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## When Do College Students Have Less Favorable Views of Drinking? Evaluations of Alcohol Experiences and Positive and Negative Consequences

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### Abstract

College students experience numerous positive and negative consequences from drinking alcohol, although the extent to which these consequences influence perceptions of their drinking experiences is poorly understood. A better understanding of the impact of experiencing specific consequences, and how they are evaluated, on college students' perceptions of the overall drinking experience and subsequent alcohol use is crucial for advancing intervention efforts. The current study used daily data to examine: (1) whether experiencing specific consequences and (2) whether ratings of the most favorable and most aversive consequences predicted overall evaluations of the drinking experience and perceptions that drinking was worth it; and (3) whether overall evaluations and perceptions that drinking was worth it predicted next-day drinking. College student drinkers ( $N = 349$ , 53.3% female) completed daily reports on drinking, consequences, evaluations of consequences, and evaluations of the drinking experience during four 2-week periods across one year. Findings from generalized estimating equations demonstrated that experiencing any of the positive consequences predicted more favorable overall evaluations and perceptions that drinking was worth it, while the majority of the negative consequences predicted less favorable overall evaluations. Ratings of the most favorable positive consequence and the most aversive negative consequence were also associated with overall evaluations. Perceiving that drinking was more worth it was associated with an increased likelihood of next-day drinking. Current findings reinforce the need to address the experience of both positive and negative consequences in interventions, while simultaneously considering the extent to which students perceived the negative consequences as aversive.

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## Keywords

evaluations; consequences; alcohol; college students; daily

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Drinking among college students is prevalent and associated with myriad positive and negative consequences. The majority of college students—about 60%—drink alcohol (Substance Abuse and Mental Health Services Administration, 2014), and 35% report consuming five or more drinks in a row in the past two weeks (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2015). Negative consequences, such as drinking-related injuries (reported by 10.5%) and being hit or assaulted by other drinking students (12%) have been persistent among young adults in the U.S. over time (Hingson, Heeren, Winter, & Wechsler, 2005; Hingson, Zha, & Weitzman, 2009). Reports of negative consequences in the last three years among young adults, such as blacking out (19.6%), getting into fights with other people (29.1%), and having a bad time (29.5%) are even more common (White & Ray, 2014). Although less studied, positive consequences of drinking are common; 47.5% of men and 56.2% of women in one college student sample reported having fun/socializing as a result of drinking in the last two months (Park, 2004). Positive and negative consequences resulting from drinking provide natural feedback to students. Positive consequences are frequently reported as more prevalent and more important to students, likely outweighing the importance of negative consequences in students' minds (Lee, Maggs, Neighbors, & Patrick, 2011; Park, 2004; Patrick & Maggs, 2008). Increasing our knowledge about how students perceive consequences and their overall drinking experiences is critical to understanding the phenomenon of college drinking and to designing intervention programs that seek to reduce alcohol-related harm. While previous literature has largely considered different types or domains of positive and negative alcohol-related consequences, the current study focuses on specific consequences (e.g., not being able to remember what happened while drinking) in order to determine whether there are differential associations between specific positive and negative consequences and evaluations of the drinking experience. Determining which consequences are linked to overall impressions of individuals' drinking experiences can indicate how to better incorporate specific consequences in alcohol interventions.

According to social learning theory principles (Maisto, Carey, & Bradizza, 1999), individuals' behavioral decisions are determined by their own personal experiences, observations of others' experiences, and related cognitions or thoughts. The experiences that people have while drinking or as a result of their drinking, including both positive (e.g., being social) and negative (e.g., having a hangover), are presumed to affect their cognitions about the drinking experience. Cognitions about how individuals evaluate their drinking experiences, and in particular, how individuals evaluate consequences they experienced as a result of their drinking may then affect future drinking behavior (Barnett, Merrill, Kahler, & Colby, 2015). For instance, if the drinking experience is perceived positively and any negative consequences that do occur are not perceived as especially aversive, then students may be more likely to drink again (see Patrick & Maggs, 2008).

Research on evaluations of alcohol-related consequences has shown that many college students do not perceive negative consequences as especially aversive. In fact, some students

report that consequences, which are typically considered negative, may be perceived as neutral or positive. Patrick and Maggs (2011) found that 16% of students rated having a hangover as neutral or positive, 17% rated passing out as neutral or positive, and 34% rated doing or saying something embarrassing as neutral or positive. Furthermore, positive consequences, such as feeling more relaxed or being more social as a result of drinking, are viewed favorably and are a central aspect of the drinking experience (Park, 2004; Park & Grant, 2005; Patrick & Maggs, 2008, 2011; White & Ray, 2014). There is likely a feedback process, such that experiencing positive and negative consequences may affect how people evaluate their drinking experiences, and evaluations may affect subsequent drinking and the likelihood of experiencing future consequences (Barnett et al., 2015; Merrill, Read, & Barnett, 2013a). To this end, experiencing more positive consequences in the past week has also been associated with plans to drink more and placing greater importance on experiencing positive consequences the following week (Patrick & Maggs, 2008). In addition, experiencing more positive consequences in the past year has been associated with more favorable perceptions of those consequences; however, the relation between experiencing negative consequences and perceptions of those consequences was less straightforward, such that it varied according to how many negative consequences students had experienced (Logan et al., 2012). Perceiving negative consequences as less aversive has been associated with more drinking and consequences (Gaher & Simons, 2007; Mallett, Bachrach, & Turrisi, 2008; Neighbors, Walker, & Larimer, 2003). However, White and Ray (2014) did not observe associations between evaluation scores (i.e., mean rating of how bothersome consequences were based on experiences in past three years) and drinking indices assessed seven years later. The current study will further our understanding of various aspects of the feedback process, including whether experiencing consequences is linked to overall evaluations of the previous night's drinking experience as well as whether these overall evaluations are linked to next-day drinking. It is worth examining the experience of consequences separately from evaluations, because different students may experience the same specific consequence, but interpret and recall the experience very differently.

