

# Collegiate Alcohol Consumption and Academic Performance

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**ABSTRACT. Objective:** Although studies consistently have found a negative bivariate association between alcohol use and academic performance among college students, some research suggests that this association largely results from student differences at matriculation. The present study examines this relationship while controlling for key background factors. **Method:** Personal interview surveys were conducted for four consecutive semesters with random samples of students at a small, liberal arts college, resulting in a combined sample of 754 (392 women). The interviews measured alcohol consumption, gender, race, athletic status, academic class, parents' education and income, and frequency of attending off-campus parties; and 94% of the sample granted permission to obtain grade point average (GPA), high school class rank, and Scholastic Aptitude Test (SAT) scores from official college records. **Re-**

**sults:** The amount of alcohol consumed correlated significantly with GPA ( $r = -.26$ ). Ordinary least squares regressions showed that gender and partying accounted for 43% of variation in alcohol consumption, and that academic class and parents' income had positive indirect effects on consumption. SAT score and class rank were the strongest predictors of GPA, but alcohol consumption remained significant when these and other variables were controlled ( $\beta = -.24$  when controlling for SAT, and  $\beta = -.14$  when controlling for both SAT and class rank in a smaller, biased subsample). **Conclusions:** The disparity in findings between this and previous research was explained in terms of differences in type of institution studied, which suggests the need to consider the college context and the interaction of college and individual factors in studies of college drinking. (*J. Stud. Alcohol Drugs* 68: 548-555, 2007)

**D**URING THE PAST 2 DECADES, college drinking has become the focus of increasing concern. Spurred by a widely cited national survey of heavy episodic drinking in the early 1990s (Wechsler et al., 1994), researchers have turned their attention to a range of problems connected to student alcohol misuse, including negative effects on the drinkers themselves such as personal injury, physical illness, and death as well as damages to other people and institutional costs. Surveying the adverse consequences of student drinking, Perkins (2002) concluded that "at least 10% of students and frequently as much as one third of the population are negatively affected in a given year" (p. 99).

Of particular interest to educators is the association between alcohol consumption and academic performance. This relationship has been inferred from two types of evidence: (1) students' subjective determination that alcohol has impaired their performance and (2) correlations between self-reported alcohol consumption and grades. For example, in the 1999 College Alcohol Study (CAS; Wechsler et al., 2000)—a mail survey based on a nationally representative sample of 14,138 students—62.5% of students who identified themselves as frequent heavy episodic drinkers (called "binge" drinkers in the Wechsler et al. study) reported that

they had missed a class, and 46.3% said that they had fallen behind in their schoolwork as a consequence of their drinking. By comparison, these problems occurred less than 10% of the time among non-heavy episodic ("nonbinge") drinkers. Similarly, in a survey of a nationally representative sample of 28,774 undergraduates (Presley and Pimentel, 2006), "heavy and frequent" drinkers were far more likely than "nonheavy" drinkers to report that they had missed class (64.4% vs 11.9%) and that they had performed poorly on a test or other project (40.2% vs 6.8%) because of drinking. An association between drinking and self-reported grade average also has been found in several studies. For example, both a 1993-1994 national survey of 12,081 students from 168 colleges and universities (Engs et al., 1996) and the 2005 Core Alcohol and Drug Survey, a survey of 57,255 undergraduates at 132 selected colleges (Core Institute, 2006), found an inverse relationship between self-reported grade point average (GPA) and the number of drinks consumed per week.

Although suggestive, both sets of findings are open to interpretation. In the first case, people may perceive a connection between drinking and study habits as a way of rationalizing their poor academic performance. In addition, in neither case does correlation imply causality. It is possible that poor academic performance is a cause rather than a consequence of heavy drinking. In fact, among adolescents academic failure has been shown to predict subsequent heavy alcohol and illicit drug use (Hawkins et al.,

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1992); further, high school GPA has been linked—through senior-year substance use—to young adult alcohol and illicit drug use (Schulenberg et al., 1994). It is also possible that the relationship is spurious—that one or more other variables are the cause of *both* problematic alcohol use and academic problems. Recent studies that have addressed these issues have produced inconsistent results.

