

# Breath Alcohol Concentrations of College Students in Field Settings: Seasonal, Temporal, and Contextual Patterns\*

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**ABSTRACT.** Objective: Seasonality in alcohol consumption has implications for epidemiology and prevention. In this research we examined seasonal, temporal, and contextual variation in drinking among college students at a large West Coast university. Method: We used a field survey (across a 3-year period) to collect anonymous breath alcohol concentrations from students sampled randomly as they walked on and near the campus on weekend nights. Results: After controlling for student demographics, we found that the breath alcohol concentration

samples we collected during the spring and winter were significantly higher than those collected during the fall. Subsequent analyses indicated that this difference could be attributed to fewer students drinking in the fall rather than to students consuming smaller quantities of alcohol. Conclusions: Seasonal trends in college student drinking mirror seasonal trends demonstrated in the general population. This research may help guide future intervention or prevention efforts. (*J. Stud. Alcohol Drugs* 69: 323-331, 2008)

**U**NDERSTANDING SEASONAL, temporal, and contextual variations in risky drinking behavior may have important implications for epidemiology and prevention. This may be particularly true for college populations relative to the working population, as the "campus lifestyle" allows greater flexibility regarding *when* to party and yields softer repercussions (e.g., missing a class vs missing work) when drinking gets in the way of day-to-day obligations. However, there is very little research in general and fewer college-focused studies that have addressed the seasonal and temporal aspects of drinking. Furthermore, to our knowledge, all such studies have relied on self-report measures of alcohol consumption that may correlate only weakly with actual consumption (e.g., Harrell, 1997).

Herein, we present the results of a field survey (Johnson et al., 2006) used to collect nighttime breath alcohol concentration (BrAC) samples of college students walking on or near the campus of a large, urban university. Using these objective data, we examined trends in student drinking across seasons, by time of evening, and by context (i.e., drinking location). This information may be useful in formulating prevention efforts by allowing health program

workers to target their efforts during the riskiest times and in the riskiest locations.

## *General population studies of seasonality*

Several researchers have linked seasonal spikes in risky alcohol consumption to holidays; for example, during the last 2 weeks of December (Vegaga, 1991) and in January (Carpenter, 2003). It also is well known by law enforcement workers that holidays, such as Independence Day and Memorial Day, are linked to heavy drinking and alcohol-related problems. Yet, limited research has addressed broader seasonal variations in drinking that are not associated particularly with holidays or special events. For example, Lemmens and Knibbe (1993) studied seasonal fluctuations of alcohol sales and corresponding changes in contexts and drinking companions using data from 1979 and 1980. They found that drinking frequency (reflected in alcohol sales) increased from winter to summer, despite the observed spike in drinking during the last 2 weeks of December. Further, they found that the quantity of drinks per occasion increased in the spring and summer, but the frequency of drinking did not. Fitzgerald and Mulford (1986) found a similar seasonal trend (among the general population) and also described very little variation in drinking context, with 80% of respondents reporting the same drinking contexts or very little change in context across seasons.

Seasonal variations in drinking, however, are not ubiquitous across all segments of the population. In the study by Lemmens and Knibbe (1996), male heavy drinking was consistent throughout the year, whereas female heavy drinking was much higher in the spring compared with other

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seasons. Uitenbroek (1995) studied seasonal variations of drinking in the Scottish population and found that seasonal variations for the entire population were very slight; however, for frequent heavy drinkers, seasonal alcohol consumption varied greatly between winter and summer. Research by Carpenter (2003) on drinkers in the United States revealed evidence of heavy drinking in January (following a December peak) regardless of age and ethnicity, but the research revealed no differences in heavy episodic drinking among the groups. White and black men and women were more likely to report heavy *episodic* drinking during January. Hispanic men, however, were more likely to report past-month heavy episodic drinking in June, whereas Asian groups showed no significant seasonal variations.

#### *College studies examining seasonal consumption patterns*

There has been minimal research on seasonality in drinking among the college student population, and the research that has been conducted has examined temporal variations in drinking that corresponded with class standing and events on the academic calendar. For example, Del Boca et al. (2004) found that the first 4 weeks of the fall semester were marked by elevated drinking by freshmen. This early period of high drinking rates was followed by a gradual decline, with marked peaks in drinking around Halloween, Thanksgiving, New Year's, and spring break. Declines in drinking seemed to fluctuate with the school schedule, with lower drinking rates being found near academic deadlines and examinations (Del Boca et al., 2004; Greenbaum et al., 2005).

