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Study Habits and the Level of Alcohol Use Among College Students

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ABSTRACT *This paper draws on the 1997 and 1999 waves of the College Alcohol Study to examine the effect of alcohol consumption on the study habits of college students. A generalized least squares estimation procedure is used to account for the potential correlation in the unobserved characteristics determining drinking behavior and study habits. Our results reveal that failing to account for the endogeneity of the level of drinking leads to an overestimate of its effect on the likelihood that a student misses a class or gets behind in school. We also find differential effects of drinking on the study habits of freshman students and their upper-year counterparts.*

Introduction

The extent to which alcohol consumption impacts on both the quantity and quality of human capital accumulation is an important question given that it has long-run implications for earnings. Following the human capital model developed by Becker (1964), an individual will invest in acquiring additional levels of human capital based on the expected return in future earnings. This decision takes into account both the costs of schooling and the rate at which future benefits are discounted. At the same time, facing both budget and time constraints, students make decisions about how much alcohol to consume.

The consumption of alcohol can be expected to have a negative impact on schooling both directly through its potential impact on cognitive ability and indirectly through its impact on study habits. A negative correlation between alcohol consumption and schooling also may be observed, however, due to the fact that individuals who face high costs and/or place a lower value on future earnings may invest less in schooling, and at the same time these individuals may be more likely to engage in heavy drinking behavior. Hence, controlling for the potential endogeneity between drinking and schooling is of key importance in establishing a causal link between alcohol use and schooling outcomes. Establishing such a casual link will inform policy-makers about the impact of alcohol policies on human capital accumulation and the potential to reduce productivity losses associated with increased alcohol consumption.

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The results from the existing literature that examines the impact of alcohol consumption on educational attainment is mixed. Not surprisingly, studies that do not account for the potential endogeneity between drinking and schooling measures find that alcohol consumption significantly reduces schooling levels. In this regard, drawing on the National Longitudinal Survey of Youth (NLSY), Yamada *et al.* (1966) find that both the number of drinks consumed during the past week and being a frequent drinker significantly reduces the probability of high school graduation. A 10% increase the probability of being a frequent drinker is found to reduce the likelihood of graduation by 6.5%. Also without accounting for endogeneity, Mullahy and Sindelar (1994) use data from the Wave 1 of the Newhaven site of the National Institute of Mental Health Epidemiological Catchment Area survey and find that alcoholic symptoms prior to age 22 reduces completed years of schooling by 5%.

Among the studies that control for the possible correlation between the unobservables that affect both drinking and schooling choice, the results range from significant to moderate to no effect at all of youthful drinking on educational attainment. Using two-stage least squares (2SLS) to account for endogeneity, Cook and Moore (1993) draw on the NLSY to examine the effect of alcohol consumption (number of drinks per week, frequent drinking, and being frequently drunk) on the years of post-secondary schooling. The authors find that all three drinking measures significantly reduce years of schooling, with frequent drinkers completing 2.3 fewer years of college. Most recently, Koch and Ribar (2001) use data on same-sex siblings from the 1979–1990 NLSYs to examine the effect of the age at which youths first drank regularly on the number of years of schooling completed by age 25. Using a siblings instrumental variable model, the results suggest that the effect of drinking onset is moderate—delaying drinking for a year leads to a one-quarter year of additional schooling.

Drawing on 1977–1992 Monitoring the Future data, Dee and Evans (1997) use a two-sample instrumental variables procedure relying on within-state variation in their instruments to examine the effect of being a drinker, a moderate drinker, and a heavy drinker on high-school completion and college entrance and attainment. Overall, they find that controlling for endogeneity, teen drinking does not have a significant effect on educational attainment. Similarly, based on NLSY data, Chatterji (1998) finds that her estimation results based on models that account for endogeneity reveal no significant effect of teen alcohol consumption on the number of grades completed by age 21.

Most of this literature focuses on educational outcomes related to prior teenage drinking behavior. In this paper, we propose to focus on college-level educational outcomes as a result of current drinking behavior. This is a particularly relevant issue, given that alcohol is a common element in the environments of most college campuses. In 1999, the annual alcohol prevalence rate among college students was 83.6% (Wechsler *et al.*, 2000).

