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FRATERNITY MEMBERSHIP & FREQUENT DRINKING

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ABSTRACT

Reinforcing earlier findings from other data, college senior fraternity/sorority members are more likely to consume alcohol frequently. Large reductions in estimates upon controlling for time spent partying, and to a lesser extent cigarette use and intramural sports involvement, suggest considerable unobserved heterogeneity in the relationship. Yet, effects remain substantive and are invariant to conditioning on numerous further measures of socializing, sports participation, academic performance and mental health. The conclusion holds when non-member comparison groups are restricted to drinkers who smoke, party and/or play intramurals, or matched to members based on drinking propensities, suggesting that fraternity/sorority membership raises alcohol use frequency.

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1. Introduction

It is commonly observed that among college students, alcohol consumption is more prevalent and intense among fraternity and sorority members than others (e.g. Chaloupka & Wechsler, 1996; De Los Reyes & Rich, 2003). DeSimone (2007, 2009) provided evidence that although much of the association between fraternity/sorority membership and binge drinking constitutes unobserved heterogeneity, a statistically and economically significant portion plausibly reflects a causal influence of membership on drinking.

In those studies, the identification strategy was to hold constant strict proxies for drinking preferences, including covariates such as frequency of alcohol use in various settings, socializing, and attitudes towards partying, which themselves are to be influenced by fraternity/sorority membership. The causality argument is that the bias towards zero imparted by interfering with the pathway from membership to drinking is at least as large as the overestimation arising from omitting neglected unobservables, given that membership coefficients were often minimally affected when these behavioral controls were inserted.

This paper investigates frequent consumption of beer and wine or liquor, rather than binge drinking and associated outcomes, using alternative data from the same era as these earlier studies. The empirical approach is parallel, yet stricter in two important respects. Time spent partying, which embodies the core of the identification problem, is held constant. Also, non-member comparison groups are restricted to drinkers who engage in other behaviors that complement frequent alcohol use and fraternity/sorority membership, or are matched to members based on predicted membership propensities. The findings again suggest that while much of the correlation between heavy drinking and fraternity/sorority membership is spurious, the remainder represents a quantitatively important causal impact.

2. Empirical Strategy

The analysis comprises primarily ordinary least squares (OLS) regressions of whether respondents drank frequently on indicators of membership in a fraternity or sorority and a set of controls. As in DeSimone (2007, 2009), the main impediment to obtaining a consistent estimator is that many students join fraternities and sororities precisely because affiliation enables drinking-related socializing in which students would attempt to engage even if they were not members. Like those studies, this analysis addresses the issue directly by controlling for behaviors and attitudes likely to reflect preferences regarding alcohol use.

Consequently, along with personal characteristics and region-by-school type fixed effects, regressions control for time spent partying, cigarette use, and intramural sports involvement. Parties have an obvious association with fraternities and sororities, presumably representing the main vehicle through which membership is associated with heavy drinking. Moreover, partying has an inherent alcohol connotation in this setting, because respondents report time spent socializing with friends as a separate survey response. Smoking is often found to complement drinking (Bask & Melkersson, 2004; Goodman, 2009), including among youth (Dee, 1999), and is also taken to signal a high rate of future discounting (Farrell & Fuchs, 1982). Fraternity and sorority members are more likely than other college students to take part in intramural sports (Dinger, 1999), and organized recreational sports participants are more likely to consume alcohol even net of fraternity membership (Ward & Gryczynski, 2007). Beyond this, regressions hold constant several additional socializing and sports participation measures, and include abundant controls for academic performance and mental health.

The identification scheme differs from DeSimone (2007, 2009), which controlled for one manifestation of alcohol use, its frequency, while examining another, binge drinking, thought to

capture socially problematic consumption. In the data used here, two measures of frequency are observed but binge drinking is not. Nonetheless, the empirical approach of this analysis is stronger in three ways. First, the set of controls for partying and socializing, the prime mechanism through which fraternity membership is associated with alcohol use, is more extensive, as are those for sports participation, academic performance and mental health. Second, the robustness of the results to restricting the sample to drinkers, and ultimately to drinkers who consume both beer and wine or liquor, smoke, party, and/or play intramural sports, is explored. Third, propensity score matching models (Dehejia & Wahba, 2002), which more systematically account for selection on observables, are estimated.