Notably, previous research has not typically considered positive and negative consequences from drinking within the same analytic model. When positive and negative consequences are considered together, more favorable evaluations of positive consequences are associated with consuming greater quantities of alcohol in the subsequent college semester, and less aversive evaluations of negative consequences are associated with having more alcohol problems (Patrick & Maggs, 2011). For consequences experienced on a given occasion, two domains of negative consequences, namely items that were grouped into a social domain (e.g., got into fights) and a personal domain (e.g., not able to do homework or study for a test) have also been associated with more aversive evaluations of the overall drinking experience. Three domains of positive consequences, specifically fun/social (e.g., have more fun), image enhancement (e.g., seem more exciting to others), and relaxation (e.g., relieve tension) were associated with more favorable evaluations (Lee et al., 2010). Given that avoiding negative consequences from drinking may not be as strong of a motivating factor as seeking out positive consequences, it is important to better understand how the possible simultaneous experience of positive and negative consequences may shape students' perceptions of the

overall drinking experience. Notably, students' perceptions of specific consequences, such as blacking out, may vary across drinking occasions due to contextual characteristics (e.g., who students are with and where they are drinking) and other situation-specific factors (e.g., mood) that may vary from night to night. Some research has assessed how evaluations vary across specific drinking occasions and after experiencing specific consequences in a prospective design (Barnett et al., 2015; Lee et al., 2010; Merrill et al., 2013a; Merrill, Read, & Colder, 2013b). This study will provide a clearer understanding of how specific positive and negative consequences contribute to students' evaluations of their drinking experiences, which can highlight specific consequences that may be especially important in students' interpretations of their experiences and their plans to drink again.

## The Current Study

The current study uses data from a measurement burst design to examine how college students evaluated specific alcohol-related consequences that they experienced the previous night as well as perceptions of their overall drinking experience. To better understand college students' evaluations of their drinking experiences, the aims of the current study were to determine: (1) whether experiencing specific positive and negative consequences on a given night, and (2) whether ratings of the most favorable and most aversive consequences on a given night, predicted students' overall evaluations of the drinking experience and perceptions that drinking was worth it; and (3) whether overall evaluations of the drinking experience and perceptions that drinking was worth it predicted next-day drinking.

## Method

### Participants

Participants ( $N = 349$ ) included freshman (17.2%), sophomore (36.7%), and junior (46.1%) undergraduate students who were attending a public university in the northwest and were part of a longitudinal study examining daily-level alcohol use, alcohol expectancies, and consequences [mean age 19.7 ( $SD = 1.27$ ), 53.3% female]. Most participants (73.9%) were White/Caucasian, with the remainder Asian American (8.6%), multiracial (11.2%), or other (6.3%), and 10.0% identified as Hispanic or Latino. Approximately 55.0% of the sample reported membership in a fraternity or sorority.

### Procedures

A random sample of students was selected from the university's registrar's lists to be invited to complete a brief screening survey to determine eligibility for the larger study. Students were mailed and emailed invitation letters requesting their participation and including a link to the online survey. The first time a participant visited the survey website, they were presented with an informational statement that included all elements of informed consent. If they agreed, they were asked to complete a brief screening survey including demographics, alcohol use, and mobile phone capabilities.

Due to the main study aims examining daily associations among alcohol use, consequences, and expectancies, frequent drinkers (based on the eligibility criteria of drinking twice per week in the last month, see "Measures") were recruited into the study to ensure a sufficient

number of drinking days during the daily reporting periods. Eligibility criteria for the one-year longitudinal study included: being a freshman, sophomore, or junior at the university (at baseline); being 18–24 years old; drinking at least twice per week in the last month; not planning to study abroad within the next year; and owning a cell phone with a monthly plan and agreeing to use cell phone for daily study in order to increase convenience of receiving reminders and completing the daily surveys three times per day. Seniors in college were excluded because the 1-year length of the study did not permit study completion prior to graduation (see below for information on the recruitment procedure).

Over the course of recruitment, 3,210 students agreed to participate and completed the screening survey, for which they were compensated \$10. Of the 3,210 who completed screening, 2671 were ineligible for the study, with the majority (77.4% of those ineligible) being excluded because they did not meet the drinking criteria (see Figure 1 for details). The remaining 539 students met eligibility criteria and were invited to complete a baseline survey to assess demographics, alcohol use, consequences, and other relevant psychosocial measures. Of these 539 students, 516 completed the baseline survey, for which they were compensated \$30. After completion of the baseline survey, participants were immediately invited to schedule an appointment for the in-person training for the longitudinal daily portion of the study. Of the 516 who completed the baseline survey, 352 completed the in-person training and participated in the daily portion of the study (see Figure 1 for details). Students who participated in the daily portion of the study did not significantly differ from those who completed only baseline on age, gender, total drinks per week, AUDIT sum scores, or negative alcohol-related consequences reported at baseline.

Data were collected from the 352 participants who completed the in-person training session and began the longitudinal daily study. During the in-person training, participants met with a research assistant who obtained consent, reviewed study procedures, and provided instruction on the interactive voice response (IVR) system. The IVR system allows participants to call a toll-free number to access the system, which accepts calls 24 hours a day, 365 days a year, and can be accessed from a landline or cell phone. When participants call in, they are prompted to provide a unique identification number. The day after the IVR training session, participants began the first of four 2-week periods of daily assessments. Three participants did not report drinking on any of the sampled days, leaving 349 people for the current analyses that focus on drinking, consequences, and related evaluations.