Drawing on information available in the Harvard School of Public Health College Alcohol Study (CAS), we provide evidence on the extent to which alcohol consumption impacts on college study habits, which, in turn, are expected to affect human capital accumulation. Assessing the mechanisms through which alcohol consumption impacts schooling may shed further light on the extent to which policies aimed at reducing alcohol consumption among young adults may affect the quality and quantity of human capital accumulation. Current evidence exists on the direct effect of drinking on cognitive ability. Based on clinical studies,

Nordby *et al.* (1999) showed that drinking reduces recall, which can be expected to have a direct effect on schooling. However, we are not aware of existing empirical evidence of the effects of alcohol consumption on intermediate outcomes such as study habits.

We examine the impact of alcohol consumption, defined by the average number of drinks consumed per drinking occasion among college students who drink, on the probability of missing a class and getting behind in school. We use a generalized least squares estimation procedure to account for potential correlation in the unobservables that determine drinking behavior and study habits. Generating consistent estimates of the effect of drinking on college study habits requires an exogenous source of variation in college drinking. That is, we require variables that affect college drinking levels but do not directly affect study habits. In this regard, we use the price of alcohol, college-level information on access to alcohol, and state-level alcohol policies to identify alcohol consumption. Our results reveal that failing to account for the endogeneity of drinking by college students leads to an over-estimate of its true effect on the likelihood of missing a class and getting behind in school. To further investigate the study habit behavior of the college sample, we also estimate our model separately by year of class. We find differential effects of drinking on the study habits of freshman and their upper-year counterparts.

Our paper is organized as follows. The next section describes our model of the relationship between alcohol consumption and study habits. The third section describes our data and summary statistics. Our estimation results are then presented, and we conclude in the fifth section with a discussion of potential policy implications to improve study habits and reduce productivity losses due to alcohol consumption among college students.

Model of Alcohol Use and Study Habits

This study examines the impact of alcohol consumption levels by college students on two potential adverse study practices: missing a class (MISS) and getting behind in school (BEHIND).[1] A key goal of our empirical model is to establish a casual link between our drinking measure and study habit outcomes. Hence, to control for the potential existence of endogeneity between alcohol consumption and study habits, we employ a generalized least squares estimator.

We specify the probability of an adverse study habit practice as follows:

$$H_i = \beta_D D_i + \beta_X' \boldsymbol{X}_i + \varepsilon_i \tag{1}$$

where D_i is the average number of alcohol drinks consumed, and $\boldsymbol{X_i}$ is a vector of individual and college campus characteristics. In our model, the observed aspect of equation (1) of the student's study practices is a 0–1 dichotomous variable. *A priori*, we expect an increase in alcohol consumption levels to increase the probability of an adverse study habit outcome.

The demand for alcohol consumption is specified as follows:

$$D_i = \beta_P P_i + \beta_C' \boldsymbol{C}_i + \beta_S' \boldsymbol{S}_i + \beta_X' \boldsymbol{X}_i + u_i \tag{2}$$

where P_i is the price of alcohol, the vector $\boldsymbol{C_i}$ includes campus measures related to access to alcohol, the vector $\boldsymbol{S_i}$ includes state-level alcohol-related policies, and the vector $\boldsymbol{X_i}$ includes individual and college campus characteristics.

We begin by testing the exogeneity of our drinking measure using the Smith–Blundell exogeneity test.[2] Having established that our drinking measure is endogenous, we implement The Amemiya Generalized Least Squares (AGLS) estimator for a dichotomous dependent variable.[3] In this model, the endogenous regressor, number of drinks, is treated as a linear function of the instruments and the other exogenous variables (Newey, 1987). We use this estimation method because it is likely that the error terms ε_i and u_i are correlated — that is, individuals who have an unobserved propensity to drink greater amounts of alcohol also may be more likely to engage in behavior that adversely affects their human capital accumulation. Hence, estimating equation (1) directly may result in a biased and inconsistent estimate of the parameter β_D in equation (1).

The AGLS estimation procedure requires an exogenous source of variation in the quantity of college drinking that does not directly affect study habits. In this regard, we use the price of alcohol, college-level information on access to alcohol, and state-level alcohol policies to identify alcohol consumption. To test the validity of our instruments, we estimate a 2SLS model to perform the Davidson and MacKinnon (1993) over-identification test.