In one of the few longitudinal studies of this relationship, Aertgeerts and Buntinx (2002) applied Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (American Psychiatric Association, 1994), criteria to assess the impact of alcohol abuse and alcohol dependence in a cohort of 3,518 first-year students at the Katholieke Universiteit Leuven, Belgium. The researchers measured alcohol use during the students' first year and then checked official university records to determine whether the students passed or failed an exam that would allow them to continue their studies. Students who met the criteria for alcohol dependence (3.6% of the sample) were more likely to fail than others; however, there was no significant association between alcohol abuse (identified in 10.5% of the sample) and exam failure.

Two studies conducted multivariate analyses of CAS data. Using the 1997 and 1999 waves of the CAS, Powell et al. (2004) examined students' perceptions of the impact of alcohol consumption on "study habits." When variables such as class year, living arrangements, parental drinking behaviors, and parental education were controlled, the effect of drinking behavior on the probability of missing class was substantially reduced and the effect on getting behind in school was nonsignificant. However, further analysis specified the relationship, showing that, according to student perceptions, drinking affected both study habits for upper-year classes but had no significant impact among first-year students.

With the notable exception of parental drinking behavior and education, Wolaver (2002) controlled for many of the same variables in analyzing the impact of drinking on study hours and self-reported GPA in the 1993 wave of the CAS. She found negative effects on study hours and GPA with four different measures of drinking behavior: heavy episodic drinking, frequency of heavy episodic drinking, intoxication, and frequency of intoxication. Irrespective of frequency, intoxication had a larger effect than heavy episodic drinking for both study hours and GPA. In addition, intense alcohol use lowered GPA both directly and indirectly by depressing daily study hours, and the association between drinking and academic performance was stronger for students younger than age 21 than for those 21 and older.

In contrast to the results from these national cross-sectional surveys, studies at two different institutions suggest that the association between problematic alcohol use and academic problems may be the result of student differences

on admission to college. Wood et al. (1997) followed 444 students at a large, midwestern university, half of whom were diagnosed as being at risk for alcoholism, during a period of 6 years. Measuring alcohol use and other factors during the first year of college, they found a bivariate correlation of .32 between composite measures of alcohol involvement and subsequent academic problems. But when other baseline variables (in particular, academic aptitude, high school class rank, drug use, deviance, and gender) were controlled, the effect of alcohol involvement was nonsignificant.

Finally, Paschall and Freisthler (2003) studied the effects of heavy alcohol use, alcohol-related problems, and drinking opportunities on academic performance during the first year of college among 465 students at the University of California, Berkeley. Contrary to many other studies, none of the alcohol measures was related to self-reported college GPA, either before or after controlling for self-reported high school GPA, age, gender, and race. On the other hand, similar to the effects of high school class rank in the Wood et al. (1997) study, both heavy drinking and college GPA were associated with high school GPA.

Although these findings clearly point to the need to control for precollege factors, especially academic aptitude and prior academic achievement, several aspects of the studies limit their generalizability. First, both studies focused on alcohol consumption during the first year of college; thus, they leave unanswered the question of whether academic problems occurring later in college can be attributed to later alcohol misuse. Second, neither sample is representative of the student body. In the Wood et al. (1997) study, half of the students were diagnosed as at risk for alcoholism. In the Paschall and Freisthler (2003) study, attrition resulted in complete data for only 37% of an initial random sample, and the authors reported that men, students with lower high school GPAs, and those who reported higher levels of drinking were underrepresented.

Third, the measures of alcohol use differed in the two studies. Wood et al. (1997) constructed a comprehensive measure of "alcohol involvement" based on indicators of consumption as well as negative alcohol consequences and alcohol dependence. On the other hand, Paschall and Freisthler (2003) used the standard measure of heavy episodic drinking: five or more consecutive drinks for men and four or more consecutive drinks for women within the past 2 weeks. Several studies that examined the bivariate association between drinking and academic performance, such as the CAS, have focused on heavy episodic drinking, and most of this research has compared heavy with nonheavy *drinkers*. Ignoring nondrinkers, however, may underestimate the association between drinking and academic performance.

Fourth, measures of academic performance also varied. In contrast to the other studies reported above, which relied

on self-reports, Wood et al. (1997) obtained grades and other information from college transcripts to create a measure of "academic problems." Such data are certainly more reliable and valid than self-reports; however, the Wood et al. operationalization included indicators of severe academic difficulties, such as number of semesters on probationary status and whether students completed a degree within 6 years of matriculation, which raises the question of whether alcohol use has more proximate effects on academic performance in terms of exam, course, and semester grades. Given the consistent finding of a bivariate association between drinking and self-reported GPA, it is important to know whether this association will remain when more valid measures of GPA are used and when key background variables are controlled.

