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Predictors and Consequences of Pregaming Using Day- and Week-Level Measurements

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Abstract

Drinking before going to a social event is common in adolescent and young adults and is associated with harmful outcomes, but information collected at the daily level is needed to better examine individual and contextual factors associated with pregaming. The purpose of this study was to investigate the prevalence of pregaming in a diverse sample of underage college students, demographic differences in rates of pregaming, the degree to which pregaming is associated with higher volume drinking, intoxication, and consequences, and the importance of time-of-year and day-of-week. Method: College students (N = 750) at three colleges completed past-week surveys throughout their freshman and sophomore years. Results: Pregaming was reported by three out of four drinkers and occurred on 31% of 12,361 drinking days. Compared to non-pregaming days, participants drank approximately two more drinks on pregaming days; this increase accounted for a .040 higher estimated blood alcohol concentration. Using Generalized Estimating Equations, we established that women, racial/ethnic minority students, and first-year students were more likely to pregame on a drinking day than males, non-Hispanic white students, and sophomore students, respectively. Men became more intoxicated on pregaming days and sophomores consumed more alcohol. Pregaming predicted higher positive and higher negative consequences, even after controlling for the number of drinks consumed. Pregaming was more common in the fall semester, in the early weeks of each semester, and on weekends. Prevention efforts targeting first-year students, the early weeks of the semester, and the hours before traditional party times may be effective at reducing this hazardous practice.

Keywords

Pregaming; College Drinking; Alcohol

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"Pregaming"—also referred to as "preloading", "front-loading" or "prepartying" is a practice that originally was associated with tailgating or other activities that occurred before athletic competitions, but the term is now commonly used to refer to consuming alcohol prior to attending a social event (see Wells et al., 2009 for a review). Although not a practice exclusive to young adults (Zamboanga et al., 2011), pregaming is one of several drinking

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practices common in college settings. College students generally agree that the purpose of pregaming is to experience the effects of drinking prior to attending a planned event, but also report strategically engaging in pregaming if they expect that alcohol will later be unavailable, difficult to obtain, or expensive (DeJong et al., 2010; Grazian, 2007; Pedersen & LaBrie, 2007; Read et al., 2010; Redden, 2006). In recent years, investigations have identified some general characteristics of pregaming and of students who report pregaming, and the association between pregaming and harmful consequences. This literature also suggests some important next steps toward understanding this drinking practice and its risks.

Prevalence and Description of Pregaming in College Students

Several qualitative and cross-sectional investigations have reported the prevalence of pregaming among college student drinkers. In focus groups conducted with students from 10 Pennsylvania colleges and universities, 71% of drinkers reported engaging in pregaming in the two weeks prior to the study (DeJong et al., 2010). In other work, among 1327 college student drinkers across nine U.S. universities, 98% reported that they pregame at least once per month (Zamboanga et al., 2010). The past month rate in another investigation was 75% (Pedersen & LaBrie, 2007), and another reported a pregaming rate of 70% in the past two months among college drinkers (Read et al., 2010). These studies consistently show that pregaming is a very common practice among college student drinkers.

In published reports, the average number of drinks consumed by college students during a pregaming episode ranges from 1.7 to 4.9 drinks (DeJong et al., 2010; LaBrie & Pedersen, 2008; Pedersen & LaBrie, 2007); in some cases these could be classified as a “binge drinking” episode (4 or more drinks for women, 5 or more for men, generally within 2 hours; National Institute on Alcohol Abuse and Alcoholism, 2004) during pregaming alone. Pregaming may result in consuming an overall greater number of drinks during a night of drinking (LaBrie & Pedersen, 2008; Pedersen & LaBrie, 2007), and contribute to higher measured blood alcohol concentration (Clapp et al., 2009) or estimated blood alcohol concentration (eBAC; Borsari, Boyle, et al., 2007; LaBrie & Pedersen, 2008; Read et al., 2010), although the type of event attended later in the night is also influential (Paschall & Saltz, 2007; Wei et al., 2010).

Characteristics of Students who Pregame

Students who engage in pregaming report higher frequency of drinking (DeJong et al., 2010; Read et al., 2010) and heavy episodic drinking (DeJong et al., 2010), compared to students who do not report pregaming. Evidence is mixed as to whether demographic characteristics are associated with the occurrence and extent of pregaming; whereas some studies among high school, college and adult samples suggest that men are more likely than women to engage in pregaming (Paschall & Saltz, 2007; Paves et al., 2012; Zamboanga et al., 2011), other studies have found no such association (Borsari, Boyle, et al., 2007; DeJong et al., 2010; Hughes et al., 2007; Kenney et al., 2010; Pedersen & LaBrie, 2007; Read et al., 2010; Zamboanga et al., 2010). Further, there is evidence that the effects of pregaming may vary between men and women. For example, whereas men report consuming more drinks on pregaming days than women (Glindemann et al., 2006; Read et al., 2010) there is evidence that women reach higher eBACs than men on drinking days involving pregaming (Read et al., 2010) and show a greater discrepancy from their eBAC on non-pregaming drinking days (LaBrie & Pedersen, 2008). The two investigations that have considered the association between pregaming and year in school (DeJong et al., 2010; Read et al., 2010), have found no associations, but tended not to use random samples, and were limited in size and scope. There is particular concern about pregaming among underage drinkers, as there is some evidence that underage drinkers reach higher measured BACs than of-age students when they pregame (Paschall & Saltz, 2007; Read et al., 2010), which may be motivated by a lack

of access to alcohol later in public venues (DeJong et al., 2010; Read et al., 2010). Indeed, recent research suggests that underage students are more likely than students of legal drinking age to pregame prior to going to a Greek party, whereas the students of legal age are more likely to pregame prior to going to a bar (Zamboanga et al., 2012). Therefore, an investigation of the specific risks associated with pregaming in an underage sample would be valuable. The evidence for race/ethnic differences is mixed, with some studies finding no differences, (DeJong et al., 2010; Kenney et al., 2010), and one finding higher rates of recent pregaming among whites than Latino/Hispanic, black, or Asian Pacific Islanders (Paves et al., 2012).

Consequences Associated with Pregaming

Higher alcohol consumption and the rapid consumption of alcohol increase the risk for a range of negative alcohol-related consequences. Pregamers report having more negative alcohol-related consequences than non-pregamers (Kenney et al., 2010), although there is some evidence that this global association is a function of their higher consumption of alcohol in general (Read et al., 2010). Another investigation has found that pregaming days are associated with higher negative consequences compared within-person to non-pregaming days (LaBrie & Pedersen, 2008), but volume of alcohol consumed was not controlled for in analyses. Furthermore, although negative alcohol-related consequences are of the highest concern, the positive effects of drinking practices such as pregaming are also important to investigate. That is, given the influence of positive expectancies on alcohol use (Mooney et al., 1987; Wardell et al., 2012) the greater frequency of reports of positive consequences than negative consequences from alcohol (Park, 2004), their possible greater salience (Logan et al., 2012; Park, 2004), and their possible stronger relationship with alcohol use than negative consequences (Park & Grant, 2005), positive consequences may be important in the determination of pregaming behavior (see also Lee et al., 2010). Although motives for pregaming have been investigated (DeJong et al., 2010; Grazian, 2007; Read et al., 2010), we are aware of no investigations that have measured positive consequences associated with pregaming.

