

Alcohol-Related and Alcohol-Free Activity Participation and Enjoyment Among College Students: A Behavioral Theories of Choice Analysis

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College student alcohol abuse remains a significant public health problem, and there is a need for theory-driven and empirically based models to guide prevention efforts. Behavioral theories of choice assume that the decision to consume alcohol is influenced by the relative value of alcohol versus other available activities. In the present study, a sample of college student drinkers ($N = 108$; 56% female, 44% male) who had previously completed a mandatory alcohol intervention completed a measure of alcohol-related and alcohol-free activity participation and enjoyment. The goals of the study were to examine the influence of drinking quantity and contextual variables on activity enjoyment and to identify enjoyable alcohol-free activities that take place on evenings when students might otherwise be drinking. Overall, students found alcohol-related activities more enjoyable than alcohol-free activities, and drinking quantity was positively related to enjoyment. However, alcohol-free activities such as watching movies, going to the theater or museums, going to bars or parties, hanging out with friends, eating at restaurants, and engaging in creative activity were generally as enjoyable as drinking. Alcohol-free activities that included peers or dates were more enjoyable than solitary activities. Men were less likely to engage in alcohol-free activities that included peers and reported less enjoyment related to alcohol-free activities than did women. Further research is required to identify procedures for increasing participation in alcohol-free activities and to determine whether increased alcohol-free activity participation results in decreased alcohol consumption.

Keywords: alcohol, college students, behavioral economics, behavioral theories of choice, prevention

College students report high rates of past-month heavy drinking (43%) and associated physical, psychological, and academic problems (Hingson, Heeren, Zakocs, Kopstein, & Wechsler, 2002; O'Malley & Johnston, 2002). Accordingly, prevention and treatment of young adult alcohol abuse has become a significant research and public health priority (Ham & Hope, 2003; National Institute on Alcohol Abuse and Alcoholism, 2002). During the past decade, there have been increased efforts to develop interventions for college student drinkers that are based on empirical research and theory. For example, research on the influence of alcohol outcome expectancies and perceived drinking norms on drinking behavior has led to the development of promising interventions for college student drinking (Darkes & Goldman, 1993, 1998; Dimeff, Baer, Kivlahan, & Marlatt, 1999; Marlatt et al., 1998).

Most theories of excessive substance use attribute variability in rates of drug use to situational variables (e.g., emotional states, conflict, drug use cues; Bandura, 1977; Maisto, Carey, & Bradizza, 1999; Marlatt & Gordon, 1985) or individual-differences variables that influence the reinforcing value of drugs (e.g., subjective response to drugs or alcohol, anxiety sensitivity, substance use outcome expectancies; Goldman, Del Boca, & Darkes, 1999; Leonard & Blane, 1999). For example, there are individual differences in sensitivity to the stimulant relative to the sedative effects of alcohol, and high sensitivity to stimulant effects is associated with greater levels of alcohol consumption (Erlich & Earleywine, 2003; Holdstock, King, & de Wit, 2000). However, behavioral "choice" and "economic" theories stress that the decision to use drugs occurs in a context that includes other potential activities or reinforcers and that the availability and value of substance-free reinforcers impacts the decision to use drugs or alcohol (Bickel & Vuchinich, 2000; Higgins, Heil, & Plebani-Lussier, 2003; Rachlin, 1997; Vuchinich & Tucker, 1988).

Laboratory drug self-administration studies have shown that rates of drug consumption generally vary inversely with the availability of substance-free reinforcers and that alternative reinforcers have both "prevention" effects (i.e., reducing rates of initial substance use acquisition) and "treatment" effects (i.e., reducing rates of drug use among animals or humans who already administer drugs at high rates).

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These results are robust across species (e.g., rats, monkeys, humans), drugs (e.g., cocaine, ethanol, nicotine), and non-drug reinforcers (e.g., food, money, recreational activities; see reviews by Carroll, Bickel, & Higgins, 2001; Higgins et al., 2003). Despite this extensive and coherent theoretical and empirical basic science literature, behavioral theories of choice have not guided much research on the determinants of substance use in the natural environment (Vuchinich & Tucker, 1996). A primary reason for this lack of translational research is that measures of the key variables identified in the laboratory have not yet been established for use in the natural environment. For example, whereas relative response rate and time allocation provide generally accepted measures of the value of drug and nondrug reinforcers in the laboratory (Schuster, 1990; Young & Herling, 1986), the procedures for quantifying the value of qualitatively different activities in the natural environment are less well established (Correia & Carey, 1999; Murphy, Correia, Colby, & Vuchinich, 2005; Vuchinich & Tucker, 1996).