Examining data gathered at a liberal arts college, the present study rectifies many of the problems with prior studies of the connection between college alcohol consumption and academic performance. In particular, grade data were obtained from official college records rather than self-reports; several key variables, including measures of academic aptitude, prior academic achievement, and parents' education, were controlled in the analysis; and the sample was randomly selected with a high response rate.

Although unique in some ways, the college in the present study also has several characteristics that make it a good site for testing this relationship. As a small (2,700 students), very competitive, residential college in the northeastern United States, it is among those types of schools and in the part of the United States with the highest rates of heavy drinking (Wechsler et al., 2000). Most typically, students consume alcoholic beverages while "partying" on weekend nights. In addition, using this institution effectively controls for the effects of attrition on the association between alcohol use and academic performance. High attrition may lead to an underestimation of the magnitude of this association because many students who drop out may "experience academic problems due to alcohol misuse/abuse" (Wood et al., 1997, p. 201). However, the college has a very low attrition rate, the 4-year graduation rate annually hovers around 90%, fewer than 10 students per year (less than 1% of each class) are suspended or dismissed for academic reasons, and students who drop out or transfer almost invariably report that they do so for financial or personal reasons. Finally, unlike many other highly selective colleges, where few grades are given below B+ and grade inflation limits grade variability, there has been comparatively little inflation in recent years at the college in this study. In the fall 2003 semester, the mean grade was 3.19 on a 4.0 scale. Thus, the effects of alcohol consumption can be estimated in terms of a relatively wide range of academic performance.

In short, the data presented here should clarify whether poor academic performance is, at least at this type of col-

lege, "a product of the drinking lifestyle of students or simply a covariate where both drinking and [academic performance] reflect other influences in one's social background" (Perkins, 2002, p. 98).

## Method

### *Sample*

Participants were 754 students at a northeastern U.S. liberal arts college who were interviewed during one of four consecutive semesters between fall 2003 and spring 2005. Each semester a simple random sample of the student body was drawn, with sample sizes varying from 180 in spring 2005 to 220 in spring 2004 to 260 in fall 2003 and fall 2004. Response rates were consistently high, averaging 89.3% and yielding a total of 822 interviews. Some respondents, however, were selected and interviewed in more than one survey. For these respondents, a single interview was randomly selected in compiling the combined data set.

### *Data collection*

In all four surveys students enrolled in a research methods course conducted structured, face-to-face interviews with fellow students as part of a class project. Each survey provided informed consent to all participants and was approved by the college's institutional review board. Interviewers received thorough training on survey interviewing and were carefully supervised, and all interviews were validated by the supervisor. Fall surveys were conducted in October and early November and the spring surveys in late March and April. Although each survey focused on a different topic (e.g., health issues, politics, friendship), the main questions analyzed here were included in all four surveys. At the conclusion of the interview, respondents were asked for permission to retrieve information from official college records, including grades, high school class rank, and scores on the SAT. No less than 93.8% gave permission during any one semester; overall, 94.4% of the combined sample granted permission.

### *Measures*

*Academic performance.* Two measures of academic performance were added to the data file at the end of the semester during which the survey was conducted: a student's average grade during the semester of the survey (semester GPA) and his or her cumulative average grade at that point (cumulative GPA).

*Alcohol consumption.* Three questions were asked about alcohol consumption. First, students were asked, "How would you describe your consumption of alcohol? Do you

abstain from drinking or would you describe yourself as a light, moderate, or heavy drinker?" Nonabstainers were then asked how often they drink alcoholic beverages, with seven possible responses ranging from "about once a year" to "almost every day." Finally, they were asked, "On a typical weekend night when you choose to drink, about how many drinks do you consume? Consider one drink as a bottle of beer, a glass of wine, a wine cooler, a shot glass of liquor, or a mixed drink." In operationalizing frequency of consumption and amount consumed, abstainers were assigned a code of zero for the second and third questions.