Gaps in the Research on Pregaming

There are several ways that our understanding of the phenomenon of pregaming can be improved. First, studies of pregaming at the event level have typically measured one night; for example, during the most recent drinking episode (LaBrie & Pedersen, 2008; Paschall & Saltz, 2007), on a given night of bar patronage (Clapp et al., 2009), or on the night of an alcohol policy violation (Borsari, Boyle, et al., 2007). In other investigations Timeline Follow-back procedures have provided descriptive information about multiple pregaming events per person (e.g., Pedersen & LaBrie, 2008; Read et al., 2010), but analyses have been conducted at the global level, aggregating data across multiple pregaming occasions over the course of several weeks or even months. Studying singular events or aggregating events does not fully capture characteristics of events that may or may not recur. For example, there is considerable evidence that alcohol use in college students varies throughout the academic year, with drinking rates tending to be higher at the beginning of the semester (Del Boca et al., 2004; Goldman et al., 2011; Hoeppner et al., 2012). There is also evidence that an increase in risky drinking occurs in the freshman year of college (Baer et al., 1995; O'Malley & Johnston, 2002; Schulenberg et al., 1996), specifically at the start of the first semester (Borsari, Murphy, et al., 2007), and that first-year students show differential risk for particular negative drinking-related outcomes such as acute intoxication (Wright et al., 1998; Wright & Slovis, 1996). Despite this, we do not know much about the relationship between year in school or time of year and pregaming, as to date no studies have captured a large sample of pregaming and drinking days across an academic year. Such a design would provide day-level information across multiple persons over time, would allow for a more

thorough exploration of alcohol use and intoxication on pregaming days, and would provide information about differences in pregaming across the academic year, which would be valuable for the planning of campus policies and preventive interventions (see Beets et al., 2009; Tiffany et al., 2007 for an example of a similar design).

Second, existing research on pregaming has often not included important constructs related to alcohol use. Specifically, examinations of the association between pregaming and estimated BAC have not accounted for the total number of drinks consumed (Borsari, Boyle, et al., 2007; Clapp et al., 2009; Glindemann et al., 2006; LaBrie & Pedersen, 2008; Read et al., 2010). As noted above, including volume of alcohol as a covariate in analyses relating the practice of pregaming to negative consequences may reduce the relationship between pregaming and consequences (LaBrie & Pedersen, 2008; Pedersen & LaBrie, 2007; Read et al., 2010). Further, including alcohol use in analyses would provide important information about mechanisms of action on the outcome of interest. For example, if BAC is higher on pregaming days even after accounting for number of drinks, we could conclude that the higher intoxication is due at least in part to the pattern of drinking associated with pregaming (i.e., rapid drinking), and not solely to the higher number of drinks consumed during pregaming. Finally, drinking in college students shows substantial variability by day of the week, with most heavy drinking occurring on weekends. As such, day of the week is associated with volume of alcohol consumed, and thus is important to include in investigations of correlates of pregaming. For example, pregaming may be associated with higher drinking because both are more likely to occur on weekends. Including these additional variables will control for possible confounds and will provide important information about what accounts for the risks conferred by pregaming, thereby providing greater specificity about potential intervention targets.

Third, the majority of studies examining pregaming among college students are limited to single-site evaluations. The multi-site studies have been small in size (DeJong et al., 2010), investigated pregaming in specific settings (Paschall & Saltz, 2007), were limited in the constructs that were examined relative to pregaming (Zamboanga et al., 2010), and did not investigate differences in pregaming rates between sites. Multi-site research is needed to investigate more thoroughly the differences in pregaming rates across sites, and to provide broader samples to investigate the association between pregaming and participant characteristics, including gender, race, ethnicity, and class year.

Purpose of the Current Study

For a more complete understanding of the risks related to pregaming and in order to best develop prevention approaches, more detailed information is needed about who is at risk, when the risk for pregaming is greatest, and what associations there are between pregaming and alcohol use, intoxication, and consequences. Moreover, no studies have examined the characteristics and consequences of pregaming using a large-scale longitudinal design that allows for examination of these practices over the course of an academic year. The purpose of the present study was to establish the prevalence of pregaming among first and second year college students all of whom were underage when enrolled, to investigate possible demographic predictors of pregaming (gender, race/ethnicity, class year), to establish the degree to which pregaming is associated with number of drinks and intoxication at the daily level, and investigate the degree to which pregaming is associated with positive and negative consequences. We also sought to determine differences in pregaming prevalence by school site, semester, week of the year, and day of the week. Finally, we investigated whether demographic subgroups (gender, race/ethnicity, class year) showed different levels of risk associated with pregaming (i.e., different increases in volume of alcohol consumed and eBAC), and whether rates of pregaming were different for different class years by time of the year. We expected that: (1) pregaming would be associated with higher alcohol

consumption on a drinking day; (2) pregaming would be associated with higher estimated blood alcohol concentration after accounting for the number of drinks consumed on a drinking day; (3) pregaming would be positively related to both positive and negative alcohol-related consequences after controlling for alcohol consumed; (4) pregaming would occur at higher rates on drinking days early in the year, early in each semester, and later in the week (Thursday, Friday, Saturday); and (5) pregaming rates would be highest among first-year students at the beginning of the school year. Given the mixed prior findings on the association between pregaming and demographic characteristics such as sex, race/ethnicity, and class year, no predictions regarding these associations were proposed.

Method

Sample

The sample was derived from a longitudinal study of college student alcohol use (N = 1,053) in which students were enrolled before arriving for their first year of college at three schools in the Northeastern US (see Hoeppner et al., 2012). School 1 was a public college with approximately 7,000 undergraduate students, and 20% of freshmen resided on-campus. School 2 was a public university with approximately 6,000 undergraduate students; 66% of freshmen lived on-campus. School 3 was a private college with approximately 6,000 undergraduate students, all of whom lived on campus. To be eligible for inclusion for the parent study students: (1) were under 21 years old, (2) intended to be enrolled in college full-time, (3) planned to live on-campus during their freshman year, and (4) were not international students. The original study had three cohorts of participants; partway through the study, when the second cohort was in the sophomore year and the third cohort was in the freshman year, items measuring pregaming were added; 808 participants comprised this sample subset (395 in Cohort 2, 413 in Cohort 3). For the parent study, participants were followed intensively for the first two years of college, because the transition to college is a particular time of alcohol-related risk (Borsari, Murphy, et al., 2007), and because investigating the sophomore year provides valuable information not previously available about within-subject differences from one year to the next.