Daily assessments occurred for two weeks (14 consecutive days) in each of four consecutive academic quarters with automated telephone interviews using the IVR system. Recruitment occurred over five academic quarters (not including summer) to accommodate for the scheduling of the in-person training session. During enrollment, students were recruited by email and mailed a letter the first week of the academic quarter. Subsequently, students who screened and were eligible needed to complete the baseline assessment and in-person training within the first 8 weeks of the quarter, as the first day of the initial 2-week period of daily reporting started the day immediately after the in-person training. In each of the three remaining quarters, students started the 2-week period of daily reporting on random days within the quarter. The four 2-week daily reporting periods occurred over one year, resulting in up to 56 possible interview days. The average number of days between the daily reporting

periods was 88.75 days ( $SD = 30.45$ ) between the first and second, 79.51 days ( $SD = 30.06$ ) between the second and third, and 81.77 days ( $SD = 24.70$ ) between the third and fourth. Participants were asked to complete assessments three times a day: morning (9am-noon), afternoon (3pm-6pm) and evening (9pm-midnight). Each interview took less than 10 minutes to complete and participants were compensated \$2 for each complete interview, plus a bonus of \$16 if they completed 36 of the 42 possible interviews for each two-week period. Participants provided partial or completed interviews for at least one of the three daily interviews on 91.5% of the 56 interview days; the mean number of partial or complete interviews was 141 out of 168 possible assessments (84%). The majority (88%) of the participants were retained through one year, such that they completed at least one assessment in the final 2-week period. All procedures were approved by the University IRB and a federal Certificate of Confidentiality was obtained from the National Institutes of Health. No adverse events were reported. For the current study, data from screening (i.e., age), baseline and the morning interviews were utilized.

## Measures

**Screening measure for drinking**—An item from the Alcohol Use – Quantity/Frequency measure was used to determine eligibility given the alcohol use criteria used here (Baer, 1993; Marlatt, Baer, & Larimer, 1995). One drink was defined using the same definition as that provided for the daily alcohol measure (see below). Individuals were asked how many days of the week they drank alcohol during the past month with 11 response options that ranged from 0 (*I did not drink at all*) to 10 (*every day*). Individuals were eligible for the study if they reported 5 (*twice a week*) or higher.

**Baseline measures**—Demographic information included age, sex coded as 0 (*male*) and 1 (*female*), fraternity/sorority membership coded as 0 (*non-member*) and 1 (*member*). For descriptive purposes, we also assessed participants' race (White/Caucasian, Black/African American, Asian, American Indian/Alaskan Native, Native Hawaiian/Pacific Islander, multiracial, other) and ethnicity (Hispanic or Latino).

**Alcohol use measured daily**—All of the daily drinking-related measures were administered during the morning interviews in each of the four 2-week reporting periods. Measures asked participants about drinking and related consequences from yesterday, specified as “from the time you got up to the time you went to sleep.” During the in-person training session (and prior to starting the daily reports), participants were instructed that one drink equals 12 oz. of beer (8 oz. of Canadian, malt liquor, or ice beers or 10 oz. of microbrew); 10 oz. of wine cooler; 4 oz. of wine; or 1 cocktail with 1 oz. of 100 proof liquor or 1 1/4 oz. of 80 proof liquor. Each day, students reported the number of standard drinks they consumed in total yesterday using an open-ended response format. From these interviews, we calculated each participant's daily alcohol consumption, mean daily alcohol consumption on drinking days across the reporting period, and the percent of the total sampled days that were considered heavy episodic drinking days ( 5 standard drinks for males, 4 standard drinks for females).

**Consequences experienced and their evaluations measured daily**—For each drinking day, students reported whether each of six positive (e.g., felt relaxed, more sociable) and seven negative (e.g., became aggressive, felt nauseated or vomited) consequences happened as a result of drinking yesterday (all items shown in Table 1), coded as 0 (*did not occur*) or 1 (*did occur*). The positive and negative consequence items were presented together in an alternating fashion, without denotation as “positive” or “negative.” For each consequence that students reported experiencing, they were asked how bad or good it was from 1 (*extremely bad*) to 9 (*extremely good*). Consequence items were selected from existing measures with the goal of selecting a range of items consistent with previously identified domains (e.g., social facilitation, tension reduction) (Lee et al., in press). A pilot study showed that the items were endorsed by students and that there was variability in how students evaluated the consequences. A two-factor structure (i.e., positive and negative) has been demonstrated for the items assessing consequences and for those assessing evaluations of the experienced consequences (Lee et al., in press).

When reporting the descriptive information, we retained the original scale, such that higher scores reflect more favorable evaluations for both positive and negative consequences. For Aim 2, we reverse-scored the evaluations of the negative, but not positive, consequences; therefore, these predictors are interpreted as the ratings of the most favorable positive consequence experienced that day and ratings of the most aversive negative consequence experienced that day.

**Evaluations of drinking experience measured daily**—Two items assessed evaluations of the overall drinking experience. The first item asked “Thinking about your overall drinking experience yesterday, how would you rate the experience?” from 1 (*extremely bad*) to 9 (*extremely good*). The second item asked “Thinking about the whole drinking experience, the good and the bad, how much was it worth it?” from 1 (*not at all worth it*) to 9 (*very worth it*).

**Study period and weekend**—For each day, we also coded study period from 0 (*1<sup>st</sup> quarter of daily reporting*) to 3 (*4<sup>th</sup> quarter of daily reporting*) and weekend as 0 (*Sunday to Wednesday*) and 1 (*Thursday to Saturday*).

### Data Analytic Strategy

Prior to testing the main aims, descriptive analyses examined how frequently students experienced specific types of positive and negative alcohol-related consequences both at the daily level (i.e., across sampled days) and at the person level (i.e., across people). Chi-square analyses were conducted at the person level to test for gender differences in whether or not each consequence was experienced at least once during the study. Descriptive analyses also summarized evaluations of each specific positive and negative consequence.

To test Aim 1 and Aim 2 regarding predictors of students’ overall evaluations of the drinking experience and perceptions that drinking was worth it, generalized estimating equations (GEE) were modeled using the SPSS statistical package, version 19.0 (IBM, Armonk, NY). GEE models are an extension of the generalized linear model method that accounts for the nesting of multiple observations within persons while controlling for autocorrelation (Zeger,

Liang, & Albert, 1988). We used GEE as an alternative to multilevel models, given the advantage of GEE to provide unbiased coefficient estimates for sparsely collected clustered data (McNeish, 2014), as was the case in the current study. We compared several covariance structures using quasi-likelihood under the independence model criterion to select the optimum working correlation matrix (Pan, 2001). The data were best fit using an autoregressive (AR1) structure and an identity link function for normally distributed outcomes.