Finally, to highlight the importance of controlling for endogeneity, we compare our results based on the AGLS model with those from a simple probit model where the average number of drinks consumed per drinking occasion is treated as an exogenous regressor. Also, to further investigate the underlying behavior of our college sample, we estimate our model separately by year of class.

Data Description

The data used for this analysis are drawn from the 1997 and 1999 waves of the CAS conducted by the Harvard University School of Public Health.[4] The CAS student survey was administered to a random sample of full-time students at colleges and universities from across the United States. The CAS is the first survey to focus on drinking patterns in a nationally representative sample of college students. In 1997, 15,685 students from 130 colleges responded to the survey, and in 1999, 14,907 students from 128 colleges completed and returned the CAS student questionnaires.[5] Tables 1 and 2 provide detailed summary statistics on the pooled 1997 and 1999 waves of the CAS data used in our study and the state-level alcohol policy measures that have been merged with our data set. Our sample contains 16,756 observations based on a subsample of students who drank in the last 30 days and for which we have non-missing data. We also provide sample means according to our adverse study habit outcomes. The remainder of this section defines our dependent, independent, and identifying variables.

Dependent Variables

We examine two possible adverse study habits based on self-reported information by students who drank within the past year. The outcome measures are conditional on drinking—the CAS only asked the study habit questions to those students who drank within the past year. We construct 0–1 dichotomous dependent variables based on whether or not students report that their drinking resulted in the following outcomes: missing a class (33%) or getting behind in school (28%). As a measure of alcohol consumption we draw on the average consumption per drinking occasion. The average consumption per drinking occasion measure is a continuous variable

Table 1. Means of variables, full sample and by study habit outcome

	Full sample	Miss	Behind
Male	41.13%	46.86%	45.25%
Age	20.95	20.56	20.72
White	83.80%	88.08%	84.82%
African American	3.57%	2.01%	2.38%
Asian	5.11%	3.82%	5.46%
Native American	0.51%	0.58%	0.65%
Other race	7.00%	5.51%	6.69%
Hispanic	6.76%	5.57%	6.58%
Never married	92.08%	97.81%	96.51%
Married	5.89%	1.37%	2.34%
Divorced	1.55%	0.60%	0.89%
Separated	0.42%	0.18%	0.24%
Widowed	0.06%	0.04%	0.02%
Freshman	20.43%	24.33%	21.70%
Sophomore	20.51%	21.52%	21.81%
Junior	24.56%	24.30%	25.32%
Senior	23.90%	21.29%	21.85%
Fifth year or beyond	10.59%	8.56%	9.31%
Atheist	13.42%	12.21%	13.30%
Catholic	41.10%	43.59%	43.60%
Jewish	3.84%	3.36%	3.36%
Moslem	0.41%	0.35%	0.52%
Protestant	30.56%	29.24%	29.17%
Other religion	10.68%	11.24%	10.05%
At least one parent attended college	82.66%	85.05%	84.73%
No father	2.30%	2.03%	2.21%
Father former problem drinker	2.53%	2.83%	2.84%
Father abstainer	15.09%	14.09%	14.17%
Father infrequent/moderate drinker	68.91%	70.74%	69.53%
Father heavy/problem drinker	11.17%	10.31%	11.26%
No mother	0.42%	0.47%	0.50%
Mother former problem drinker	0.89%	0.88%	1.00%
Mother abstainer	28.82%	26.38%	27.92%
Mother infrequent/moderate drinker	67.38%	69.81%	67.66%
Mother heavy/problem drinker	2.49%	2.46%	2.92%
Live off-campus	52.50%	49.62%	51.55%
Unisex dormitory	11.18%	10.51%	9.90%
Co-ed dormitory	25.64%	28.48%	27.75%
Other university housing	3.09%	2.63%	2.82%
Live in fraternity/sorority	3.72%	6.37%	5.18%
Other housing	3.87%	2.39%	2.82%
Woman's college	4.55%	2.30%	3.31%
African American college	0.91%	0.35%	0.37%
Community college	12.80%	8.42%	10.87%
Small private campus	10.41%	8.62%	8.08%
Large private campus	14.82%	15.66%	16.46%
Small public campus	15.55%	16.78%	15.98%
Large public campus	40.96%	47.88%	44.92%
Northeast	24.56%	23.69%	24.43%
South	28.31%	30.05%	28.76%
West	15.27%	12.91%	15.64%
Midwest	31.86%	33.35%	31.17%
Year 1997	52.45%	56.39%	51.25%
Year 1999	47.55%	43.61%	48.75%
Number of observations	16,756	5478	4617