Several preliminary studies have used modified reinforcement survey instruments, such as the Pleasant Events Schedule (MacPhillamy & Lewinsohn, 1982), to measure behavioral allocation and enjoyment from substance-related and substance-free activities. Reinforcement survey instruments measure participation in and enjoyment from a predetermined list of potentially rewarding activities. "*Reinforcement*" is operationalized as the product of the activity frequency and enjoyment ratings. Although traditional definitions of reinforcement focus on rates of behavior rather than activity enjoyment, enjoyment may be a useful metric for comparing the value of activities that are available in the natural environment (Correia, Simons, Carey, & Borsari, 1998; MacPhillamy & Lewinsohn, 1982). Researchers have modified reinforcement surveys to collect separate ratings of substance-related and substance-free reinforcement (Correia et al., 1998). A cross-sectional study with college students showed that frequency of substance use was positively related to substance-related reinforcement and negatively related to substance-free reinforcement (Correia et al., 1998). The "*reinforcement ratio*," which is based on Herrnstein's (1970) matching law and designed to measure the reinforcement received from substance-related activities relative to total reinforcement (i.e., relative reinforcing value), accounted for unique variance in substance use beyond substance-related reinforcement. These results were replicated with a sample of psychiatric patients (Correia & Carey, 1999) and suggest that the reinforcing value of substance use relative to substance-free activities may be an important measure of strength of preference for drugs and alcohol. Higher reinforcement ratio scores reflect a greater reliance on substance-related reinforcement and may indicate greater substance abuse problem severity (Murphy, Correia, et al., 2005; Murphy & Vuchinich, 2002; Tucker, Vuchinich, & Rippins, 2002).

Our research group used a reinforcement survey methodology to examine substance-related and substance-free reinforcement among heavy-drinking college students who completed a brief alcohol intervention (Murphy, Correia, et al., 2005). Women who, at baseline, derived a smaller proportion of their total reinforcement from substance use

showed greater drinking reductions at the 6-month follow-up than women who derived a greater proportion of their total reinforcement from substance use. The reinforcement ratio variable predicted change in women's drinking levels even after the researchers controlled for the women's baseline drinking level. Thus, students who have a number of enjoyable substitutes to substance use may have an easier time reducing their drinking following an intervention (see also Tucker, Vuchinich, & Rippins, 2002). The finding that the reinforcement ratio did not predict drinking outcomes among men may be due to the fact that men showed very little change in drinking from baseline to follow-up. We also found that male and female students who showed moderate to large drinking reductions (at least five drinks per week) showed a significant reduction in reinforcement from peer interactions and a significant increase in school-related reinforcement over the 6-month follow-up (Murphy, Correia, et al., 2005). These results suggest that reinforcement variables have important and perhaps gender-specific relations to drinking patterns and might be relevant to prevention and intervention efforts.

The present study uses a modified timeline follow-back interview (TLFB; Sobell & Sobell, 1995) to measure substance-related and substance-free activity participation and enjoyment in a sample of college students who participated in an alcohol intervention trial following an alcohol-related medical or disciplinary incident. Unlike reinforcement survey instruments, which collect ratings of the average participation frequency and enjoyment from a predetermined list of activities, the TLFB measure collects event-level data on specific substance-using and substance-free activities. This reduces error associated with requiring participants to generate "average" reports of behaviors (Sobell & Sobell, 1995; Tucker, Vuchinich, & Murphy, 2002). We also collected information on contextual variables that might influence activity enjoyment, including the number of drinks consumed, the drinking location, illicit drug use, and the presence of peers or romantic partners. Thus, compared with reinforcement survey instruments, the TLFB can provide more detailed information on the relative value of alcohol use and alternative activities.