Although research on college students has focused on correlates of alcohol consumption, such as holidays and examinations, it also is possible that broad seasonal variations in drinking exist among student populations just as they do among the general population (e.g., Carpenter, 2003; Fitzgerald and Mulford, 1986; Lemmens and Knibbe, 1993; Uitenbroek, 1995). The seasonal variations in drinking have implications not only for planning programs and interventions but also for measuring the prevalence of risky alcohol consumption in general, as the timing of data collection on and near campus could skew the rates to be higher or lower than is representative. Seasonal variation studies have been found to be more accurate than survey estimates of annual mean consumption (Lemmens and Knibbe, 1993), and even a temporal measure of use, such as past 2 weeks, might be highly influenced by holidays, special events, or circumstances (Del Boca et al., 2004).

The value in identifying seasonal variation in college student drinking may be extended further by examining temporal variations in drinking (e.g., time of night), as well as the drinking context (e.g., bars, own residence, parties). Thus, we examined BrAC data collected from students at a large, urban university across almost 4 years. We tested for

differences in BrACs among college students in the fall, winter, and spring months, as well as systematic differences within the fall and spring semesters (e.g., Del Boca et al., 2004). We further tested for differences in BrAC levels for the time of night and for seasonal differences in BrAC levels across different contexts of last-drink location.

## Method

### *Procedure*

Data, including BrAC test samples, were collected using our sidewalk survey method (see Johnson et al., 2006). We first identified 46 discrete geographic "sampling segments" on the campus of a large, West Coast university (see Figure 1). These sampling segments were selected from areas with a high probability of foot traffic on weekend nights (e.g., around dorms, dining halls, parking lots, off-campus eateries, and fraternity/sorority houses). Next, we defined a path that connected each segment to form a circuitous route. On data-collection nights, research staff traveled that route and, at each segment, randomly sampled one naturally occurring group of young people who volunteered to participate. The number of persons in each sampling segment (participants as well as nonparticipants) was counted.

Random sampling was accomplished by generating a random number (on the handheld computers that survey staff used to enter data) that indicated how many steps the survey team would walk into the sampling segment before attempting to recruit participants. Once the survey team reached the appropriate place in the segment, a staff member attempted to recruit the student (and his or her friends) closest to the survey team. We sampled and interviewed entire peer groups (rather than individuals) because our prior experience with field surveys suggested that individuals were less likely to participate if they were separated from their friends. Individuals were offered a coupon for a slice of pizza and a soft drink in exchange for their participation. Our analysis indicated that 33.6% of whole groups refused to participate. Of groups that agreed to participate, however, only 15% of the individuals within groups refused to take part in the study.

### *Survey questions*

Individuals who agreed to participate completed an oral interview with a survey staff member. Participant responses were entered directly into a handheld personal computer. Research questions fell into three broad categories: (1) basic demographics (e.g., age, gender, race-ethnicity) and student status variables (e.g., class, housing situation/location, whether they belonged to fraternity/sorority); (2) their drinking plans for the evening (their original plans for the

