Alcohol Use and Related Problems Among College Students and Their Noncollege Peers: The Competing Roles of Personality and Peer Influence*

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ABSTRACT. Objective: Although alcohol use and related problems are highly prevalent in emerging adulthood overall, college students drink somewhat more than do their peers who do not attend college. The personal or social influences underlying this difference, however, are not yet well understood. The present study examined whether personality traits (i.e., self-regulation and sensation seeking) and peer influence (i.e., descriptive drinking norms) contributed to student status differences. **Method:** At approximately age 22, 4-year college students (n = 331) and noncollege emerging adults (n = 502) completed web-based surveys, including measures of alcohol use, alcohol-related problems, personality, and social norms. **Results:** College students drank only slightly more heavily. This small difference, however, reflected personality suppression. College students were lower in trait-based risk for drinking, and accounting for traits revealed a stronger positive association between attending college and drinking more heavily. Although noncollege emerging adults reported greater descriptive drinking norms for social group members, norms appeared to more strongly influence alcohol use among college students. Finally, despite drinking less, noncollege individuals experienced more alcohol-related problems. **Conclusions:** The association between attending college and drinking heavily may be larger than previously estimated, and it may be masked by biased selection into college as a function of both self-regulation and sensation seeking. Differing patterns of alcohol use, its predictors, and its consequences emerged for the college and noncollege samples, suggesting that differing intervention strategies may best meet the needs of each population. (*J. Stud. Alcohol Drugs, 72,* 622–632, 2011)

ALCOHOL USE INCREASES IN THE TRANSITION out of high school (Baer et al., 1995), rising to the highest levels across the life span during emerging adulthood (i.e., ages 18–25; Arnett, 2000). Twenty-five percent of graduating high school seniors engage in heavy episodic drinking (defined in this article as four or more drinks in a sitting for females, five or more for males), but that rate increases to 40% following graduation and remains stable through age 24 (Bachman et al., 1997; Johnston et al., 2009a). Furthermore, alcohol use is also highly clinically problematic during this period. Risk for the onset of alcohol dependence peaks at age 18 years (Li et al., 2004). Moreover, alcohol use disorders are more prevalent among emerging and young adults than among any other age group. Approximately 9% of those ages 18–29 meet the criteria for alcohol dependence, more than twice the overall prevalence rate (Grant et al., 2004). Research examining interplay among the many personal, environmental, and social-role contributors to drinking during this period is therefore crucial to understanding the etiology of problematic alcohol involvement and designing interventions. In the United States, roughly 60% of the population attends college after high school graduation (Bianchi and Spain, 1996; Johnston et al., 2009b), and the college environment is one potential contributor to elevated drinking rates (Bachman et al., 1997).

Awareness among researchers and college administrators of the severity of collegiate drinking has increased over the past decade (Task Force of the National Advisory Council on Alcohol Abuse and Alcoholism, 2002). As a result, alcohol use and its consequences among college students are fairly well described in the literature. Roughly two in five students engage in heavy episodic drinking (Wechsler et al., 1998). Alcohol use among college students resulted in more than 1,800 deaths and 500,000 unintentional injuries in 2005, and increases in mortality rates have outpaced the growth of the student population since 1998 (Hingson et al., 2009).

Although drinking in the noncollege population has been less well studied, this group appears to drink less heavily relative to their college-attending peers. The Monitoring the Future project demonstrated that, despite drinking more during high school, individuals who do not attend college engage in less heavy episodic drinking during emerging adulthood (Bachman et al., 1997; O'Malley and Johnston, 2002), and this trend has been replicated in both epidemiological samples (Dawson et al., 2004; Slutske, 2005) and smaller scale studies (White et al., 2006). The difference between the college student and noncollege populations appears relatively small; in the National Epidemiologic Survey on Alcohol and

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Related Conditions, the 12-month prevalence of heavy episodic drinking was 42.6% among college students and 38.1% among noncollege individuals (Dawson et al., 2004). Indeed, in several studies, the student-status difference has failed to reach statistical significance (Lanza and Collins, 2006; White et al., 2005). Additionally, there are conflicting findings regarding differences in the consequences of alcohol use (e.g., alcohol use disorders; Dawson et al., 2004; Slutske, 2005), and some evidence actually suggests that college students may experience *fewer* alcohol-related problems (White et al., 2005). Although college students may drink more relative to their noncollege peers, this difference appears to be relatively small and may be limited to heavy episodic drinking.

Explaining college versus noncollege drinking differences

Although the association between attending college and engaging in heavy episodic drinking may be small, it affects a considerable segment of the population, and little is known about the contributing factors. Because students select (and are selected) into the college environment as a function of pre-college characteristics, one possibility is that personality differences help account for differences in rates of drinking. The available evidence, however, argues against this explanation. Low self-regulation (defined as the capacity for effortful control of thoughts, emotions, and behaviors) and high sensation seeking (defined as preference for novelty and risk) are among the strongest personality predictors of drinking (Hittner and Swickert, 2006; Hustad et al., 2009; Quinn and Fromme, 2010; Wills and Stoolmiller, 2002). However, those *higher* in self-regulation and *lower* in sensation seeking may be more likely to select into college. Attending college is likely better suited to the goal orientation typical of those high in self-regulation (Gollwitzer et al., 2004). Indeed, the "Big Five" personality dimension of conscientiousness, which includes self-regulation, is positively associated with years of education (Borghans et al., 2008). Similarly, those low in sensation seeking may be more likely to tolerate or enjoy the lectures and readings expected of college students. Among adolescents, for example, low sensation seekers exhibit more positive attitudes toward academics (Stephenson et al., 2003), and college students appear to be somewhat lower in sensation seeking (White et al., 2006). Thus, college students should be, on average, at less risk for heavier drinking as a function of personality.