3. Data

This study analyzes the College Senior Survey, administered annually since 1993 by the Higher Education Research Institute at UCLA (http://gseis.ucla.edu/heri/cssoverview.php). Though ongoing, data from 1997 are used here because they are the most recent that are publicly available. In 1997, surveys were conducted at 148 four-year schools (listed at http://gseis.ucla.edu/heri/researchers/parthist/CSS.Participation.History.PDF), in the classroom or other group setting or by mail, from the previous November through June to allow participation by both December and spring graduates.

Of the 33,824 students interviewed, 498 not attending four-year schools are removed from the sample, as are 3,433 whose spring degree is something other than bachelor's or "none", 2,095 who attend school part-time, 4,989 with unknown enrollment status, and the 261 left for whom drinking is unobserved, yielding 22,548 respondents. Missing value indicators are constructed for two variables, year of entry into college originally and into the current school, in

order to maintain the corresponding 8,261 observations (only 63 of which reflect neither entry year being reported). Because no other variable is unavailable in more than 647 cases, all remaining observations with any missing data are excluded, reducing the sample size to 20,277 students, i.e. by only 10%.

Table 1 lists the analysis variables, all of which are binary indicators, and their means. The dependent variables taken directly from the survey are indicators of frequently drinking beer (33% of the sample) and wine or liquor (25%) over the past year, in each case relative to two alternative choices, drinking occasionally or not at all. From these, indicators for frequently drinking one (36%) and both (22%) types of alcohol are constructed to serve as two additional response measures. As table 1 implies, there is substantial overlap among these groups, with 90% of frequent wine or liquor drinkers also frequently consuming beer, although one-third of frequent beer drinkers do not frequently consume wine or liquor.

Note that drinking frequency is categorized subjectively by respondents, rather than based on a specific alcohol use periodicity. Two separate data sets used in DeSimone (2007, 2009) reveal that fraternity and sorority members report more episodes of alcohol use, binge drinking and intoxication over the past two weeks or month than non-members. This suggests the threshold rate of alcohol use qualifying as "frequent" is likely to be higher among fraternity/ sorority members, meaning that the subjective nature of the drinking measures will, if anything, bias the estimates towards zero.

Just over 18% of students are fraternity or sorority members. Two considerations involving this variable are that membership is recorded simply by marking the corresponding questionnaire box, and literally refers to anytime previously rather than currently. The first issue means that those who neglect or are unwilling to acknowledge membership are miscoded as non-

members, rather than omitted because of missing data. As noted above, however, only 1% of otherwise eligible students failed to report alcohol use frequency for both beer and wine/liquor, and these non-responders are already excluded from the sample, so the potential for drinking-related misclassification seems minimal. The second issue implies the reverse miscategorization for current non-members who formerly belonged to a fraternity or sorority. If any attrition from fraternities and sororities is related to drinking, the effect of ever being a member, the parameter actually estimated, is policy-relevant. Also, models control for potentially correlated school interruptions and changes. Furthermore, if fraternity dropout is instead related to alcohol abstention, or reciprocally not reporting membership is related to alcohol use, the estimator will be biased away from finding a negative effect of current membership.

The control variable set is divided into four groups that are sequentially inserted into the regression to begin the analysis. Covariates labeled as exogenous factors, i.e. predetermined or core demographic characteristics, include indicators of gender, graduating at the end of the semester, year of entry into original and current college, race/ethnicity, getting married during college, native English speaking and self-rated physical health. Region-by-school type fixed effects constitute interactions between seven U.S. regions (New England, Mid-East, Great Lakes, Plains, Southeast, Southwest/Rocky Mountains, Far West) and six school types (public or private university, public college, private college that is nonsectarian, Catholic or with another religious affiliation). Main confounders, as outlined previously, are past year time spent partying and cigarette smoking frequency along with intramural sports participation during college. Secondary confounders are past year frequencies of religious service attendance and feeling lonely, depressed, and overwhelmed; past year time spent socializing with friends, exercising or playing sports, attending classes or labs, and studying or doing homework; self-rated academic

ability, drive to achieve, intelligence, social self-confidence and emotional health; having participated in intercollegiate football or basketball and any other intercollegiate sport, taken a leave of absence, withdrawn from school, and transferred to another school anytime during college; cumulative grade point average; and satisfaction with the overall college experience.