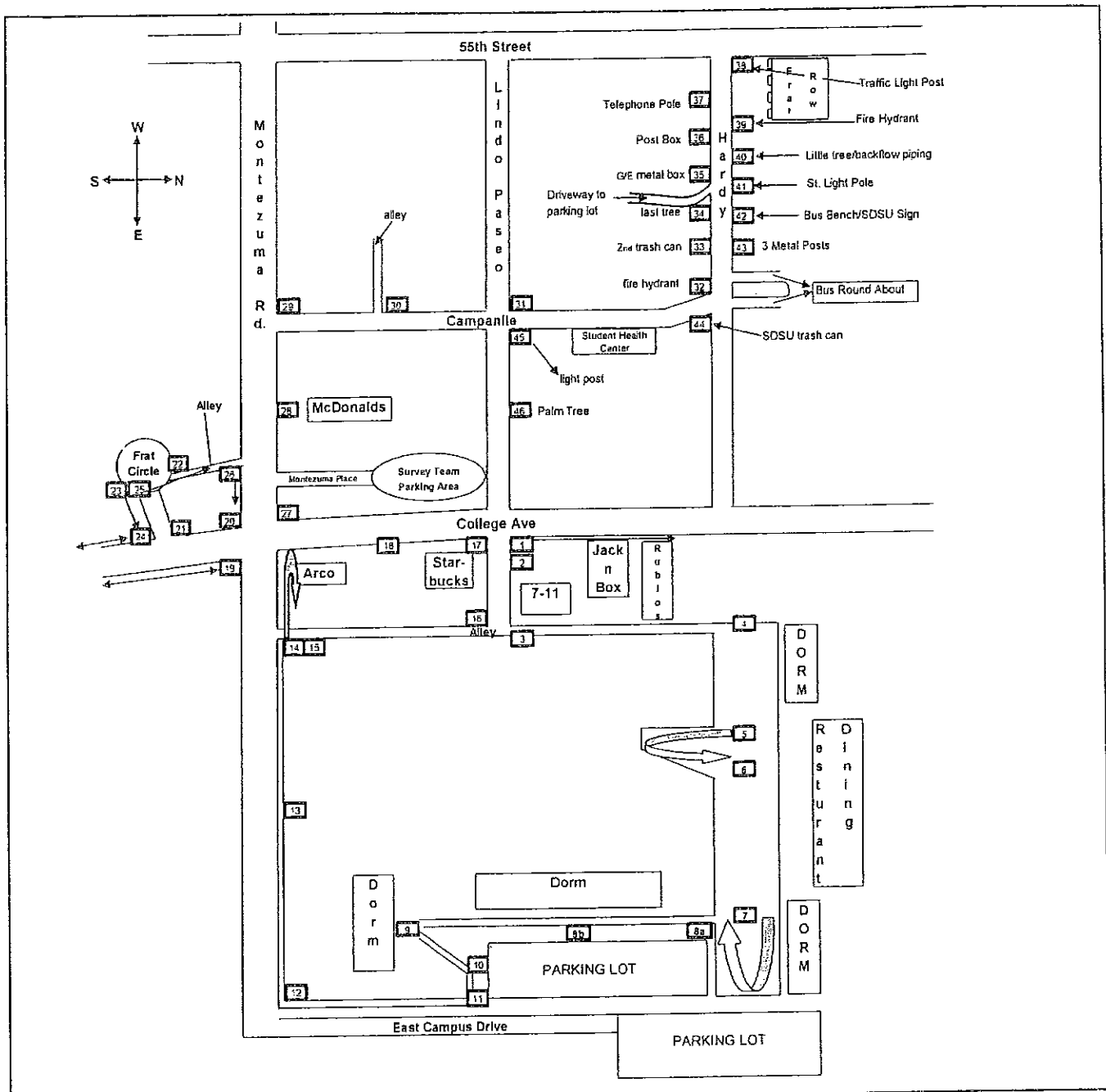


FIGURE 1. Map of the "sidewalk survey" route

evening, how much they intended to drink); and (3) their activity that evening (e.g., how much they consumed). We asked participants to indicate the type of event or place from which they were returning (e.g., their own residence, a friend's residence, a bar or restaurant, a private party) because this information was particularly relevant to this research. In addition, participants provided a breath sample for an anonymous BrAC test. The BrAC testing units (CMI Intoxilyzer 400, Owensberg, KY) did not display the participant's BrAC value but rather stored a three-digit read-

ing internally. The morning after data collection, the survey staff downloaded the BrAC data and merged it with the survey data.

*Sample*

We collected data (including a BrAC test) from 4,809 participants on 75 survey nights (Fridays and Saturdays) between May 2000 and May 2003. No data collection occurred on holidays, during special events, or immediately

before or during final examinations. After removing cases with missing data on key variables (primarily demographics such as age and fraternity/sorority status), we retained a working data set of 4,521 complete cases for analysis. Our final sample was composed of 65.5% men, 85.3% 20-year-olds and younger (median age = 19), 72.9% whites (non-Hispanic), and 20.5% fraternity/sorority members.

#### Case weights

Our sampling plan dictated that one participant group be sampled from a larger pool of individuals who were passing through the sampling segment at the time of data collection. At times, pedestrian traffic flow through the segment was heavy; therefore, the group sampled represented a small proportion of the total number of groups and the number of people in the segment. At other times, pedestrian traffic was slow; therefore, the group sampled was the only group in the segment. Because our goal is to infer the drinking behavior of the student population of interest, it is statistically appropriate to allow groups sampled from periods of heavier pedestrian traffic to count more than groups sampled from periods of lighter pedestrian traffic.

To accommodate this, we created weights for each group based on the inverse of the probability of being sampled from a particular segment at a particular time. These weights do not affect the sample size and thus should not increase power. They do, however, allow us to estimate drinking within the population with greater accuracy.

#### Analysis strategy

Our sampling method involved recruiting entire peer groups to participate in the research. Because people tend to be similar to their peers, members of the select groups would have similar substance-use goals and would patronize the same drinking environments as the other members in their group; consequently, they would tend to be more similar to each other than to individuals in other groups (at least it is not tenable to assume the contrary). The fact that responses within groups are correlated violates the general linear model assumption of independent observations. We therefore analyzed the data using generalized linear mixed modeling (GLMM), and accommodated the nonindependence of data by modeling the covariance structure (treating the *participant group* as a random variable). Our GLMM analysis was conducted using PROC GLIMMIX in SAS (Version 9.1; SAS Institute Inc., Cary, NC).