Table 2. Means of drinking measure and alcohol cost measures

	Full sample	Miss	Behind
Average number of drinks	3.83 (2.23)	5.19 (2.11)	4.82 (2.22)
Average price per drink	1.32 (0.22)	1.28 (0.20)	1.31 (0.22)
Fraction paying flat fee for drinks	4.49%	4.99%	4.69%
Pub on campus	30.64%	30.76%	31.64%
Bar within 1 mile	92.26%	93.32%	92.31%
Happy hour restrictions	52.55%	52.85%	52.74%
Dram law restrictions	69.74%	79.59%	78.99%
Number of observations	16,756	5478	4617

Note: Standard deviations presented in parentheses.

that reflects the average number of drinks a student consumed per drinking occasion in the previous 30 days. This variable is constructed from the following question: "In the past 30 days, on those occasions when you drank alcohol, how many drinks did you usually have?"[6]

Independent Variables

The student surveys also obtained detailed demographic and socio-economic information on each of the respondents. This made it possible to construct controls for many important correlates. These variables include: the age of the respondent; an indicator for gender; race (White—omitted, African American, Asian, Native American and Other race); ethnicity (Hispanic); marital status (never married—omitted, married, divorced, separated, widowed); religious affiliation (none or atheist—omitted, Catholic, Judaism, Moslem, Protestant, Other); living arrangement (single sex residence hall, co-ed residence hall, other university housing, fraternity/sorority housing, off-campus housing—omitted, and other type of housing); current year in school (freshman—omitted, sophomore, junior, senior, fifth year or beyond).

The CAS survey also obtained detailed background information on the parents of the respondents. Parental information includes an indicator for parental education (at least one parent attended college), as well as an indicator for both mothers' and fathers' past alcohol use (defined separately for both mother and father: parent not present, parent is a former problem drinker, parent abstains from alcohol—omitted, parent is an infrequent or moderate drinker, parent is a heavy drinker or current problem drinker).

Finally, a key advantage of the CAS data set is that it contains an administrators' questionnaire. This allows us to include information on the type of campus (all female, traditionally African-American, small private, large private, commuter campus, small public or large public) and its regional location (South, West, Northeast or Midwest) in our analyses.

Identifying Variables

In order to identify our drinking measure in the AGLS estimation procedure, we rely on several variables that account for the full price of alcohol. First, we construct two college-level price measures based on information collected in the student questionnaires of the 1997 and 1999 CAS surveys: the average real college price paid per

alcoholic drink and the proportion of students at a given college who pay a fixed fee for all they can drink. Students were asked to report the amount that they typically pay for a single alcoholic drink. Possible responses included: do not drink; pay nothing — drink free; under \$0.50; between \$0.51 and \$1.00; between \$1.01 and \$2.00; between \$2.01 and \$3.00; \$3.01 or more; pay a set fee. Based on this information, we construct the average college price as the campus mean of non-zero prices (using mid-points) paid for a single alcoholic drink as reported by students from each school. We use the consumer price index to denote our alcohol price measure in real 1990 dollars. The proportion of students who pay a fixed fee for all they can drink is defined as the percentage of students who drink within each campus, who when asked about how much they typically pay for a single alcoholic drink reported typically paying a set fee to drink alcohol. This latter measure allows us to account for the impact on alcohol consumption of facing zero marginal cost after the first drink.

To further account for the full cost of alcohol, we include measures drawn from the CAS administrator questionnaires to construct variables that reflect access to alcohol at each of the campuses. The first indicator equals one if there is a pub on campus, and equals zero otherwise. The second variable indicates if there is one or more outlets licensed to sell alcoholic beverages located within one mile of the campus. We also take advantage of state-level alcohol control laws that were merged with our CAS data. Our two state-level policy variables capture information pertaining to whether or not the state imposes restrictions (either regulation or prohibition of) on happy hours at bars and pubs and dram shop laws, which hold a bar or the owner of the establishment responsible for damages incurred from heavy or excessive drinking. These measures are dichotomous indicators set equal to a value of one if a state mandates a particular alcohol control policy, and equal to a value of zero otherwise.