4. Results

Sequentially adding covariates

Table 2 displays OLS results for the full sample, with absolute *t*-statistics in parentheses. In all OLS models, standard errors are adjusted for clustering within region-by-school type pair as well as heteroskedasticity. Percentage increases are calculated at sample mean drinking rates.

Column 1 shows estimates holding constant only basic personal characteristics. Coefficients are highly significant and large in all four equations. Fraternity/sorority members are roughly 50% more likely to drink frequently than non-members, slightly less for beer and any alcohol but slightly higher for wine/liquor and both alcohol types. These magnitudes seem too large to plausibly reflect causal impacts.

In lieu of school identifiers, which are not available in the public use data file, column 2 adds fixed effects for the 42 region-by-school type combinations, each representing about 3½ institutions on average. The coefficients actually increase, such that semi-elasticities rise by about 10% of the dependent variable means, while standard errors fall disproportionately. These parameter responses suggest that, if anything, not controlling for specific institutions biases the estimates away from finding a negative effect of fraternities, while also reducing their precision.

The changes in estimates moving through the rest of table 2 comprise the main results of the analysis. First, column 3 inserts time spent partying into the regression. Just this one

additional set of indicators has a dramatic impact, reducing the fraternity/sorority membership coefficients by about 70%. Under the assumption that membership does not alter time allocated to parties, this result exemplifies substantial unobserved heterogeneity, signifying that most excess frequent drinking among members is simply attributable to partying more often.

Conditioning on partying gets at the heart of the identification problem, but is a stringent solution. Joining a fraternity or sorority is presumably often motivated by a desire to increase drinking frequency through facilitated access to parties. Still, members might ultimately spent even more time at parties, and thus drink more frequently, than if they had not joined. In this case, the column 3 coefficients underestimate the true drinking impacts of fraternities and sororities, at least relative to the counterfactual situation of holding constant only the component of partying not influenced by membership. Nonetheless, to minimize the possibility of finding specious effects, the remainder of the analysis controls for partying time.

Column 4 adds the two other main confounders, cigarette use and intramural sports participation. Either, particularly the latter, might also occupy the causal pathway from fraternity/sorority membership to frequent drinking, akin to the mechanism just argued for partying. Regardless, coefficients fall by only 10–20%. The implied semi-elasticities of 13% for beer and either alcohol type, and 18% for wine/liquor and both types, are still highly significant and quantitatively meaningful.

In contrast, the estimates are virtually unaltered moving to column 5, despite adding to the regression 20 sets of indicators covering religious attendance, socializing and social skills, intercollegiate and informal sports participation and exercise, academic effort, performance, ability and ambition, school transitions, happiness, and emotional and psychological well-being. These secondary confounders are jointly significant determinants of frequent drinking, at far

beyond the 1% level, in all four equations (when standard errors are unclustered to allow for adequate degrees of freedom). This is strong, although by definition not totally conclusive, evidence that the three main confounders, particularly partying, absorb the omitted factors that induce spurious correlation between fraternity/sorority membership and frequent drinking.

Drinkers engaging in other confounding behaviors

Though arguably dubious, the existence of unobservables not related with the included covariates, yet sufficiently correlated with both fraternity membership and alcohol use frequency to alter their relationship, is impossible to disprove. To even more strictly test the null of a zero direct effect, therefore, the analysis proceeds by constructing comparison groups of non-members that are more observably homogeneous with members. Table 3 shows results for the first of two strategies for doing so, which is to remove from the sample students who do not engage in specific correlated behaviors.

Naturally, the most relevant behavior is drinking. In particular, students abstaining from alcohol consumption are much less likely than others to be fraternity or sorority members (9% v. 20%), and not drinking at all might be a manifestation not of membership but rather unmeasured characteristics that also determine membership. Consequently, the remainder of the analysis omits the 15% of respondents who did not drink either beer or wine/liquor in the past year, incorporating information on whether non-frequent drinkers of each alcohol type do so occasionally or not at all, as listed for the other frequency variables in table 1. The implied additional identifying assumption is that any causal effect of fraternities is limited to raising drinking frequency from occasional to frequent, rather than across the threshold from non-drinking. This is another restrictive condition liable to bias the estimator towards zero.