The primary goals of this study are (a) to determine whether there are differences in enjoyment between alcohol-related and alcohol-free activities, (b) to determine whether quantity of alcohol consumed is related to activity enjoyment, (c) to identify the specific types of alcohol-free activities that students find most enjoyable and are most likely to engage in on evenings that they do not drink, and (d) to determine whether gender and contextual variables influence levels of activity enjoyment.

Method

Participants

Participants ($N = 108$; 60 women, 48 men) were college students from a medium-size, private New England university who participated in a clinical trial of a brief alcohol intervention (see Barnett et al., 2004, for more details about the clinical trial). Participation satisfied a university mandate that students receive alcohol education following an alcohol-related incident. Data for

this study were collected from participants who were first enrolled in the larger clinical trial study between September 2002 and May 2004. Most students (82%) were mandated following an episode of intoxication that required emergency medical attention. The remainder of the sample were cited for an alcohol-related disciplinary infraction, such as illegal possession of alcohol, damage to property, or disruptive behavior. Participants were randomly assigned to one of two brief alcohol interventions: a motivational interview that included personal drinking feedback (Miller & Rollnick, 2002), or an educational session that included an interactive CD-ROM program (Century Council, 1998). Half of the sample was then randomly assigned to complete a 1-month booster session that was similar in content to the original intervention session. Participants completed 3- and 12-month follow-up assessments. The present study examines data collected from participants at the 3-month follow-up. Most participants (71%) were freshmen; seniors were not eligible to participate because the larger study included a 1-year follow-up. The sample was 69% White, 12% Hispanic, 12% Asian American, 5% African American, and 2% American Indian. Only 2 students were members of a fraternity or sorority. At the 3-month follow-up, the participants averaged 5.26 ($SD = 5.36$) drinks per week and 2.44 ($SD = 3.41$) past-month heavy-drinking days (i.e., at least five drinks for men and at least four drinks for women). Half of the sample scored at or above the cutoff score for hazardous drinking (i.e., 8) on the Alcohol Use Disorders Identification Test, which is a widely used self-administered screening measure for risky alcohol use developed by the World Health Organization (Babor, de la Fuente, Saunders, & Grant, 1992).

Procedures

A trained research assistant administered the TLFB individually during the 3-month postintervention follow-up interview. Participants received \$30 for completing the TLFB and a number of other assessment measures. We took several steps to enhance the validity of the substance use and activity self-reports. We assured participants that we would keep their data confidential and would not release the information to the university or to their parents. To enhance recall for specific activity participation and substance use, we encouraged participants to bring a day planner to the interview, and we provided them with a calendar that listed campus events and holidays.

Measures

Participants completed a 30-day TLFB alcohol use interview. The TLFB uses a calendar to obtain retrospective estimates of daily drinking quantities and has good psychometric properties (Sobell & Sobell, 1995). Research with the TLFB suggests that retrospective accounts of substance use and other target behaviors (e.g., drinking and driving, gambling, risky sexual behavior, spousal violence) are generally accurate (Carney, Tennen, Affleck, Del Boca, & Kranzler, 1998; Fals-Stewart, Birchler, & Kelly, 2003; Usdan, Schumacher, & Bernhardt, 2004).

The research assistant administered the activity participation and enjoyment portion of the TLFB after obtaining the daily drinking reports using the standard TLFB. The research assistant selected up to 7 drinking days and 7 nondrinking days from the TLFB and queried the participant about his or her primary activity on each of those days. Because our goal was to identify potential substitutes for alcohol consumption, which, for college students, generally occurs in the evening, we focused on alcohol-free activities that occurred in the evening. For the same reason, we selected the 7 nondrinking days by identifying "potential drinking days"—

that is, weekends and days that had been drinking days for the participant during the past month. For example, if a participant drank on 2 Saturdays and 1 Friday during the past month, we collected activity data for the 2 abstinent Saturdays and the 3 abstinent Fridays during that month. If these days did not sum to 7, we collected activity data for days of the week that the participants identified as drinking days during other months. If these days still did not sum to 7, we collected activity data for the most recent alcohol-free days. If participants had more than 7 drinking days, we collected activity data for the 7 most recent drinking days.