Results

We present our AGLS and probit model results of the impact of the average number of alcohol drinks consumed on study habits for our full sample and by year in class in Table 3. We also report the *p*-value results from our Blundell–Smith exogeneity tests in Table 3. In Appendix A, we present the results for all covariates; Table A1 presents the results based on the AGLS model for the probability of missing a class and getting behind in school, and Table A2 presents the alcohol demand results. We begin by discussing our key findings and then we highlight some of the detailed results from the full set of covariates presented in the appendix.

Based on the full sample, our results presented in Table 3 reveal that, with respect to study habits, the average quantity of alcohol consumed per drinking occasion is endogenous at the 5% level of significance. Hence, it is appropriate to implement the AGLS estimation model in order to account for the correlation in the unobservables. Based on the AGLS results, Table 3 shows that once we control for endogeneity, an increase of an additional drink in the average number of drinks consumed only weakly (at the 10% level) reduces the probability of missing a class by about 4% and does not significantly affect getting behind in school. Based on the probit model, without correcting for endogeneity, we would over-estimate the impact of an additional drink on the probability of missing a class and getting behind in school to be 9.0% and 5.4%, respectively.

To investigate the underlying behavior of students more closely, we estimate our model separately by each class year. These results are quite interesting. We find that

Table 3. The effect of alcohol consumption on study habits

	Miss	Behind
AGLS model	0.0396*	0.0105
Probit model	0.0899‡	0.0536‡
Exogeneity test	0.0275	0.0414
Freshman		
AGLS model	–0.0636	–0.0324
Probit model	0.0891‡	0.0555‡
Exogeneity test	0.0061	0.0784
Sophomore		
AGLS model	0.0610	0.0724*
Probit model	0.0872‡	0.0553‡
Exogeneity test	0.5456	0.6496
Junior		
AGLS model	0.0614	–0.0097
Probit model	0.0902‡	0.0526‡
Exogeneity test	0.4415	0.0768
Senior		
AGLS model	0.0829	–0.0180
Probit model	0.0982‡	0.0531‡
Exogeneity test	0.789	0.1781
fifth year +		
AGLS model	0.0968	0.0888
Probit model	0.0826‡	0.0553‡
Exogeneity test	0.8848	0.6929

Notes: Table presents marginal effects for the probit and AGLS model for the impact of the average number of drinks consumed per drinking occasion on the probability of missing a class and getting behind in school. The results are presented for the full sample and then by year of class. Controls for age, sex, race, ethnicity, religious affiliation, year in school, marital status, parental education, parental drinking patterns, living arrangements, type of college, region, and year were included but are not presented. *, †, and ‡ Statistically significant at the 10%, 5%, and 1% levels, respectively. The exogeneity test results presented report the *p*-values based on the Smith–Blundell exogeneity test.

for freshman students the observed correlation between drinking and study habits is driven by the correlation in the unobservables. We reject exogeneity of our drinking measure at the 1% level for missing a class and at the 10% level for getting behind in school. And, controlling for endogeneity in our AGLS model, we find that the average amount drunk has no significant impact on either of the two study habits. However, beyond the freshman year, the results suggest that the drinking measure is exogenous (with the exception of drinking in the BEHIND model for juniors at the 10% level) and hence the probit results are valid, which, in turn, suggests that for the upper-year classes an additional drink in the average amount drunk increases the probability of missing a class by about 8–9% and getting behind in school by about 5%.

Several possible explanations exist as to why endogeneity seems to be an issue just for freshman. First, it is quite possible that students who face high costs and/or place a lower value on future earnings and, at the same time, are more likely to be heavy drinkers have dropped out of college after the first year. Second, students who

started college placing a relatively low value on doing well may have matured after their first year and gained information that allows them to better appreciate the value of education and, hence, their unobserved characteristics may change as they transition upwards from their freshman year.