Column 1 of table 3 provides baseline estimates for the remaining 17,154 respondents. Semi-elasticities have declined, but not drastically, to 10–11% for beer/any alcohol and 16–17% for wine/liquor by itself or with beer. Compared with the most conservative specifications from DeSimone (2007, 2009), which estimated binge drinking semi-elasticities, respectively, of 19% for the past month and 11% for the past two weeks, these are quite similar, despite the differences in alcohol use measures and time frames.

Column 2 maintains only students who consume both beer and wine/liquor. This further standardizes the sample, raising the prevalence of both fraternity/sorority membership and frequent alcohol use, but discards over 5% of frequent drinkers. Coefficients are further diminished, but remain highly significant with semi-elasticities of 8–14%.

The remainder of table 3 returns to the column 1 sample of drinkers but makes additional restrictions by excluding students who do not engage in one or more of the three behaviors shown to influence the relationship of interest, i.e. the main confounders. By design, fraternity/ sorority and frequent drinking prevalence rates are again somewhat higher, usually even compared with column 2.

Column 3 limits the sample to respondents who spend at least three hours/week at parties, which is taken to imply at least weekly party attendance. This threshold omits students who party less, and correspondingly have substantially lower rates of fraternity membership and frequent drinking, than the modal category of 3–5 weekly hours. The impact on semi-elasticities, compared with that of conditioning on partying time in table 2, is relatively small.

Column 4 omits non-smokers, resulting in the smallest sample yet as well as the most conservative estimates. A potential explanation is that some of the frequent alcohol use resulting from fraternity/sorority membership also triggers occasional cigarette use among students who

would not otherwise smoke. In particular, Nichter et al. (2010) reported that many college student cigarette users, particularly among fraternity and sorority members, smoke primarily at parties when drinking sufficiently to become intoxicated. Still, coefficients remain significant at the 5% level, and represent no less than 6% of the corresponding mean drinking rates.

Column 5 includes only intramural sports participants. Intramurals might be linked to membership and frequent drinking in part because fraternities and sororities are especially likely to organize intramural teams while also encouraging drinking, so that removing non-participants cuts off one mechanism through which membership raises alcohol use. Despite this, coefficients are comparable with or exceed those in column 1.

Column 6 is by far the most restrictive sample, simultaneously imposing the exclusion criteria from columns 3–5 and thereby maintaining only the one-seventh of original respondents who drink, smoke, party at least three hours/week and play intramural sports. Remaining students are thus quite homogenous in the factors observed to have a substantive impact on the relationship between fraternities/sororities and drinking. Nearly one-third are members, over half frequently drink both beer and wine/liquor, and nearly four-fifths frequently drink some type of alcohol. Yet, membership continues to raise the incidence of frequent drinking by 8–11%, providing compelling evidence that membership directly increases alcohol use frequency.

Matching models

Another technique for constructing comparison groups of fraternity/sorority non-members that are more homogeneous with members is to match each member with one or more non-members who have very similar predicted likelihoods of membership, or propensity scores, based on observable factors. To do so, membership is regressed on the full set of covariates

using a probit model. The sample continues to omit non-drinkers, meaning that the propensity score regression is the probit version of the models from column 1 of table 3 in which fraternity/ sorority membership, rather than frequent drinking, is the dependent variable. For each respondent, the propensity score is the predicted probability of membership from this regression.

Two matching strategies are employed. Nearest neighbor matching couples each fraternity/sorority member with the non-member who has the closest propensity score. The logic is that each pair has a virtually equivalent tendency for membership, except that one is a member and other is not. The matching estimator, the mean difference in frequent drinking between members and matched non-members, is thereby purged of selection on observables. Radius matching proceeds likewise, except each member is matched with all non-members who have propensity scores within a pre-defined narrow range, or caliper. The latter procedure trades off the efficiency gain from adding observations with the homogeneity loss from widening the propensity score matching range.

The matching analysis uses a caliper of 0.012. To the nearest 0.001, this is the narrowest width providing matches for all members besides seven with propensity scores outside the common support, i.e. the lower and upper bounds among non-members. These seven observations are omitted regardless of caliper. This approach casts a relatively broad net, but as discussed below, maintains covariate balancing across membership status.