## Results

#### Analysis of seasonal trends

Our initial analysis examined differences in participant BrACs by season. We identified *winter* as including De-

ember, January, and February; *spring* as including March, April, and May; *summer* as including June, July, and August; and *fall* as including September, October, and November. Unfortunately, we did not collect any data during the summer months because the campus is less active, and we therefore anticipated low sample sizes.

First, we examined mean BrACs among spring ( $n = 1,490$ ), fall ( $n = 2,082$ ), and winter ( $n = 949$ ). This three-level season variable was the primary predictor in this analysis. However, we also included participant gender, age, membership in a fraternity/sorority, racial minority (white vs nonwhite), ethnicity (Hispanic vs non-Hispanic), and driver status (whether they planned to drive later) as control variables. In addition, we constructed a date variable to control for general linear trends across time. This date variable reflected the week, beginning in January 2000, during which data were collected. Our first data collection (on May 5, 2000) occurred during Week 18, and our last data collection (on May 10, 2003) occurred during Week 175.

Before testing any of our fixed-effect variables, we first estimated the effect of our random variable (in this case, participant group). Participant groups accounted for 7.3% of the variance in participant BrACs ( $p < .01$ ), thus necessitating the inclusion of participant-groups as a random variable in our analyses.

Our initial model (predicting BrACs) included the random participant-group variable, all fixed-effect main effects (seasons, gender, age, fraternity/sorority status, minority status, ethnicity, driver status, and survey week), and all two-way interactions involving season (no other two-way interactions, or any higher level interactions, were included). We followed a process of model development whereby, after testing, we trimmed the model to gain parsimony, first by removing all nonsignificant two-level interactions and then testing the model again. Then we removed all nonsignificant main effects (that also were not involved in significant interactions) and tested the model a third time. Thus, in our final model, only statistically significant effects remained. In the current analyses, the process of removing nonsignificant effects did not change the statistical significance of any other effect; nevertheless, it is a conservative approach that promotes parsimony and helps to rule out model indeterminacy.

The analysis revealed that a number of the control variables significantly predicted BrAC. Accordingly, men had higher BrACs than women, fraternity/sorority members had higher BrACs than nonmembers, white (non-Hispanic) participants had higher BrACs than nonwhite participants, Hispanic participants had higher BrACs than non-Hispanic participants, drivers had higher BrACs than nondrivers, and BrAC decreased linearly across the course of the study. Test statistics and point estimates for these effects are provided in Table 1.

TABLE 1. Summary of statistical tests for fixed-effect variables predicting BrAC

Effect	Statistical test	Model adjusted estimates of BrACs
Season	$F = 14.14, 2/2,223 \text{ df}, p < .01$	Winter = .040; spring = .037; fall = .023
Gender	$F = 100.14, 1/2,223 \text{ df}, p < .01$	Men = .042; women = .025
Fraternity status	$F = 16.58, 1/2,223 \text{ df}, p < .01$	Frat. sorority member = .038; nonmember = .029
Minority status	$F = 20.62, 1/2,223 \text{ df}, p < .01$	White (non-Hispanic) = .038; nonwhite = .029
Hispanic	$F = 16.58, 1/2,223 \text{ df}, p < .01$	Hispanic = .040; non-Hispanic = .027
Time trend	$F = 12.92, 1/2,223 \text{ df}, p < .01$	Standardized regression coefficient ( $\beta$ ) = -.07
Driver status	$F = 30.59, 1/2,223 \text{ df}, p < .01$	Driver = .043; nondriver = .024
Season $\times$ Hispanic	$F = 3.70, 1/2,223 \text{ df}, p < .05$	Hispanic participants: Winter = .030; spring = .030; fall = .021 Non-Hispanic participants: Winter = .051; spring = .044; fall = .025

Notes: BrAC = breath alcohol concentration; frat. = fraternity.

Importantly, the analysis revealed a statistically significant main effect for seasons ( $F = 14.14, 2/2,223 \text{ df}, p < .01$ ). BrACs during the fall (adjusted mean = .023) were significantly lower than those during the winter (adjusted mean = .040,  $p < .01$ ) and the spring (adjusted mean = .037,  $p < .01$ ). However, BrACs did not differ significantly between spring and winter ( $p = .43$ ). Estimated mean BrACs for each season (spring, fall, and winter) across the course of the study are presented in Figure 2.