Turning to our complete set of covariates for our full sample of college students, presented in Appendix A, we see from Table A1 that several of our individual/family and college control variables are important determinants of college study habits, in particular for missing a class. In terms of individual characteristics, we find that compared with their white counterparts, African American students are less likely to miss a class or get behind in school, while Asians and our other race category are also less likely to miss a class. Being married, divorced or separated significantly reduces the probability of either of the two adverse outcomes. Religious affiliation has no effect on getting behind in school, although being catholic increases the likelihood of missing a class. Older students are more likely to miss a class, while compared with their freshman counterparts, controlling for age, upper-year students are less likely to miss a class. These latter variables do not significantly affect the probability of getting behind in school.

We find that the living arrangements of students significantly affect their study habit behavior. Compared with living off-campus, living on-campus in either a dorm or other housing reduces the probability of missing a class, and living in a unisex dorm or other housing reduces the probability of getting behind in school. Living in a fraternity or sorority results in a strong significant increase in the probability of missing a class and getting behind in school, even after controlling for its effect on drinking behavior.

In terms of our parental characteristics, we find that having at least one parent who attended college significantly increases the probability of both of our adverse study habits. While we might expect parents' education levels (and hence income levels) to be positively correlated with child educational outcomes, these results suggest that those students who are first-generation college attendees are less likely to engage in activities that would undermine their educational attainment. First-generation college students may place more value on their college opportunity compared with their counterparts who may take attending college for granted. Similar to Chatterji (1998), we also find that parental alcoholism significantly affects their children's educational outcomes. Students with parents who fall into categories of being a heavy or problem drinker or a former problem drinker are significantly more likely to miss a class and get behind in school compared with their counterparts with parents who are abstainers. Chatterji (1998) undertook sensitivity analyses with and without parental alcoholism as a right-hand side variable and found that, after controlling for parental alcoholism, adolescent substance use did not have a significant effect on schooling. Undertaking similar sensitivity analyses, we find that our results are robust to the omission of the parental alcohol variables.

Our results reveal that controlling for college characteristics is important. Compared with their counterparts at a large public college, students who attend a women's, African American, commuter, or small private college are less likely to miss a class and get behind in school. We find no significant difference among students who attend public (either small or large) colleges or large (either public or private) colleges. Sensitivity analyses reveal that omitting the college characteristics from our specification leads us to over-estimate the impact of drinking on college study habits. Without including college characteristics in our AGLS model, we find

that the average number of drinks consumed per drinking occasion significantly increases the probability of missing a class and getting behind in school by approximately 9% and 4%, respectively.

Turning to Table A2 in Appendix A, let us now examine the alcohol demand equation. As noted earlier, in the AGLS estimation procedure, we identify our drinking measure by the full cost of alcohol that includes the average price paid per drink, the fraction of students who are able to purchase alcohol on a flat fee basis, college-level access measures, and state-level alcohol policies.[7] Our results reveal that, as expected, the price of alcohol significantly reduces demand—a dollar increase in the average price reduces the average number of drinks consumed per drinking occasion by 0.6 of a drink. Access to purchase alcohol on a flat fee basis significantly increases the average number of drinks consumed by 1.6 drinks. Indeed, this large effect is not surprising given that the flat fee drinking scheme implies zero marginal monetary cost for each additional drink. The presence of a pub on campus or an alcohol outlet within one mile of campus does not significantly affect the average number of drinks consumed by college students. We find that state dram shop laws that hold establishments responsible for damages incurred from heavy or excessive drinking significantly reduce alcohol consumption levels. The results from Table A2 also show that alcohol consumption levels differ by race, marital status, religion, housing arrangements[8] (in particular, fraternity/sorority housing), parental drinking behavior, and type of college.