If personality risk factors for drinking are lower among college students, one might expect college students to drink less, and yet the reverse appears to be true. In fact, because students select into college based on lower sensation seeking and higher self-regulation, college/noncollege drinking differences might be partially masked by the unequal distribution of trait-based risk among students and their noncollege peers. That is, failing to take into account that noncollege individuals are at greater trait-level risk would result in an underestimation of the true positive association between attending college and drinking more heavily. This pattern of third-variable associations is referred to as statistical suppression (MacKinnon et al., 2000), and it suggests that epidemiological estimates may actually fail to give appropriate weight to any influence of college attendance. Thus, the difference in alcohol use between college students and their noncollege peers may be larger than previously thought. Accounting for personality would permit a more accurate estimation of its magnitude, but, to our knowledge, no study has yet done so.

If individual differences do not explain why college students drink more heavily, student-status differences are likely a product of environmental influences. This explanation is supported by twin studies, which have found more prevalent heavy episodic drinking among college students relative to noncollege co-twins after accounting for genetic sources of similarity (Slutske et al., 2004; Timberlake et al., 2007). One potential environmental factor is influence from perceived social norms (Cialdini et al., 1990). Individuals develop beliefs about both the behaviors and the attitudes of their peers regarding alcohol use, and these beliefs—referred to as *descriptive* and *injunctive* social norms, respectively—have been heavily studied in college contexts. College students overestimate both descriptive and injunctive norms (Borsari and Carey, 2003), and students who make larger descriptive-norm overestimations drink more heavily (Baer et al., 1991; Neighbors et al., 2006; Read et al., 2005; Sher and Rutledge, 2007; Stappenbeck et al., 2010). Although descriptive norms may be among the strongest predictors of college student drinking (Neighbors et al., 2007), less research has examined drinking norms outside the college environment. White and colleagues (2008) demonstrated that descriptive norms predict alcohol use among noncollege emerging adults, but we are aware of no studies testing their contribution to college/noncollege differences.

We see two possible ways peer-group descriptive norms might influence student-status differences (cf. Luthar, 1993; Luthar et al., 2000). First, college students might perceive their peers as drinking more. That is, there could be a statistical main effect of college attendance on descriptive norms, which would then serve as a mediator between college status and heavier drinking. Second, given that the bulk of the literature on descriptive norms concerns college students, it is possible that norms are less influential among those who do not attend college. Relative to their peers in college, noncollege individuals attend parties less frequently and spend less time with members of their social group (Bachman et al., 2002). College status could therefore moderate the relation between norms on drinking, with norms less strongly associated with drinking among those not attending college. A weaker influence of norms among noncollege individuals might help explain why college students drink more heavily.

Present study

In the current investigation, we compared rates of drinking among college students and their peers who do not attend college, and we examined the competing roles of personality and social influences in student-status differences. In particular, we tested whether the traits of self-regulation and sensation seeking masked the true magnitude of the association between attending college and drinking more heavily and whether social norms were a contributing factor. Additionally, given conflicting prior findings regarding differences in drinking consequences, we extended our comparisons to include alcohol-related problems. Specifically, this study addressed the following research questions: (a) Do college students drink more heavily relative to those who do not attend college? (b) Is the strength of the association between college attendance and heavier drinking suppressed by students' lower levels of personality risk factors, such as sensation seeking and low self-regulation? (c) Do descriptive drinking norms contribute to college/noncollege drinking differences? and (d) Do college students experience more negative consequences as a result of their drinking?

Method

Participants and procedures

College sample. College students were recruited as part of a larger longitudinal study of alcohol use and other behavioral risks during the transition from high school through college. First-time students between ages 17 and 19 in the incoming class of 2004 at a large, public, southwestern university were invited to participate during the summer before college matriculation (N = 6,391; 95% of the incoming class). The 4,832 interested students (76% of those eligible) who met the final inclusion criterion of being unmarried were randomly assigned to one of three conditions: a biannual assessment condition (n = 3,046), a Year 1 and Year 4 assessment condition (n = 976), and a Year 4 assessment-only condition (n = 810).

Repeated assessment throughout the college years may affect reports of alcohol use (i.e., assessment reactivity), which could bias comparisons with nonreactive samples. The collegiate sample for the present study was therefore drawn from the Year 4–only condition. Following randomization, we attempted to maintain contact with these participants via birthday cards, and participants were encouraged to update their contact information via phone, email, or a secure website. Additionally, we received participants' addresses, phone numbers, and email addresses from university records biannually. For further information regarding participant recruitment, see Corbin and colleagues (2008) and Hatzenbuehler and colleagues (2008).