Although it is not possible to compute traditional measures of effect size in random effects models, we estimated the partial eta squared for seasons by conducting the analysis using a random subset of the sample containing one

participant per peer group (thus eliminating the need to model peer group as a random variable). As is typical for field research involving BrACs, only a small unique effect size (partial  $\eta^2 = .01$ ) was associated with season in this analysis. Thus, although mean differences in BrAC between the fall and spring semesters are meaningful (the difference approximates one drink per hour), there is considerable variation in BrAC that is not explained by the variables in the model.

In addition to the main effect for season, the analysis revealed a statistically significant interaction between season and Hispanic ethnicity ( $F = 3.70, 1/2,223 \text{ df}, p < .05$ ). Results of this effect suggest that BrAC differences between

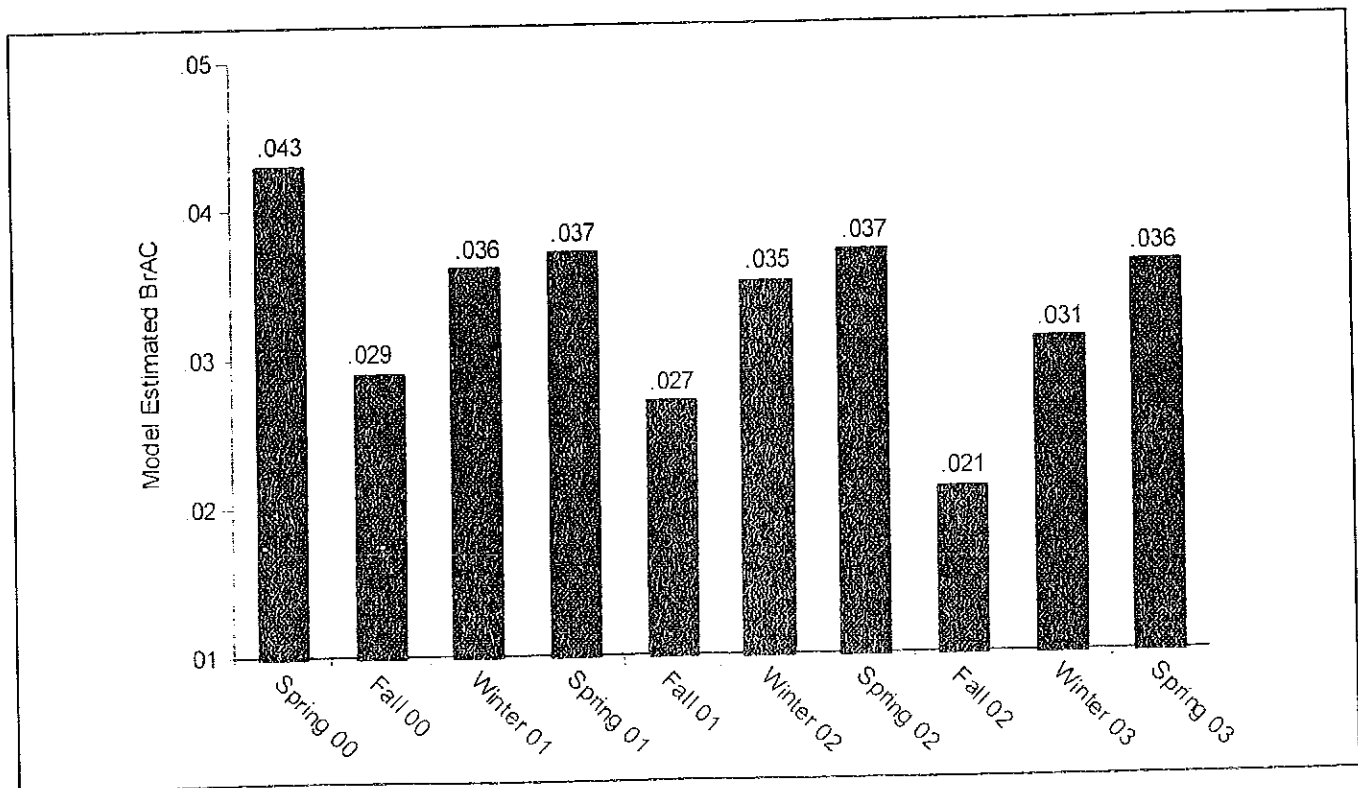


FIGURE 2. Estimated breath alcohol concentrations (BrACs) across time, by season and year

Hispanic and non-Hispanic participants were greater during the winter and spring than in the fall (see Table 1).

