

# Description and Predictors of Positive and Negative Alcohol-Related Consequences in the First Year of College

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**ABSTRACT. Objective:** The purpose of this study was to establish the frequency of positive and negative alcohol-related consequences during the first year of college and to evaluate gender, race/ethnicity, time of year, alcohol use, and intoxication as predictors of consequences using frequent assessments. **Method:** Participants ( $N = 1,053$ ; 57.5% female) completed biweekly assessments of alcohol use and positive and negative alcohol-related consequences throughout the year. **Results:** The majority of drinkers reported both positive and negative consequences. Having a good time and feeling less stressed were the most commonly reported positive consequences. Blackouts and getting physically sick were the most commonly endorsed negative consequences. At the weekly level, number of drinking days, drinks per drinking day, and estimated blood alcohol concentration (eBAC, reflecting intoxication) were significantly related to all consequences after controlling for demographics and time of year. Negative consequences had stronger associations with number

of drinks and eBAC than positive consequences did. With each additional drink consumed on a drinking day, the incidence of negative consequences more than doubled (incidence rate ratio [IRR] = 2.34, 95% CI [2.19, 2.50]), whereas the incidence of positive consequences increased by about half (IRR = 1.51, 95% CI [1.47, 1.56]). The consequence with the largest gender difference was regretted sex, with women reporting it more often. Few racial/ethnic differences were found in report of negative consequences. Greater positive and negative consequences were endorsed at the beginning of both academic semesters. **Conclusions:** As number of drinks and eBAC increase, the relative odds of a negative consequence are higher than that of a positive consequence. Alcohol interventions could promote greater awareness of the likelihood of specific consequences and could highlight that positive consequences are associated with lower levels of drinking. (*J. Stud. Alcohol Drugs*, 75, 103–114, 2014)

**H**AZARDOUS DRINKING IS one of the most pressing public health concerns on college campuses and is linked to a host of problematic outcomes (Hingson et al., 2009; Perkins, 2002; Wechsler et al., 2000). Positive consequences of alcohol have received considerably less research attention but are also meaningful (Corbin et al., 2008) because they tend to be reported more frequently than negative consequences (Park, 2004; Park and Grant, 2005) and are positively related to plans to drink in the future (Patrick and Maggs, 2008). Accordingly, positive consequences may be an important but understudied factor in the escalation and maintenance of problem drinking. Several individual and contextual variables are important for understanding alcohol consequences experienced by college students, in-

cluding gender, race/ethnicity, time of the year, alcohol use frequency and quantity, and intoxication. These variables and limitations in prior research on alcohol consequences are briefly reviewed next.

## *Demographic correlates of positive and negative alcohol consequences*

**Gender:** There is considerable evidence that young men experience more negative alcohol consequences than young women (Engs and Hanson, 1990; Hammer and Pape, 1997), but it has been argued that these gender differences have been overestimated (Perkins, 2002). Although men tend to report experiencing more negative consequences of a “public” nature (e.g., harm to others), women are equally or more likely to report “private” consequences (e.g., harm to the self) (Sugarman et al., 2009; Wechsler and Isaac, 1992). Indeed, item response analyses have found that negative consequence items vary by gender (Kahler et al., 2004).

A second major issue with research on gender differences in the experience of consequences relates to volume of alcohol. When the typically larger volume of alcohol consumed

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by men is statistically controlled for, there are fewer gender differences in such consequences as memory loss, poor academic performance, and unplanned sexual activity (Cronin and Ballenger, 1991; Lo, 1996; Wechsler and Isaac, 1992). Alternatively, controlling for volume obscures the independent contribution of gender regardless of amount of alcohol consumed. For this investigation, we were interested in the most accurate estimates of the frequency of alcohol-related consequences and the prediction of these consequences for male and female college students, without controlling for gender differences in volume (or intoxication). Last, gender differences associated with positive consequences have been infrequently evaluated. Park and Grant (2005) found no gender differences in positive consequences among undergraduates, but Park (2004) found that men were more likely to report positive consequences than women; both studies had small samples and used single cross-sectional surveys.

*Race/ethnicity.* Alcohol use and alcohol diagnoses among adolescents and young adults show racial/ethnic subgroup differences. Studies have found that White (vs. Black) adolescent drinkers had a greater prevalence of alcohol abuse and dependence symptoms (Wagner et al., 2002), that White (vs. non-White) college students seen in an emergency department for alcohol-related visits were more likely to have accompanying injuries (Turner and Shu, 2004), and that Asian and Black (vs. White) college students reported less frequent driving after drinking (Fromme et al., 2008). However, to our knowledge, there have been no investigations of the prevalence of a variety of positive and negative alcohol consequences in a racially diverse sample of college students. Understanding the experience of different consequences among racial/ethnic groups will allow a greater specification of acute alcohol-related risk and will help determine the necessity for targeted programming and/or tailored interventions.

#### *Time of year*

Prior research suggests that alcohol use occurs most frequently on weekends and at the beginning of each semester when academic requirements are low (Beets et al., 2009; Del Boca et al., 2004). Data from participants in the current study indicate that alcohol use is higher in the first semester and at the beginning of semesters (Barnett et al., 2013; Hoeppepner et al., 2012). Thus, there is considerable evidence that alcohol use differs by time of year, but variation in positive and negative consequences by time of year has not been systematically investigated.

#### *Alcohol use and intoxication*

Positive and negative consequences have been associated with alcohol frequency, alcohol quantity, and frequency of heavy episodic drinking (Lee et al., 2011; Park, 2004; Park

and Grant, 2005). Although these alcohol consumption variables tend to be correlated, there may be differences in their association with problems, supporting their separate investigation. For example, level of intoxication may have a greater association than volume of alcohol with consequences that reflect cognitive impairment, such as blackout (Goodwin, 1995; Lee et al., 2009). Having an improved understanding of the relations between different consumption constructs and individual positive and negative consequences could inform prevention efforts more specifically than previous work has allowed.