Participants (N = 750) were on average 18.3 years old (SD = 0.5) at baseline. The sample (N = 750) was 57.1% female and 11.3% Latino/Hispanic. Participants were 65.3% white, 13.3% Asian-American, 7.7% black, and 5.9% multi-racial; 7.7% indicated “other” or did not indicate a race (most of these cases had indicated Latino/Hispanic ethnicity). There were significant gender differences in participant enrollment by school, χ^2 (2, N = 808) = 7.84, p = .02, with post hoc comparisons showing that that School 1 had significantly more female respondents than school 3. Race/ethnicity also differed by school, χ^2 (2, N = 803) = 38.52, p < .001, with School 3 showing a higher proportion of non-white/Hispanic respondents than Schools 2 and 1, and School 2 showing a higher proportion of non-white/Hispanic respondents than School 1.

Procedures

In the summer prior to the start of college, incoming students at the three sites were recruited to participate. Using information provided by the sites, a gender stratified random sample of students, with oversampling for racial/ethnic minority status received an invitation and a $5 token of appreciation for considering participation. Parents of sampled students who were under the age of 18 received similar information and their consent was required for their children to participate. The enrollment rate was identical for the two cohorts, at 43%. Following enrollment, participants completed a baseline survey. To minimize participant burden over the course of the two years of the study, participants were randomly assigned to one of two alternating biweekly assessment groups. Data were collected using a

commercially available web-based survey software system (Inquisite Survey). Beginning with the first week of the fall semester, students were sent an invitation email containing an authenticated link to a web survey. The invitation emails were sent each Monday morning, with reminder emails to nonresponders on Wednesday and Friday. Surveys were available for one week and participants provided data for the seven days prior to their response day. This biweekly method of assessment resulted in each participant being invited to complete eight surveys per semester. Participants earned $20 for completing the baseline (pre-college) survey, $2 for each completed biweekly assessment, and a $20 bonus for completing at least seven biweekly assessments each semester. Upon every survey submission, participants also were eligible to win a $100 lottery. All procedures were approved by the Institutional Review Boards at the participating institutions.

Measures

Demographics—Gender, race, and ethnicity were collected on the baseline survey.

Alcohol use—For each biweekly assessment, a past-week calendar grid was used to collect the number of standard drinks consumed and the length of time (in hours/minutes) spent drinking on each day over the past seven days, from which the number of drinks per week was calculated. Using gender, weight (self-reported at least annually), and length of time spent drinking, an estimate of blood alcohol concentration was calculated for each day of drinking (Matthews & Miller, 1979).

Pregaming—On the same calendar grid, for each day participants were asked, “Did you pregame on this day?” Pregaming was defined as “the practice of drinking, typically in one’s home or room, before going out for the night.” Pregaming for each day was recorded only if the participant reported drinking on that day.

Alcohol-related consequences—On each biweekly survey, participants were asked, “In the past week did you have any of the following experiences during or after drinking alcohol?” followed by a list of 11 positive consequences and 13 negative consequences. Positive alcohol-related consequences included: having a good time, talking to someone you were sexually attracted to, feeling less stress/more relaxed, enjoying sex more, feeling more energetic, having an easier time socializing, feeling like a part of a group, feeling more self-confident, feeling sexier, being able to take your mind off problems, and expressing thoughts/feelings more easily. Negative alcohol-related consequences included: being physically sick, not remembering part of the night, saying something that you later regretted, feeling sad or depressed, disappointing others, regretted sexual activity, problems at school/work, passing out, being physically injured, drinking and driving, getting into trouble with authorities/police, accidentally physically hurting someone, or getting into a fight. These consequences were chosen from well-established measures of positive and negative outcomes of alcohol use (Fromme et al., 1997; Fromme et al., 1993; Hurlbut & Sher, 1992; Kahler et al., 2005; Leigh & Stacy, 1993; Noar et al., 2003; Saunders et al., 1993), and had good internal reliability in our sample (average biweekly alpha = .81). Consequences were recorded only for participants who had reported one or more drinking days in the week. Positive and negative alcohol-related consequences were separately summed for each week.

Time variables—For each participant, weekly reports of daily drinking were collected every other week. Since the two groups of randomly assigned participants alternated weeks of data collection, each two-week timeframe includes all participants. “Biweek” was coded to reflect these two-week periods, resulting in eight “past-week” surveys per person per semester.[1]

Data Analysis

Three datasets were used, one person-level dataset for describing the sample, and two multiple-record datasets that reflected drinking at the daily level and consequences at the weekly level. In the models, female served as the reference category for gender (0 = female, 1 = male) and after initial analyses on race and ethnicity (described below) non-Hispanic white served as the reference category for race/ethnicity (0 = non-Hispanic white, 1 = other). The three-level categorical predictor of school was dummy coded into two variables with School 3 as the reference category because it comprised the largest number of participants in the sample (Zamboanga et al., 2010). The eight biweekly surveys in each semester were coded 1 through 8, each record was coded according to whether it occurred in the first or second semester (coded 0, 1), and day of the week was dummy coded with Sunday as the reference group. For the purpose of the current study, only assessments conducted within the academic year were utilized, using each school's academic calendar for each year. Analyses did not examine data collected during school orientation week, winter break, spring break, or summer break.

Initial analyses used chi-square tests and independent and paired t-tests. To examine whether school, gender, race/ethnicity, year in school, semester, biweek of the semester, and day of the week were associated with pregaming, a Generalized Estimating Equations (GEE; Zeger & Liang, 1986) model (binomial distribution, exchangeable correlation structure, logit link; hereafter called logistic GEE) was produced. Since data were collected in two cohorts of students across two years, cohort was included as a covariate. Utilizing the same set of variables, a second GEE model (negative binomial distribution, exchangeable correlation structure, log link, hereafter referred to as negative binomial GEE) was used to examine whether pregaming was associated with number of drinks per drinking day at the daily level. Third, a GEE model (normal distribution, exchangeable correlation structure, identity link, hereafter referred to as linear GEE) was used to examine whether pregaming was associated with the continuous outcome of eBAC at the daily level, with the same set of variables as the previous models, with drinks per day included in a similar analysis. Fourth, two GEE models (Poisson distribution, exchangeable correlation structure, log link; hereafter called Poisson GEE) were produced to examine whether pregaming was associated with greater consequences (i.e., the count variables of number of positive consequences and number of negative consequences) at the weekly level. The same set of variables as other models was included, in addition to number of drinks per week and average week eBAC.