#### *Drinking less or drinking less often*

The differences in BrAC could be the result of fewer people drinking alcohol during the fall (i.e., we are sampling a higher proportion of nondrinkers), people drinking less during the fall, or both. We repeated our previous analyses (using the same set of variables as the final model), but this time we excluded individuals who did not drink (BrAC = 0). If the differences among seasons are because fewer people are drinking in the fall (rather than people are drinking less), then we would not expect to find seasonal differences in this subsample. However, our analysis revealed seasonal changes (similar to the previous analysis), even when examining only participants who had consumed alcohol ( $F = 5.97$ , 2/990 df,  $p < .01$ ). BrACs in the winter and spring (adjusted mean = .090 and .083, respectively) did not differ significantly from each other ( $p = .31$ ), but they did differ from BrACs in the fall (adjusted mean = .077, both  $p$  values  $< .01$ ). Thus, even among drinkers, the amount of drinking appears to change among seasons.

We also analyzed the likelihood that a participant was a drinker (i.e., had a nonzero BrAC) as a function of season. This analysis also revealed a statistically significant effect of season ( $F = 17.28$ , 2/2,223 df,  $p < .01$ ). The model-estimated proportion of drinkers during the winter (.30) and spring (.21) did not differ significantly ( $p = .08$ ), but both differed significantly (both  $p$ 's  $< .01$ ) from the proportion of drinkers in the fall (.10). In combination, these two latter analyses indicate that, during the fall, a significantly lower proportion of students from our population consumed alcohol, and among those who did drink, lower BrACs were observed in the fall than in the spring and winter.

An additional analysis was conducted to test for systematic differences in alcohol consumption within semesters; for example, we tested to see if students drank more heavily in the early, the middle, or the late portion of the semester. Data collection during the spring and fall semesters each occurred during 3 months per semester. Accordingly, months within semesters were coded as *early* (March and September), *middle* (April and October), and *late* (May and November). We included this intrasemester variable in a model along with season (spring and fall), survey week, and the Season  $\times$  Intrasemester interaction (the model also included the same demographic covariates as the previous models). The model did not reveal a statistically significant main effect for intrasemester ( $p = .99$ ), nor was there a statistically significant interaction between Season and Intrasemester ( $p = .40$ ). During the spring, model-estimated BrACs were .033, .035, and .037 (ns) for early, middle, and late, and in the fall, estimated BrACs were .027, .026, and .022 (ns) for early, middle, and late, respectively.

#### *Analysis of time-of-night trends*

We collected data between 8 PM and 2 AM. A time variable was created to reflect the hour block during which data collection occurred. The time variable comprised a 7-point scale reflecting hour blocks, where "1" reflected 8:00-8:59 PM and "7" reflected 2:00-2:59 AM.

GLMM was used to predict BrAC from time of night, controlling for participant gender, age, minority status, ethnicity, membership in a fraternity/sorority, driver status, and date (weeks during the project). Only main effects were included in the model. Although the time variable reflected hour blocks, it was treated as a continuous regressor in analysis. We thought that this approach was conservative in that only a linear relationship between time and BrAC would yield statistical significance. If time were treated as a seven-level categorical variable, analysis may have found significant differences in BrACs, even if there was no clearly interpretable pattern of BrACs across time.

Our analysis found a statistically significant and positive linear effect of time of night ( $F = 4.40$ , 1/2,221 df,  $p < .05$ ; unstandardized regression coefficient = .008). Estimated mean BrACs increased linearly from .014 at Hour 1 (8 PM) to .079 at Hour 8 (3 AM). These estimates control for participant gender, fraternity/sorority status, minority status, Hispanic ethnicity, driver status, and week since the start of the project. The BrAC estimates were made assuming values on the control variables as found in the sample (i.e., 65.5% men, 20.5% in fraternities/sororities, 27.1% nonwhite, 9.9% Hispanic, and 4.8% drivers). The estimates were computed also assuming the study was 88 weeks into the project. Using the same approach for estimating effect size as we used previously (i.e., selecting at random one participant per group to eliminate the need for modeling group as a random effect), we found that time of night had a partial  $\eta^2$  of .10.

#### *Drinking locations across time*

We examined BrACs as a function of types of locations from which participants had come when they were sampled. Presumably, these locations were the place of the last drink. We also were interested in examining differences among drinking locations as a function of semester. As part of our survey, participants were asked whether they were coming from 1 of 11 types of locations: (1) my place, (2) friend's place, (3) family's home, (4) study location, (5) bar, (6) private party, (7) restaurant, (8) store, (9) outdoor recreation area, (10) transportation center, and (11) other. Because some categories received limited responses, we aggregated the responses into five locations: (1) my place ( $n = 1,666$ ), (2) friend's place ( $n = 890$ ), (3) bar or restaurant ( $n = 456$ ), (4) private party ( $n = 817$ ), and (5) other ( $n = 692$ ).