In the fall of 2007, students randomized to the Year 4–only condition for whom we had current contact information were given access to a secure web server on which they were invited to provide informed consent and complete the Year 4 survey. Surveys were collected and stored by DatStat (Seattle, WA). After 3 years, 82% of the incoming class of 2004 at the university remained enrolled, with 4% having graduated and 14% having dropped out (Office of Information Management and Analysis, 2010). This represents relatively low undergraduate attrition relative to other public universities (Martinez et al., 2008). Of the 810 students randomized to the Year 4–only condition in 2004, 421 provided consent and completed at least part of the Year 4 survey. Participants received $40 for completing the survey and were permitted to omit responses to individual items if they did not feel comfortable providing answers.

A subset of participants (79%) completed the measures included in the current study (final n = 331; 41% of the randomized sample). Relative to the n = 470 participants who were not included because of loss of contact, refusal to participate, or missing data, included participants generally did not differ on variables assessed at randomization, including age, ethnicity, high school class size and type (i.e., urban, suburban, or rural), and the frequency and quantity of alcohol consumption (ps > .07). Although 65% of included participants were female, 51% of those not included were female, $\chi^2(1) = 16.43$, $p < .001$. The included sample can, therefore, be considered largely representative of the randomized sample. The final college sample (53% White, 18% Asian American, 16% Hispanic or Latino, 6% African American, and 7% multiethnic or other ethnicities) was demographically similar to the undergraduate population, and the median reported family income during high school was $85,000 per year. At the Year 4 survey, the mean age was 21.70 years (SD = 0.36), and participants had completed an average of 111.36 course hours (SD = 21.23, range: 32–200).

Noncollege sample. In the spring of 2008 (i.e., Year 4 of the college study), we began recruiting a comparison sample of high school graduates who were matched to the Year 4–only college sample on demographic variables (i.e., age, gender, and ethnicity) but who had completed five or fewer courses at a 4-year college or university. We additionally excluded any individuals who enrolled at a 4-year college or university in the year immediately following high school graduation. Because recruitment was on a rolling basis and began after the completion of the college assessment, graduates of the high school classes of 2004–2006 were invited to participate. Participants were recruited from cities, towns, and regions from which collegiate participants originated via web and print newspaper advertisements, flyers posted in the community, and web-based announcements. No recruitment information included mention of the college-credit exclusion criteria to encourage honest responding. In response to invitations, 3,139 emerging adults completed a phone or

online screening questionnaire. Of those screened, 24% (n = 768) were eligible for participation. Screeners were most likely to be deemed ineligible because they were current or former college students who had reached the college-credit exclusion criterion (66%). They were also excluded because they were no longer needed for matching on ethnicity (22%), geographical region of origin (6%), or gender (0.4%) or because they did not meet the year-of-graduation criterion (5%). Eligible individuals were invited to complete a web-based survey largely identical to that administered to the college sample, for which they were also compensated $40.

Of the eligible volunteers, 595 (78% of those eligible) completed at least part of the survey, 84% of whom completed the measures included in the current investigation (final n = 502; 65% of the eligible sample). At the time of the survey, the noncollege sample (64% female; 53% White, 7% Asian American, 14% Hispanic or Latino, 13% African American, and 13% multiethnic or other ethnicities) was 22.42 years old on average (SD = 0.76). The vast majority (91%) of noncollege participants had not completed any courses at a 4-year college or university (M = 0.32, SD = 1.11, range: 0–5). The median reported family income during high school was $45,000 per year. The full sample, including college students and noncollege participants, comprised N = 833 participants in total.

Measures

Self-regulation. Participants completed the Brief Self-Control Scale (BSCS; Tangney et al., 2004), a 13-item scale assessing trait self-regulation. Participants responded to items including "I am good at resisting temptation" on a 5-point scale, where 1 = *not at all* and 5 = *very much.* The BSCS is associated with behavioral measures of self-regulation and a wide range of theoretically relevant outcomes (Schmeichel and Zell, 2007; Tangney et al., 2004). In the current investigation, the BSCS demonstrated good internal consistency (α = .83). See Table 1 for summary statistics for the college and noncollege samples.

Sensation seeking. Participants completed an 11-item measure of sensation seeking from the Zuckerman–Kuhlman Personality Questionnaire (Zuckerman et al., 1993). Participants endorsed items including "I like doing things just for the thrill of it" on a dichotomous scale, where 0 = *false* and 1 = *true.* In the current investigation, the sensation-seeking scale demonstrated good internal consistency (α = .81).

Descriptive norms. Participants' perceptions of descriptive drinking norms for members of their social group were assessed using a modified version of the Drinking Norms Rating Form (DNRF; Baer et al., 1991). Participants separately estimated the number of standard drinks male and female members of their social group (i.e., "the principal group of friends with whom you interacted and spent time") consumed on each day of a typical week during the past 3 months. Because "typical" peers may often be construed as male in the context of drinking, same-gendered descriptive norms exert greater influence on alcohol use than do gender-neutral norms, particularly for women (Lewis and Neighbors, 2004). Consequently, we calculated the perceived total number of drinks consumed per week by same-gendered social group members on the DNRF.