Participants rated the subjective enjoyment of the activity using a 5-point scale (0 = *unpleasant/neutral* to 4 = *extremely pleasant*; Correia, Carey, Simons, & Borsari, 2003). For drinking activities, participants rated the subjective enjoyment of the activity (e.g., party, time at a bar or club) rather than the subjective effects of alcohol (e.g., euphoria, relaxation). We also collected information on three contextual variables that might influence reinforcement value: the number of peers present (coded as 0, 1, 2–3, and 4+ for alcohol-free days and 0, 1, 2–3, 4–10, 11–20, and 21+ for drinking days); the presence of a date or romantic partner (coded dichotomously); and, for drinking days, the drinking location (e.g., bar, restaurant, personal residence, friend's residence, large party, family function, concert or sporting event, or outdoor activity). We coded the alcohol-free activities using a list of 30 activity categories identified from previous reinforcement survey and activity-monitoring research (Desmond & Glenwick, 1987; Nakamura, 1998). We also used the TLFB to obtain reports of illicit drug use (coded dichotomously for each activity). We did not include days that participants used drugs but did not consume alcohol in the analysis examining alcohol-free days. Therefore, all alcohol-free days are also substance-free days.

Data Analysis Plan

We used event-level analyses that treated each drinking or alcohol-free activity as a unique case. We collected data on 707 alcohol-free and 419 alcohol-related activities. Most participants ($n = 97$; 90% of sample) contributed 7 alcohol-free activities to the analysis. The remaining 11 participants had fewer than 7 abstinent days during the 30-day TLFB period and therefore provided data for fewer than 7 alcohol-free activities. Also, most participants ($n = 84$; 78% of sample) drank on fewer than 7 days in the past month and therefore provided data for fewer than 7 drinking episodes ($M = 4.23$, $SD = 2.16$, mode = 3 drinking episodes). Six participants were abstinent during the 30 days covered by the TLFB, and 3 could not recall the details of their activities during their drinking episodes. To determine whether the overrepresentation of drinking episodes from more frequent drinkers altered the results, we reran our analyses with a restricted maximum of 2 drinking episodes per person ($N = 186$ episodes) so that most participants (76%) contributed an equal number of episodes to this analysis. Because these results were similar to the results obtained with the entire sample of drinking episodes, we included data from all cases in the analyses to maximize statistical power.

After examining gender differences in drinking quantity and contextual aspects of drinking episodes, we compared students' mean levels of enjoyment from alcohol-related versus alcohol-free activities. We then examined the influence of gender, drinking quantity, and contextual variables on enjoyment from drinking activities. Finally, we identified the most common and the most enjoyable alcohol-free activities and examined gender and contextual influences on alcohol-free activity enjoyment.

Results

Gender Differences in Drinking Quantity and Contextual Aspects of Drinking Episodes

Men consumed significantly more standard drinks per drinking episode than did women ($M_s = 5.71$ and 3.91 , respectively), $t(421) = 5.49$, $p < .01$. Men's drinking episodes were less likely to include a date or a romantic partner than were women's (9% and 22%, respectively), $\chi^2(1, N = 419) = 14.19$, $p < .01$, but the presence of a romantic partner did not have a significant effect on drinking quantity. There were no gender differences in the average number of peers present for drinking episodes. The modal drinking episode for both men and women included 4–10 peers; there were no solitary drinking episodes. Number of peers present was positively correlated with drinking quantity, $r(418) = .258$, $p < .01$, and this relation was stronger for men, $r(205) = .428$, $p < .01$, than it was for women, $r(213) = .132$, $p = .05$. Men and women also drank in similar locations, most frequently at parties. Drinking location had a similar effect on drinking quantity for both men and women; students drank higher quantities at bars ($M = 5.22$ standard drinks, $SD = 3.99$) and parties ($M = 5.90$, $SD = 3.55$) and drank considerably less at restaurants ($M = 2.61$, $SD = 2.11$) or in their own residence ($M = 3.45$, $SD = 2.24$), $F(6, 412) = 7.42$, $p < .01$. Men were more likely to report drug use during drinking episodes than were women (11% and 4%, respectively), $\chi^2(1, N = 418) = 7.07$, $p < .01$, but drug use was not related to drinking quantity.