#### *Summary and study overview*

Prior research has tended to investigate negative alcohol consequences among college students by means of cross-sectional surveys and summary scores, commonly using retrospective reports of the prior year (e.g., Lee et al., 2011; Mallett et al., 2008, 2011). Although there have been a few investigations of demographic, time-related, and alcohol use correlates of individual consequences, examinations of the correspondence between multiple indicators of alcohol use and individual consequences on a weekly basis have not been conducted. There has also been limited investigation of individual positive consequences, their frequency relative to negative consequences, and associations with demographics, time of year, and alcohol use variables. Last, data tend to be collected using single measures covering a long period (commonly 1 year), which could result in reporting inaccuracies. Frequent measurements of shorter periods should yield more reliable estimates while also providing closer temporal correspondence between alcohol use and alcohol consequences.

The purpose of this investigation was to examine positive and negative alcohol consequences across the entire first year of college using frequent brief assessments. We had two primary goals. First, we sought to describe the prevalence and rates of common positive and negative consequences during the year using both person-level and week-level summaries. Aggregated summaries by person and total consequences reported across the sample provide a more comprehensive description of consequences. Second, we investigated demographic, time of the school year, and alcohol consumption variables as predictors of the total number of positive and negative consequences and the endorsement of specific consequences per drinking week.

Building on past research, we hypothesized that men would endorse more negative consequences of an external or public nature and women would report more negative consequences tied to internal states but that men and women would not differ in total numbers of positive and negative consequences and that there would be minimal gender differences in individual positive consequences. We expected that racial/ethnic minority (vs. non-Hispanic White) students would report fewer negative consequences. We predicted that

alcohol consequences would be highest at the start of each semester and higher in the fall semester than in the spring semester as previously found with drinking consumption (Barnett et al., 2013; Hoepfner et al., 2012). We expected that the occurrence and accumulation of positive and negative consequences would be positively related to alcohol frequency, quantity, and estimated intoxication.

## Method

### *Participants*

Participants ( $N = 1,053$ ; 57.5% female) were incoming first-year students at three New England colleges/universities enrolled before the start of three academic years. Average age was 18.4 years ( $SD = 0.5$ ; range: 15.5–20.9). Latino/Hispanic ethnicity was reported by 125 participants (11.9%). Race was 65.6% White ( $n = 691$ ), 12.8% Asian ( $n = 135$ ), 7.2% Black ( $n = 76$ ), 5.9% multiracial ( $n = 62$ ), and 8.4% unknown or other ( $n = 89$ ). College 1 had 186 participants (17.7%), College 2 had 269 (25.5%), and College 3 had 598 (56.8%). See Barnett et al. (2013) for additional sample details. Procedures were approved by the institutional review boards at the participating institutions.

### *Procedures*

*Recruitment.* Eligible students were younger than age 21 years, enrolled full time, lived on campus during their first year of college, and were not international students. Entering first-year students who met inclusion criteria were identified by the colleges; the invited sample was gender-stratified and oversampled students with a racial/ethnic identity other than exclusively non-Hispanic White 2:1. The total number of students invited to participate was 2,821 (1,053 enrolled; 37.4% enrollment rate; 52.3% female; 34.7% racial/ethnic minority) over 3 years.

In late June, sampled students received a mailed description of the study, an informed consent form, information about how to enroll online using a username and password provided, and \$5 for considering participation. Parents of students younger than 18 received a separate packet and provided informed consent either online using a unique parent username and password or by returning a paper consent form. Nonresponders received a second packet and telephone contact.

*Data collection.* The baseline survey was administered immediately after consent using commercial web survey software, after which participants were randomly assigned to one of two survey groups. Participants in each group received alternating biweekly email invitations to complete brief web-based assessments throughout the academic year. Invitation emails were sent on Monday, with reminder emails on Wednesday and Friday, to members of that week's assigned group, and participants could respond through

Sunday. The survey was programmed to identify the current day and display the days of the week for the prior 7 days. This survey approach limited retrospective recall to 7 days and participant burden to two surveys per month. Surveys were collected through winter break, and the last survey was sent mid-May, for 18 surveys per participant (8 each semester and 2 over winter break). Participants received \$20 for completing the baseline survey, \$2 for each biweekly assessment, \$20 bonuses for completing at least seven of the eight assessments during each semester, and a chance to win \$100 for each biweekly submission.

### *Measures*

*Demographics.* Gender, age, race/ethnicity, and weight were collected at baseline.

*Biweekly alcohol consumption and consequences.* On the biweekly surveys, participants provided the number of standard drinks consumed and the time (hours/minutes) spent drinking each day for the prior 7 days. For each week, the number of days drinking and the average drinks per drinking day were calculated. Using gender and weight, we calculated the average estimated blood alcohol concentration (eBAC; Matthews and Miller, 1979) to reflect intoxication on drinking days.

To measure a range of consequences while minimizing assessment burden, positive and negative consequences were selected from established measures of alcohol use outcomes and expectancies (Fromme et al., 1993; 1997; Hurlbut and Sher, 1992; Kahler et al., 2005; Leigh and Stacy, 1993; Noar et al., 2003; Saunders et al., 1993). We identified items that were shared across established measures and tried to achieve breadth across different domains (external/internal; harm to others/harm to self) and across severity, resulting in 11 positive consequences (Table 1) and 13 negative consequences (Table 2). Participants were asked, "In the past week, did you have any of the following experiences during or after drinking alcohol?" Answer options were yes/no for these items. The set of items had acceptable internal reliability (coefficient  $\alpha = .79-.83$  in each week). Consequences were recorded only for participants who reported one or more drinking days that week.