To determine whether specific subgroups showed differential risks associated with pregaming, we calculated 2-way interaction terms between pregaming and gender, class year, and race/ethnicity. We then included these terms in separate GEE models along with the same set of predictors as in the other models. To determine whether rates of pregaming were higher among first year students early in the year, our final model included an interaction term of class year and semester of the year, with pregaming as the dependent variable in a logistic GEE.

Number of drinks per day and number of drinks per week had negatively skewed distributions; in analyses in which number of drinks per day was the dependent variable a negative binomial distribution was utilized without a data transformation. When these variables were investigated as independent variables, they were square-root transformed. To examine eBAC as a dependent variable it was multiplied by 10 for interpretability of beta coefficients. In cases where average weekly eBAC was utilized as an independent variable,

[1]The alternative to this coding strategy would be to analyze and present each chronological week separately, but alternating weeks would contain different participants. We determined that combining participants into 2-week groups provides a high level of detail without the complication of alternating groups each week.

no transformations were applied. Analyses were conducted using all available data and an assumption of covariate dependent missingness (i.e., that differences in rates of assessment completion were accounted for by adjusting for covariates of cohort, school, gender, race, etc.). All analyses were conducted using SPSS Statistics (IBM, version 19).

Results

Of the original 808 participants, 750 (92.8%) provided one or more weeks of data in the freshman or sophomore year, with an average of 13.6 (*SD* = 4.8) surveys submitted per person in the freshman year, and 12.8 (*SD* = 5.5) in the sophomore year (out of 16 biweekly surveys in each academic year). Any responding in the three schools differed significantly (87.5%, 91.5%, and 95.2% responding once or more at Schools 1, 2, and 3 respectively, χ^2 (2, *N* = 808) = 10.78, *p* = .005 (Cramer's V = .12). There was no difference in any responding between cohorts in the sophomore year (the only year with both cohorts). Weekly survey response rates averaged 85.2% in the freshman year (SD = 1.8; range: 82.1% to 87.7%) and 80.3% in the sophomore year (SD = 1.4; range: 78.2% to 82.1%). Women had slightly higher response rates than men in the sophomore year only, *t*(806) = 2.38, *p* = .018, but there were no race/ethnicity differences in response rates. Withdrawal from the study was very low; 14 subjects in these cohorts withdrew, with no significant difference in withdrawal by school, χ^2 (2, *N* = 808) = 0.37, *p* = 829.

Alcohol Use, Pregaming, and Consequences at the Person Level

In the cohort with only freshman year data, 294 (76.2%) reported drinking on one or more biweekly surveys, with an average of 5.1 (*SD* = 7.9) drinks per week; 77.6% of drinkers reported pregaming at least once. In the sophomore years, 517 (71.9%) reported drinking on one or more surveys, with an average of 4.8 (*SD* = 7.7) drinks per week; the pregaming rate among drinkers was 72.7%. There were no cohort or biweekly group differences on any alcohol consumption variables.

Using person-level averages, the average number of drinks consumed on pregaming days was 5.6 (*SD* = 3.0) and 6.3 (*SD* = 3.2) in the freshman and sophomore years, respectively, and the average number of drinks consumed on non-pregame days was 3.9 (*SD* = 2.2) and 4.0 (*SD* = 2.1). Using person-level averages, the average eBAC on pregame days was .113% (*SD* = .065) and .121% (*SD* = .058) for freshman and sophomores, respectively, compared to .072% (*SD* = .047) and .071% (*SD* = .042) on non-pregame days.

Of participants who reported drinking in their freshman year, 95.9% reported one or more positive consequence as a result of drinking (*M* = 35.6, *SD* = 29.8). In the sophomore year, 92.3% of drinkers reported one or more alcohol-related positive consequence (*M* = 27.9, *SD* = 25.3). Rates of one or more negative consequences were 82.0% (*M* = 7.6, *SD* = 8.9) in the freshman year, and 73.6% (*M* = 5.5, *SD* = 7.3) in the sophomore year.

Pregaming at the Daily Level

The total number of days of data submitted on biweekly surveys was 97,244; participants provided data regarding drinking on 97,118 (99.9%) of those days. Of these days, 12,371 (12.7%) were drinking days, and 12,361 (99.9%) of these days had pregaming data available (see Table 1). The average number of drinking episodes reported per person was 21.8 (SD = 19.5; Median = 17; Mode = 1; Range: 1 – 122). Of the drinking days reported, the highest rates of pregaming were seen among women and freshmen. The highest week was the first week of the semester, and the highest day of the week was Friday. The cohort difference in rates of pregaming is likely due to Cohort 2 having both freshman and sophomore data included, whereas Cohort 3 had only freshman year data.

Non-white and Hispanic/Latino participants showed a numerically higher proportion of drinking days that included pregaming relative to white and non-Hispanic/Latino groups, respectively. To establish whether there were statistical differences between racial groups on pregaming we conducted a logistic GEE analysis with race dummy coded as a predictor of pregaming, and again with ethnicity (Hispanic/Latino vs. non-Hispanic/Latino). Compared to white students, Asian, multiracial, and black students showed a higher odds of pregaming, but only the contrast between white and black students reached significance (OR = 1.61 [95% CI: 1.08 – 2.39] $p = .019$). Hispanic ethnicity was associated with a higher odds of pregaming (OR = 1.20 [95% CI: .86 – 1.63] $p = .24$), but this effect was nonsignificant.[ii] Given the generally higher rates of pregaming in minority groups in our sample and the lack of significant differences when contrasts were conducted using relatively smaller group sizes, we collapsed the non-white and Hispanic groups into a dichotomous variable of non-Hispanic white vs. non-white for further analyses.

Using logistic GEE, cohort, gender, race/ethnicity, class year, school site, semester, biweek of the semester, and day of the week were evaluated as predictors of pregaming during a drinking day. Odds Ratios and 95% confidence intervals are presented in Table 2. The GEE model revealed that women were significantly more likely to report pregaming on drinking days compared to men, and that racial/ethnic minority students were significantly more likely to pregame on a drinking day. School 3 had a higher pregaming rate than School 1 and School 2. Drinking days in the freshman year were more likely to involve pregaming compared to sophomore year. Pregaming on a drinking day was more likely in the fall semester, and was more common in the early weeks of the semesters (see Figure 1). With the exception of Monday, all days of the week were more likely to involve pregaming on a drinking day when compared to Sunday.

Pregaming and Number of Drinks at the Daily Level

A negative binomial GEE model examined the extent to which pregaming was associated with the number of drinks (nontransformed) consumed on that day. The full model is presented in Table 3. With all predictors included, pregaming was significantly associated with a higher number of drinks. The negative binomial model provides an incident rate ratio which for pregaming was 1.46 [95% CI: 1.42 −1.52], indicating that there was a 46% higher expected count of drinks on a pregaming day vs. a non-pregaming drinking day.