For Aim 1, GEE analyses included drinking days on which at least one positive or negative consequence was reported to test our hypotheses that experiencing specific positive consequences would predict more favorable overall evaluations of the drinking experience, whereas experiencing negative consequences would predict less favorable overall evaluations of the drinking experience (Model A). We also examined whether or not experiencing specific positive and negative consequences would predict perceptions that the drinking experience was worth it (Model B). These two outcomes, overall evaluations of the drinking experience and perceptions that the drinking experience was worth it, were significantly positively correlated ( $r = 0.66, p < .001$ ), although not fully redundant with one another. Six positive consequences and seven negative consequences were entered as binary variables at the daily level, indicating whether or not each consequence was reported for a given drinking day. All positive and negative consequences were entered simultaneously into Model A and Model B to test a single model for each outcome. This approach provides a conservative test since we are testing the effect of experiencing a given consequence while controlling for the other consequences. Models included additional daily-level covariates (study period, weekend, and total drinks consumed that night) and also person-level covariates (sex, age, fraternity/sorority membership, person-mean drinks per drinking day, and percent of total days in the daily reporting period that were heavy episodic drinking [HED] days).

For Aim 2, GEE analyses included drinking days on which both a positive and a negative consequence occurred so that ratings of the most favorable positive consequence and ratings of the most aversive negative consequence experienced that day could be included as predictors in addition to the same set of covariates as those included in Models A and B. These analyses required values on all predictors; consequently only days for which both a positive and a negative consequence were reported (and therefore evaluation ratings were reported) could be included in the analysis. We tested the hypotheses that ratings of the most favorable positive consequence would predict more favorable overall evaluations of the drinking experience, whereas ratings of the most aversive negative consequence would predict less favorable overall evaluations of the drinking experience (Model C). Similarly, we used these ratings of the most favorable and most aversive consequences to predict perceptions that drinking was worth it (Model D). All predictors were entered simultaneously into Models C and D. On days when only one positive consequence was reported, we used the single evaluation rating as the most favorable consequence; similarly, on days when only one negative consequence was reported, we used the single evaluation rating as the most aversive consequence.



Given our interest in Aim 2 of separating daily-level effects from person-level effects (i.e., how much an individual's evaluation rating changes across days, after accounting for an individual's average evaluation rating and drinking), we disentangled day-to-day variability from person-level variability (Palta, 2003). Specifically, we entered daily ratings of the most favorable positive consequence (person-centered), daily ratings of the most aversive negative consequence (person-centered), and daily number of drinks consumed (person-centered), reflecting effects at the daily level whereby individuals can vary across occasions. We also entered each participant's average ratings of most favorable and most aversive consequences and average number of drinks consumed on drinking days (averaged across the sampled days), reflecting effects at the person level.

To test Aim 3, we ran a model that used the overall evaluations of the drinking experience and perceptions that drinking was worth it as predictors of next-day drinking (Model E). Given the high proportion of days that included no drinking on the next day, we ran a zero-inflated negative binomial (ZINB) model using Stata Statistical Software, Release 14 (StataCorp LP, College Station, TX). ZINB models essentially run two simultaneous regression models; a logistic regression that predicts the likelihood of being an excess zero (non drinking day); and a count regression that predicts the number of standard drinks consumed on a given night using a negative binomial distribution (Atkins, Baldwin, Zheng, Gallop, & Neighbors, 2013). To account for the nested structure of the data (multiple observations nested within people), we used cluster-robust adjusted standard errors of the model parameters similar to the GEE models (StataCorp, 2015). The ZINB model also included the same covariates as previous models with the exception of the number of drinks consumed on the day pertaining to the overall evaluations.

## Results

### Frequency of Positive and Negative Consequences

Frequencies for each specific consequence were evaluated both across all drinking days (daily-level) and across people (person-level) (Table 1). The proportion of drinking days on which the positive consequences were reported ranged from .27 (express feelings) to .67 (relaxed). The proportion of drinking days on which the negative consequences were reported ranged from .02 (hurt/injured) to .22 (hangover). The median number of drinks consumed on days when positive consequences were experienced was either five or six drinks (mean ranged from 5.55 to 6.80 drinks), depending on the specific consequence; the median number of drinks consumed on days when negative consequences were experienced ranged from seven to nine drinks (mean ranged from 7.36 to 9.34 drinks).

When examined at the person level, the proportion of drinkers who experienced each positive consequence ranged from .77 (express feelings) to .98 (relaxed), such that for each positive consequence the vast majority of drinkers reported experiencing it at least once across the sampled days. The proportion of drinkers who experienced each negative consequence at least once across the sampled days ranged from .28 (hurt/injured) to .86 (hangover). In addition, the median number of times students experienced the positive consequences ranged from 3 to 10, with students reporting being more relaxed and buzzed a median of 10 days over the up to 56 sampled days (i.e., collected in four 2-week periods

spanning one year), which amounts to about once a week. For four of the seven negative consequences, the median number of times students experienced the negative consequence across the sampled days was zero. Students experienced having a hangover a median of three times over the sampled days.

Gender differences were found on the proportion of students reporting certain consequences at least once on the sampled days (Table 2). Women were more likely than men to have reported experiencing the following consequences at least once: being energetic and expressing feelings (positive) as well as feeling nauseated or vomiting and being embarrassed (negative). No other gender differences were observed.

### **Evaluations of Positive and Negative Consequences**

Evaluations of the consequences were averaged across days for each person, which resulted in a person-mean for those who experienced the consequence at least once during the study. Overall, students rated the positive consequences more favorably than the negative consequences (Table 3). The two positive consequences rated most favorably were being in a better mood and being more social. The two negative consequences rated as most aversive were vomiting and getting hurt or injured.