Table 1. Summary statistics for college students and noncollegiate participants

Variable	Possible range	College M (SD)	Noncollege M (SD)
Self-regulation	13–65	44.68 (8.17)	43.02 (9.28)
Sensation seeking	0–11	5.45 (2.95)	6.51 (3.18)
Descriptive drinking norms	≥0	12.37 (11.16)	16.08 (19.00)
Alcohol use	–	0.13 (0.91)	-0.09 (1.05)
Weekly drinks consumed	≥0	8.54 (10.77)	10.07 (13.25)
Frequency of heavy episodic drinking	≥0	4.92 (7.64)	5.06 (10.19)
Frequency of subjective intoxication	≥0	4.74 (7.40)	5.22 (10.96)
Maximum drinks	≥0	6.64 (5.34)	5.91 (5.75)
Alcohol-related problems	0–92	4.13 (7.08)	6.49 (10.79)

Note: Summary statistics for the four measures comprising the alcohol use composite were computed before log-transformation for analyses.

Alcohol use. Following recommendations for genomic studies (Agrawal et al., 2009) and research among college students (Fromme et al., 2008), we used a composite approach to the measurement of drinking, with four commonly used measures assessing past-3-month alcohol consumption. First, participants completed the Daily Drinking Questionnaire (DDQ; Collins et al., 1985). In a format similar to the DNRF, the DDQ asks participants to report the number of standard drinks (defined as 12 oz. of beer, 5 oz. of wine, or 1 shot of liquor straight or in a mixed drink) they consumed on each day of a typical week. From responses to the DDQ, we calculated the total number of drinks consumed per week. Second, participants reported how frequently they reached the standard definition of heavy episodic drinking (i.e., four or more standard drinks in a sitting for women and five or more for men; Wechsler and Isaac, 1992). Third, participants reported the number of times that they became subjectively "drunk (not just a little high) on alcohol" (Jackson et al., 2001; Midanik, 1999). Finally, participants reported the maximum number of standard drinks they consumed in a single 24-hour period (Dawson, 1998). Consistent with other samples of emerging adults, responses to these measures were nonnormally distributed: 20%, 37%, 38%, and 14% reported no typical drinking, heavy episodic drinking, subjective intoxication, and maximum drinks, respectively. We log-transformed responses to reduce skew and kurtosis, standardized the transformed scores, and then computed an average of the standardized scores. Internal consistency among the alcohol use measures was excellent (α = .91).

Alcohol-related problems. We used the Rutgers Alcohol Problem Index to assess the frequency with which par-

ticipants experienced 23 alcohol-related consequences in the past 3 months (White and Labouvie, 1989). Consequences ranged from "got into fights" and "passed out" to "went to work or school high or drunk." We summed responses to all items for each participant. This widely used measure of alcohol-related problems has demonstrated reliability and validity across numerous populations, including adolescents (White and Labouvie, 1989), college students (Simons and Carey, 2006), and noncollege emerging adults (Warner et al., 2007; White et al., 2005). The Rutgers Alcohol Problem Index demonstrated excellent internal consistency in the current investigation (α = .95). See Table 1 for summary statistics.

Data analytic strategy

Our index of drinking (skewness and kurtosis ≤ |0.77|) was appropriate for use as a dependent variable in linear regression models. Neither descriptive norms (skewness = 2.65, kurtosis = 10.59) nor alcohol-related problems (skewness = 3.55, kurtosis = 19.19), however, met the distributional assumptions of the general linear model. In analyses predicting norms and alcohol-related problems, we used generalized linear models, which allow for the specification of error distributions other than the normal (Hardin and Hilbe, 2003). For these analyses, we specified the negative binomial distribution and log link. Similar to the Poisson distribution, the negative binomial is appropriate for count data (i.e., nonnegative integers) with positive skew. The negative binomial distribution, however, additionally allows for the overdispersion common to alcohol use data (Neal and Simons, 2007). Exponentiated regression coefficients, or incidence rate ratios (IRRs), serve as a standardized effect size (e.g., reflecting the factor difference in frequency of problems). We standardized continuous predictors in generalized linear model analyses to aid interpretation of IRRs.

Results

Demographic analyses

Although noncollege participants were recruited to match the college sample on key demographic variables (i.e., age, gender, and ethnicity), there were several demographic differences between the two groups. Specifically, college students were approximately 8 months younger on average, $t(831) = 15.94$, $p < .001$, $d = 1.20$. College students were also more likely to be Asian American and less likely to be African American, multiethnic, or other ethnicities, $\chi^2(4) = 36.52$, $p < .001$. As might be expected given that socioeconomic status was not a basis for matching, college students reported growing up in higher income households relative to noncollege emerging adults, $t(831) = 11.95$, $p < .001$, $d = 0.85$. The college and noncollege samples did not differ with respect to gender, $\chi^2(1) = 0.15$, $p = .70$. To account for these differences, we controlled for demographics in all subsequent analyses.

College student status and alcohol use

College students drank more than did noncollege participants, as indexed by the alcohol use composite, $t(831) = 3.04$, $p = .002$, $d = 0.22$, although this difference was small in magnitude. College students similarly reported drinking significantly more, after log transformation, on all measures comprising the alcohol use composite except weekly consumption, *d*s ranging from 0.11 to 0.25. When accounting for demographics, the student-status difference remained small but significant. See Table 2, Model 1.