### *Data analysis*

Two data sets were used: a person-level data set for describing the sample and a multiple-record data set of drinking and consequences at the weekly level. Predictors of total number of consequences and individual consequences at the weekly level were examined using generalized estimating equations (GEE; Zeger and Liang, 1986). For total number of (positive and negative) consequences a Poisson distribution with an exchangeable correlation structure, log link, was used. For models of the individual (positive and negative)

TABLE 1. Positive consequences in the freshman year ( $n = 762$  drinkers)

Consequence	Person level		Week level	
	No. (%) of drinkers who endorsed at least once	Range endorsed per person	Total no. of times endorsed in year	Percentage of drinking weeks on which consequence was endorsed
Had a good time	717 (94.1%)	0–18	5,902	81.4%
Felt less stressed or more relaxed	647 (84.9%)	0–18	4,002	55.2%
It was easier to socialize	640 (84.0%)	0–18	3,923	54.1%
Was more energetic	596 (78.2%)	0–18	2,910	40.1%
Talked to someone I was attracted to	577 (75.7%)	0–18	3,090	42.6%
Felt like I was part of the group	566 (74.3%)	0–18	2,761	38.0%
Felt more self-confident and sure of myself	523 (68.6%)	0–18	2,466	34.0%
Was able to take my mind off my problems	511 (67.1%)	0–18	2,230	30.7%
Expressed my thoughts or feelings to someone more easily	499 (65.5%)	0–18	1,887	26.0%
Felt more sexy	356 (46.7%)	0–18	1,290	17.8%
Enjoyed sex more	208 (27.3%)	0–15	506	7.0%
Totals	736 (96.6%) <sup>a</sup>	0–194	30,967	87.1% <sup>b</sup>

Notes: The first two data columns reflect the proportion of drinkers who endorsed a consequence one or more times over the course of the year and the range of number of times per person. The last two data columns reflect the per-week data, and show the total number of reports in the year and the proportion of drinking weeks that resulted in each consequence. No. = number. <sup>a</sup>Reflects the total number (and percentage) of participants who reported one or more of the 11 positive consequences; <sup>b</sup>reflects the percent of all drinking week reports across participants that had one or more positive consequence.

consequences, a binomial distribution with exchangeable correlation structure, logit link, was used.

Four GEE models were produced for the positive and negative consequences. In the first model, gender, race/ethnicity (coded dichotomously), semester of the year, and numbered biweek of the semester were entered as predictors of the total number of consequences and each individual consequence (separately). In Model 2, these same demographic and time variables were entered, along with number of drinking days in the week. In Models 3–4, the demographic and time variables were included, as were the number of drinking days in the week and the number of drinks per drinking day (Model 3) and average eBAC (Model 4). Our rationale was that we thought it important first to evaluate the importance of demographic and time of year variables and then to establish the importance of frequency of drinking (i.e., number of opportunities to experience consequences). For number of drinks per drinking day (Model 3) and eBAC (Model 4), it was important to establish their significance while controlling for the number of days of drinking (i.e., controlling for the opportunity to experience consequences). Site differences in alcohol consumption and positive alcohol consequences were found (details available from first author); therefore, (dummy-coded) college site was entered as a covariate in the GEE models.

## Results

### Survey responses

Of the 1,053 research participants, 992 (94.2%; 58.4% female; 38.0% racial/ethnic minority) completed at least one

biweekly assessment; the average was 15.1 of 18 surveys ( $SD = 5.3$ ;  $Mdn = 18$ ; mode = 18). Responding (completing at least one assessment) was slightly higher among women (95.5% of women vs. 92.4% of men),  $\chi^2(1, N = 1,053) = 4.68, p = .031$ , but did not differ by non-Hispanic White/non-White status (93.6% and 95.4%, respectively),  $\chi^2(1, n = 1,047) = 1.54, p = .214$ . Responding was not related to past-year drinking as measured at baseline,  $\chi^2(1, N = 1,053) = 0.63, p = .429$ .

### Alcohol consumption

Aggregating across all weeks, 762 participants (76.8% of biweekly respondents) reported drinking once or more in the school year. The average number of drinking days per week was 0.95 ( $SD = 1.1$ ), the average number of drinks per drinking day was 4.2 ( $SD = 2.2$ ), and the average eBAC on drinking days was .082% ( $SD = .048$ ). Only individuals who reported at least one drinking day were included in subsequent analyses.

### Positive alcohol-related consequences

Overall, 96.6% of drinkers reported one or more positive consequences in the year, with an average total number of 40.6 ( $SD = 33.3$ ). With all drinking weeks accumulated (i.e., at the week-level), 87.1% of drinking weeks resulted in one or more positive consequences. Table 1 shows the total number of reports in the year and the proportion of drinking weeks that resulted in each consequence. Most participants reported at least one episode of having a good time (94.1%)

TABLE 2. Negative consequences in the freshman year ( $n = 762$  drinkers)