In table 4, panel A displays unadjusted mean differences, which despite excluding non-drinkers are close to the coefficients from column 1 of table 2 that adjust only for exogenous factors, along with the propensity score results. The two matching procedures yield estimates that are nearly identical for beer and wine/liquor, and similar for either or both, with different models producing larger effects in each of the two latter cases. Compared to the OLS

coefficients from column 1 of table 3, the matching estimates are uniformly bigger, though by no more than one percentage point.

Panel B shows one manifestation of covariate balancing, or a lack of correlation between observables and membership status. The top row indicates a pseudo *R*-squared of over 21% for the original propensity score regression, with control variables jointly significant at beyond the 0.1% level. In contrast, the two subsequent rows show pseudo *R*-squareds of around 1% for the same regression in the matched samples, with the group of covariates highly insignificant in each model. Observables, therefore, do not predict fraternity/sorority membership differences by membership status.

The top row of panel C reports another balancing metric, the standardized difference. For each of the 144 indicators that comprise the set of controls, this represents the difference in sample mean between members and non-members, as a percentage of the average standard deviation. Median standardized differences are only 1–2%, with 95th percentiles less than 5% and maxima of 6–9%. Rosenbaum & Rubin (1985a, b) consider standardized differences large when over 20%, and in the latter study also flag values above 10%. This suggests that even the largest standardized difference in table 4 is acceptable, another indication that the matching model estimates are not biased by selection on observables.

Attributes of the matches are detailed in the remainder of panel C. The second row shows that the vast majority of closest matches involve propensity score differences at least an order of magnitude below the maximum allowable, so that narrowing the caliper has little scope for impacting the results, particularly for the nearest neighbor model. The third row indicates that using the radius approach, the median fraternity/sorority member has over 200 matches and over 5% have more than 1,000. Finally, the last row shows that while only 2,201 non-members

are nearest neighbors, with 5% matched to at least 4 separate members and one matched to 20 different members, radius matching utilizes all but 28 non-members at least once, with no non-member constituting more than slightly over six weighted observations. Nonetheless, the estimates are apparently quite robust to the substantially different amounts of information used by the two matching procedures.

Of course, matching does not directly address unobservables, the primary threat to validity. However, if selection on unobservables parallels that on observables (Altonji et al., 2005), the fact that the wide array of analysis covariates is balanced across membership status would suggest that the matching, and thus more conservative OLS, estimators reflect causality.

Stratifying by gender, age & race/ethnicity

Table 5 investigates whether effects are different across three important demographic dimensions. It returns to OLS, which as just seen provides estimates that are conservative relative to matching models, while continuing to restrict the sample to drinkers.

Columns 1 and 2 show separate estimates for sororities and fraternities. Frequent drinking, especially of beer, is more prevalent among males, but membership rates and effects are similar. The semi-elasticity is greater among males for frequent use of both beer and wine/liquor (21% v. 12%), but among females for any frequent use (13% v. 10%).

Columns 3 and 4 divide the sample according to whether students first began college in 1993, so would be no more than one semester off track from graduating in four years (with 88% scheduled to graduate on time), to examine whether behavior differs by status as a "traditional" student. Membership and drinking rates are slightly higher among 4th-year seniors, while semi-elasticities are greater among non-4th-years, but estimates do not vary appreciably.

Finally, columns 5 and 6 give results for non-Hispanic whites compared with remaining students. Whites are 20% more likely to have fraternity/sorority affiliations and 50% more likely to frequently drink any alcohol as well as both beer and wine/liquor. Coefficients are highly significant and comparable in size to the table 3 baseline estimates for whites, but as large or larger for non-whites despite the lower prevalence of alcohol use, with semi-elasticities ranging from 17–22%.

5. Discussion

Fraternity and sorority members are more likely to consume alcohol frequently. This conclusion holds conditional on partying, smoking and playing intramural sports, as well as among drinkers who engage in these activities even controlling for abundant additional measures of socializing, sports participation, academic performance and mental health, and using matching models. These findings suggest that fraternity and sorority membership directly raises the likelihood of frequent drinking, akin to binge drinking in DeSimone (2007, 2009).