Personality suppression. As expected, college students were higher in self-regulation, $t(831) = 2.65$, $p = .008$, $d = 0.19$, and lower in sensation seeking, $t(831) = 4.83$, $p < .001$, $d = -0.34$. These differences remained significant for

Table 2. Summary of linear regression models predicting alcohol use

	Model 1 (R^2 = .09***)			Model 2 (R^2 = .18***)			Model 3 (R^2 = .32***)		
Variable	*b*	*SE*	β	*b*	*SE*	β	*b*	*SE*	β
Intercept	-0.57	1.19	–	-0.37	1.14	–	-0.29	1.04	–
Age	0.02	0.05	.01	0.02	0.05	.02	0.02	0.05	.01
Male gender	0.29	0.07	.14***	0.21	0.07	.10**	0.04	0.06	.02
Ethnicity[a]									
Asian American	-0.62	0.11	-.19***	-0.62	0.11	-.20***	-0.40	0.10	-.13***
African American	-0.43	0.12	-.13***	-0.31	0.11	-.09**	-0.29	0.10	-.09**
Hispanic/Latino	-0.06	0.11	-.02	-0.05	0.09	-.02	-0.02	0.09	-.01
Multiethnic/other	-0.16	0.11	-.05	-0.18	0.11	-.06	-0.11	0.10	-.03
Family income	0.04	0.02	.09*	0.04	0.01	.10**	0.04	0.01	.09**
College student	0.19	0.08	.09*	0.29	0.08	.14***	0.34	0.07	.17***
Self-regulation				-0.02	0.004	-.17***	-0.01	0.003	-.12***
Sensation seeking				0.07	0.01	.21***	0.04	0.01	.13***
Descriptive norms							0.02	0.002	.36***
College × Norms							0.02	0.01	.11**

[a]The reference category for ethnicity was White.
*$p < .05$; **$p < .01$; ***$p < .001$.

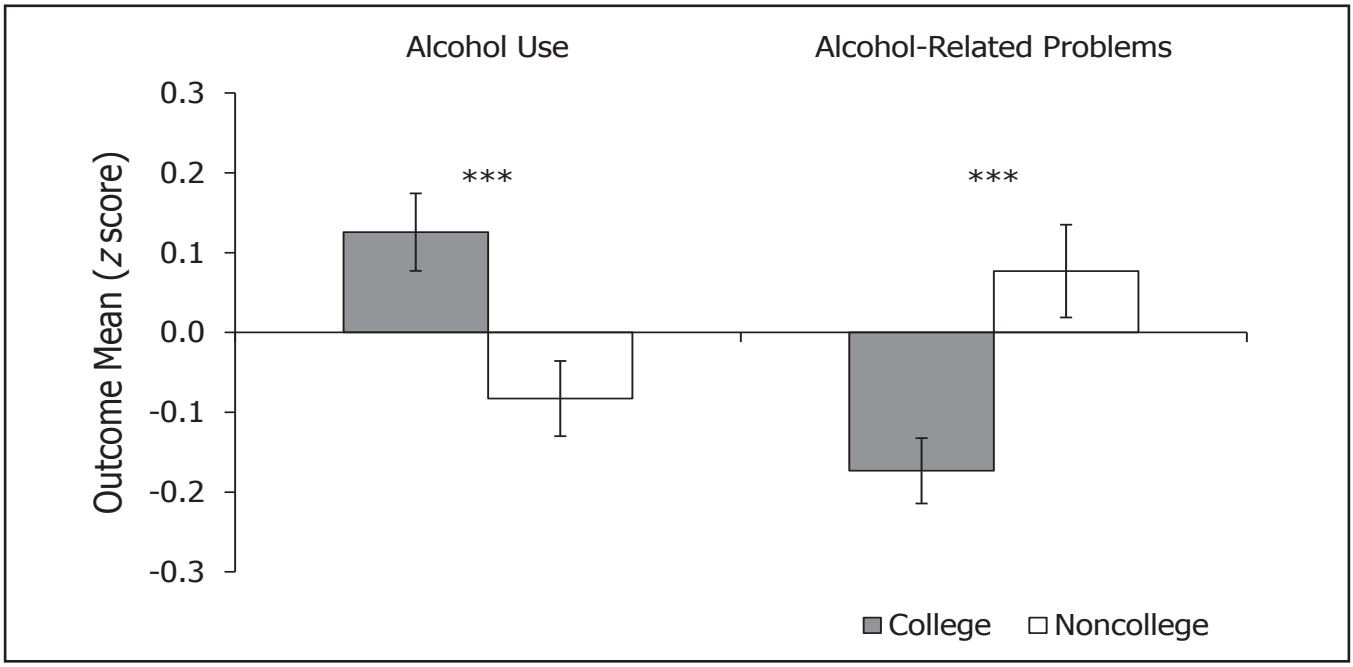

FIGURE 1. Mean alcohol use and alcohol-related problems scores for college and noncollege participants, controlling for demographics, personality, and—for alcohol-related problems—alcohol use. Bars represent standard errors.
***$p < .001$.

both self-regulation ($\beta = .09$, $p = .03$) and sensation seeking ($\beta = -.18$, $p < .001$) when accounting for demographics. Additionally, as shown in Table 2, Model 2, accounting for demographics, those higher in self-regulation drank less, whereas those higher in sensation seeking drank more. Moreover, when accounting for demographics *and* traits, the association between attending college and drinking more heavily appeared stronger.