As an alternative measure of alcohol use and partial check on the validity of the latter measures, in the fall 2003 survey students also were asked the CAS standard measure of heavy alcohol use (see, e.g., Wechsler and Nelson, 2001), which varies for men and women respondents. First, all respondents were asked when they most recently drank an alcoholic beverage: within the last week, within the last 2 weeks, 3-4 weeks ago, or more than a month ago. If they had drunk within the last week or last 2 weeks, men were asked, "During the last two weeks, how many times have you had five or more drinks in a row, that is, within a couple hours?" (Women were asked how often they had "four or more drinks.") Frequency of heavy alcohol use was operationally defined as responses to the second question, with abstainers and those not drinking in the previous 2 weeks coded as zero. This measure showed a moderate to high correlation with both frequency of consumption ( $r = .59$ ) and amount consumed ( $r = .70$ ).

*Academic aptitude.* Academic aptitude was represented by a student's combined verbal and math scores on the SAT, obtained from student records. SAT scores were available for 680 respondents (90.2% of the sample).

*High school class rank.* High school class rank, also obtained from official records, was transformed into a percentile score equal to  $100 - (\text{rank} / \text{graduating class size})$ . Unfortunately, high schools had provided this information for 388 respondents only (51.5% of the sample) with the proportion increasing by academic class, from 45.6% of first- to 56.1% of fourth-year students. In addition to this class bias, students for whom high school rank data were available differed in several ways from those for whom data were not available: They had significantly higher semester and cumulative GPAs and reported a lower frequency of drinking and a lower amount of alcohol consumed. Consequently, the subset of cases with high school rank may underestimate the magnitude of the relation between alcohol consumption and academic performance.

*Frequency of partying.* In two semesters (fall 2004 and spring 2005), students reported how often they attended off-campus parties on an 8-point scale ranging from 0 (never) to 7 (nearly every day).

*Demographics.* Additional measures were obtained for gender, academic class, race/ethnicity, athletic status, pa-

rental level of education, and parents' annual income. Academic class was highly correlated with age at this institution ( $r = .88$ ); therefore, class essentially served as a proxy for age and was treated as an interval-level variable. Given the relatively low proportion of nonwhite respondents and the consistent association between being white and heavy alcohol use found in prior research, race/ethnicity was coded as a white/nonwhite dichotomy. Athletic status also was coded as a dichotomy based on whether a student was an intercollegiate athlete. Parental education was operationalized as the sum of father's and mother's education, each measured according to 5 categories ranging from 1 (less than high school) to 5 (graduate or professional degree). Parents' income was measured by asking respondents to estimate their parents' combined income the previous year using 8 categories ranging from 1 (less than \$25,000) to 8 (\$200,000 or more).

## Results

### *Sample characteristics*

In the initial sample of 754 students, 52% were women, 85% were white, 99.5% ranged in age from 18 to 23 years old, and 88% lived on campus. By academic class, 27.1% were first-, 26.5% second-, 20.4% third-, and 26.0% fourth-year students. These figures very closely correspond to characteristics of the college as a whole as well as the subsample of 680 respondents for whom SAT scores were available.

One in eight students reported that they abstained from drinking, and two thirds reported that they drank at least 1 to 2 times a week. The average (SD) number of drinks consumed on a typical weekend night was 5.62 (3.90). Men and women did not differ significantly in frequency of alcohol consumption ( $p > .05$ ), but men consumed significantly more drinks than did women (mean = 7.26 [4.38] vs 4.11 [2.62], respectively;  $t = 3.90$ , 752 df,  $p < .001$ ).

### *Bivariate correlations*

For comparability across analyses, Table 1 reports variable means and SDs, and Table 2 reports the intercorrelations among all variables for the 680 students with SAT scores. Excluding frequency of partying, measured in two of the four semesters, and variables measured with official records, there were few missing values except for parents' income. For two cases with missing data on amount of alcohol consumed, mean values were imputed from nonmissing data based on the gender of the respondent; for eight cases with missing values on either mother's or father's level of education, missing values were imputed from the value of the nonmissing parent. For the baseline sample, 148 respondents either refused to report their parents' income or, more commonly, did not know. Because

