequently.

2. Materials and methods

2.1 Participants

Participants were part of a larger intervention study conducted at two west-coast universities beginning in the Fall semester of 2010. One is a large, public university with approximately 30,000 undergraduate students and the other is a mid-sized private university with total undergraduate enrollment of approximately 5,600. A total of 6,000 students stratified across class year and equally portioned from both universities were recruited for participation. Of these students, 2,689 (44.8%) completed the screening survey, and all students meeting inclusion criteria of a heavy episodic drinking occasion in the past month (five/four or more drinks in one occasion for men/women; $n = 1,493$; 55.5%) were immediately invited to the larger study and directed to the baseline survey. Of those invited, 1,367 (91.6%) completed

the baseline survey, from which data for the current study was drawn. Recruitment rates were comparable to other large-scale studies among this population (e.g., Marlatt et al., 1998; McCabe, Boyd, Couper, Crawford, & D'Arcy, 2002; Neighbors, Lee, Lewis, Fossos, & Larimer, 2007). The combined assessments took approximately one hour to complete, for which participants received $40.

Of the 1,367 students who completed the baseline survey, 988 (63.6% female) reported prepartying at least once in the previous 30 days, thus comprising the final sample used in the current analyses. These participants reported a mean age of 20.11 years ($SD = 1.35$). The racial breakdown of the sample was as follows: 67.7% Caucasian, 12.5% Asian, 11.8% Multi-Racial, 3.2% other, 2.5% African American, 1.9% Pacific Islander, and 0.4% American Indian/Alaskan Native. In addition, 12.0% reported Hispanic/Latino(a) ethnicity.

2.2 Design and procedure

The Institutional Review Boards at the participating universities approved the study protocol. Student samples were randomly selected and invited via mail and email to participate in a study about alcohol use among college students. The invitations included the web address to the study survey and a unique identification number. Interested students followed the link to the website and then entered their assigned identification number. The initial screen contained the study consent forms and following electronic consent, students were administered the screening survey. Upon completing the screening survey and meeting inclusion criteria described above, participants were immediately directed to the baseline survey. Before completing any questions on alcohol use, participants were first provided with the definition of a standard drink, defined as one half ounce of pure ethyl alcohol, which is contained in one 1.5 ounce shot of 80-proof liquor, one 12-oz beer, or one 4-5oz glass of wine.

2.3 Measures

2.3.1 Demographics—Participants provided information regarding their age, sex, weight (used for calculating BAL), race and ethnicity.

2.3.2 Past month prepartying behavior—Prepartying was defined for participants as "the consumption of alcohol prior to attending an event or activity [e.g., party, bar, concert] at which more alcohol may or may not be consumed" (Pedersen & LaBrie, 2007, p. 238). The prepartying measure began with the following question: "In the last 30 days, how many days did you engage in prepartying?" If participants reported prepartying on at least one day, they were then asked to picture the last drinking occasion on which they prepartied and the last drinking occasion on which they did not preparty.

2.3.3 Preparty event—The event-specific assessment items for preparty and non-preparty events were derived from use in prior research (LaBrie & Pedersen, 2008). Participants were asked to consider the last occasion that they prepartied. First, they were asked the following open-ended questions: "How many drinks did you consume while prepartying (before leaving to your planned destination)?" and "Over how many hours did you drink while prepartying (e.g., .5, 1, 1.5, 2…)?" Respondents were also asked about the entire drinking event that involved prepartying: "How many drinks did you drink over the course of the entire drinking event (including drinks consumed during and after prepartying)?" and "Over how many hours did you drink during the entire drinking event (including time spent drinking during and after prepartying)? (e.g., .5, 1, 1.5, 2…)?"

2.3.4 Non-preparty event—Participants were asked to consider the last occasion that they drank but did not preparty. They were then asked the following open-ended questions:

"How many drinks did you consume on this occasion?" and "Over how many hours did you drink?"