Influence of Alcohol Consumption and Gender on Activity Enjoyment

We conducted an analysis of variance to determine whether there was an overall mean difference in students' reported enjoyment from alcohol-related versus alcohol-free activities. We coded alcohol consumption dichotomously (i.e., abstinent vs. drinking), and, because of the gender differences in drinking quantity, we included gender as a second between-subjects factor. There were significant main effects for alcohol consumption, $F(1, 1125) = 81.54$, $p < .01$, and gender, $F(1, 1125) = 19.11$, $p < .01$, and a significant Alcohol Consumption \times Gender interaction, $F(1, 1125) = 4.55$, $p < .04$. Students reported greater enjoyment from alcohol-related activities than from alcohol-free activities ($M = 2.95$, $SD = 0.88$, and $M = 2.36$, $SD = 1.25$, respectively), women reported greater activity enjoyment than men ($M = 2.72$, $SD = 1.11$, and $M = 2.42$, $SD = 1.21$, respectively), and the gender difference was more pronounced for alcohol-free activities (see Figure 1). Contrast analyses showed that women reported higher enjoyment ratings for alcohol-free activities than did men ($M = 2.55$, $SD = 1.21$, and $M = 2.11$, $SD = 1.27$, respectively), $t(707) = 4.74$, $p < .01$, but there was not a significant gender difference for drinking activity enjoyment ($M = 3.03$, $SD = .81$, for women; $M = 2.87$, $SD = 0.95$, for men), $t(418) = 1.85$, $p < .07$.

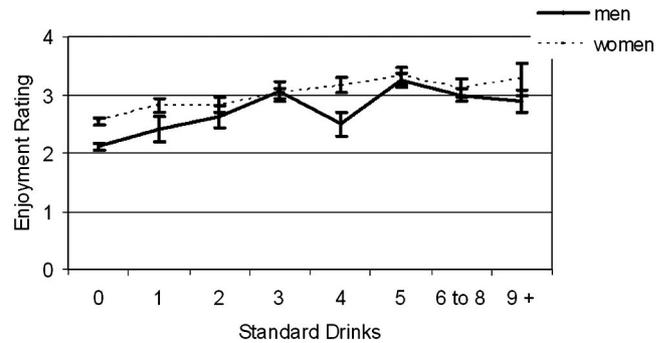


Figure 1. Mean (± 1 standard error of the mean) enjoyment ratings for alcohol-free and drinking activities among men and women. Activity enjoyment was rated using a 5-point scale: 0 = unpleasant/neutral, 1 = mildly pleasant, 2 = moderately pleasant, 3 = very pleasant, 4 = extremely pleasant. The data points represent the mean enjoyment rating as a function of gender and the number of standard drinks consumed during the activity. The data point for the standard drink value of 0 is the mean of all alcohol-free activities. Women reported significantly greater enjoyment from alcohol-free activities than did men. Drinking activities were, on the whole, significantly more enjoyable than abstinent activities. There was a significant positive, linear relation between drinking quantity and enjoyment among women. There was a significant positive, curvilinear relation between drinking quantity and enjoyment among men.

Relations Among Gender, Drinking Quantity, Contextual Variables, and Activity Enjoyment

We conducted regression models to identify predictors of students' reported enjoyment from drinking activities. Potential predictors included number of standard drinks consumed, drug use, number of peers present, presence of a date or romantic partner, and drinking location. The first model evaluated the linear and quadratic relation between drinking quantity and enjoyment. Because of the gender differences in drinking quantity and contextual variables, we included a Gender \times Drinking Quantity interaction term in the model. The interaction term was significant ($\beta = .206$), $t(417) = 2.64$, $p < .01$, so we conducted separate regression models for men and women. A quadratic model provided a slightly better fit for men ($\Delta R^2 = .02$) but not for women (see Table 1). In both cases the linear regression coefficient was positive, but for men the quadratic coefficient was negative, indicating a curvilinear relation between heavy drinking and enjoyment (see Figure 1).