TABLE 1. Means and SDs of study variables

Variable	N	Mean (SD)
Amount of alcohol consumed <sup>a</sup>	680	5.72 (3.85)
Frequency of consumption <sup>b</sup>	680	4.38 (1.82)
Cumulative GPA (0-4.0 scale)	680	3.17 (0.412)
Semester GPA	680	3.22 (0.471)
SAT total	680	1,259 (117)
High school percentile class rank <sup>c</sup>	371	90.00 (9.10)
Male <sup>d</sup>	680	0.47 (0.500)
White <sup>d</sup>	680	0.87 (0.338)
Intercollegiate athlete <sup>d</sup>	680	0.26 (0.442)
Academic class	680	2.46 (1.15)
Parents' level of education <sup>e</sup>	680	8.06 (1.84)
Parents' combined income <sup>f</sup>	680	\$135,408 (\$55,062)
Frequency of partying <sup>g</sup>	333	3.40 (1.71)

Notes: GPA = grade point average. <sup>a</sup>Number of drinks consumed on a typical weekend night; <sup>b</sup>categories are 0 = never, 1 = about once a year, 2 = several times a year, 3 = about once a month, 4 = 2-3 times a month, 5 = 1-2 times a week, 6 = 3-4 times a week, 7 = almost every day; <sup>c</sup>100 - rank/graduating class size; <sup>d</sup>dummy variable with 1 = characteristic present; <sup>e</sup>sum of mother's and father's education level, each measured on 5-point scale with 1 = less than high school, 2 = high school degree, 3 = some college or associate degree, 4 = college degree, 5 = graduate or professional degree; <sup>f</sup>measured with midpoints of eight response categories: less than \$25,000, 25,000-39,999, 40,000-59,999, 60,000-79,999, 80,000-99,999, 100,000-149,999, 150,000-199,999, and 200,000 or more (midpoint = 225,000); <sup>g</sup>categories are 0 = never, 1 = less than once a month, 2 = about once a month, 3 = 2-3 times a month, 4 = about once a week, 5 = about twice a week, 6 = 3-4 times a week, 7 = nearly every day.

eliminating these cases from multivariate analyses would produce a smaller and possibly less representative sample, the mean income of nonmissing cases was assigned to missing values. Correlations with the recoded income variable tended to be slightly lower than correlations with income for nonmissing cases only (e.g.,  $r = .145$  and  $.158$ , respectively, with amount consumed); hence, regression models may underestimate the influence of parents' income.

Overall, the correlations indicated, first, that amount consumed was more strongly associated with academic performance ( $r = -.26$  with cumulative GPA) than frequency of

consumption ( $r = -.16$ ). This is consistent with cross-sectional surveys from several countries, which show that a range of alcohol-related problems tends to correlate with volume consumed (Bondy, 1996). Second, amount consumed tended to be more strongly associated with other independent variables than frequency of consumption. The only major exception to this pattern was that frequency of consumption related more strongly to academic class ( $r = .19$ ) than amount consumed ( $r = .08$ ;  $z = 2.01$ ,  $p < .05$ ). Third, the pattern of correlations was very similar for semester and cumulative GPA; in fact, none of the differences in correlations between these two measures was statistically significant ( $p > .05$ ). Therefore, multivariate analyses focused on amount consumed and cumulative GPA.

The correlations among other variables also reinforce the need to control for various background factors in examining the relation between alcohol use and academic performance. Every variable in Table 2 except academic class and parents' income correlated significantly with cumulative GPA, and every variable except SAT total score correlated significantly with alcohol consumption.

#### Multivariate analysis

Table 3 shows the ordinary least squares regressions for amount consumed. Model 1 presents data for the subsample of 680 with SAT scores; Models 2 and 3 present data for the two semesters in which frequency of partying was measured. When amount consumed was regressed on the background variables, excluding high school class rank, for the larger sample, gender, race, academic class, and parents' income were significant predictors. When the same variables were included in the smaller sample in Model 2, the regression coefficients were similar to Model 1 except for race, which was not statistically significant. Model 3 shows, however, that gender and frequency of attending off-campus parties were relatively strong predictors, whereas the