Frequent drinking does not necessarily imply binge drinking or its potential harmful consequences. Indeed, consuming a glass or two of beer or wine on a daily basis is associated with increased cardiovascular health (O'Keefe et al., 2007) and wages (Hamilton & Hamilton, 1997). Nonetheless, an extremely strong connection between frequent and binge drinking was the crux of the identification strategy in DeSimone (2007, 2009). Moreover, among college students it seems unlikely that "wine or liquor" predominantly reflects the former, or that frequent consumption of the latter would typically occur in moderation.

Fraternity and sorority membership has also been associated with cheating on exams (Kerkvliet, 1994) and lower academic performance (Grubb, 2006). Yet, economics research has

also found that fraternity and sorority members are more likely to have GPAs above the minimum requirement and declare majors by senior year (Grubb, 2006), obtain high-paying entry-level jobs (Marmaros & Sacerdote, 2002), and donate to their alma maters after graduation (Harrison et al., 1995). Caution should be exercised, therefore, in extending implications from this study beyond highlighting the potential usefulness of targeting informational campaigns and education programs at fraternity and sorority members to minimize the potential for drinking to become excessive and thereby cause problems on college campuses.

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Table 1: Variable definitions & means

Main analysis variables
Frequently drank: beer: .333; wine or liquor: .246; beer or wine/liquor: .357; beer & wine/liquor: .222
Fraternity/sorority member: .180
Exogenous factors
Female: .600; Graduating end of semester: .773; Married during college: .039; Native English speaker: .937
Year first entered college: 1992/earlier: .125, 1993: .522, 1994: .048, 1995: .034, 1996: .048, missing: .224
Year entered current college: 1992/earlier: .055, 1993: .514, 1994: .101, 1995: .096, 1996: .093, missing: .140
Race/ethnicity: Asian: .049, black: .053, Hispanic: .034, white: .793, other: .021, multiple: .051
Physical health self-rating: bottom 10%: .005, below average: .051, average: .378, above average: .377, top 10%: .189
Main confounders
Partying hours/week past year: 0: .181, < 1: .134, 1–2: .167, 3–5: .221, 6–10: .162, 11–15: .069, 16–20: .034, > 20: .032
Cigarette use past year: not at all: .663, occasionally: .215, frequently: .122
Intramural sports participation in college: not at all: .502, occasionally: .313, frequently: .185
Secondary confounders
Religious service attendance past year: not at all: .256, occasionally: .408, frequently: .336
Socializing hours/week past year: 0: .002, < 1: .013, 1–2: .060, 3–5: .164, 6–10: .236, 11–15: .178, 16–20: .133, > 20: .214
Social confidence self-rating: bottom 10%: .007, below average: .078, average: .315, above average: .400, top 10%: .199
Exercise/sports hours/week past year: 0: .042, < 1: .113, 1–2: .212, 3–5: .283, 6–10: .192, 11–15: .071, 16–20: .043, > 20: .043
Intercollegiate sport participant: football or basketball: .085; other sport: .208
Class/lab hours/week past year: 0: .013, < 1: .005, 1–2: .013, 3–5: .052, 6–10: .159, 11–15: .338, 16–20: .261, > 20: .159
Study/homework hours/week past year: 0: .003, < 1: .008, 1–2: .043, 3–5: .159, 6–10: .263, 11–15: .209, 16–20: .148, > 20: .168
Cumulative GPA: A: .142, A–/ B+: .386, B: .322, B–/ C+: .121, C: .026, C –/below: .002
Academic ability self-rating: bottom 10%: .001, below average: .008, average: .230, above average: .521, top 10%: .240
Drive to achieve self-rating: bottom 10%: .003, below average: .028, average: .205, above average: .422, top 10%: .342
Intelligence self-rating: bottom 10%: .003, below average: .035, average: .261, above average: .462, top 10%: .239
School interruption during college: leave of absence: .065; withdrawal: .037; transfer: .179
Lonely past year: not at all: .387, occasionally: .553, frequently: .060
Depressed past year: not at all: .274, occasionally: .642, frequently: .084
Overwhelmed past year: not at all: .069, occasionally: .602, frequently: .330
Satisfaction with college experience: can't rate: .002, dissatisfied: .033, neutral: .128, satisfied: .531, very satisfied: .306
Emotional health self-rating: bottom 10%: .006, below average: .054, average: .315, above average: .387, top 10%: .238

The sample size is 20,277. Regressions omit one indicator for each categorical variable and also include region-by-school type fixed effects.