2.3.5 Event-level consequences—Negative alcohol-related consequences were assessed using a modified version of the Brief Young Adult Alcohol Consequences Questionnaire (BYAACQ; Kahler, Strong, & Read, 2005). The BYAACQ is a 24-item measure (e.g., "I got into a sexual situation I later regretted;" "I took foolish risks") that is an outgrowth of other alcohol use measures (Hurlbut & Sher, 1992). For the purposes of evaluating endorsements of event-specific consequences the scale was modified in two ways. First, seven items not deemed appropriate for an event-level assessment were dropped from the original 24-item scale (e.g., I often have ended up drinking on nights when I had planned not to drink; I have been overweight because of drinking; The quality of my work or school work has suffered because of my drinking). Second, response options were modified from a *yes/no* format to reflect the following four response options: (1) Did not happen either time (when I drank or when I prepartied); (2) Happened both times (when I prepartied and when I did not preparty); (3) Happened the last time I prepartied; (4) Happened the last time I drank but did not preparty. Responses were then recoded into two separate dummy variables to indicate whether or not the participant experienced each of 17 alcohol-related problems during the previous prepartying and non-prepartying drinking occasion (i.e., 0 = did not experience consequence, 1 = did experience consequence). Responses were summed to create a total score for each event composite. In the current study the internal consistency was good for the prepartying occasion ($\alpha = .83$) and non-prepartying occasion ($\alpha = .86$).

2.3.6 Event-level blackout—In both event assessments, students were asked if they had blacked out during the drinking event. Response options were yes/no. This item assessing preparty-specific blackouts has been used in prior research (LaBrie et al., 2011).

2.3.7 Event-level drinking games participation—One question assessed whether participants had played drinking games during the preparty (before leaving to their planned destination). This item was also assessed for the non-preparty event. Response options were yes/no.

2.3.8 Event-level social context—Participants were also asked questions regarding who they had prepartied with during the last prepartying occasion. The social context categories utilized in the current study were created following a review of past literature on the topic (e.g., Senchak et al., 1998; Thombs et al., 1997). Response options included gender-specific or coed prepartying contexts. For example, females were asked if they had prepartied with a group of all females and males were asked if they had prepartied with a group of all males. All participants also had the option of selecting a coed group. This item was also assessed for the non-preparty event in which the question simply referred to the 'party.'

2.3.9 Event-level BAL—Self-reported drinking data from each drinking event, along with the NHTSA (1994) equation were used for calculating event-level BAL: BAL = $(SD*(2.24146232/(W*TBW)))-(\beta_{60}*t)$, where SD is the number of self-reported standard drinks, W is weight in pounds, TBW is total body water (0.58 for males, 0.49 for females), β_{60} is the metabolism rate of alcohol per hour (i.e., 0.017g/dl), and t is time spent drinking in hours. This equation has previously been used in research examining undergraduate alcohol use (e.g., Carey & Hustad, 2002; Grant, LaBrie, Hummer, & Lac, 2011; Hansson, Rundberg, Zetterlind, Johnsson, & Berglund, 2006; LaBrie & Pedersen, 2008).

3. Results

3.1 Preparty and non-preparty events

Participants' mean number of drinks, time spent drinking, BAL and number of negative consequences are presented in Table 1. Drinking and consequence outcomes were examined for the occasion where participants did not preparty, during the preparty itself, as well as across the whole occasion when they prepartied (including the preparty and the post-preparty event). Participants, on average, reached the same BAL during prepartying ($M = 0.09$, $SD = .06$) and on the occasion when they did not preparty ($M = 0.09$, $SD = .07$), $t(982) = 0.80$, $p = .42$. While prepartying, participants drank on average one drink less ($M = 4.1$) than on the occasion where they did not preparty at all, but consumed the alcohol in a significantly shorter time period (during preparty: $M = 1.5$ hours, $SD = .72$; non-preparty occasion: $M = 3.2$ hours, $SD = 1.49$), $t(982) = −34.25$, $p < .001$. An examination of the whole occasion when participants prepartied revealed that participants drank significantly more ($M = 7.3$, $SD = 3.47$), than when they had not prepartied ($M = 5.2$, $SD = 3.02$), $t(985) = 23.17$, $p < .001$, and reached a significantly higher BAL ($M = .14$, $SD = .09$) than when they did not preparty, $t(984) = 18.83$, $p < .001$.