As hypothesized, these relations are consistent with third-variable statistical suppression. That is, the true association between attending college and drinking more heavily may have been masked by the fact that college students were at lower risk for alcohol use as a function of personality. The significance of suppression can be tested using the same methods used to test indirect effects in mediation (MacKinnon et al., 2000). Using Preacher and Hayes' (2008) bias-corrected bootstrapping method to generate standard errors for indirect effects, we confirmed the significance of the overall pattern of suppression (indirect effect = -.11, 95% CI: [-.17, -.05]). Furthermore, both self-regulation (indirect effect = -.03 [-.07, -.004]) and sensation seeking (indirect effect = -.08 [-.12, -.04]) were significant suppressors over and beyond each other. In sum, differences in both traits helped suppress the association between attending college and drinking more heavily. See Figure 1 for differences between college and noncollege participants after accounting for demographics, self-regulation, and sensation seeking.

Descriptive norms and college student status. We examined two possible ways in which descriptive drinking norms could contribute to differences between college students and noncollege emerging adults. First, students could perceive their peers as drinking more relative to noncollege emerging adults, which could help explain (i.e., mediate) drinking differences. The first step in testing mediation is to demonstrate that the independent variable (college status) is positively associated with the mediator (norms) (e.g., Baron and Kenny, 1986). However, accounting for demographics, alcohol use, and traits, college students reported lower descriptive norms ($b = -0.19$, IRR = 0.83, $p = .04$). Given the positive association between norms and drinking (see Table 2, Model 3), norms could not have mediated the association between attending college and drinking more heavily.

Second, we tested whether descriptive norms conferred greater risk among college students. As shown in Table 2, Model 3, we found support for this possibility in that college student status moderated the association between descriptive norms and alcohol use. Specifically, descriptive norms were significantly more strongly associated with drinking among college students ($\beta = .47$, $p < .001$) than among noncollege emerging adults ($\beta = .37$, $p < .001$). See Figure 2.

College student status and alcohol-related problems

If college students drink more heavily than do noncollege emerging adults, then we might also expect them to experience more alcohol-related problems. Accounting for demographics, however, we found the reverse association: College students experienced fewer alcohol-related prob-