Consequence	Person level		Week level	
	No. (%) of drinkers who endorsed at least once	Range endorsed per person	Total no. of times endorsed	Percentage of drinking weeks on which consequence was endorsed
Got physically sick (e.g. vomit, stomach cramps)	438 (57.5%)	0–12	1,010	13.9%
Couldn't remember some part of the day or night	413 (54.2%)	0–14	1,381	19.0%
Said something that I wish I hadn't	345 (45.3%)	0–14	878	12.1%
Felt sad or depressed	328 (43.0%)	0–14	811	11.2%
Disappointed others who are close to me	279 (36.6%)	0–9	544	7.5%
Had a romantic or sexual activity that I now regret	242 (31.8%)	0–9	488	6.7%
Had problems with school work	232 (30.4%)	0–11	455	6.3%
Passed out	158 (20.7%)	0–9	308	4.2%
Was physically injured	156 (20.5%)	0–7	264	3.6%
Drove after drinking and realized I should not have	100 (13.1%)	0–10	194	2.7%
Got into trouble with my school authorities or police	82 (10.8%)	0–3	98	1.4%
Accidentally physically hurt someone	68 (8.9%)	0–5	96	1.3%
Got into a physical fight	59 (7.7%)	0–9	88	1.2%
Totals	625 (82.0%) <sup>a</sup>	0–81	6,615	42.3% <sup>b</sup>

Notes: The first two columns reflect the proportion of drinkers who endorsed a consequence one or more times over the course of the year and the range of number of times per person. The last two columns reflect the per-week data, and show the total number of reports in the year and the proportion of drinking weeks that resulted in each consequence. No. = number. <sup>a</sup>Reflects the total number (and percent) of participants who reported one or more of the 13 negative consequences; <sup>b</sup>reflects the percentage of all drinking week reports across participants that had one or more negative consequence.

and feeling less stressed or more relaxed (84.9%). Even the least frequent positive consequence (enjoying sex more) was reported by 27.3% of drinkers.

*Model 1: Positive consequences as a function of demographics and time.* As expected, gender was unrelated to the total number of positive consequences, and the only individual consequences with significant gender differences were “talked to someone I was attracted to” (men more likely to report) and “felt more sexy” (women more likely to report) (Table 3). Non-Hispanic White students showed a significantly higher incident rate of positive consequences overall and showed differences relative to non-Whites primarily in the area of social interaction (“it was easier to socialize,” “felt like I was part of the group,” “felt more confident and sure of myself”). To investigate these differences, we conducted follow-up analyses for the total number of positive consequences and for the individual consequences that showed race/ethnicity differences and found a higher likelihood for Whites and multiracial students to report positive consequences compared with Asian and Black students (Table 4).

*Models 2–4: Positive consequences as a function of consumption variables, controlling for demographics and time.* As predicted, all three alcohol variables showed significant positive associations with total number of positive conse-

quences and with each individual positive consequence. For the positive consequence of “had a good time,” the confidence intervals for drinks per drinking day [3.55, 4.86] and for average eBAC [3.02, 4.48] do not overlap with the confidence intervals for other positive consequences, indicating that number of drinks and eBAC are more strongly associated with having a good time than they are with other positive consequences.

#### *Negative alcohol-related consequences*

Overall, 82% of drinkers reported one or more negative consequences, and the average past-year total number was 8.7 ( $SD = 10.7$ ). Forty-two percent of drinking weeks resulted in one or more negative consequences (Table 2). Getting physically sick was endorsed by the most drinkers (57.5%), but memory loss was endorsed more frequently, in almost 1 in 5 drinking weeks. Interpersonal consequences, including saying something that was later regretted or disappointing others, were commonly endorsed.

*Model 1: Negative consequences as a function of demographics and time.* There were no gender differences in the total number of consequences reported, but consistent with expectations, women were more likely to report saying something they regretted, feeling sad or depressed,

TABLE 3. Predictors of positive consequences in the freshman year

Positive consequence	Model 1			Model 2		Model 3		Model 4	
	Gender	Race/ethnicity	Semester	Biweek of the semester	No. of drinking days	Drinks per drinking day	Avg. estimated BAC		
No. of positive consequences in the week <sup>a</sup>	1.00 [0.93, 1.08] 1.06 [0.86, 1.30]	0.89 [0.82, 0.97]** 0.67 [0.53, 0.83]***	0.82 [0.79, 0.85]*** 0.65 [0.58, 0.73]***	0.97 [0.96, 0.97]*** 0.93 [0.91, 0.95]***	1.13 [1.12, 1.15]*** 1.63 [1.50, 1.77]***	1.51 [1.47, 1.56]*** 4.15 [3.55, 4.86]***	1.40 [1.37, 1.44]*** 3.68 [3.02, 4.48]***		
Felt less stressed or more relaxed	0.90 [0.75, 1.09] 0.85 [0.70, 1.03]	0.84 [0.69, 1.03] 0.80 [0.65, 0.98]*	0.65 [0.59, 0.72]*** 0.63 [0.57, 0.69]***	0.95 [0.93, 0.96]*** 0.91 [0.89, 0.93]***	1.34 [1.28, 1.41]*** 1.38 [1.32, 1.45]***	2.21 [2.00, 2.44]*** 2.67 [2.40, 2.98]***	1.92 [1.73, 2.13]*** 2.33 [2.08, 2.61]***		
Was more energetic	1.18 [0.98, 1.41]	0.96 [0.79, 1.17]	0.68 [0.61, 0.76]***	0.92 [0.91, 0.94]***	1.33 [1.26, 1.40]***	2.67 [2.40, 2.97]***	2.36 [2.12, 2.63]***		
Talked to someone I was attracted to	0.80 [0.66, 0.97]*	0.86 [0.71, 1.06]	0.70 [0.63, 0.78]***	0.91 [0.89, 0.92]***	1.41 [1.33, 1.48]***	2.31 [2.09, 2.56]***	2.10 [1.90, 2.32]***		
Felt like I was part of the group	0.97 [0.80, 1.19]	0.73 [0.58, 0.91]**	0.63 [0.57, 0.70]***	0.94 [0.92, 0.95]***	1.28 [1.22, 1.33]***	2.02 [1.82, 2.23]***	1.78 [1.62, 1.96]***		
Felt more self-confident and sure of myself	0.95 [0.78, 1.17]	0.75 [0.60, 0.93]**	0.69 [0.63, 0.77]***	0.95 [0.93, 0.96]***	1.25 [1.20, 1.31]***	2.48 [2.23, 2.76]***	2.13 [1.93, 2.35]***		
Was able to take my mind off my problems	1.07 [0.86, 1.32]	1.02 [0.81, 1.28]	0.72 [0.65, 0.81]***	0.98 [0.96, 1.00]*	1.18 [1.13, 1.23]***	1.98 [1.79, 2.19]***	1.82 [1.66, 1.99]***		
Expressed my thoughts or feelings to someone more easily	1.00 [0.82, 1.22] 1.80 [1.37, 2.35]*** 1.33 [0.94, 1.88]	0.81 [0.64, 1.01] 0.70 [0.53, 0.93]* 0.87 [0.57, 1.33]	0.67 [0.60, 0.76]*** 0.68 [0.59, 0.78]*** 1.07 [0.86, 1.34]	0.92 [0.90, 0.94]*** 0.94 [0.92, 0.97]*** 0.97 [0.94, 1.00]	1.35 [1.29, 1.42]*** 1.25 [1.19, 1.32]*** 1.42 [1.32, 1.53]***	2.28 [2.06, 2.52]*** 2.20 [1.96, 2.47]*** 1.68 [1.43, 1.96]***	2.03 [1.85, 2.24]*** 1.94 [1.75, 2.15]*** 1.60 [1.38, 1.86]***		