### **Experiencing Specific Consequences as Predictors of the Overall Evaluations**

Table 4 presents results for GEE models testing whether or not experiencing specific positive and negative consequences predicted overall evaluations of the drinking experience (Model A) and perceptions that drinking was worth it (Model B) (Aim 1). Experiencing the six positive consequences predicted more favorable evaluations of the overall drinking experience and also predicted perceptions that the drinking experience was viewed as more worth it. Experiencing the following three negative consequences predicted less favorable overall evaluations of the drinking experience and also predicted perceptions that the drinking experience was viewed as less worth it: feeling nauseated or vomiting, not being able to remember what did while drinking, and doing something embarrassing. Three negative consequences were significantly associated with only one of the two outcomes. Specifically, being rude or obnoxious only predicted less favorable overall evaluations of the drinking experience, while having a hangover and becoming aggressive only predicted perceptions that the drinking experience was viewed as less worth it. Getting hurt or injured did not predict either outcome. Greater alcohol consumption predicted more favorable overall evaluations of the drinking experience and perceptions that drinking was viewed as more worth it. Finally, drinking experiences were perceived as more worth it on weekends compared to weekdays. None of the person-level variables were significant predictors.

### **Ratings of the Most Favorable and Most Aversive Consequences as Predictors of the Overall Evaluations**

Table 5 presents results for GEE models that include ratings of the most favorable positive consequence and ratings of the most aversive negative consequence as predictors of the overall evaluations of the drinking experience (Model C) and perceptions that the drinking experience was worth it (Model D) (Aim 2). At the daily level, ratings of the most favorable positive consequence predicted more favorable overall evaluations of the drinking

experience and perceptions that drinking was more worth it. Conversely, ratings of the most aversive negative consequence predicted more aversive overall evaluations of the drinking experience and perceptions that drinking was less worth it. At the person level, participants with greater mean ratings for the most favorable positive consequences rated overall drinking experiences as more favorable and more worth it. Participants with greater mean ratings for the most aversive negative consequences rated overall drinking experiences as more aversive and less worth it.

### **Overall Drinking Evaluations as Predictors of Next-Day Drinking**

Table 6 presents results for ZINB models that include overall evaluations of the drinking experience and perceptions that the drinking experience was worth it as predictors of next-day drinking (Model E, Aim 3). At the daily level, neither the overall evaluations of the drinking experience or perceptions of drinking as worth it predicted the number of standard drinks consumed the next day (count portion of model). Daily deviations in overall evaluations of the drinking experience did not predict the likelihood of next-day drinking (logistic portion of model), however perceptions of drinking as worth it predicted the likelihood of next-day drinking such that drinking that was perceived as being more worth it was associated with a reduced likelihood of zero next-day drinking (i.e., greater likelihood of being a drinking day).

### **Discussion**

The current study documented that the experience and evaluation of specific positive and negative consequences on a given night predicted college students' overall evaluations of the drinking experience and perceptions that drinking was worth it. Furthermore, a student's report that drinking was worth it was associated with next-day drinking. Specifically, we found that experiencing any of the six positive consequences was associated with more favorable overall evaluations of the drinking experience and perceptions that drinking was more worth it. With regard to negative consequences, feeling nauseated or vomiting, not being able to remember what happened, and doing something embarrassing were all associated with less favorable overall evaluations of the drinking experience and perceptions that drinking was less worth it. Experiencing these negative consequences may offset the potential for a more favorable evaluation of the drinking experience if positive consequences were also experienced that night. This extends previous daily-level research that identified two domains of negative consequences (i.e., negative social and personal) and three domains of positive consequences (i.e., fun/social, image enhancement, relaxation) that were associated with overall evaluations of the drinking experience (Lee et al., 2010).

Three negative consequences examined were uniquely associated with either overall evaluations of the drinking experience or perceptions that drinking was worth it, but not both types of evaluations. Being rude or obnoxious was only associated with less favorable overall evaluations of the drinking experience, while experiencing a hangover and becoming aggressive were only associated with perceptions that drinking was less worth it, suggesting that experiencing certain negative consequences can have unique associations with different aspects of students' perceptions of the drinking experience. Unlike the other negative

consequences examined, reporting being rude or obnoxious is at least somewhat dependent on the student's recognition of how his or her own behavior is perceived by others, rather than solely on the students' own experiences. As such, being rude or obnoxious may not be associated with students' perceptions that their own drinking was worth it because it was other people to whom the student was rude or obnoxious. In contrast, students feel direct effects from a hangover, which may in turn have a stronger influence on perceptions of whether drinking was worth it. Our findings demonstrate that negative consequences do, in fact, influence perceptions of the overall drinking experience, thus reinforcing the need to include negative consequences in intervention and prevention efforts as one component focusing on the pros and cons of heavy drinking.

Two additional key findings from the current study are that, first, ratings of the most favorable positive consequence experienced on a given night predicted more favorable overall evaluations of the drinking experience and perceptions that drinking was more worth it. Second, ratings of the most aversive negative consequence experienced on a given night predicted less favorable overall evaluations of the drinking experience and perceptions that drinking was less worth it. These findings suggest that both the positive and negative consequences experienced on a given night are important the next morning when students evaluate the overall drinking experience. It may be that one type of consequence (either positive or negative) has a longer lasting impact on students' impressions of a drinking event. The exact nature of the consequences being evaluated as most favorable and most aversive was not accounted for in our analysis, and it is also possible that evaluating a relatively severe negative consequence as most aversive may have a stronger association with perceptions of the drinking experience than evaluating a relatively mild positive consequence as most favorable. Indeed, the magnitude and impact of these evaluations may be substantially different for a mild, positive consequence versus a severe, negative consequence. Drawing attention to negative consequences that students perceived as especially aversive may be a useful component of brief interventions as a way to encourage students to limit their heavy drinking. It may also be particularly important for realtime mobile interventions to capitalize on instances where students experienced especially aversive consequences and contrast those with especially positive experiences that may have occurred at lower levels of alcohol use.