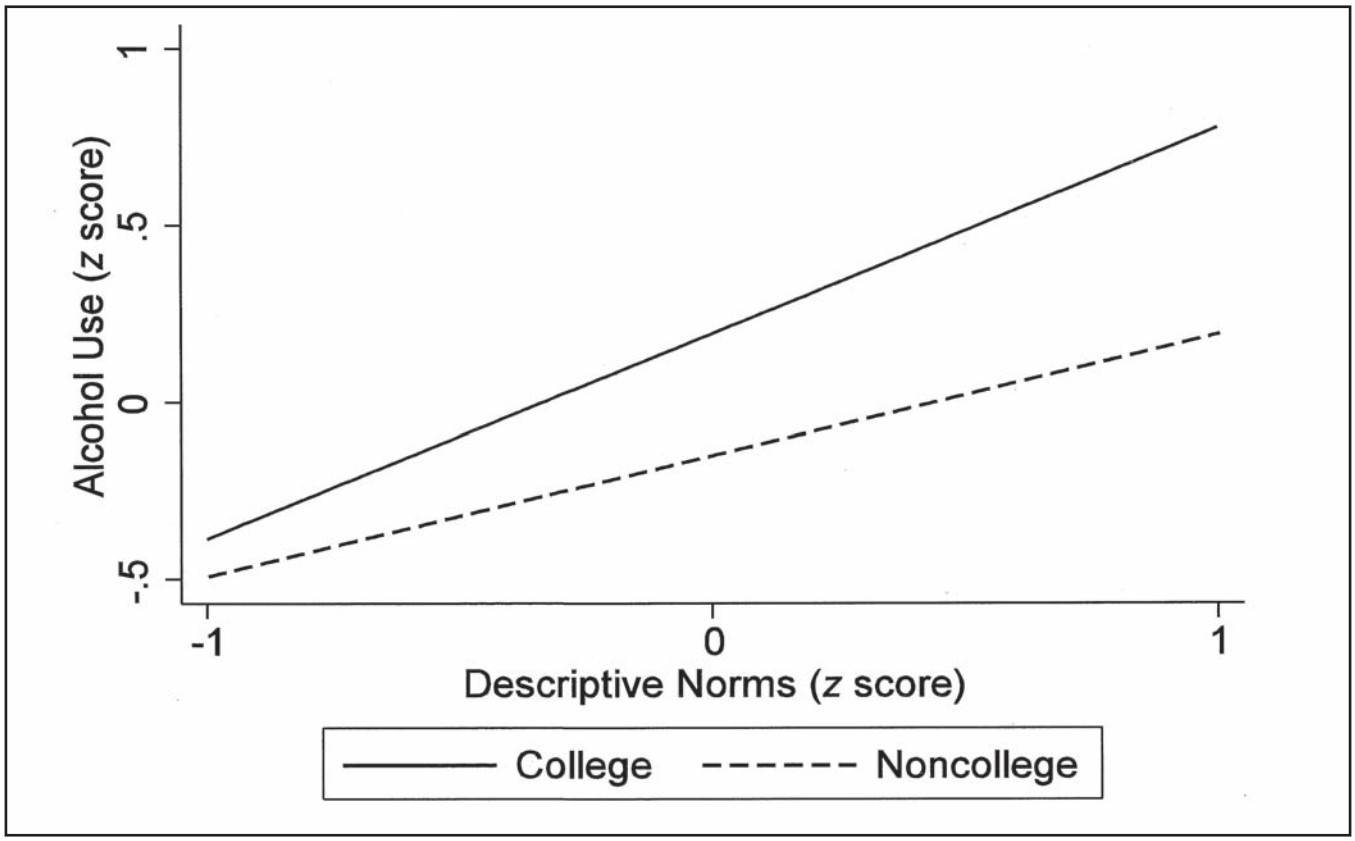

FIGURE 2. Association between gender-specific social group descriptive drinking norms and alcohol use among college students and noncollege emerging adults, controlling for demographics and personality

lems. Furthermore, this relation held when controlling for drinking. Specifically, accounting for drinking, college students experienced half as many alcohol-related problems as did noncollege participants. See Table 3, Model 2.

In the same way that self-regulation and sensation seeking masked the association between attending college and heavier drinking, the same traits may have exaggerated the association between attending college and experiencing *fewer* alcohol-related problems. Indeed, participants higher in self-regulation reported significantly fewer alcohol-related problems, whereas participants higher in sensation seeking reported greater alcohol-related problems (Table 3, Model

TABLE 3. Summary of generalized linear models predicting alcohol-related problems

	Model 1 (R^{2a} = .11***)			Model 2 (R^{2a} = .67***)			Model 3 (R^{2a} = .70***)		
Variable	*b*	*SE*	*IRR*	*b*	*SE*	*IRR*	*b*	*SE*	*IRR*
Intercept	1.79	0.07	–	1.08	0.08	–	0.95	0.08	–
Age	-0.08	0.05	0.92	-0.11	0.05	0.89*	-0.07	0.05	0.94
Male gender	0.50	0.08	1.65***	0.20	0.09	1.22*	0.19	0.09	1.21*
Ethnicity[b]									
Asian American	-0.65	0.13	0.52***	0.12	0.16	1.13	0.05	0.16	1.05
African American	-0.25	0.14	0.78	0.16	0.16	1.17	0.29	0.16	1.33
Hispanic/Latino	-0.13	0.11	0.88	0.03	0.13	1.03	0.05	0.13	1.05
Multiethnic/other	-0.11	0.13	0.89	0.11	0.15	1.11	-0.04	0.15	0.96
Family income	-0.02	0.04	0.98	-0.11	0.05	0.90*	-0.09	0.05	0.91
College student	-0.49	0.10	0.61***	-0.70	0.11	0.50***	-0.51	0.11	0.60***
Alcohol use				1.55	0.06	4.72***	1.42	0.06	4.12***
Self-regulation							-0.36	0.05	0.70***
Sensation seeking							0.11	0.05	1.12*

Notes: Generalized linear models using negative binomial reference distribution and log link. IRR = incidence rate ratio.
[a]Cragg and Uhler R^2. [b]The reference category for ethnicity was White.
*$p < .05$; ***$p < .001$.

3). We are aware of no method of testing indirect effects using the generalized linear model framework, but when we included self-regulation and sensation seeking in the model, the association between student status and alcohol-related problems was reduced by 27% (from b = -0.70 to b = -0.51) but remained significant.

Discussion

This investigation generated four major conclusions. First, accounting for demographics, college students at this university drank modestly—but significantly—more than did their noncollege peers. This result replicates national findings of a small student-status difference (Dawson et al., 2004). Second, we found that the relatively small magnitude of the student-status difference in drinking rates may partially reflect biased selection into college in terms of personality. Specifically, college students were lower in the risk factors of low self-regulation and high sensation seeking. Consequently, the at-face-value small difference in drinking rates actually belied a significantly larger divergence, which became apparent after accounting for suppression by the two traits. This third-variable suppression suggests that previous findings on differences in rates of drinking between college students and their noncollege peers have likely underestimated any possible effect of attending college. In the current study, college status explained approximately 1% of the variance in alcohol use, suggesting that the association was modest in size but meaningful (Cohen, 1988).

Third, although college students perceived members of their social group as drinking less than did noncollege participants, these perceptions were more strongly associated with drinking among students. Previous research has clearly identified norms as a correlate of drinking among college students (Borsari and Carey, 2003; Neighbors et al., 2007), but less evidence is available for their role in other populations. This study is among the first to suggest that descriptive social group norms may be less influential among noncollege individuals. Moreover, this finding provides a potential explanation for why noncollege individuals drink less. If alcohol use among noncollege emerging adults is more independent of perceived peer drinking, they may feel less compelled to meet overestimated norms, which could help limit their drinking. That is, if two individuals—one a student and the other not—have similar levels of perceived norms, the nonstudent may be less strongly impelled to drink.