Participants experienced significantly more negative consequences on the night they prepartied ($M = 4.3$, $SD = 3.88$) than they did when they did not preparty ($M = 3.0$, $SD = 3.24$), $t(951) = 12.97$, $p < .001$. Further, a significantly larger proportion of students reported blacking out during the drinking occasion when they prepartied (164/987, 16.6%), than on the occasion when they did not preparty (62/972, 6.4%), $Z = 8.22$, $p < .001$.

3.2 Drinking games

For both prepartying and non-prepartying drinking events, 2×2 between subjects ANOVAs were conducted with gender (male / female) and participation in drinking games during the drinking event (yes / no) as the independent variables. For each type of event (non-prepartying and prepartying), the total number of negative consequences and BAL for the overall drinking occasion were examined as dependent variables (Figure 1).

3.2.1 Drinking games and BAL—For the prepartying occasion, there was a significant main effect of both gender, $F(1,972) = 107.50$, $p < .001$, $d = .71$, and playing drinking games, $F(1,972) = 3.99$, $p = .046$, $d = .21$, on BAL. Males ($M = .17$, $SD = .10$) had higher BALs than females ($M = .11$, $SD = .07$) on evenings when they prepartied. Students who played drinking games when they prepartied ($M = .15$, $SD = .09$), had higher BALs than those who did not play games ($M = .13$, $SD = .08$). The interaction between gender and playing drinking games was not significant, $F(1,972) = 2.09$, $p = .15$.

For the non-prepartying context, there were significant main effects of both gender, $F(1,977) = 93.40$, $p < .001$, $d = .72$, and playing drinking games, $F(1,977) = 90.71$, $p < .001$, $d = .67$, on BAL. There was also a significant interaction between gender and playing drinking games, $F(1,977) = 4.04$, $p = .045$. Both male, $t(355) = 6.02$, $p < .001$, and female students, $t(622) = 7.18$, $p < .001$, had greater BALs on the occasions when they played drinking games. However, the effect of playing games on BALs was greater for males than females during non-preparty events, $d = .64$ for males and $d = .59$ for females.

3.2.2 Drinking games and negative consequence—For the prepartying context, there was a significant main effect of playing drinking games on negative consequences, $F(1,938) = 13.33$, $p < .001$, $d = .28$, indicating that students who played games when prepartying experienced more negative consequences than those who did not. The main effect of gender was not significant, $F(1,938) = 2.17$, $p = .141$. The interaction between

gender and playing drinking games was marginally significant, $F(1,938) = 3.29$, $p = .07$. For female students there was a significant difference in the number of negative consequences experienced on prepartying days where they played drinking games ($M = 5.38$, $SD = 4.39$), compared to when they did not play drinking games ($M = 3.89$, $SD = 3.57$), $t(601) = 4.35$, $p < .001$, $d = .28$. For males, there was no significant difference in consequences, $t(337) = 1.17$, $p = .24$, $d = .13$.

For the non-prepartying occasion, there was a significant main effect of playing drinking games, $F(1,944) = 10.29$, $p = .001$, $d = .23$, on negative consequences, indicating that students who played games on occasions when they did not preparty experienced more negative consequences than those who did not. There was non-significant main effect of gender, $F(1,944) = 0.54$, $p = .46$, and non-significant interaction between gender and playing drinking games, $F(1,944) = 0.62$, $p = .43$.

3.3 Social context

The majority of participants reported prepartying either in a coed setting (70.9%) or in a same-sex setting (24.2%). A small number of participants reported prepartying with members of the opposite sex only (3.3%), alone (1.4%), or with strangers (0.2%). A similar pattern was seen for the social setting in which participants drank without prepartying (coed 86.1%; single sex 8.5%; opposite sex 3.6%; alone 1.4%; stranger 0.4%). Due to small sample sizes, participants who reported drinking only with members of the opposite sex, alone or with strangers were excluded from the multivariate analysis examining the effect of social context on drinking outcomes. To examine differences in BAL and negative consequences for both prepartying and non-prepartying drinking events, 2×2 between subjects ANOVAs were conducted with gender (male / female) and social context of drinking (single sex / coed) as the independent variables (Figure 2).