In the current study, overall evaluations of the drinking experience did not predict next-day drinking, suggesting that the effect of these evaluations on shaping subsequent drinking may not be evident from one day to the next. It is possible that overall evaluations of drinking experiences have a cumulative effect on subsequent drinking that is evident over extended periods of time. Previous research has demonstrated that perceiving negative consequences as more aversive was associated with decreased total weekly alcohol use during the subsequent assessment two weeks later (Barnett et al., 2015). In addition, experiencing more positive consequences one week has been associated with planning to drink more and rating positive consequences as being more important to experience during the subsequent week (Patrick & Maggs, 2008), lending some support to the notion that evaluations may have cumulative effects over time. In contrast to our lack of findings for overall evaluations, drinking experiences that were perceived as being more worth it did predict a greater likelihood of next-day drinking. Additional research is needed to determine the influence of

overall evaluations as well as consequence-specific evaluations on prospective drinking behavior, particularly event-level designs that include a sufficiently long span of days (e.g., over several consecutive weeks) to test for both next-day and weekly effects on subsequent drinking. Although overall evaluations of the drinking experience and perceptions of drinking as worth it are positively correlated, the current study suggests that perceptions of drinking as worth it may have a stronger influence on deciding whether or not to drink the following day. Students may be more likely to drink the next day in an effort to recreate the positive experience from the night before if that previous drinking occasion was perceived as more worth it. Given our findings that negative consequences are associated with perceiving drinking occasions as being less worth it, it may be beneficial for interventions to call attention to occasions on which negative consequences were perceived as less worth it to develop discrepancy between a student's current behavior and his or her goals.

Almost all of the students in the sample experienced four of the six positive alcohol-related consequences on at least one of the sampled days, which further attests to the need to incorporate the positive aspects of the drinking experience into the content of interventions for this population (Barnett et al., 2015; Park, 2004; Patrick & Maggs, 2008). As observed in other studies (Barnett et al., 2015; Lee et al., 2011; Park, 2004; Patrick & Maggs, 2008), negative consequences from drinking were less commonly reported than positive consequences. The lower endorsement of the seven negative consequences assessed may be due in part to the negative consequences being more severe in nature (e.g., getting hurt or injured) compared to the more mild positive consequences (e.g., being in a better mood). The negative consequences were, on average, viewed as aversive, and tended to be reported on heavy drinking days. We found very few gender differences, with only two positive and two negative consequences being more prevalent among women than among men. Women were more likely to report being energetic, expressing feelings, feeling nauseated or vomiting, and being embarrassed after drinking than men.

Approximately a quarter of the students in the sample reported getting hurt or injured at some point during the study, and more than half of the students experienced three of the seven negative consequences at least once (i.e., hangover, feeling nauseated or vomiting, being unable to remember). The percentage of college drinkers experiencing negative consequences at some point during college, as well as the average number experienced, are likely higher than reported here based on the limited number of consequences assessed over a limited number of days (a total of eight weeks collected in four 2-week periods from different college quarters). Importantly, we found that having a hangover, being unable to remember, and being aggressive were rated as the least aversive of the negative consequences, which suggests that the common occurrence of these negative consequences may in part contribute to their perception as being less aversive among college students.

## Limitations

Several limitations should be acknowledged. First, students were recruited at a single university and were eligible for the study if they reported drinking at least twice a week in the last month. Therefore, results may not generalize across the entire college population. Given that previous research has demonstrated that more naive drinkers may be more

sensitive to alcohol's negative consequences (Leigh, 1999; McCarty, Morrison, & Mills, 1983), the current findings may not generalize to students who drink less often, such that less frequent drinkers may evaluate negative consequences as being more aversive. It is possible that if a consequence is being experienced for the first time, this could result in a less favorable view of the overall drinking experience and potentially result in a lower likelihood of next-day drinking. Second, the current sample included a larger proportion of fraternity and sorority members than would be found in the undergraduate population from which the sample was drawn. Although the alcohol use criteria of drinking twice per week likely contributed to the overrepresentation of fraternity and sorority members, given that they are a high-risk group for heavy alcohol use (Turrisi, Mallett, Mastroleo, & Larimer, 2006), this limits the generalizability of the findings. Third, GEE analyses examining ratings of the most favorable and most aversive consequences (Aim 2) are limited to only those drinking days in which both a positive and a negative consequence were reported. Therefore, it is not possible to predict overall evaluations of the drinking experience across all drinking days, but rather only for drinking days with reported consequences and the associated evaluations.

### Future Directions

There are several potential areas for future research. First, research about how positive and negative consequences are experienced and evaluated is needed to better understand how students reflect on their experiences, and this information could be used to inform personalized normative feedback interventions. For example, vomiting may be viewed as extremely negative on a night when an individual was sick in a friend's vehicle rather than in a bathroom. Second, future work is needed to determine whether evaluations of specific types of consequences experienced on a given night may be more or less predictive of future drinking than evaluations of the overall experience. In addition, it is important to determine for whom and under what circumstances evaluations predict subsequent drinking because individuals who drink less regularly may be more likely to alter their behavior after having an aversive drinking experience. Third, future studies should collect daily data over a longer span of consecutive days in order to test cumulative or cyclic effects of evaluations on subsequent drinking. Fourth, future research that examines other negative consequences such as sexual assault, which was not assessed in the current study, may help identify additional consequences that are salient and influential in guiding future behavior. Finally, the role of experiencing multiple positive (or negative) consequences within a single day as well as experiencing a positive consequence in conjunction with a negative consequence requires additional research.

### Conclusions

The current study showed that experiencing specific positive and negative consequences on a given night significantly predicted students' overall evaluations of the drinking experience and perceptions that drinking was worth it. Further, these perceptions that drinking was more worth it were associated with an increased likelihood of next-day drinking. This area of work has great potential to provide specific ways in which intervention and prevention efforts may be modified to focus on the alcohol-related consequences that either enhance or diminish students' favorable perceptions of their drinking experiences.