Table 2: OLS fraternity/sorority membership effects

Frequently drank:	(1)	(2)	(3)	(4)	(5)
Beer	.154	.186	.053	.042	.041
[μ = .333]	(6.19)	(12.7)	(5.41)	(4.83)	(4.43)
	R^2 = .101	R^2 = .145	R^2 = .410	R^2 = .434	R^2 = .439
Wine or liquor	.129	.152	.049	.045	.045
[μ = .246]	(6.58)	(11.9)	(5.62)	(5.47)	(5.19)
	R^2 = .046	R^2 = .081	R^2 = .275	R^2 = .297	R^2 = .304
Either beer or wine/liquor	.162	.196	.056	.047	.046
[μ = .357]	(6.30)	(13.1)	(6.03)	(5.63)	(5.24)
	R^2 = .091	R^2 = .139	R^2 = .414	R^2 = .438	R^2 = .443
Both beer & wine/liquor	.121	.142	.045	.040	.040
[μ = .222]	(6.56)	(11.7)	(5.26)	(4.81)	(4.53)
	R^2 = .052	R^2 = .083	R^2 = .276	R^2 = .298	R^2 = .304
Covariate set includes:					
Region-by-school type indicators		X	X	X	X
Partying			X	X	X
Smoking & intramural sports				X	X
Secondary confounders					X

Each cell represents a different OLS regression of the dependent variable in the row heading on an indicator of fraternity or sorority membership and the covariate sets indicated in the lower panel, as detailed in table 1. Parentheses contain absolute *t*-statistics adjusted for heteroskedasticity and clustering within region-by-school type combinations. Brackets contain dependent variable means. All regressions include the exogenous factors listed in table 1 and have a sample size of 20,277.

Table 3: OLS fraternity/sorority membership effects among drinkers

Frequently drank:	(1)	(2)	(3)	(4)	(5)	(6)
Beer	.040	.037	.043	.032	.054	.058
	(4.24)	(3.76)	(3.25)	(1.97)	(7.07)	(2.89)
	$\mu = .394$	$\mu = .470$	$\mu = .590$	$\mu = .570$	$\mu = .491$	$\mu = .763$
	$R^2 = .401$	$R^2 = .371$	$R^2 = .260$	$R^2 = .346$	$R^2 = .399$	$R^2 = .210$
Wine/liquor	.048	.049	.052	.038	.053	.061
	(5.04)	(4.57)	(3.82)	(2.65)	(3.82)	(2.74)
	$\mu = .290$	$\mu = .346$	$\mu = .433$	$\mu = .440$	$\mu = .337$	$\mu = .556$
	$R^2 = .272$	$R^2 = .250$	$R^2 = .179$	$R^2 = .232$	$R^2 = .257$	$R^2 = .160$
Beer or wine/liquor	.047	.045	.047	.039	.058	.067
	(5.02)	(4.21)	(3.77)	(2.32)	(7.62)	(3.33)
	$\mu = .422$	$\mu = .493$	$\mu = .625$	$\mu = .605$	$\mu = .513$	$\mu = .787$
	$R^2 = .401$	$R^2 = .367$	$R^2 = .246$	$R^2 = .342$	$R^2 = .398$	$R^2 = .199$
Beer & wine/liquor	.042	.042	.048	.031	.049	.051
	(4.43)	(4.03)	(3.32)	(2.08)	(3.81)	(2.17)
	$\mu = .262$	$\mu = .322$	$\mu = .398$	$\mu = .405$	$\mu = .316$	$\mu = .531$
	$R^2 = .275$	$R^2 = .256$	$R^2 = .187$	$R^2 = .237$	$R^2 = .261$	$R^2 = .160$
Sample restriction besides drinking	None	Beer & wine/liquor	Party ≥ 3 hours/week	Smoke cigarettes	Play intramurals	Columns 3–5
Fraternity mean	.196	.210	.244	.232	.250	.318
Sample size	17,154	13,930	10,198	6,676	8,949	2,875

Each cell represents a different OLS regression of the dependent variable in the row heading on an indicator of fraternity or sorority membership, all covariates listed in table 1, and region-by-school type fixed effects, with the samples restricted as stated in the last row. Parentheses contain absolute *t*-statistics adjusted for heteroskedasticity and clustering within region-by-school type combinations. Means in each cell are for the dependent variable in the corresponding sample.