3.3.1 Social context and BAL—For the prepartying occasion, there were significant main effects of both social context, $F(1,933) = 7.56$, $p = .006$, $d = .21$, and gender, $F(1,933) = 57.02$, $p < .001$, $d = .72$, on BAL. There was also a significant interaction between gender and social context, $F(1,933) = 6.78$, $p = .009$. Whether females prepartied in a single-sex ($M = .11$, $SD = .08$) or coed setting ($M = .11$, $SD = .07$) did not have a significant effect on BALs, $t(589) = .15$, $p = .87$, $d = .02$. For males, however, their BALs were significantly greater when they prepartied in a coed setting ($M = .18$, $SD = .10$), compared to a single sex setting ($M = .15$, $SD = .09$), $t(344) = 2.67$, $p = .008$, $d = .36$.

For the non-prepartying occasion, there were significant main effects of both social context, $F(1,925) = 8.71$, $p = .003$, $d = .34$, and gender, $F(1,925) = 57.98$, $p < .001$, $d = .75$, on BALs. There was a non-significant interaction between gender and social context, $F(1,925) = 1.99$, $p = .16$. The results indicate that males had higher BALs ($M = .13$, $SD = .08$) than females ($M = .07$, $SD = .06$) on occasions when they did not preparty, and that those that drank in coed settings had higher BALs ($M = .10$, $SD = .07$) than those who drank in single-sex settings ($M = .07$, $SD = .07$).

3.3.2 Social context and negative consequences—For the prepartying occasion, there was a significant main effect of social context on consequences, $F(1,900) = 4.04$, $p = .045$, $d = .15$. Participants reported more negative consequences ($M = 4.4$, $SD = 4.05$) when they prepartied in a coed setting than in a single-sex setting ($M = 3.9$, $SD = 3.50$). The main effect of gender, $F(1, 900) = .35$, $p = .56$, and the interaction between gender and social context, $F(1, 900) = .59$, $p = .44$ were not significant. We were interested in determining whether there was a significant difference in the incidence of regrettable sexual experiences following prepartying in coed and single-sex setting. In a chi-square analysis, those who

prepartied in a coed setting (93/660; 14.1%) were more likely to report regrettable sexual encounters than those who prepartied in a single-sex setting (14/229; 14.1%), $\chi^2(1) = 10.22$, $p = .001$.

For the non-prepartying context, there were non-significant main effects of social context, $F(1,893) = .66$, $p = .42$, gender, $F(1,893) = .06$, $p = .80$, and a non-significant interaction between gender and social context, $F(1,893) = .18$, $p = .67$, on consequences.

3.4 Moderating role of frequency of prepartying

A three-step hierarchical multiple regression model examined the role of frequency of prepartying and BAL in predicting negative consequences on the night of prepartying (Table 2). At Step 1, gender was entered to control for any gender differences. Step 2 included the main effects of BAL and frequency of prepartying. The interaction term involving BAL and frequency of prepartying was entered in Step 3. Predictors were mean centered prior to calculating the interaction term.

BAL ($\beta = .25$, $p < .001$), frequency of prepartying ($\beta = .22$, $p < .001$) and the interaction between BAL and frequency of prepartying ($\beta = -.14$, $p < .001$) all uniquely contributed to the prediction of alcohol-related negative consequences. The BAL $\times$ Frequency interaction was graphed at one standard deviation below the mean (low preparty frequency), at the mean, and one standard deviation above (high preparty frequency) the mean (Figure 3; Aiken & West, 1991). Simple slope analyses were significant for both high ($B = 17.51$, $p < .001$) and low frequency of prepartying ($B = 7.39$, $p < .001$). This indicates that as BAL increased the number of negative consequences reported increased more sharply for those who prepartied infrequently, compared to those who prepartied frequently.