TABLE 2. Intercorrelations among study variables<sup>a</sup>

	1	2	3	4	5	6	7	8	9	10	11	12
1. Amount consumed												
2. Frequency of consumption	.68 <sup>†</sup>											
3. Cumulative GPA	-.26 <sup>†</sup>	-.16 <sup>†</sup>										
4. Semester GPA	-.26 <sup>†</sup>	-.15 <sup>†</sup>	.87 <sup>†</sup>									
5. SAT total	.05	.02	.38 <sup>†</sup>	.31 <sup>†</sup>								
6. High school class rank	-.16 <sup>†</sup>	-.17 <sup>†</sup>	.36 <sup>†</sup>	.30 <sup>†</sup>	.22 <sup>†</sup>							
7. Male	.41 <sup>†</sup>	.06	-.22 <sup>†</sup>	-.25 <sup>†</sup>	.09*	-.16 <sup>†</sup>						
8. White	.13 <sup>†</sup>	.08*	.28 <sup>†</sup>	.22 <sup>†</sup>	.41 <sup>†</sup>	.11*	.01					
9. Intercollegiate athlete	.13 <sup>†</sup>	-.02	-.14 <sup>†</sup>	-.16 <sup>†</sup>	-.12 <sup>†</sup>	-.07	.11 <sup>†</sup>	.01				
10. Academic class	.08*	.19 <sup>†</sup>	.05	.12 <sup>†</sup>	.02	-.11*	-.01	.08*	-.03			
11. Parents' education	.08*	.12 <sup>†</sup>	.12 <sup>†</sup>	.10 <sup>†</sup>	.15 <sup>†</sup>	-.10*	-.04	.16 <sup>†</sup>	.03	.07		
12. Parents' income	.16 <sup>†</sup>	.18 <sup>†</sup>	.02	.03	.06	-.19 <sup>†</sup>	-.01	.18 <sup>†</sup>	.12 <sup>†</sup>	-.03	.39 <sup>†</sup>	
13. Frequency of partying	.51 <sup>†</sup>	.61 <sup>†</sup>	-.11*	-.12*	-.02	-.15*	.09	.05	.16 <sup>†</sup>	.17 <sup>†</sup>	.18 <sup>†</sup>	.24 <sup>†</sup>

Notes: GPA = grade point average. <sup>a</sup> $n = 371$  for high school class rank;  $n = 333$  for frequency of partying; otherwise,  $n = 680$ .

\* $p < .05$ ; <sup>†</sup> $p < .01$ .

TABLE 3. OLS standardized regression coefficients for amount consumed

Variable	Model 1 <sup>a</sup>	Model 2 <sup>b</sup>	Model 3 <sup>b</sup>
SAT total	-.038	-.001	.017
Male	.412 <sup>†</sup>	.466 <sup>†</sup>	.427 <sup>†</sup>
White	.105 <sup>†</sup>	.058	.061
Intercollegiate athlete	.061	.027	-.025
Academic class	.084*	.094*	.014
Parents' education	.023	.026	-.020
Parents' income	.131 <sup>†</sup>	.179 <sup>†</sup>	.089
Frequency of partying	–	–	.448 <sup>†</sup>
Adjusted R <sup>2</sup>	.211	.256	.434

Notes: OLS = ordinary least squares. <sup>a</sup>Based on subsample of cases for whom SAT scores were available ( $n = 680$ ); <sup>b</sup>based on subsample of cases for whom frequency of partying was measured ( $n = 333$ ).

\* $p < .05$ ; <sup>†</sup> $p < .01$ .

direct effects of all other variables were negligible. This model accounted for 43% of the variation in amount consumed. Further, a comparison of Models 2 and 3 suggests that much of the effects of academic class and parents' income on amount consumed occurred because these variables influenced how often students attended off-campus parties. Bivariate correlations (Table 2) showed that frequency of partying was positively associated with both academic class and parents' income.

Table 4 presents ordinary least squares regressions on semester GPA and cumulative GPA. Preliminary analyses showed that the semester of the survey had no effect on cumulative GPA; therefore, this variable was excluded from the final models. Model 1 includes all independent variables except amount consumed and high school class rank. SAT total score was positively related to GPA, men received significantly lower grades than did women, white students obtained higher grades than nonwhites, and intercollegiate athletes earned lower grades than other students. When amount consumed is added in Model 2, the beta coefficient for being an intercollegiate athlete was reduced to nonsignificance, and the coefficient for the gender dummy

variable also decreased in size, from  $-.24$  to  $-.15$ , which indicates that part of the difference in the GPA of men and women may be explained by men's higher level of consumption. In addition, the regression coefficient for amount consumed in Model 2 ( $\beta = -.24$ ) was nearly the same as the bivariate correlation between consumption and grades ( $r = -.26$ ). Thus, although SAT was the strongest predictor of academic performance, amount consumed also was a significant predictor, even after controlling for key background variables.