Table 4: Fraternity/sorority membership effects in matching models

Panel A Dependent variable: Frequently drank	Sample	Member/Non-member difference Mean	 *t*-statistic
Beer	Original	.151	16.2
	Radius	.052	4.33
	NN	.051	3.13
Wine or liquor	Original	.126	14.5
	Radius	.055	4.88
	NN	.055	3.55
Beer or wine/liquor	Original	.157	16.6
	Radius	.055	4.61
	NN	.050	3.08
Beer & wine/liquor	Original	.120	14.3
	Radius	.052	4.68
	NN	.055	3.69

Panel B	Sample	Pseudo *R*-squared	*p*-value
Regression of fraternity	Original	.213	.000
membership on all covariates	Radius	.007	1.00
	NN	.016	.245

Panel C Distribution of	Sample/ size	Median	95th %	Maximum
Standardized difference	R–144	.975	3.69	6.01
for covariates	NN–144	1.75	4.92	8.70
Distance to nearest match	3,362	.00003	.0007	.003
for members				(99th %)
Number of matches for members	R– 3,362	223	1,253	2,459
Sample weights for	R–13,757	.120	.874	6.33
matched non-members	NN–2,201	1	4	20

The original sample omits non-drinkers, corresponding to column 1 of table 3. Radius (R) signifies matching each fraternity/sorority member with all non-members within a propensity score of 0.012, while NN (nearest neighbor) corresponds to matching only with the non-member who has the closest propensity score. The caliper of 0.012 includes all members besides seven with propensity scores outside the extreme values among all nonmembers. Covariates include all those listed in table 1, along with region-by-school type indicators.

Table 5: OLS fraternity/sorority membership effects by demographic characteristics

Frequently drank:	(1)	(2)	(3)	(4)	(5)	(6)
Beer	.034	.055	.039	.042	.039	.044
	(2.34)	(4.91)	(2.99)	(3.44)	(3.81)	(2.07)
	μ = .318	μ = .505	μ = .422	μ = .361	μ = .424	μ = .261
	R^2 = .386	R^2 = .386	R^2 = .427	R^2 = .379	R^2 = .406	R^2 = .357
Wine/liquor	.041	.059	.038	.057	.047	.048
	(3.64)	(4.11)	(3.10)	(4.37)	(4.10)	(2.45)
	μ = .271	μ = .318	μ = .312	μ = .265	μ = .305	μ = .224
	R^2 = .296	R^2 = .252	R^2 = .282	R^2 = .270	R^2 = .268	R^2 = .310
Beer or wine/liquor	.047	.051	.041	.053	.045	.051
	(3.30)	(4.51)	(3.19)	(4.75)	(4.54)	(2.21)
	μ = .356	μ = .519	μ = .451	μ = .389	μ = .450	μ = .299
	R^2 = .393	R^2 = .388	R^2 = .423	R^2 = .381	R^2 = .405	R^2 = .367
Beer & wine/liquor	.029	.063	.037	.046	.041	.041
	(2.45)	(4.12)	(2.96)	(3.62)	(3.66)	(2.52)
	μ = .233	μ = .304	μ = .284	μ = .237	μ = .279	μ = .186
	R^2 = .295	R^2 = .255	R^2 = .288	R^2 = .270	R^2 = .273	R^2 = .302
Sample restriction besides drinking	Females	Males	4^{th} year in school	Other entry years	Non-Hispanic whites	Other race/ ethnicity
Fraternity mean	.191	.204	.202	.190	.203	.168
Sample size	10,230	6,924	9,220	7,934	13,940	3,214

Each cell represents a different OLS regression of the dependent variable in the row heading on an indicator of fraternity or sorority membership, all covariates listed in table 1, and region-by-school type fixed effects, with the samples restricted to drinkers and by gender, school entry year or race/ethnicity as stated in the column. Parentheses contain absolute *t*-statistics adjusted for heteroskedasticity and clustering within region-by-school type combinations. Means in each cell are for the dependent variable in the corresponding sample.