4. Discussion

The current study extends and addresses several shortcomings of previous research by using event-level analyses among a large representative sample of heavier college drinkers to elucidate specific, concrete ways in which prepartying and its various attributes are related to heightened risk in the college drinking environment. First, event-level analyses supported hypotheses that students would reach higher BALs and report more event-specific consequences during their last preparty event as compared with their last non-prepartying drinking occasion. Results demonstrated that students obtained equivalent BALs of 0.09 between the preparty event only (excluding drinks consumed after) and the general drinking occasion, but did so in approximately half the time. The short duration of prepartying likely accounts for its heightened risk of elevated BALs and consequences, as participants typically do not stop drinking once the preparty has concluded. The continuation of drinking after the preparty itself resulted in participants reaching an average BAL of 0.14, with males reaching higher BALs (0.17) than females (0.11). Further, reports of event-specific negative consequences were significantly higher in the prepartying context than the general drinking context and students were almost three times more likely to blackout on the night when they last prepartied (16% of students reporting blacking out during their prepartying night).

4.1 Ecological factors

4.1.1 Drinking games—The study also looked at ecologically relevant factors. Overall, playing drinking games led to higher BALs in both the prepartying and non-prepartying contexts, which was consistent with previous research into non-prepartying contexts (Correia & Cameron, 2010). There was no interaction between drinking game playing and gender in the prepartying context, which suggests the heightened risk associated with game playing on BALs impacts both men and women similarly when prepartying. Drinking games

also resulted in more negative consequences in both the preparting and non-preparting contexts. Contrary to the effects of drinking games on BALs where there was no gender moderation in the prepartying event, the impact of game playing on negative consequences when prepartying was more pronounced for female students as compared to male students. Therefore, as hypothesized, playing drinking games while prepartying seems to be the riskiest combination for heavier drinking college women, as those who engage in both drinking behaviors concurrently have more resultant problems than heavier drinking women who preparty sans games; and although women reach lower BALs than men when engaging in both behaviors, they experience more problems. This is particularly concerning as women experience fewer negative alcohol-related consequences than men in general drinking contexts (e.g., Wilsnack et al., 2000), indicating that playing drinking games during a preparty event dramatically increases risk for women.

4.1.2 Social context—The second ecological factor examined in this study was the social context where drinking occurs. Women's BALs did not differ whether they prepartied in same-sex or coed groups, whereas males reached higher BALs when prepartying in coed contexts. A possible factor accounting for males' increased drinking, is that one of the primary reasons males report for prepartying is to facilitate social and sexual interactions with females (DeJong et al., 2010; Grazian, 2007; Pedersen et al., 2009). Further, in one qualitative study, participants consistently reported that college students often sought out drinking scenarios in order to find a sexual partner (Lindgren, Pantalone, Lewis, & George, 2009). The presence of females in drinking contexts allows for the possibility of social and sexual interactions and thus may increase males' motivation to engage in more preparty drinking. For example, for some males, how much one can drink (i.e., his tolerance) is a socially desirable skill that one may demonstrate by consuming large amount of alcohol to impress others (Mallett, Lee, Turrisi, & Larimer, 2009; Martinez, Steinley, & Sher, 2010). Similarly, being able to drink larger quantities of alcohol is believed by some to be a desirable demonstration of masculinity (Iwamoto, Cheng, Lee, Takamatsu, & Gordon, 2011; LaBrie, Lamb, & Pedersen, 2008). Given the opportunity to demonstrate their tolerance or masculinity, males may be motivated to consume larger amounts of alcohol.