Pregaming and eBAC at the Daily Level

Two linear GEE models were examined to investigate whether pregaming was associated with higher eBAC (see Table 4 for details). Model 1 included all predictors and pregaming, and Model 2 added the (transformed) number of drinks. In Model 1, pregaming was associated with a higher eBAC. When the (transformed) number of drinks was included in Model 2, pregaming was no longer significantly associated with eBAC, suggesting that the association between pregaming and higher eBAC is due to the greater number of drinks consumed rather than the rate in which drinks are consumed.

Group Differences in Number of Drinks and eBAC Associated with Pregaming

To establish whether there were gender, class year, or race/ethnic differences in increases in number of drinks and eBAC associated with pregaming, we separately added the interaction terms of pregaming and demographic variables to the above models for number of drinks and eBAC. There was not a significant interaction between pregaming and gender on number of drinks, but the interaction was significant for eBAC ($B = .06$, $p = .008$) indicating that compared to women, men reported a significantly higher eBAC on pregaming days compared to non-pregaming days. We also found a significant interaction between class year and pregaming on number of drinks ($B = .11$, $p < .001$), indicating that after controlling for

covariates, compared to freshmen, sophomores reported a greater increase in number of drinks on pregaming days. There was not a significant race/ethnicity difference in the increase in number of drinks or eBAC on pregaming days.

Class Year Differences by Semester

To establish whether there were class year differences in the rates of pregaming in the different semesters, we calculated an interaction term between class year and semester and included it in a logistic GEE with pregaming as the dependent variable and including all covariates. The interaction term was significant in this analysis (B = .22, p =.04), and reflected a higher rate of pregaming among first-year students in the first semester (39%) than in the second semester (32%), whereas the level of pregaming stayed stable for sophomores across semesters (29% and 28%, respectively).

Pregaming and Alcohol Consequences at the Weekly Level

Using two Poisson GEE models and the same set of covariates as in other models (except day of week), pregaming in the week and the (transformed) number of drinks in the week were evaluated as predictors of the number of positive (Model 1) and number of negative alcohol-related consequences (Model 2) in an assessment week (see Table 5). Model 1 indicated that number of drinks per week and pregaming were independently positively associated with the number of positive consequences. Model 2 showed that number of drinks per week and pregaming were independently and positively associated with the number of negative alcohol-related consequences in the week.

Discussion

Using a multiple cohort, multiple sites, multiple years, longitudinal dataset we found that when asked to report on approximately half of the weeks in the academic year, about three out of four freshman and sophomore drinkers reported pregaming, and about one-third of drinking days included pregaming. At the person level, the increase in drinking on pregaming days was about two drinks, which at the episode level reflected a 46% higher number of drinks on pregaming days relative to non-pregaming days. Further, pregaming was the strongest predictor of number of drinks per day in our model – stronger than any other variable in the analysis. Pregaming occurred at the highest rates early in the school year and on weekends, and was significantly more likely to occur on drinking days among first-year students, women, and ethnic/racial minority students.

One of the motives for pregaming is reportedly to get “buzzed” before going out, and there are reports of rapid drinking during pregaming (LaBrie et al., 2011; Read et al., 2010). Our data showed an increase of approximately .040 in eBAC was associated with pregaming; however pregaming was not associated with greater intoxication after number of drinks was accounted for. That is, contrary to our expectations, the level of intoxication associated with drinking on days that included pregaming was directly accounted for by the higher number of drinks consumed on those days. Our findings indicate that pregaming leads to greater drinking, which results in greater intoxication. If intoxication had been higher on pregaming days after controlling for number of drinks, we could have concluded that pregaming conveys greater risk of intoxication, presumably from drinking more quickly on pregaming days. It is possible that the topography of drinking on pregaming days relative to non-pregaming days results in different intoxication profiles, but our surveys did not separate the drinking that occurred during a pregaming episode and other drinking on that day. To our knowledge, there are no studies that delineate drinking in this way, estimating BAC after a pregaming episode, but before subsequent drinking. Such delineation will be an important next step for future research, as it will allow for the identification of unique risk related to

drinking while pregaming specifically, rather than just drinking on days in which pregaming occurred. Nevertheless, our findings suggest the importance of including control variables in evaluations of risk-related behaviors such as pregaming.

As predicted, pregaming in a week was associated with a higher number of positive and negative alcohol-related consequences, after controlling for other variables. This reflects that pregaming is part of a context that includes positive personal and social effects that may serve to reinforce the behavior, even as it also results in negative consequences (Park, 2004; Park & Grant, 2005). By using multiple one-week retrospective surveys, the current study aligned the measurement timeframes and determined that negative consequences are higher on pregaming weeks even after controlling for alcohol consumption in that week. This finding is different from Read and colleagues (2010) who determined that after accounting for typical alcohol consumption, college pregamers showed no greater risk of negative consequences; the difference in findings between the current study and Read et al. may be due to the level of analysis (i.e. week-level vs. global comparison). Since alcohol consequences were measured at the weekly level in the current study, a direct association between a pregaming day and consequences experienced on that day could not be made, and therefore the conclusion that pregaming results in higher consequences requires replication. However, among drinking weeks the modal number of drinking days in a week was one day, and this reflected 42% of weeks, so on a high proportion of weeks the drinking day was directly associated with the consequences reported. It is also possible that other unmeasured individual differences, contextual variables, or settings (Paschall & Saltz, 2007; Zamboanga et al., 2010) place individuals at greater risk both for pregaming and for experiencing consequences, but a thorough exploration of these areas requires additional work.

The investigation of individual differences revealed somewhat complex findings. Demographic groups that are typically at higher risk for alcohol use and related risky behaviors (men and non-Hispanic whites) showed significantly lower rates of pregaming on drinking days than women and racial/ethnic minority students, respectively. However, compared to women, men showed a higher level of intoxication on pregaming days, indicating that though they may be less likely on a drinking day to pregame, when they do pregame they become differentially more intoxicated than women. Initially, this finding appears to be inconsistent with those of others that have found men to have higher rates of pregaming (Paves et al., 2012), however, our study investigated the different rate of pregaming *on drinking days* and found women had higher rates, which is different from reporting overall rates of *any recent pregaming* at the person level. These differences in methodological approaches (i.e., person-level vs. drinking day-level analysis) are important to keep in mind when interpreting findings across studies. The finding that racial or ethnic minority status predicted greater likelihood of pregaming suggests that when non-white or Hispanic/Latino students drink, they may be at slightly higher risk of pregaming. This higher likelihood of pregaming may be in part a function of the lower drinking rates overall in minority students, possibly reflecting that when they do drink, they do so on a weekend and/or special occasion when pregaming is more likely to occur. Again, though these findings may appear inconsistent with other work which found lower rates of pregaming among non-white and Hispanic/Latino groups, our investigation calculated different statistics; rather than reporting any evidence of recent pregaming, we showed that on drinking days these groups show higher likelihood of pregaming, so care should be taken in comparing outcomes between investigations. Based on a lack of differences between non-white and Hispanic subgroups we collapsed all racial/ethnic minority groups, so though justified, this approach limited our ability to further investigate race/ethnicity differences. Although they showed no difference in drinks per drinking day, freshmen reported higher likelihood of pregaming on a drinking day, and reported higher positive and negative consequences associated with pregaming than sophomores. In addition, we found that this higher rate of

pregaming among freshmen was predominant in the first semester, and that when sophomores pregamed they consumed a higher number of drinks relative to non-pregaming days (compared to freshmen). In other words, freshmen and women show higher rates of pregaming on drinking days, but sophomores show a greater difference in number of drinks consumed than freshmen, and men show a greater difference in intoxication than women on pregaming days relative to non-pregaming days.