Notes: College site was included as a covariate. Gender: male = 0, female = 1. Race/ethnicity: non-Hispanic White = 0, other = 1. Semester: fall = 0, spring = 1. Biweek of semester coded: 1-8. Number (no.) of drinking days, drinks per drinking day, and average (avg.) estimated blood alcohol concentration (BAC) in Models 2-4 were per-week averages. Estimated BAC was multiplied by 10. Model 2 includes all variables from Model 1 as covariates. Models 3 and 4 include variables from Model 1 and 2 as covariates. <sup>a</sup>For the first data row (total number of consequences), a Poisson distribution was used so coefficients are incidence rate ratios with confidence intervals; for the individual consequences, a binomial distribution was used, so coefficients are odds ratios with confidence intervals. \**p* < .05; \*\**p* < .01; \*\*\**p* < .001.

TABLE 4. Race/ethnicity comparisons for consequences that showed significant differences using dichotomous race/ethnicity ( $n = 762$ )

Variable	Ethnicity ( $n = 760$ )					
	Latino ( $n = 85$ )	Non-Hispanic/ Latino ( $n = 675$ )	Race ( $n = 704$ )			
			White ( $n = 529$ )	Multiracial ( $n = 46$ )	Asian ( $n = 80$ )	Black ( $n = 49$ )
Avg. no. of positive consequences per drinking week*	3.92 (2.12) <sup>a</sup>	4.00 (2.31) <sup>a</sup>	4.14 (2.27) <sup>a</sup>	4.43 (2.33) <sup>a</sup>	3.41 (2.19) <sup>b</sup>	3.45 (2.36) <sup>b</sup>
Proportion of drinking weeks on which consequence was endorsed**						
Positive consequences:						
Had a good time	.80 (.38) <sup>a</sup>	.80 (.39) <sup>a</sup>	.82 (.38) <sup>a</sup>	.79 (.40) <sup>a</sup>	.73 (.42) <sup>b</sup>	.68 (.46) <sup>b</sup>
It was easier to socialize	.50 (.50) <sup>a</sup>	.51 (.50) <sup>a</sup>	.53 (.50) <sup>a,b</sup>	.56 (.49) <sup>a</sup>	.47 (.50) <sup>b,d</sup>	.39 (.50) <sup>c,d</sup>
Felt like I was part of the group	.32 (.46) <sup>a</sup>	.37 (.49) <sup>a</sup>	.38 (.49) <sup>a</sup>	.45 (.50) <sup>a</sup>	.24 (.45) <sup>b,c</sup>	.31 (.48) <sup>a,c</sup>
Felt more self-confident and sure of myself	.28 (.46) <sup>a</sup>	.32 (.48) <sup>a</sup>	.34 (.48) <sup>a</sup>	.37 (.49) <sup>a</sup>	.25 (.46) <sup>b</sup>	.23 (.45) <sup>b</sup>
Felt more sexy	.13 (.35) <sup>a</sup>	.16 (.38) <sup>a</sup>	.17 (.39) <sup>a</sup>	.19 (.41) <sup>a,b</sup>	.11 (.35) <sup>b</sup>	.11 (.36) <sup>a,b</sup>
Negative consequence:						
Had problems with school work	.06 (.24) <sup>a</sup>	.06 (.24) <sup>a</sup>	.05 (.23) <sup>a</sup>	.13 (.34) <sup>b</sup>	.07 (.27) <sup>a,b</sup>	.05 (.23) <sup>a,b</sup>

Notes: Ethnicity and race were analyzed separately. Participants included were those who reported drinking in the year. Latino/Hispanic ethnicity was missing for two participants. Race was missing for 55 participants, 53 of whom reported their ethnicity as Latino/Hispanic. An additional three participants were in other race categories too small in number to include. Multiracial participants endorsed more than one race. Cells that share a superscript do not differ significantly. \*The data row of the table is the average (avg.) per person number (no.) of positive consequences reported, calculated by dividing the number of positive consequences by the number of drinking weeks reported in the year. Cell values are adjusted for college site and gender; \*\*the individual consequence data are calculated from the event-level dataset so are adjusted for college site, gender, biweek of semester, and semester of the year.

disappointing others, and regretting a sexual activity (Table 5). Men were more likely to report driving after drinking. There were no race/ethnicity differences in the total number of negative consequences, contrary to our expectation that Whites would show higher rates. Non-White participants were more likely to report having problems with schoolwork. Follow-up analyses found that multiracial students reported greater problems with schoolwork than did White students (Table 4). As expected, the first semester and earlier semester weeks were associated with higher total negative consequences. Both showed associations with several individual consequences as well, including getting sick, having memory loss, and disappointing others.