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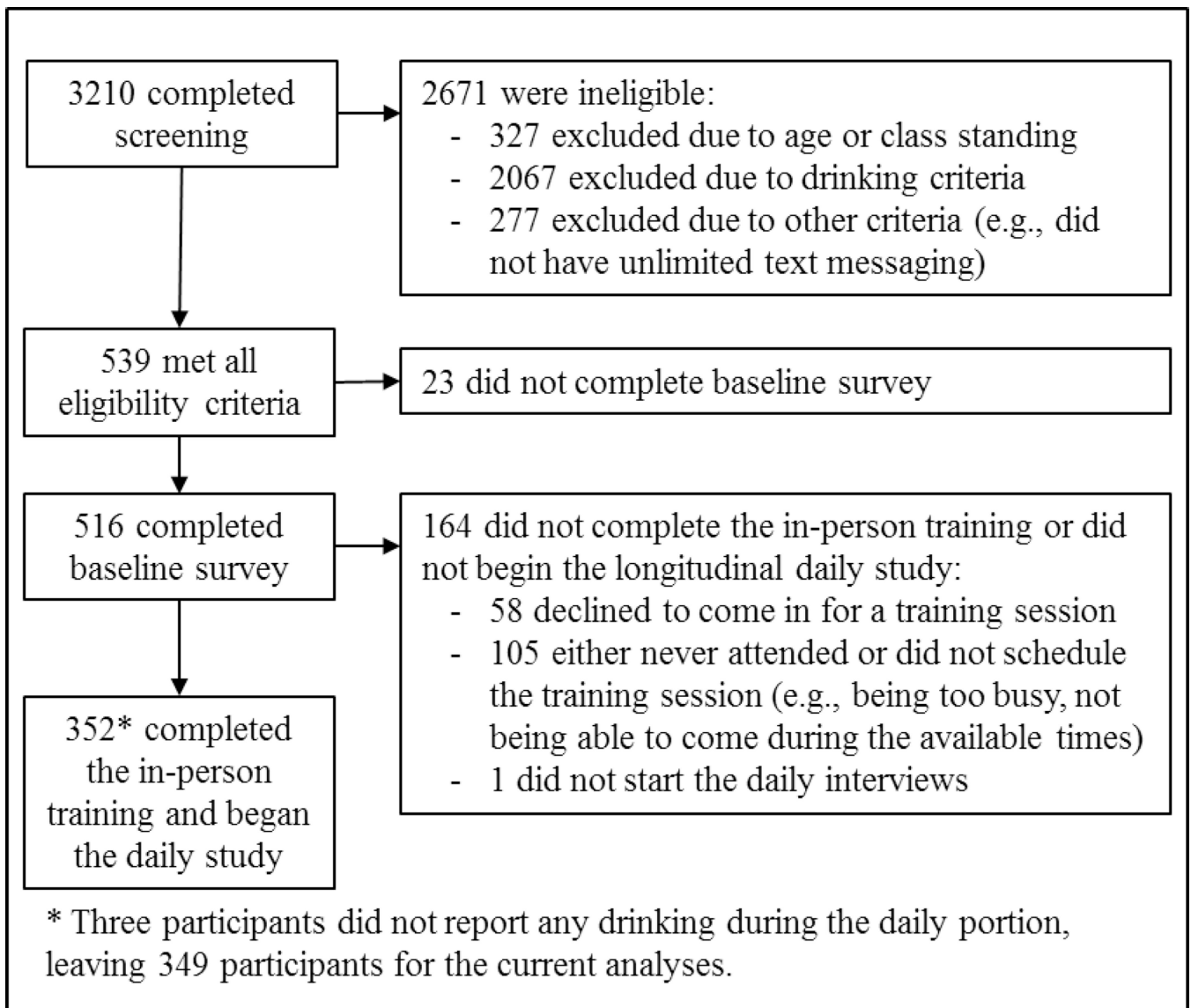
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**Figure 1.** Recruitment flow chart to detail the number of participants who participated in screening, baseline, and the longitudinal daily portion as well as the reasons for ineligibility and non-completion.

Table 1

## Frequency of Consequences and Average Number of Drinks When Experienced

Consequence	Daily level			Person level				
	Proportion of drinking days experienced	Number of drinks on days experienced		Proportion of drinkers who experienced at least once	Number of days consequence experienced per person			
		<i>M (SD)</i> drinks	Median		Range	<i>M (SD)</i> days	Median	Range
Positive consequences								
Relaxed	.67	5.55 (3.43)	5	1–25	.98	11.29 (7.52)	10	0–46
Buzzed	.66	6.20 (3.35)	6	1–26	.97	11.05 (7.49)	10	0–47
Social	.57	6.45 (3.42)	6	1–25	.97	9.55 (6.42)	9	0–34
Better mood	.52	5.99 (3.46)	6	1–26	.97	8.79 (6.87)	7	0–39
Energetic	.34	6.80 (3.46)	6	1–26	.87	5.62 (5.27)	4	0–27
Express feelings	.27	6.56 (3.49)	6	1–25	.77	4.45 (4.96)	3	0–27
Negative consequences								
Hangover	.22	8.03 (3.41)	8	1–26	.86	3.63 (3.33)	3	0–18
Vomited	.07	7.62 (3.44)	7	1–26	.56	1.16 (1.58)	1	0–12
Couldn't remember	.07	9.34 (3.51)	9	1–26	.51	1.13 (1.65)	1	0–13
Embarrassed	.06	7.36 (3.36)	7	1–25	.47	0.98 (1.40)	0	0–7
Rude/obnoxious	.05	7.74 (3.97)	7	1–26	.38	0.76 (1.35)	0	0–10
Aggressive	.04	7.71 (3.97)	7	1–26	.42	0.67 (1.06)	0	0–8
Hurt/injured	.02	8.05 (3.88)	8	1–26	.28	0.36 (0.66)	0	0–3

Note. Descriptive information reported on 5895 drinking days (daily-level) from the 349 participants (person-level) who drank on at least one day over the course of the study.

**Table 2**

Gender Differences in the Proportion of Students Reporting Each Consequence at Least Once on Sampled Days

Consequence	Women ( <i>n</i> =186)	Men ( <i>n</i> = 163)	<i>p</i> -value
Positive consequences			
Relaxed	0.98	0.99	.51
Buzzed	0.97	0.96	.60
Social	0.97	0.97	.83
Better mood	0.98	0.96	.39
Energetic	0.91	0.83	.04
Express feelings	0.82	0.72	.02
Negative consequences			
Hangover	0.85	0.87	.78
Vomited	0.62	0.49	.01
Couldn't remember	0.52	0.51	.90
Embarrassed	0.55	0.37	<.001
Rude/obnoxious	0.40	0.36	.49
Aggressive	0.41	0.43	.77
Hurt/injured	0.31	0.23	.10

*Note.* Chi-square tests were conducted to test for gender differences in the proportion of students experiencing each consequence at least once on the sampled days from the eight weeks of daily reporting (collected during four 2-week periods spanning one year).