Models 3 and 4 present the regressions of cumulative GPA on the subset of respondents for whom high school class rank was available. Although this is a biased sample, the *pattern* of regression estimates is similar to models excluding this variable. High school class rank was a significant predictor of college cumulative GPA, but when rank was controlled, amount consumed also was a significant predictor. The beta coefficient for amount consumed in Model 4 ( $\beta = -.14$ ) was smaller than in Model 2, reflecting the fact that high school class rank was associated with both consumption and GPA. However, it should be noted that the bivariate correlation between amount consumed and GPA for the subsample of 371 cases in Model 4 ( $r = -.20$ ) was smaller than in the larger sample ( $n = 680$ ) on which Model 2 was based ( $r = -.26$ ).

Except for mostly minor variations in coefficients, the regression models for semester GPA are very similar to those for cumulative GPA. Most importantly, the beta coefficients for amount consumed are nearly identical. Two differences are noteworthy, however. First, academic class was positively related to semester GPA but unrelated to cumulative GPA. Second, SAT total score was a stronger predictor of cumulative GPA than less stable semester GPA; consequently, models explain more of the variation in cumulative GPA.

Because prior studies have focused on first-year students and because academic class may moderate the effects of

TABLE 4. OLS standardized regression coefficients for semester GPA and cumulative GPA

Variable	Cumulative GPA				Semester GPA	
	Model 1 <sup>a</sup>	Model 2 <sup>a</sup>	Model 3 <sup>b</sup>	Model 4 <sup>b</sup>	Model 2 <sup>a</sup>	Model 4 <sup>b</sup>
SAT total	.324 <sup>†</sup>	.315 <sup>†</sup>	.333 <sup>†</sup>	.321 <sup>†</sup>	.265 <sup>†</sup>	.289 <sup>†</sup>
Male	-.244 <sup>†</sup>	-.147 <sup>†</sup>	-.154 <sup>†</sup>	-.106*	-.169 <sup>†</sup>	-.160 <sup>†</sup>
White	.148 <sup>†</sup>	.173 <sup>†</sup>	.089	.105*	.128 <sup>†</sup>	.054
Intercollegiate athlete	-.071*	-.056	-.052	-.046	-.081*	-.050
Academic class	.023	.043	.031	.043	.116 <sup>†</sup>	.130 <sup>†</sup>
Parents' education	.052	.058	.047	.047	.038	.019
Parents' income	-.044	-.013	.035	.051	.023	.094
Amount consumed	–	-.235 <sup>†</sup>	–	-.136 <sup>†</sup>	-.229 <sup>†</sup>	-.150 <sup>†</sup>
High school class rank	–	–	.267 <sup>†</sup>	.259 <sup>†</sup>	–	.215 <sup>†</sup>
Adjusted R <sup>2</sup>	.227	.270	.286	.299	.236	.255

Notes: OLS = ordinary least squares; GPA = grade point average. <sup>a</sup>Based on subsample of cases for whom SAT scores were available ( $n = 680$ ); <sup>b</sup>based on subsample of cases for whom high school class rank was available ( $n = 371$ ).

\* $p < .05$ ; <sup>†</sup> $p < .01$ .

alcohol consumption on grades, separate regressions were performed for each class. When the variables in Model 2, excluding academic class, were regressed on cumulative GPA, the regression estimates for amount consumed were statistically significant in all 4 years. The beta coefficient for first-year students only ( $\beta = -.21$ ) was slightly lower than for second- through fourth-year students ( $\beta = -.25$ ). Finally, two additional regressions were run for respondents younger than age 21 and those 21 and older. Once again, the beta coefficients were nearly identical for these age groups ( $\beta = -.24$  and  $-.25$ , respectively).

Finally, given the popularity of the CAS operational definition of heavy alcohol use (five or more drinks for men; four or more drinks for women), the principal analyses were repeated with frequency of heavy alcohol use as the predictor instead of amount consumed. In general, the results provide further evidence of the utility of "amount consumed." For the fall 2003 survey in which frequency of heavy alcohol use was measured, the bivariate correlation with cumulative GPA was  $-.18$ , compared with  $-.27$  between amount consumed and GPA. Model 4 estimates were similar for the two measures, except the beta coefficient for heavy alcohol use was  $-.15$ , compared with  $-.24$  for amount consumed. Thus, at this college, the number of drinks students consumed on a typical weekend night was a stronger predictor of their academic performance than how frequently they engaged in "heavy" alcohol use.