Social context played a role in the experience of negative consequences during or after a prepartying event, such that individuals who prepartied in a coed context were more likely to experience consequences at some point during or immediately following the drinking occasion. Of additional interest is a more focused analysis which revealed that students were more likely to report a regrettable sexual experience if they prepartied in a coed setting rather than a single-sex setting. It may be expected that sexual regrets are more prevalent following prepartying in a coed setting (14%). A recent prepartying motives scale-development study showed that the intimate pursuit subscale, containing items pertaining to increasing the likelihood of 'hooking up' and meeting potential dating partners, demonstrated the strongest correlation with preparty drinking, compared to the other three subscales (LaBrie, Hummer, Pedersen, & Chithambo, 2012). Yet what is particularly intriguing is that 6% of students who reported a regrettable sexual consequence, had prepartied in a same sex setting. It is not clear from the data at what point during the drinking occasion the sexual encounter occurred, nor do we know the situational factors that led to such incidences. These are interesting research questions for future research to explore more deeply.

4.2 BALs and consequences

Finally, as hypothesized, multiple regression analysis revealed that greater frequency of prepartying and higher BALs were both associated with more consequences. Moreover, as BALs increased, the number of negative consequences increased more sharply for those who

prepartied infrequently. While the slope of less frequent prepartiers is to be expected, given perhaps the lack of familiarity with rapid increases in BALs and how to subsequently react to situations accordingly, it is disconcerting that even at low BALs, those who preparty more frequently experience more than twice the amount of consequences as their counterparts. This finding is surprising given that past research suggests that less frequent and lighter drinkers tend to experience more negative consequences. It is possible that frequent prepartiers are more comfortable in the preparty situation and are thus not as mindful of the potential risks inherent to prepartying, making them more susceptible to experiencing alcohol-related consequences. Moreover, it bears noting that the current sample consisted of heavier drinking students which should be considered in interpreting this pattern of results. Further research could assess whether there are differences in the types and severity of consequences experienced by frequent and infrequent prepartiers and among all drinker types.

The findings of the current study have implications for those interested in reducing alcohol risk among heavier drinking college students. While prepartying, students may be more concerned with the number of drinks they consume than their BAL; therefore prevention efforts should place a strong emphasis on BAL education to explain the risks of rapid alcohol consumption. Further, given the heightened risks to women, resources should be targeted towards this group and include information highlighting harm associated with combining prepartying and drinking games, and the differential effects of alcohol on the sexes. Moreover, it would be beneficial to educate college women about the findings that men tend to reach higher BALs when prepartying in coed contexts and that one of the primary reasons males report for prepartying is to facilitate social and sexual interactions with females (DeJong et al., 2010; Grazian, 2007; Pedersen et al., 2009). Such knowledge may possibly serve as a protective factor if women then act to be more en garde against over-intoxication in prepartying settings, which could lead to risky sexual situations. Finally, contrary to expectations, the results of the current study identify frequent prepartiers as an at-risk group experiencing the highest levels of negative consequences during prepartying, even at low BALs. Consequently, screening students to identify those who frequently engage in prepartying and providing brief interventions targeting prepartying may be beneficial.

4.3 Limitations

This study should be viewed in light of several limitations that offer promising directions for future research. Although participants reported the social context they prepartied in (e.g., coed, single-sex), they were not asked to report the social context of the destination event post-preparty. Thus, it cannot be determined from the data if preparty drinking differs based on the social context of the following event (e.g., a 'girls-night out' compared to a typical coed house party). Similarly, future research could investigate other related contextual factors that were not assessed in the current study. For example, the assessment of prepartying drinking might also vary depending on the nature of the destination event (e.g., party, bar, concert) and whether students anticipated that they would continue drinking there or not. Moreover, the nature of prepartying dictates that it takes place prior to attending another, typically larger, event. It would be beneficial for future studies to try and match prepartying and non-prepartying occasions in terms of the type of event attended. In the current study, we asked participants to recall the last occasion when they did not preparty, and compared the key variables to the last drinking occasion involving prepartying. However, it is possible that the last non-prepartying occasion may have involved a more subdued atmosphere (e.g., having a glass of wine while watching TV), which might be less akin to a typical college party experience wherein students preparty prior to attending. Particularly among first year students, it may be of interest to examine the effects of

participants' prepartying history on current prepartying frequency as one study (Zamboanga et al., 2011) found that 48% of a sample of high school students reported pregaming within the past 30 days. Finally, although the current study provides important insight into the event-level differences in specific contexts among heavier drinkers, future studies should replicate the current approach among all types of drinkers.