This investigation established the importance of time variables for understanding the prevalence of pregaming. With day- and week-level data we determined that pregaming was higher in the fall semester relative to the spring semester and higher at the beginning of semesters. As expected, the highest rates of pregaming were seen on Friday and Saturdays. More importantly, by controlling for day of the week, we established that the increase in number of drinks and intoxication that occurred on pregaming days was not just a function of those days being weekend days, when drinking and intoxication are higher. In other words, the analyses established that later days of the week and pregaming independently predicted higher volume drinking episodes.

Significantly different rates of pregaming were found at the three data collection sites, with rates ranging from roughly 1 in 3 to 1 in 5 drinking days at the three campuses. The number of sites included in this study is too low to identify college/university characteristics related to pregaming risk, but the significantly different rates do strongly suggest that pregaming rates collected from one college/university site may not generalize to others. There were significant demographic differences between schools, but school site was controlled for in analyses. In addition, all of the sites included were residential campuses, and all participants reported living on campus during their first year of college; as with drinking rates, pregaming results would likely vary by college type (i.e., residential vs. commuter) and college residence (Harford et al., 2002; Wechsler et al., 2000).

Since we were interested in student behaviors while on campus, we intentionally excluded days when classes were not in session. All break weeks are not the same, as alcohol use is commonly lower during winter break than academic weeks (except New Year's Eve; Del Boca et al., 2004; Hoeppner et al., 2012; Tremblay et al., 2010) and higher during spring break (Del Boca et al., 2004), particularly among students who travel (Grekin et al., 2007; Lee et al., 2006; see Neighbors et al., 2012 for review). Thus a thorough investigation of break week differences was beyond the scope of this study, but is needed to fully understand the association between pregaming and the college student’s academic and school break activities.

It is important to emphasize that by design the analyses in this study included a subset of all students, since to be included students had to report at least one day of drinking on the biweekly surveys, and that the analyses were conducted with a subset of all days, since only drinking days were analyzed. Approximately one-quarter of the students surveyed did not report any drinking on our surveys, and of those who did report drinking, most days were not drinking days. Thus in our analyses, pregaming occurred on 31.2% of all drinking days, but this reflected only 4.0% of all measured days. This is an important distinction to make, as it may easily be forgotten that the “denominator” used in our sample was not the entire set of available survey days.

Limitations

To minimize participant burden, surveys were administered every other week, so half of the days in the year were planned missing. Although the data presented do not reflect all days of drinking that occurred in each year, and some very low level drinkers were likely not included in these analyses, bias as a result of the biweekly methodology is unlikely, as there

were not demographic or drinking behavior differences between the alternating biweekly groups. The number of drinks reported covered the entire day, so differences in consumption and/or intoxication during pregaming episodes compared to other drinking on the same day could not be determined. We did not have a direct measure of intoxication, and estimates of BAC should be interpreted with caution (Carey & Hustad, 2002; Hustad & Carey, 2005), particularly since they are based on several assumptions, including that drinking occurs at a steady pace, which may not be the case for nights that contain pregaming. As noted above, reports of consequences were collected at the week level so we could not associate pregaming episodes with the number of consequences or with specific consequences. The sample contained only first and second year college students so findings may not generalize to later classes. It may be important as well to investigate differences between underage students and legal age students as there is evidence that motivations for pregaming (Zamboanga et al., 2012), and volume of drinking and estimated BAC during pregaming episodes (Paschall & Saltz, 2007; Read et al., 2010) may differ for these groups. Our dichotomization of ethnic/race groups was supported by our data, but limited our ability to investigate race and ethnic group differences optimally. The enrollment rate of 43%, though moderate, was comparable to other large scale investigations of pregaming (Paschall & Saltz, 2007; Paves et al., 2012). The number of sites was too small to investigate characteristics (e.g., size or residential status) possibly related to pregaming risk, and our sites were in a specific region of the US, so findings may not generalize to other campus sites.

Future Directions and Implications

Future research should include more specific event-level data about consequences on pregaming days, including estimates (or actual measures) of intoxication, and individual difference characteristics beyond those examined here that might place students at greater risk for pregaming and/or negative consequences because of pregaming. Positive consequences of pregaming may be very influential in determining future drinking and pregaming, in that they occur more frequently (on average five times more frequently in this study) and are more reliably experienced than negative consequences (Park, 2004). The role of positive consequences in maintaining excessive drinking and risky practices must be better understood. In addition, further investigation of the interaction between positive and negative alcohol-related consequences and their influence on subsequent behavior is needed.

Evidence from this study supports the need for prevention measures to reduce pregaming. Given the mixed findings on the risks associated with specific subgroups, universal prevention approaches to reduce pregaming and its associated overconsumption are recommended. As expected, we found the highest rates of pregaming among freshmen in the first semester; this finding would suggest targeted prevention programming is needed for these students. Since pregaming by definition occurs before other (presumably identifiable) events, event-specific prevention efforts (Neighbors et al., 2007) and active monitoring by campus resident advisors in the hours before traditional party times warrants evaluation. Given our finding that earlier weeks in the semester and later days of the week show the highest rates of pregaming, specific attention to these weeks and days is supported. Alcohol-free events on weekends and prior to campus parties (Wei et al., 2010), and close visual monitoring and denial of entrance for intoxicated students to events also may reduce pregaming and associated harmful outcomes. This sort of event-specific or context-specific intervention has the potential to reduce the extreme alcohol use seen at specific times of the year on campuses nationwide (DeJong & Langford, 2002; Neighbors et al., 2012).