*Models 2–4: Negative consequences as a function of consumption variables, controlling for demographics and time.* For both the total number of consequences and the individual consequences, the number of drinking days in the week was predictive of greater negative consequences (Model 2). Also as expected in Models 3 and 4, drinks and eBAC were significantly related to greater endorsement of negative consequences, after controlling for number of drinking days. Memory loss was more strongly associated with drinks and eBAC than were other negative consequences, as indicated by nonoverlapping confidence intervals.

## Discussion

In this large, multisite, multicohort prospective investigation of first-year college students, positive consequences were endorsed at much higher rates than negative consequences. Even with a smaller list of positive ( $n = 11$ ) than negative ( $n = 13$ ) consequences, positive consequences

were endorsed at five times the frequency of negative consequences. Our results support prior findings that positive consequences are much more common and predictable (Park, 2004; Park and Grant, 2005; Patrick and Maggs, 2008) and likely serve as positive reinforcement for alcohol consumption. The results also are consistent with evidence that for adolescents the rewarding properties of alcohol may be particularly salient, whereas sensitivity to some of the negative effects of alcohol, such as hangover, is decreased (for review, see Maisto et al., 2012). Nevertheless, 82% of drinkers reported experiencing one or more negative alcohol-related consequences. The negative consequence endorsed by the most drinkers (58%) was getting physically sick. However, the most frequent negative consequence (i.e., the highest number of times endorsed) was blackouts, with almost 1 in 5 drinking weeks resulting in a blackout episode. This indicates that blackouts are more likely to recur than getting sick, suggesting that they are not something that students attempt to avoid, an interpretation that is supported by findings that blackouts do not necessarily concern students (Mallett et al., 2008).

Our rates of negative consequences are considerably higher than in retrospective surveys of consequences. For example, in a national survey of past-year consequences in more than 90,000 students (American College Health Association, 2012), 32% of drinkers reported “forgetting where you were or what you did,” which is a rate much lower than the 54% of students in our sample. Similarly, we found higher rates of physically injuring oneself (9% vs. 2%) and of physically injuring another person (21% vs. 15%), despite surveying only half of the days in the year. We believe that the method we used of regular past-week surveys produced

TABLE 5. Predictors of negative consequences in the freshman year

Negative consequence	Model 1			Model 2		Model 3		Model 4	
	Gender	Race	Semester	Biweek of the semester	No. of drinking days	Drinks per drinking day	Avg. estimated BAC		
No. of negative consequences in the week <sup>a</sup>	1.03 [0.89, 1.19]	1.14 [0.97, 1.34]	0.84 [0.77, 0.91]***	0.97 [0.95, 0.98]***	1.25 [1.22, 1.29]***	2.34 [2.19, 2.50]***	2.09 [1.98, 2.20]***		
Got physically sick (e.g. vomit, stomach cramps)	0.98 [0.82, 1.19]	1.20 [0.97, 1.47]	0.74 [0.64, 0.86]***	0.97 [0.95, 1.00]*	1.21 [1.15, 1.28]***	3.34 [2.90, 3.85]***	2.85 [2.52, 3.23]***		
Couldn't remember some part of the day or night	0.89 [0.72, 1.11]	1.06 [0.83, 1.37]	0.81 [0.71, 0.93]**	0.95 [0.92, 0.97]***	1.40 [1.33, 1.48]***	5.44 [4.65, 6.36]***	4.32 [3.80, 4.91]***		
Said something that I wish I hadn't	1.29 [1.01, 1.64]*	1.10 [0.85, 1.42]	0.89 [0.76, 1.05]	0.95 [0.92, 0.98]**	1.28 [1.21, 1.35]***	2.47 [2.16, 2.81]***	2.26 [2.01, 2.54]***		
Felt sad or depressed	1.32 [1.04, 1.67]*	0.97 [0.74, 1.28]	0.90 [0.76, 1.07]	0.97 [0.94, 1.00]*	1.22 [1.15, 1.30]***	1.72 [1.51, 1.96]***	1.73 [1.53, 1.94]***		
Disappointed others who are close to me	1.47 [1.13, 1.91]**	1.24 [0.93, 1.64]	0.78 [0.64, 0.96]*	0.94 [0.90, 0.97]**	1.27 [1.19, 1.35]***	2.51 [2.14, 2.93]***	2.23 [1.95, 2.55]***		
Had a romantic or sexual activity that I now regret	1.67 [1.26, 2.22]***	1.08 [0.80, 1.47]	0.73 [0.59, 0.90]**	0.97 [0.93, 1.00]	1.42 [1.33, 1.52]***	2.52 [2.15, 2.94]***	2.25 [1.98, 2.55]***		
Had problems with school work	0.90 [0.66, 1.22]	1.67 [1.22, 2.29]**	0.81 [0.65, 1.01]	0.96 [0.93, 1.00]*	1.44 [1.34, 1.54]***	2.09 [1.80, 2.42]***	2.03 [1.76, 2.34]***		
Passed out	0.69 [0.47, 1.01]	1.48 [0.98, 2.25]	0.86 [0.64, 1.14]	1.00 [0.96, 1.04]	1.40 [1.29, 1.51]***	3.45 [2.84, 4.18]***	2.92 [2.45, 3.48]***		
Was physically injured	0.90 [0.63, 1.29]	1.11 [0.76, 1.61]	0.77 [0.59, 1.01]	0.97 [0.92, 1.02]	1.43 [1.31, 1.56]***	3.19 [2.55, 3.99]***	2.74 [2.25, 3.33]***		
Drove after drinking and realized I should not have	0.60 [0.37, 0.96]*	1.20 [0.64, 2.25]	1.09 [0.79, 1.49]	1.01 [0.95, 1.07]	1.40 [1.24, 1.58]***	1.55 [1.22, 1.96]***	1.58 [1.27, 1.97]***		
Got into trouble with my school authorities or police	0.71 [0.47, 1.09]	1.60 [0.98, 2.62]	0.95 [0.61, 1.48]	0.96 [0.89, 1.04]	1.27 [1.12, 1.44]***	1.93 [1.36, 2.75]***	1.78 [1.38, 2.29]***		
Accidentally physically hurt someone	1.00 [0.59, 1.70]	1.44 [0.84, 2.47]	0.74 [0.49, 1.11]	0.89 [0.83, 0.95]**	1.37 [1.20, 1.56]***	2.59 [1.95, 3.43]***	2.33 [1.79, 3.02]***		
Got into a physical fight	0.58 [0.32, 1.07]	0.93 [0.49, 1.76]	0.88 [0.53, 1.44]	1.00 [0.92, 1.08]	1.44 [1.29, 1.61]***	2.84 [1.81, 4.44]***	2.10 [1.53, 2.88]***		