4.4 Conclusions

The present study extends previous research by utilizing event-level data to examine drinking outcomes as a function of social context and playing drinking games on occasions on which prepartying did and did not occur. The study draws attention to the risky drinking patterns associated with prepartying among heavier drinking college students and the differential impact of prepartying on males' and females' drinking outcomes. The identification of high-risk combinations of activities for males (co-ed prepartying) and females (playing drinking games during prepartying) may help identify strategies to develop effective interventions. Future studies are needed to explore why those who engage in prepartying the most frequently also experience the most negative consequences.

Acknowledgments

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Highlights

Event-specific risk and ecological factors associated with prepartying among heavier drinking college students (3-5 bullet points, maximum 85 characters, including spaces, per bullet point)

1. Examines drinking outcomes on occasions where prepartying did and did not occur.

2. Students drank more and experienced more consequences during preparty events.

3. Prepartiers who played drinking games had higher BALs and more consequences.

4. Students reported more consequences when prepartying in a coed setting.

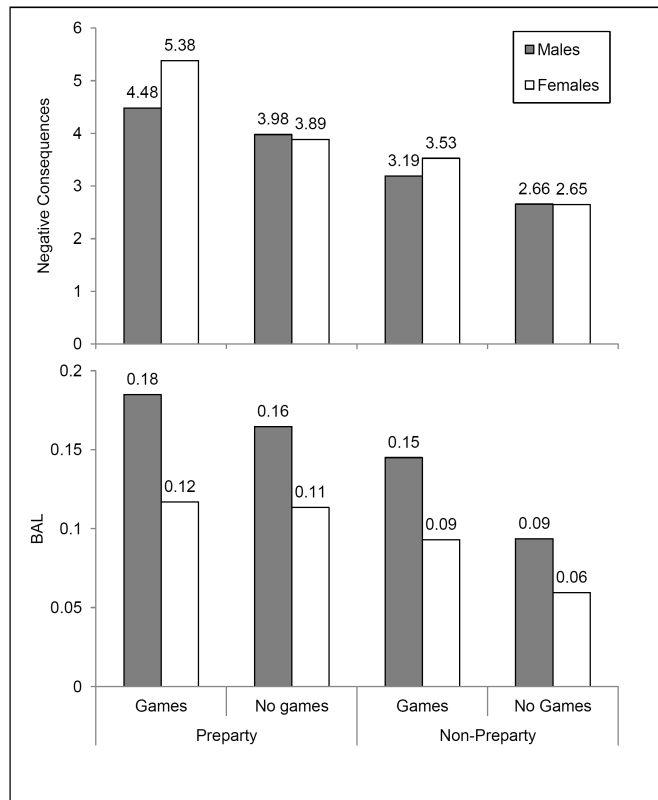5. Interventions can use BAL education to emphasize the impact of preparty drinking.