**Table 3**

Evaluation Ratings of Experienced Consequences Averaged across Days for Students who Experienced the Consequence at Least Once

Consequence	<i>M (SD)</i>	<i>N</i>
Positive consequences		
Relaxed	6.66 (0.93)	343
Buzzed	6.55 (0.91)	338
Social	6.67 (0.98)	339
Better mood	6.79 (0.89)	339
Energetic	6.45 (0.92)	305
Express feelings	5.86 (1.14)	270
Negative consequences		
Hangover	3.60 (1.41)	300
Vomited	2.89 (1.51)	195
Couldn't remember	3.66 (1.69)	179
Embarrassed	3.35 (1.42)	164
Rude/obnoxious	3.47 (1.55)	133
Aggressive	3.71 (2.15)	145
Hurt/injured	3.19 (1.71)	96

*Note.* In cases where the participant experienced the consequence more than once during the sampled days, evaluations were averaged across days (i.e., person-mean). Evaluations of each specific consequence experienced were rated on a scale from 1 (*extremely bad*) to 9 (*extremely good*), such that higher scores reflect more favorable evaluations.

Experiencing Specific Consequences as Predictors of Overall Drinking Experience (Model A) and Perceptions that Drinking was Worth It (Model B)

Table 4

	Model A: Overall experience			Model B: Was it worth it?		
	<i>b</i>	SE	<i>p</i> -value	<i>b</i>	SE	<i>p</i> -value
<u>Person level</u>						
Sex (female)	-.04	.10	.64	-.10	.12	.41
Age at screening	.06	.04	.08	.04	.04	.29
Fraternity/sorority membership	-.12	.09	.21	.00	.13	.99
Person-mean drinks per drinking day	.02	.03	.55	-.01	.04	.81
Percent HED days	-.53	.33	.11	.23	.44	.60
<u>Daily level</u>						
Study period	.04	.02	.06	.06	.02	.02
Alcohol use (# drinks)	.08	.01	<.001	.07	.01	<.001
Weekend	.06	.04	.13	.10	.05	.04
<u>Positive consequences</u>						
Relaxed	.38	.05	<.001	.40	.06	<.001
Buzzed	.32	.06	<.001	.30	.07	<.001
Social	.35	.05	<.001	.27	.06	<.001
Better mood	.38	.05	<.001	.45	.06	<.001
Energetic	.32	.05	<.001	.33	.06	<.001
Express feelings	.11	.05	.03	.13	.06	.03
<u>Negative consequences</u>						
Hangover	-.07	.06	.26	-.25	.06	<.001
Vomited	-.43	.09	<.001	-.49	.10	<.001
Couldn't remember	-.23	.11	.04	-.25	.11	.02
Embarrassed	-.71	.11	<.001	-.79	.12	<.001
Rude/obnoxious	-.37	.12	.003	-.20	.13	.12
Aggressive	-.15	.12	.22	-.37	.14	.01
Hurt/injured	.02	.17	.92	-.22	.18	.24

Note. Values are unstandardized regression coefficients. All positive and negative consequences were entered simultaneously into Model A and Model B to test a single model for each outcome. Number of days analyzed ranged from 5808 (Model B) to 5815 (Model A) across 348 participants (both Models A and B).

Consequence Evaluation Scores as Predictors of Overall Drinking Experience (Model C) and Perceptions that Drinking was Worth It (Model D)

Table 5

	Model C: Overall experience			Model D: Was it worth it?		
	<i>b</i>	SE	<i>p</i> -value	<i>b</i>	SE	<i>p</i> -value
<u>Person level</u>						
Sex (female)	-.10	.11	.37	-.10	.12	.39
Age at screening	-.02	.04	.73	-.08	.05	.14
Fraternity/sorority membership	-.17	.11	.11	.05	.13	.70
Person-mean drinks per drinking day	.00	.03	.97	-.01	.04	.89
Percent HED days	.17	.39	.68	.74	.45	.10
Person-mean for ratings of the most favorable positive consequences	.54	.07	<.001	.60	.07	<.001
Person-mean for ratings of the most aversive negative consequences	-.26	.08	.001	-.27	.08	.001
<u>Daily level</u>						
Study period	.02	.03	.55	.01	.04	.73
Alcohol use (# drinks)	.06	.02	<.001	.07	.02	<.001
Weekend	.05	.07	.50	.16	.09	.09
Ratings of the most favorable positive consequence	.48	.05	<.001	.57	.05	<.001
Rating of the most aversive negative consequence	-.22	.04	<.001	-.29	.04	<.001

Note. Values are unstandardized regression coefficients. All predictors were entered simultaneously into Models C and D. Number of days analyzed was 1752 across 320 participants for Models C and D.

Overall Evaluations of Drinking Experiences and Perceptions of Drinking as Worth It as Predictors of Next-Day Drinking (Model E)

Table 6

	Logistic portion of model			Count portion of model		
	<i>b</i>	SE	<i>p</i> -value	<i>b</i>	SE	<i>p</i> -value
<u>Person level</u>						
Sex (Female)	.03	.09	.710	-.24	.04	<.001
Age at screening	-.23	.04	<.001	-.08	.01	<.001
Fraternity/Sorority membership	.43	.10	<.001	.19	.04	<.001
Percent HED Days	-3.22	.37	<.001	1.71	.17	<.001
Person-Mean Overall						
Evaluations	.25	.09	.005	.09	.04	.015
Person-Mean "Worth It"	-.24	.07	.001	-.07	.03	.030
<u>Daily level</u>						
Study period	-.07	.03	.019	-.05	.01	<.001
Weekend	-.94	.07	<.001	.28	.03	<.001
Daily Overall Evaluation						
Deviations	.01	.02	.637	.00	.01	.943
Daily "Worth It"						
Deviations	-.05	.02	.050	.01	.01	.607

*Note.* Values are unstandardized regression coefficients. All predictors were entered simultaneously. Number of days analyzed was 5,214 days, of which 2,708 included no drinking, across 343 participants.