Notes: College site was included as a covariate. Gender: male = 0, female = 1. Race/ethnicity: non-Hispanic White = 0, other = 1. Semester: fall = 0, spring = 1. Biweek of semester coded: 1–8. Number (no.) of drinking days, drinks per drinking day, and average (avg.) estimated blood alcohol concentration (BAC) in Models 2–4 were per-week averages. Estimated BAC was multiplied by 10. Model 2 includes all variables from Model 1 as covariates. Models 3 and 4 include variables from Model 1 and 2 as covariates. <sup>a</sup>For the first data row (total number of consequences), a Poisson distribution was used, so coefficients are incidence rate ratios with confidence intervals. For the individual consequences, a binomial distribution was used, so coefficients are odds ratios with confidence intervals. \* $p < .05$ ; \*\* $p < .01$ ; \*\*\* $p < .001$ .



higher reports because the period of recall was very short, whereas other surveys commonly required a 1-year recall, likely resulting in underreporting. The method of assessment used here capitalizes on the greater reliability of short recall intervals while also measuring the temporal variability that characterizes the academic year (Del Boca et al., 2004) and suggests that the frequency of negative outcomes is likely higher than previously estimated.

As expected, we found that gender was not associated with a difference in total numbers of positive or negative consequences after controlling for race/ethnicity and time effects. This may be because we assessed a balance of consequences, some more likely for men and some more likely for women. Indeed, as expected, individual consequence differences were consistent with gender roles: women were more likely to report interpersonal consequences, such as saying something they regretted, feeling sad or depressed, and disappointing others, whereas men were more likely to report driving after drinking.

The pattern of sexual consequences warrants some discussion. A large proportion (75.7%) of participants reported that they were able to talk to someone they were attracted to, with this positive consequence being higher in men. Just under half (47%) reported feeling more sexy, with women showing higher odds. However, 32% also reported having a regretted sexual experience, and this consequence showed the greatest gender difference of all the negative consequences, with women showing 67% greater odds of reporting (Table 5, Model 1). These findings provide important information for prevention efforts; both men and women appear to be using alcohol to bolster sexual interaction (facilitating contact for men and feeling sexier for women), but many, particularly women, regret the sexual contact that results.

When we dichotomized race/ethnicity, we found that non-Hispanic White students reported higher positive but not negative consequences than other students. The greater frequency of positive consequences reported by White students is consistent with the higher reports of alcohol use in this demographic group (Johnston et al., 2012) and may reflect greater reinforcement of alcohol. The lower positive consequences for non-White students may also suggest lower positive and social reinforcement for drinking, whereas the lack of differences in negative consequences suggests no racial/ethnic group protection from alcohol's negative effects. The only significantly different negative consequence, "having problems with school work," was reported more often by multiracial (relative to White) students. This and the finding that multiracial students have patterns of positive consequences that are similar to White students (Table 4) raises some concern about risk among multiracial students. Nevertheless, the general lack of differences in reports of negative consequences suggests that targeted interventions for particular racial/ethnic groups are not needed, but given

the relatively small number in each racial/ethnic group, more definitive conclusions await replication.

Our investigation is one of the first to consider time of year as a predictor of alcohol-related consequences. Weekly totals of positive and negative alcohol-related consequences declined from the first semester to the next, and declined within each semester. This is consistent with other findings with this sample that alcohol use and related risky drinking practices decline during the semester and during the freshman year (Barnett et al., 2013; Hoeppepner et al., 2012), suggesting that the decline is likely attributable to a reduction in consumption over time. Individual positive consequences also consistently showed the same pattern, whereas individual negative consequences were more varied with respect to time effects, suggesting that not all negative consequences are more likely early in the year/semester.