### Discussion

Two studies identified in the introduction concluded that problematic alcohol use has either no effect or a markedly attenuated effect on academic performance among college students when other predictors of academic failure, most notably prior academic achievement and academic aptitude, are controlled. Indeed, Wood et al. (1997) called this finding "highly generalizable" (p. 208). Results from the present study challenge this conclusion but also beg the question of why, in contrast to these two prior studies, the effect of alcohol consumption on grades remained significant when key variables were included in regression models.

One possible answer is that prior studies examined alcohol use in the first year only, whereas the present study included all 4 years. However, the effects of alcohol consumption examined here were similar for every class, from first through fourth year; therefore, class difference does not seem to be the answer. Each of the prior studies also measured more distal effects of alcohol misuse; Wood et al. (1997) tracked the academic problems of students for 6 years after matriculation, at the end of which only 41% of the research participants had graduated. By contrast, the present study examined grade records at the end of the semester in which alcohol consumption was measured, and grades obtained in the semester of the survey produced the

same results as a student's cumulative GPA. Thus, these data suggest that alcohol consumption may have both short- and long-term effects on academic performance; moreover, the relationship appears to be relatively stable.

Another important difference between the present and past research mentioned in the introduction is the representativeness of the samples: only the present study employed a random sample with a high response rate. But the crucial difference may be the type of institution. Wood et al.'s (1997) research participants attended a large, midwestern university; Pascall and Freisthler's (2003) participants attended the University of California, Berkeley. These institutions have more diverse student bodies, more diverse student lifestyles, and more varied campus subcultures than the small, liberal arts college studied here. At small colleges, student bodies are more homogeneous, the student culture tends to be monolithic, and students may experience greater pressures to drink. At the present institution, where almost 90% of the students live on campus, the social lives of students outside the classroom, at least on the weekends, revolve around partying and alcohol consumption. More than 80% of the respondents reported that they drank alcoholic beverages at least two to three times a month; 75% reported that they attend off-campus parties this often.

Associations between "background" variables and alcohol consumption in the present study support this conclusion. Men and white students drank more than their counterparts; further, academic class and parent's income were positively associated with how much students consumed. That the effects of race, class, and income were attenuated when frequency of partying was added to the regression model shows that these variables affected how often students partied or, in other words, participated in the dominant subculture of partying/drinking. In addition, the greater their involvement, at least in terms of how much students' drank, the lower their academic performance.

Surprisingly, studies of college drinking seldom have examined the influence of the college environment (Dowdall and Wechsler, 2002; Presley et al., 2002). Much of the research focuses on clinical, developmental, and psychological variables. When social influences are analyzed, these tend to be sociodemographic factors such as race and gender or affiliations such as athletic status and fraternity/sorority membership. What is needed is research that considers the larger college context as a moderating influence on both the causes and consequences of drinking behavior. Based on their study of resistance to pressure to drink and the desire to refrain from drinking, Shore et al. (1983) concluded that factors in the college environment might be more strongly related to drinking habits than past experiences or background variables. Similarly, the campus culture may interact with personal characteristics and past experiences to influence the effect of drinking on academic

performance. Thus, it is possible that at a large, public university, personal factors present at matriculation may predict both heavy alcohol use and academic performance, whereas at a smaller, residential college, especially one with a high rate of heavy drinking, the campus drinking culture overrides the influence of personal factors on this relationship.

Because the present study was carried out at a single institution, generalizations are hazardous. Still, this college shares many features in common with other colleges; and the evidence strongly indicates that heavy alcohol use—at least at a certain type of institution—has a negative impact on academic performance. In light of this research, it would be premature to discontinue investigations of alcohol's effects on academic performance. Rather, future research on this relationship—and on drinking behavior generally—needs to consider the influence of the campus context. This will require (1) large-scale studies with both institutional and individual units of analysis, and (2) the identification and measurement of key institutional variables, especially drinking norms and residential systems. In addition, other individual-level variables, not included in the present study, such as students' commitment to academic achievement and satisfaction with school, may influence both alcohol use and GPA. Incorporating all of these factors in theoretical models and research designs should provide a more complete understanding of the causes and consequences of problematic alcohol use among college students.

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