We speculate that social role differences may help explain why social group norms may be less influential among noncollege individuals. College students often live with members of their social group (e.g., in dorms, other shared housing), and they may select into housing partially on the basis of drinking (Fromme et al., 2008). In the absence of full-time employment or family responsibilities (e.g., child or elder care), students may additionally have ample time to spend with their social group. In contrast, noncollege individuals are more likely on average to spend time in contexts other than with their primary social group (Bachman et al., 2002), such as in occupational or family settings. As a result, social-group drinking norms may be less salient for noncollege emerging adults' alcohol use. Recent evidence suggests that drinking norms vary in influence as a function of the proximity of the reference group (Larimer et al., 2009). Further research is needed to determine whether the salience of norms also varies as a function of social roles.

Finally, despite drinking more on average, students experienced fewer alcohol-related problems, even after accounting for personality. This finding replicates previous longitudinal findings (White et al., 2005). Several studies have tested for student-status differences on other measures of the consequences of drinking, such as alcohol use disorders (Dawson et al., 2004; Slutske, 2005). These studies have generally found inconsistent results, suggesting that noncollege individuals are primarily distinguished in that they are more likely to experience the smaller-scale-but-still-negative consequences captured by measures of alcohol-related problems (e.g., fights with friends, hangovers, missed work). We concur with White and colleagues (2005) that these differences likely reflect the differing responsibilities of college students and those who do not attend college. Indeed, the same drinking behavior, such as heavy episodic drinking on a Thursday night, would have remarkably different consequences depending on whether the drinker was a student with no Friday classes or a noncollege individual with childcare responsibilities and/or a 9-to-5 job.

The conclusions we have drawn from this investigation should be understood with an appreciation of its strengths and limitations. Strengths included our approach to the measurement of alcohol use, which captures drinking without exclusively relying on limited measures of heavy episodic drinking (Agrawal et al., 2009; Midanik, 1999), and our inclusion of both social and personality correlates of drinking. The principal limitation of this study was its cross-sectional design. Without randomization or prospective evidence, we cannot establish the causal influence of traits and drinking norms on differences between college students and their noncollege peers. This concern is particularly noteworthy regarding drinking norms, which have demonstrated transactional relations with drinking over time (Neighbors et al., 2006). Future research should prospectively test the effects of environmental selection and socialization on drinking and its consequences as emerging adults depart high school and adopt new social roles across the adult life span (Park et al., 2009).

This investigation sampled college students at only one university. These students were demographically diverse and likely had heterogeneous motives for attending the university. Importantly, however, the social environment varies across universities, and it is possible that personality influences the

types of schools into which students matriculate (e.g., urban vs. suburban vs. rural, academic vs. social reputation, strong vs. weak athletic reputation). Although we are aware of little research in this area, given the strong association between academic achievement and self-regulation (Duckworth and Seligman, 2005), it is likely that selection into universities with elite academic reputations is even more biased on this trait than was demonstrated in our sample. Other traits may influence selection as well, with more extroverted students, for example, preferentially selecting into schools with social reputations. Thus, although self-regulation and sensation seeking may distinguish students from noncollege emerging adults, these traits or others may further differentiate students across universities.

Additionally, despite screening 3,166 emerging adults for the noncollege sample, our college and noncollege groups were not perfectly matched on age and ethnicity. It proved especially difficult to recruit noncollege Asian Americans from similar geographical regions of origin, likely reflecting the fact that Asian Americans are nearly twice as likely as other U.S. residents to earn a bachelor's degree (U.S. Census Bureau, 2009). Noncollege participants were also from lower income families, which may not have been surprising given that we made no attempt to match on socioeconomic status. Fortunately, however, our large, diverse sample enabled us to account for demographics in all analyses, raising our confidence that differences between the groups were a product of the personality and environmental effects of interest. We cannot, however, rule out the possibility that unmeasured third-variable confounds (e.g., neighborhood alcohol availability, IQ, other personality traits) may underlie associations found here. A replication of our results using techniques to account for a broader range of covariates is therefore needed. Proximity score matching, for example, would strengthen conclusions drawn from samples in which a wide array of potential confounds were assessed.

Finally, this and many other investigations of student-status drinking differences have compared students with those who do not attend college but have excluded those who leave college early or who attend college intermittently. By age 25, 20% of emerging adults in the United States have attended a 4-year college without earning a bachelor's degree (U.S. Census Bureau, 2006–2008), and—highlighting the influence of the college environment on alcohol use—drinking rates during the college years appear to be somewhat lower among students who will complete fewer years of college (Bachman et al., 2008). Further research is needed to identify whether the same personal and social factors identified here play a role among those who attend but do not complete college.

Implications

Taken together, the current findings illustrate the differing patterns of alcohol involvement among college students and noncollege emerging adults, and they suggest that we consider tailoring intervention strategies to environments. Despite selection by students with more protective levels of self-regulation and sensation seeking, the college environment may contribute to heavier drinking, perhaps partly as a consequence of the strong influence of social drinking norms. Intervention programs targeting normative overestimations to reduce drinking appear well matched to the needs of college students (see Larimer and Cronce, 2007, for a review). In contrast, despite drinking less, noncollege emerging adults may be less able to avoid potentially harmful consequences. Prevention or treatment programs based on the principles of harm reduction may best suit that population. Although rapidly expanding, efforts to develop and implement interventions for college students run the risk of neglecting those who do not attend college. Future empirical and clinical work would do well to consider the differing challenges facing each population.

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