Conclusion

The results based on our full sample of college students reveal that, once we control for the endogeneity of our drinking measure, alcohol consumption levels of students who drink do not have a strong impact on study habits—the average number of drinks consumed per drinking occasion does not significantly affect getting behind in school and only weakly affects the probability of missing a class. However, estimating our model separately by each class year, we find differential effects of drinking on study habits between freshman and upper-year students. Our results show that the observed correlation between drinking and study habits for freshman is attributable fully to the correlation in the unobservables but that beyond the freshman year our drinking measure is exogenous and, for these years, an increase of an additional drink in the average amount drunk increases the probability of missing a class by about 8–9% and getting behind in school by about 5%. We also find race, parental drinking habits, living in a fraternity/sorority, and the type of college one attends to be important determinants of study habit practices by college students. When interpreting our results, we must bear in mind that our estimation is based on the average quantity of alcohol consumed conditional on drinking and, hence, we cannot draw inferences for the full college population. Indeed, we would expect an additional impact on study habits through the drinking participation decision. Further, given that the CAS sample is representative of students enrolled at college at the time of survey, although it does not include individuals who were previously enrolled but may have already dropped out of college due to heavy drinking, our results may tend to under-estimate the adverse effect of drinking on study habits.

Overall, our results show that reducing alcohol consumption levels among college students may result in improved study habits among upper year students. Based on our alcohol demand results, policy-makers at both the state-level and

school administrator level may be successful in reducing alcohol consumption by several means. First, at the state-level, increasing the price of alcohol via taxes and the imposition of dram shop laws across all states can be expected to reduce drinking levels by college students. Second, we find that college administrators could substantially reduce alcohol consumption levels among their students by prohibiting the sale of alocohol on a flat fee basis. Further, the imposition of local ordinances to prohibit the sale of alcohol on a flat fee basis would help to reduce drinking levels both on and off-campus.

Indeed, the implementation of such policies to improve study habits can be expected to improve both the quantity of education through an increased likelihood of college graduation and the quality of schooling with students graduating with a better understanding of their major. In turn, these human capital benefits can be expected to yield increases in long-run earnings and reduce alcohol-related productivity losses.

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Notes

1. Due to data limitations, we are unable to examine the effect of drinking participation on our study habit outcomes
2. Under the null hypothesis of this test, the model is appropriately specified with all explanatory variables as exogenous. Under the alternative hypothesis, the suspected endogenous variable (in this case, our drinking measure) is expressed as a linear projection of a set of instruments. The residuals from the first-stage regressions are added to the model and, under the null hypothesis, they should have no explanatory power (Smith and Blundell, 1986)
3. The AGLS estimator is an asymptotically efficient estimator for the structural parameters of a limited dependent variable model with endogenous regressors and normally distributed disturbances. The AGLS estimator is a member of the class of minimum distance estimators, where the structural parameters are chosen to minimize the (weighted) distance between two estimates of the reduced form parameters; the unrestricted reduced form parameters and the reduced form parameters that satisfy the restrictions imposed by the structure of the model. For a detailed summary of how AGLS works, see Maddala (1993, pp. 247–252)
4. The first CAS was administered in 1993 but did not collect alcohol price data. Hence we draw on the 1997 and 1999 surveys
5. See Wechsler *et al.* (1994, 1998, 2000) for a detailed description of the sampling methods and survey design of the CAS
6. It is worth re-iterating the point that, given that the CAS only asked the study habit questions of those students who drank within the past year, our estimation sample is conditional on drinking. Specifically, we subsample on those students who drank in the last 30 days as this reflects the best overlap between the study habit and drinking measures as permitted by the survey design
7. The validity of our instruments is confirmed by the Davidson and MacKinnon (1993) overidentification test. The chi-squared test statistics based on the 2SLS estimation of drinking and missing a class, and drinking and getting behind in school models, are 5.3963 chi-sq(5) with a

p-value of 0.3694, and 2.168875 chi-sq (5) with a *p*-value of 0.8253, respectively. Further, as suggested by Bound *et al.* (1995), it is important to have instruments that are strong predictors of the suspected endogenous variable. In this regard, in Table A2 of Appendix A, the R^2 value from our alcohol demand equation that includes the identifying variables is reported to be 0.1738. Estimating our alcohol demand equation excluding our identifying variables yields an R^2 value of 0.1685

8. While among our six housing categories we specify off-campus student housing as a single category, previous work has examined differences among this group and has found that students who live off-campus without parents versus those who live off-campus with parents report a higher prevalence of alcohol use (Kuo *et al.*, 2002).