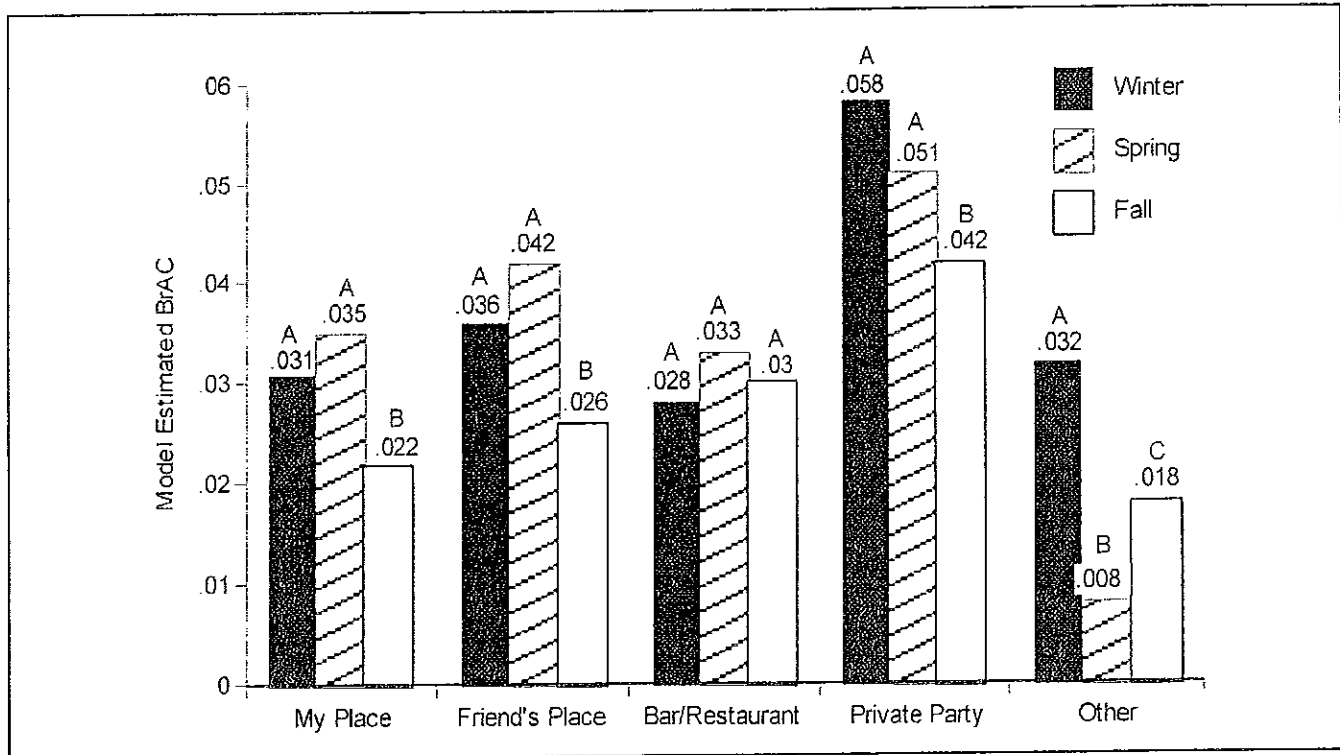


FIGURE 3. Estimated breath alcohol concentrations (BrAC) by drinking context and season. Note: Within each context, BrAC estimates with different superscripts are statistically significant at the .05 level. Risk of Type I error was controlled using Scheffe testing.

The analysis examined the Location  $\times$  Season interaction (along with the appropriate main effects) on participants' BrACs. Participants' gender, age, minority status, Hispanic ethnicity, fraternity/sorority status, and driver status were used as control variables, as was the linear weekly time variable. The analyses revealed significant main effects for season (described previously) and for location ( $p < .01$ ), as well as a statistically significant Season  $\times$  Location interaction ( $F = 3.59$ ,  $8/2,212$  df,  $p < .01$ ).

Table 2 depicts model-estimated BrACs by location. Accordingly, BrACs from participants returning from private parties were significantly higher than those from all other locations, and BrACs from participants returning from unspecified locations (other) were significantly lower than those from all other locations. Figure 3 depicts estimated BrACs as a function of drinking location and season. Within each context, estimated means with different scripts are sta-

tistically significant at the .05 level. Scheffe testing was used to control for the risk of making a Type I error. The pattern of lower BrACs being observed during the fall (relative to the spring and/or the winter) was found in participants returning from their own residences, friends' residences, private parties, and other locations. Season appeared not to matter only for participants returning from bars and restaurants.