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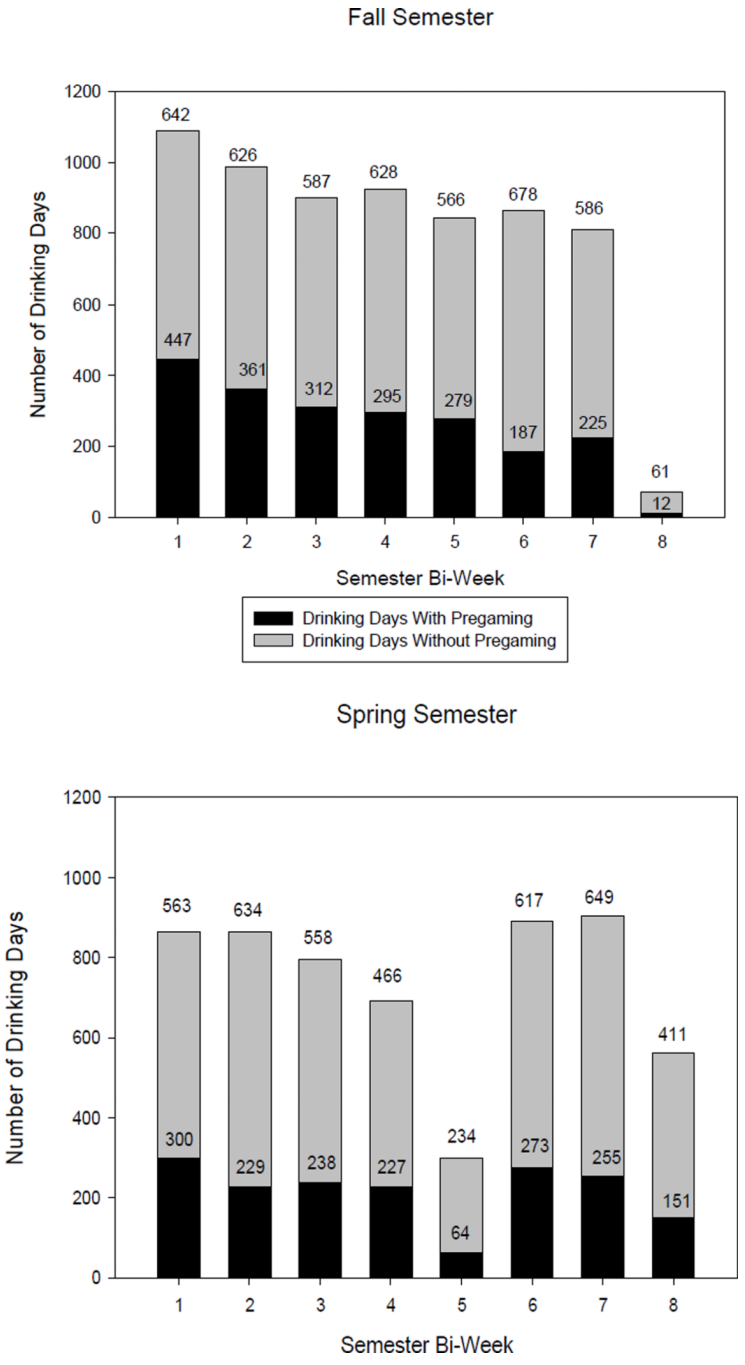

Figure 1.

Pregaming on drinking days during academic fall and spring semesters. Only days during the academic year are included. As such, during spring semester, days classified as “spring break” (Spring semester, biweek 5) are not included. Similarly, days during the winter break between fall and spring semester (fall semester week and days at the end of spring semester are not included, which is why biweeks 5 and 8 in the spring semester have fewer days.

Table 1

Number and Proportion of Drinking Days that Included Pregaming

Factor	Pregaming		Number of Drinking Days
	No (*N*, %)	Yes (*N*, %)	*N* = 12,361
Cohort			
2	2887 (72.7%)	1082 (27.3%)	3969
3	5619 (67.0%)	2773 (33.0%)	8392
School			
1	1025 (78.2%)	285 (21.8%)	1310
2	2124 (75.9%)	675 (24.1%)	2799
3	5357 (64.9%)	2895 (35.1%)	8252
Gender			
Female	4576 (65.5%)	2409 (35.5%	6985
Male	3930 (73.1%)	1446 (26.9%)	5376
Ethnicity[a]			
Hispanic	758 (63.9%)	429 (36.1%)	1187
Non-Hispanic	7747 (69.3%)	3426 (30.7%)	11173
Race[b]			
White	6740 (69.3%)	2985 (30.7%)	9725
Asian	624 (64.9%)	337 (35.1%)	961
African American/Black	306 (66.4%)	155 (33.6%)	461
Multi-racial	453 (68.3%)	210 (31.7%)	663
Unknown	379 (69.4%)	167 (30.6%)	546
Class Year			
Freshman	2866 (64.3%)	1590 (35.7%)	4456
Sophomore	5640 (71.3%)	2265 (28.7%)	7905
Semester			
Fall	4374 (67.4%)	2118 (32.6%)	6492
Spring	4132 (70.4%)	1737 (29.6%)	5869
Biweek of the Semester[c]			
1	1205 (61.7%)	774 (38.3%)	1952
2	1260 (68.1%)	590 (31.9%)	1850
3	1145 (67.6%)	550 (32.4%)	1695
4	1094 (67.7%)	522 (32.3%)	1616
5	800 (70.0%)	343 (30.0%)	1143
6	1295 (73.8%)	460 (26.2%)	1755
7	1235 (72.0%)	480 (28.0%)	1715
8	472 (74.3%)	163 (25.7%)	635
Day of the Week			
Sunday	696 (88.9%)	97 (11.1%)	783
Monday	412 (90.4%)	44 (9.6%)	456

Factor	Pregaming		Number of Drinking Days
Tuesday	496 (82.3%)	107 (17.7%)	603
Wednesday	582 (69.7%)	253 (30.3%)	835
Thursday	1302 (71.7%)	514 (28.3%)	1816
Friday	2401 (62.6%)	1437 (37.4%)	3838
Saturday	2617 (64.9%)	1413 (35.1%)	4030

[a] N = 12,630 due to missing ethnicity for one individual.

[b] N = 12,356 due to missing race for one individual.

[c] Two-week spans.

Table 2

Prediction of Pregaming on a Drinking Day

Variable	B	SE B	OR	95% CI
Cohort	0.11	0.11	1.11	[0.90 – 1.37]
School (1 vs. 3)	−0.44	0.16	0.65**	[0.47 – 0.89]
School (2 vs. 3)	−0.41	0.13	0.66**	[0.51 – 0.86]
Gender	−0.34	0.10	0.71**	[0.58 – 0.87]
Race/Ethnicity	0.16	0.11	1.17*	[0.95 – 1.44]
Class Year	−0.28	0.07	0.76***	[0.67 – 0.86]
Semester	−0.15	0.05	0.86**	[0.78 – 0.95]
Biweek of the Semester	−0.07	0.01	0.94***	[0.92 – 0.96]
Day of the Week				
Monday	−0.20	0.21	0.82	[0.55 – 1.23]
Tuesday	0.38	0.19	1.46*	[1.01 – 2.10]
Wednesday	0.99	0.14	2.69***	[2.03 – 3.57]
Thursday	1.00	0.13	2.71***	[2.10 – 3.48]
Friday	1.41	0.12	4.11***	[3.22 – 5.25]
Saturday	1.31	0.12	3.67***	[2.92 – 4.68]