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Appendix A

Table A1. The probability of missing a class and getting behind in school

	Missing a class	Behind in school
Average number of drinks	0.0396*	0.0105
Male	0.0112	0.0202
Age	0.2357‡	0.0373
Age squared	–0.0056‡	–0.0010
African American	–0.0924‡	–0.0574†
Asian	–0.0561†	0.0239
Native American	0.0539	0.0751
Other race	–0.0464†	–0.0118
Hispanic	–0.0111	0.0034
Married	–0.2063‡	–0.1503‡
Divorced	–0.1272‡	–0.0940‡
Separated	–0.1344†	–0.1056*
Sophomore	–0.0603‡	–0.0006
Junior	–0.0568‡	0.0031
Senior	–0.0606†	–0.0158
Fifth year or beyond	–0.0563†	–0.0130
Catholic	0.0331†	0.0193
Jewish	–0.0245	–0.0339
Moslem	0.0495	0.0936
Protestant	0.0140	–0.0018
Other religion	0.0425†	0.0030
At least one parent attended college	0.0295‡	0.0216†
No father	–0.0147	0.0189
Father former problem drinker	0.0618†	0.0554†
Father infrequent/moderate drinker	0.0093	0.0152
Father heavy/problem drinker	0.0189	0.0373‡
No mother	0.1128*	0.0490
Mother former problem drinker	0.0123	0.0284
Mother infrequent/moderate drinker	0.0246†	–0.0036
Mother heavy/problem drinker	0.0649†	0.0694‡
Unisex dormitory	–0.0352†	–0.0387‡
Co-ed dormitory	–0.0223†	–0.0051
Other university housing	–0.0538†	–0.0324
Live in fraternity/sorority	0.1511‡	0.0619†
Other housing	–0.0912‡	–0.0673‡
Woman's college	–0.1399‡	–0.0509†
African American college	–0.1305‡	–0.1186‡
Community college	–0.0901‡	–0.0368‡
Small private campus	–0.0950‡	–0.0691‡
Large private campus	–0.0442‡	–0.0007
Small public campus	–0.0207*	–0.0067
South	0.0225*	0.0124
West	–0.0181	0.0161
Midwest	–0.0056	–0.0090
Year 1999	–0.0703‡	0.0117
Number of observations	16756	

Note: Table presents marginal effects for all covariates from the AGLS model for our full college sample. *, †, and ‡ Statistically significanct at the 10%, 5%, and 1% levels, respectively.

Table A2. The demand for alcohol: coefficient estimates

	Number of drinks
Male	1.0801‡
Age	0.1304
Age squared	–0.0050
African American	–0.8115‡
Asian	–0.5736‡
Native American	0.1275
Other race	–0.3115‡
Hispanic	0.0650
Married	–0.9112‡
Divorced	–0.3190‡
Separated	–0.1381
Sophomore	–0.1696‡
Junior	–0.5494‡
Senior	–0.7383‡
Fifth year or beyond	–0.6370‡
Catholic	0.3633‡
Jewish	–0.4385‡
Moslem	–0.1669
Protestant	0.0596
Other religion	0.2025‡
At least one parent attended college	–0.0088
No father	0.2996‡
Father former problem drinker	0.2405‡
Father infrequent/moderate drinker	0.0521
Father heavy/problem drinker	0.1439‡
No mother	–0.3074
Mother former problem drinker	–0.2369
Mother infrequent/moderate drinker	–0.0580
Mother heavy/problem drinker	0.0734
Unisex dormitory	–0.1697†
Co-ed dormitory	–0.0052
Other university housing	–0.1163
Live in fraternity/sorority	0.7220‡
Other housing	–0.2962‡
Woman's college	–0.2463*
African American college	–0.2894†
Community college	–0.1789†
Small private campus	–0.2029
Large private campus	–0.0414
Small public campus	–0.0917
South	0.0146
West	–0.3736‡
Midwest	–0.0399
Year 1999	0.2014‡
Average price per drink	–0.6186‡
Fraction paying flat fee for drinks	1.6111‡

Table A2. *Continued*

	Number of drinks
Pub on campus	–0.1309
Bar within 1 mile	0.0748
Happy hour restrictions	–0.0174
Dram law restrictions	–0.1528†
R^2	0.1738
Number of observations	16,756

Note: ⋆, †, and ‡ Statistically significant at the 10%, 5%, and 1% levels, respectively, based on robust standard errors clustered at the college level.