Figure 1.
BAL and negative consequences for preparty and non-preparty events as a function of whether games were played.
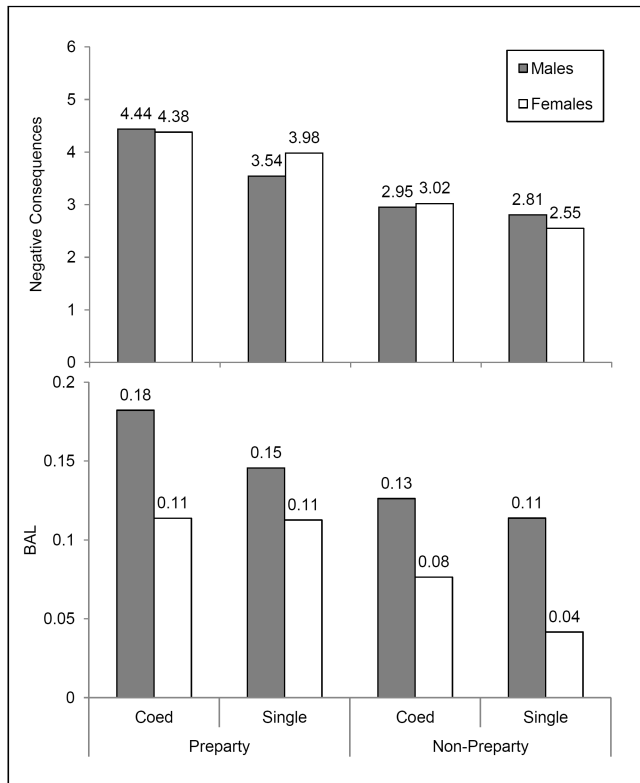
Figure 2.
BAL and negative consequences for preparty and non-preparty events as a function of the social context.
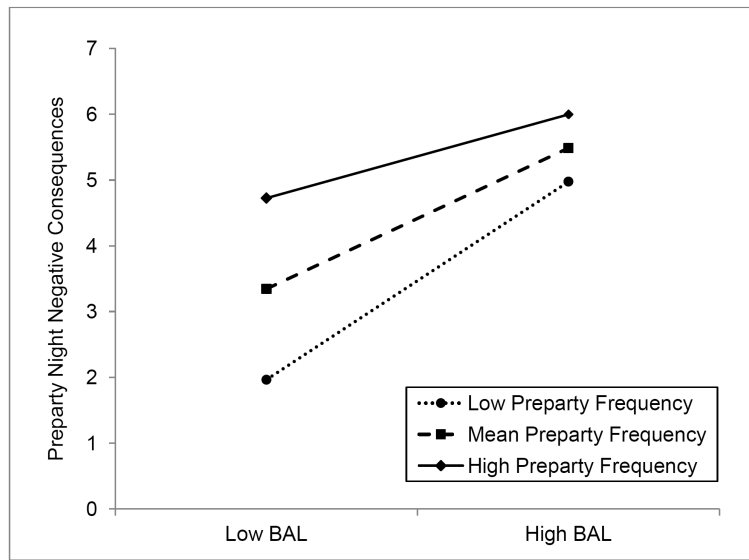
Figure 3.
Effect of BAL on negative consequences moderated by preparty frequency, while controlling for gender.

Table 1

Summary of Means and Standard Deviations for Number of Drinks Consumed, Hours Spent Drinking, BAL and Negative Consequences for Males and Females in Preparty and Non- Preparty contexts.

	Preparty only		Complete Preparty Occasion		Non-Preparty Occasion	
	M	*SD*	*M*	*SD*	*M*	*SD*
Number of drinks	4.08	2.36	7.34	3.47	5.16	3.02
Males	4.82	2.83	9.07	4.07	6.65	3.59
Females	3.63	1.87	6.35	2.61	4.31	2.20
Hours spent drinking	1.53	0.72	4.12	1.67	3.19	1.49
Males	1.56	0.74	4.19	1.69	3.33	1.52
Females	1.51	0.69	4.08	1.66	3.12	1.46
BAL	0.09	0.06	0.14	0.09	0.09	0.07
Males	0.11	0.07	0.17	0.10	0.13	0.08
Females	0.08	0.05	0.11	0.07	0.07	0.06
Negative consequences			4.27	3.88	2.99	3.24
Males			4.20	3.91	2.95	3.24
Females			4.32	3.87	3.01	3.25

Note. BAL = Blood Alcohol Level

Table 2

Hierarchical Multiple Regression Analyses Predicting Alcohol-Related Negative Consequences from BAL, Preparty Frequency and Gender

	Δ R²	*B*	*SE*	β
Step 1:	.00			
Gender		.11	.26	.01
Step 2:	.14 ***			
BAL		11.19	1.53	.25 ***
Preparty frequency		.23	.03	.22 ***
Step 3:	.02 ***			
BAL X Preparty Frequency		−1.37	.31	−.14 ***
Total R²	.15			

***
p < .001.