Note. Logistic GEE model. Pregaming: No pregaming = 0, Pregaming = 1. Cohort: Cohort 2 = 0, Cohort 3 = 1. Gender: Female = 0, Male = 1. Race/Ethnicity: Non-Hispanic white = 0, other = 1. Class Year: Freshman year = 0, Sophomore year = 1. Semester: Fall semester = 0, Spring semester = 1. Biweek of the Semester: Continuous variable, from biweek 1 to biweek 8. Day of the Week: Coded as 6 binary variables, with 0 for Sunday and 1 for the other day of the week.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 3

Pregaming Predicting Number of Drinks per Drinking Day

Variable	B	SE B
Cohort	−0.03	0.04
School (1 vs. 3)	0.24***	0.05
School (2 vs. 3)	0.34***	0.04
Gender	0.43***	0.04
Race/Ethnicity	−0.07	0.04
Class Year	0.00	0.02
Semester	0.07***	0.01
Biweek of the Semester	0.01**	0.00
Day of the Week		
Monday	0.13**	0.05
Tuesday	0.12**	0.04
Wednesday	0.16***	0.04
Thursday	0.23***	0.03
Friday	0.35***	0.03
Saturday	0.38***	0.03
Pregaming	0.39***	0.02

Note. Negative binomial GEE model. Number of drinks was rounded to the nearest integer. Cohort 2 = 0, Cohort 3 = 1. Gender: Female = 0, Male = 1. Race/Ethnicity: Non-Hispanic white = 0, other = 1. Class Year: Freshman year = 0, Sophomore year = 1. Semester: Fall semester = 0, Spring semester = 1. Biweek of the Semester: Continuous variable, from biweek 1 to biweek 8. Day of the Week: Coded as 6 binary variables, with 0 for Sunday and 1 for the other day of the week. Pregaming: No pregaming = 0, Pregaming = 1.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

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Table 4

Pregaming Predicting Estimated BAC (Model A), and Including Number of Drinks (Model B)

Model A			Model B		
Variable	**B**	**SE B**	**Variable**	**B**	**SE B**
Cohort	−0.04	0.04	Cohort	−0.03	0.02
School (1 vs. 3)	0.18**	0.06	School (1 vs. 3)	−0.05	0.03
School (2 vs. 3)	0.31***	0.05	School (2 vs. 3)	−0.03	0.10
Gender	0.43***	0.04	Gender	0.03	0.02
Race/Ethnicity	−0.04	0.04	Race/Ethnicity	0.04	0.02
Class Year	−0.04	0.03	Class Year	−0.04**	0.01
Semester	0.05***	0.01	Semester	−0.01	0.01
Biweek of the Semester	0.01**	0.01	Biweek of the Semester	0.01	0.01
Day of the Week			Day of the Week		
Monday	0.10**	0.04	Monday	0.01	0.01
Tuesday	0.11**	0.03	Tuesday	−0.01	0.01
Wednesday	0.14***	0.03	Wednesday	0.01	0.01
Thursday	0.22***	0.03	Thursday	−0.01	0.01
Friday	0.32***	0.03	Friday	−0.02	0.03
Saturday	0.34***	0.03	Saturday	−0.02*	0.03
Pregaming	0.42***	0.02	Pregaming	0.01	0.01
			Number of Drinks	0.91***	0.01

Note. Linear GEE model. Number of drinks was normalized using a square root transformation. Cohort: Cohort 2 = 0, Cohort 3 = 1. Gender: Female = 0, Male = 1. Race/Ethnicity: Non-Hispanic white = 0, other = 1. Class Year: Freshman year = 0, Sophomore year = 1. Semester: Fall semester = 0, Spring semester = 1. Biweek of the Semester: Continuous variable, from biweek 1 to biweek 8. Day of the Week: Coded as 6 binary variables, with 0 for Sunday and 1 for the other day of the week. Pregaming: No pregaming = 0, Pregaming = 1.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 5

Pregaming Predicting Positive and Negative Alcohol-Related Consequences

Positive Alcohol-Related Consequences					Negative Alcohol-Related Consequences				
Variable	**B**	**SE B**	**IRR**	**95% CI**	**Variable**	**B**	**SE B**	**IRR**	**95% CI**
Cohort	0.06	0.06	1.06	[0.96 – 1.19]	Cohort	0.07	0.08	1.08	[0.91 – 1.27]
School (1 vs. 3)	−0.09	0.08	0.92	[0.79 – 1.06]	School (1 vs. 3)	0.18	0.12	1.20	[0.96 – 1.51]
School (2 vs. 3)	−0.16	0.06	0.85*	[0.75 – 0.96]	School (2 vs. 3)	0.12	0.09	1.13	[0.95 – 1.34]
Gender	−0.16	0.05	0.85**	[0.77 – 0.94]	Gender	−0.27	0.08	0.76**	[0.65 – 0.89]
Race/Ethnicity	−0.15	0.06	0.87*	[0.77 – 0.97]	Race/Ethnicity	0.07	0.08	1.07	[0.91 – 1.27]
Class Year	−0.20	0.03	0.82***	[0.78 – 0.86]	Class Year	−0.23	0.05	0.80***	[0.72 – 0.86]
Semester	−0.14	0.02	0.87***	[0.85 – 0.90]	Semester	−0.17	0.04	0.85***	[0.79 – 0.91]
Biweek of the Semester	−0.01	0.01	0.99***	[0.98 – 0.99]	Biweek of the Semester	0.01	0.01	1.01	[0.99 – 1.02]
Pregaming	0.17	0.02	1.18***	[1.14 – 1.23]	Pregaming	0.24	0.05	1.27***	[1.17 – 1.39]
Number of Drinks	0.18	0.01	1.19***	[1.17 – 1.22]	Number of Drinks	0.26	0.02	1.29***	[1.25 – 1.34]
Average Week eBAC	1.16	0.17	3.19	[2.27 – 4.47]	Average Week eBAC	4.35	0.41	77.12***	[34.73 – 171.23]

Note. Poisson GEE model. IRR= Incident Rate Ratio. Cohort: Cohort 2 = 0, Cohort 3 = 1. Gender: Female = 0, Male = 1. Race/Ethnicity: Non-Hispanic white = 0, other = 1. Class Year: Freshman year = 0, Sophomore year = 1. Semester: Fall semester = 0, Spring semester = 1. Biweek of the Semester: Continuous variable, from biweek 1 to biweek 8. Day of the Week: Coded as 6 binary variables, with 0 for Sunday and 1 for the other day of the week. Pregaming: No pregaming = 0, Pregaming = 1. Number of drinks was normalized using a square root transformation.

* $p < .05$.

** $p < .01$.

*** $p < .001$.