## Discussion

We examined seasonal variations in BrAC samples taken in the field during a random nighttime survey. Similar to general population studies, we found an increase in drinking outcomes (BrAC levels) from fall to spring. Given our BrAC outcome variable, the results we report are consistent with those of Lemmens and Knibbe (1993), who found an increase in drinks per occasion during the spring. Interestingly, when we did not collect data around holidays and special academic events (see Del Boca et al., 2004), we found no significant BrAC differences within semesters.

Although these patterns are consistent, the reason for them is not obvious. Better weather in spring is an obvious plausible explanation; however, our data were collected in southern California, where weather shifts across seasons are minimal. Future research is needed in which colleges from a variety of weather conditions are studied to examine if the weather per se is associated with college-drinking

TABLE 2. Model-estimated BrACs, by location

Location	Estimated BrAC
My place	.030 <sup>a</sup>
Friend's place	.035 <sup>a</sup>
Bar/restaurant	.031 <sup>a</sup>
Private party	.051 <sup>b</sup>
Other	.019 <sup>c</sup>

Notes. Estimates with different superscripts are statistically significant at the .05 level. Risk of Type I error was controlled using Scheffe testing. BrAC = breath alcohol concentration.

behaviors. Lower consumption levels during the fall may also be the result of "re-adjusting" to school life after summer break. It may take several months before students can efficiently juggle social and academic activities, requiring them to limit alcohol consumption until acclimated. Alternatively, campus administrations may choose to "crack down" on campus drinking early in fall in the hope of discouraging student drinking behavior later in the year.

Social variables related to seasonal shifts have yet to be carefully examined. Several interesting research questions relate to social factors that may influence seasonal variations in drinking. Do fall "back to school" parties, for instance, give way to more dating and smaller events in the spring? If so, why do spring events involve increased amounts of alcohol consumption? Our finding that spring drinking was heavier in certain contexts and not others would benefit from research addressing these questions.

### *Limitations*

These findings need to be interpreted with caution because of their inherent limitations. The study is descriptive rather than explanatory and much remains to be understood regarding the association between drinking patterns and time of year the alcohol is consumed among college students. The study was conducted in southern California at a large university; thus, the findings are not generalizable to regions that are colder during the late fall and early spring months. The data would be generalizable only to larger universities with the bulk of students commuting to campus. We sampled students who walked in specified areas; thus, answers from students who drive to a destination on campus would not have been included in our data.

Our data are further limited by the response rate; it is possible that those who refused to participate drank more or less than our participants. Additionally, cautions for report reliability must be considered because data used in this study are partially self-reported. Although we cannot be completely confident that our survey method (see Johnson et al., 2006) produced an unbiased sample, sample bias cannot explain the clear seasonal pattern of results. Despite these limitations, this is the only study to examine seasonal differences for college student drinking patterns, and it is the only study that used an objective biological measurement for BrACs rather than relying totally on self-report.

### *Implications for future research*

Given that drinking events tend to be dynamic (e.g., multiple settings, multiple social contexts), understanding the complex relationships among BrAC, time of night, location, and problem risk have both basic and applied scientific applications (Clapp et al., 2001). At a fundamental

level, studies of person, group, and environmental interactions related to drinking behaviors are important to the field's understanding of the etiology of heavy drinking and alcohol-related problems such as drunk driving. Although the current study has limitations, it begins to address some of these complex issues in a descriptive way.

The applied implications associated with the present study are several. Drinking behavior and drinking environments are typically studied using retrospective survey methodologies that require respondents to recall drinking events and behaviors several weeks or months after they occur. Recent field studies by Hustad and Carey (2005) and Clapp et al. (2006) have called into question the accuracy of such reports. Field studies such as the one presented here help overcome potential recall errors by asking questions about drinking environments minutes or hours after they have occurred. Further, the use of breathalyzers eliminates the need for respondents to recall the number of drinks they consumed. Thus, the methodology used here, although costly, has several important advantages over typical survey methodologies.

From a prevention standpoint, understanding where and when heavy drinking occurs is important. Common strategies such as norms correction campaigns (DeJong et al., 2006) target individuals rather than environments. Although these approaches have been touted as being protective (i.e., drinking does not increase for students exposed to them at the same rate as it does for students not exposed to them), they are removed from the settings in which drinking occurs. More proximal prevention efforts (i.e., designated driver campaigns) or prevention efforts that target environments through ordinances or policies (i.e., noise ordinances) might benefit from the types of data generated in field studies like the present one. Understanding seasonal and temporal changes in student drinking may facilitate implementation of more effective countermeasures and contribute to greater reduction in alcohol-related harm.

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