All three of our consumption variables were strongly associated with positive and negative alcohol-related problems. Drinking days per week was positively associated with greater endorsement of consequences of all kinds. After controlling for drinking days and other variables, we also found that the number of drinks on a drinking day and estimated intoxication levels (in separate analyses) predicted the endorsement of both the total number of consequences and of each (positive and negative) individual consequence at the weekly level. Our data allow us to specify the expected number (i.e., the incidence rate) of consequences, and for Models 2–4, negative consequences had a higher IRR than positive consequences (top rows of Tables 3 and 5). Of note, with each additional drink consumed, the expected number of positive consequences increased by 51% (Table 3, Model 3), whereas the expected number of negative consequences increased by 134% (Table 5, Model 3). Furthermore, our data allow us to analyze the relative odds that each consequence will happen with increased drinking. For example, for number of drinks per drinking day (Model 3), the odds ratio was highest for blacking out, and of the five consequences with the highest odds ratios, four were negative consequences (blacking out, getting sick, passing out, and being injured). Identical results were found for eBAC. This suggests that, with each additional drink consumed, the relative odds of a negative consequence are higher than those of a positive consequence. We can conclude that although positive consequences are more common and frequent than negative consequences, the odds of negative consequences are more strongly associated with the amount of alcohol consumed and the level of intoxication.

Our reason for investigating demographic and time predictors of consequences without controlling for alcohol volume was that findings on the prediction of negative consequences have implications for the implementation of prevention programs. For example, we established that gender and race/ethnicity differences tend to be seen at the level of specific consequences, whereas the overall number

of consequences was more related to time of year (Tables 3 and 5, top rows). The implication here is that resources to reduce overall alcohol consequences would be best focused at the beginning of the academic semesters, and that efforts to reduce specific consequences may warrant targeting specific student groups and events. Along these lines, support is growing for approaches that target events that commonly result in heavy drinking and intoxication (Glindemann et al., 2007; Neighbors et al., 2012) and that focus on particular consequences including sexual assault (Testa et al., 2010).

In summary, findings contribute to our understanding of problem drinking by showing who is likely to report specific alcohol-related consequences; showing the correspondence between multiple indicators of alcohol use and individual consequences, thereby providing a finely detailed perspective on the relationship between consumption and problems; allowing for direct comparisons between positive and negative consequences (i.e., their associations with alcohol use); and providing odds ratios for estimating the likelihood that specific consequences will occur as consumption changes.

#### *Limitations*

Our response rate was less than optimal but is comparable to that of studies with similar methods (Beets et al., 2009). Although participants were compensated for every survey, enrollment might have been affected by the assessment burden, enrollment timing (before arrival on campus), and concerns about providing sensitive information to researchers. The consequences we measured are not a comprehensive set. Differences in the volume of positive and negative consequences may be an artifact of the consequences we measured, and we collected data on approximately half of the available days in the year. For these reasons, the total number of consequences is not a true count of those experienced by participants. It may be more useful to consider the percentage of drinkers who reported having consequences and the probability that a consequence will occur. Because consequences were measured at the weekly level, we were not able to associate alcohol volume and eBAC on a given drinking day with particular consequences reported in that week. However, in drinking weeks, the modal number of drinking days was one, accounting for 45% of all drinking weeks in our sample (results not presented). Therefore, for a large proportion of weeks, the drinking day was directly associated with the reported consequences. It is possible that because of social desirability or other response biases, including defensiveness about negative consequences, participants were more inclined to endorse positive consequences than negative. However, Corbin et al. (2008) found no differences in participant confidence in their ability to report on positive and negative consequences. Last, because our sample comprised first-year students at primarily residential colleges

in the northeast United States, results may not generalize to other regions, colleges, or class years.

#### *Implications for preventive interventions*

Information from this study suggests that positive effects of alcohol are substantially more prevalent than negative effects but that negative consequences were more often reported as consumption and intoxication increased; this imbalance warrants discussion with students who drink. For example, this information can be used in a straightforward application within brief motivational interventions, which commonly include feedback and discussion about negative consequences but are less likely to include a personalized evaluation of the positive and negative effects of alcohol (Carey et al., 2007). Interventions can highlight that positive consequences are associated with lower levels of drinking, whereas negative consequences are more than two times as likely to occur with each additional drink. These findings could be translated into promoting greater awareness of the nature and likelihood of specific consequences: for example, that blackout is a very commonly reported occurrence and is more strongly associated with number of drinks and eBAC than other negative consequences; that, for every .10 increase in % BAC, the odds of getting sick increases almost threefold (i.e., an odds ratio of 2.85 for eBAC; Table 5, Model 4); or that women are significantly more likely than men to report regretting sex that occurs after drinking. Our findings also suggest that prevention efforts are warranted early in the semester to reduce the likelihood of negative effects on new students. Environmental and policy approaches that could affect this pattern include early semester party moratoriums for student organizations and strategically focusing enforcement efforts (Borsari et al., 2007).

#### *Future directions*

In this study, positive and negative consequences were investigated separately. This is an artificial approach because both often occur as a result of the same drinking episode. Future research should investigate the shared experience of positive and negative effects of alcohol use (Lee et al., 2010) with more fine-grained measurement than retrospective summaries (Stone et al., 2007). A second measurement issue is that negative consequences tend to be discrete and objective (e.g., "got physically sick" or "passed out"), whereas positive consequences tend to be more subjective and less discrete (e.g., "had a good time" or "felt more self-confident"). This difference may result in greater reporting of positive experiences than negative. Measurement of positive consequences has received much less attention than negative consequences, and development of measures and investigation of positive consequences warrants further research. In addition, the valence of consequences (i.e., the positive evaluation

of positive consequences and the aversiveness of negative consequences) may be relevant for understanding the natural history of drinking. There is accumulating evidence that aversive experiences are related to subsequent motivation to change (Barnett et al., 2002, 2006) and actual behavior change (Merrill et al., 2013), but there is also evidence that negative consequences are not always seen as aversive by drinkers (Mallett et al., 2008, 2013 for review; Patrick and Maggs, 2011). Research is needed that contributes to our understanding of cognitive and affective processes that precede and follow alcohol-related experiences and how those interpretations are related to subsequent behavior.

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