The only contextual variable that showed a significant bivariate association with women's drinking enjoyment was the presence of a romantic partner. Drinking activities that included a romantic partner were significantly more enjoyable than activities that did not include a romantic partner, $r_{pb}(212) = .190$, $p < .01$. A regression model that included both number of drinks and presence of a date or romantic partner indicated that both variables were unique predictors of enjoyment (see Table 2). The only contextual variable that showed a significant bivariate association with men's drinking enjoyment was the number of peers present, $r(205) = .270$, $p < .01$. A regression model indicated that

Table 1
Regression Model Predicting Activity Enjoyment from Number of Standard Drinks Consumed by Men and Women

Variable	B	SE B	β	Model R^2	Model F, dfs	p
Men						
Linear model				.016	3.30, 1, 20	.07
Standard drinks	0.03	0.02	.13			
Quadratic model				.032	3.30, 2, 205	.04
Standard drinks*	0.13	0.05	.50			
(Standard drinks) ² *	-0.01	0.01	-.40			
Women						
Linear model				.038	8.29, 1, 211	.004
Standard drinks*	0.05	0.02	.20			
Quadratic model				.038	4.41, 2, 211	.02
Standard drinks	0.07	0.05	.26			
(Standard drinks) ²	-0.01	0.01	-.07			

* $p < .05$.

drinking quantity was not a significant predictor of men's enjoyment when number of peers was included in the model, $t(204) = 1.53$, $p < .13$ (see Table 3).

Identifying the Most Common and Enjoyable Alcohol-Free Activities

Table 4 lists the frequency of each alcohol-free activity, the modal number of peers present for each activity, and the mean level of enjoyment for men and women. The activities are listed in order of frequency. Engaging in academic activity, hanging out with friends, watching a movie at home, and spending time with family were the most frequently occurring alcohol-free evening activities. There was considerable variability in the enjoyment ratings across activities. Activities such as going to the movies, the theater or museum, and bars or parties; hanging out with friends; eating at restaurants; and taking part in creative activity were generally very enjoyable and comparable to enjoyment levels for drinking episodes. Additionally, men rated watching and playing sports as very enjoyable, and women rated time with family and time spent in nature or outdoors as very enjoyable.

Gender and Contextual Influences on Alcohol-Free Activity Participation and Enjoyment

Enjoyment ratings were significantly correlated with the number of peers present for both men, $r(304) = .440$, $p <$

.01, and women, $r(402) = .367$, $p < .01$. The presence of a significant other or a date was also associated with increased enjoyment for both men ($M_s = 3.02$ vs. 2.04), $t(302) = 3.50$, $p < .01$, and women ($M_s = 3.22$ vs. 2.47), $t(400) = 4.05$, $p < .01$. Figure 2 shows the mean enjoyment ratings for alcohol-free activities as a function of peer involvement and the presence of a romantic partner. Figure 3 shows the percentage of alcohol-free activities that included peers or a romantic partner. Women were more likely than men to engage in alcohol-free activities that included a greater number of peers, $\chi^2(3, N = 707) = 26.70$, $p < .01$. Women were also slightly more likely to engage in alcohol-free activities that included a romantic partner, but this difference was not significant (11% and 7% for activities with and without a romantic partner, respectively), $\chi^2(1, N = 706) = 3.50$, $p < .06$.

Discussion

This study examined alcohol-related and alcohol-free activity participation and enjoyment in a high-risk sample of college student drinkers who had previously completed a mandatory alcohol intervention. College students choose to drink in a context that includes many other possible activities, and we presume that they drink more when the value of alcohol exceeds that of available alcohol-free activities. The goals of the study were to examine the influence of drinking quantity and contextual variables on activity en-

Table 2
Regression Model Predicting Women's Activity Enjoyment From Number of Standard Drinks Consumed and the Presence of a Date or Romantic Partner

Variable	B	SE B	β	Model R^2	Model F(2, 211), p
Model				.07	7.7, .001
Standard drinks**	0.05	0.02	.18		
Romantic partner**	0.34	0.13	.18		

Note. Romantic partner was coded 0 (no partner) or 1 (evening included date or romantic partner).
** $p < .01$.

Table 3
Regression Model Predicting Men's Activity Enjoyment From Number of Standard Drinks Consumed and the Presence of Peers

Variable	<i>B</i>	<i>SE B</i>	β	Model R^2	Model $F(3, 204), p$
Model				.08	6.12, .01
Standard drinks	0.09	0.06	.34		
Standard drinks ²	-0.01	0.01	-.33		
No. peers**	0.21	0.06	.25		

Note. Number of peers present was coded as 0 = 0 peers, 1 = 1 peer, 2 = 2-3 peers, 3 = 4-10 peers, 4 = 11-20 peers, and 5 = 21 or more peers.

** $p < .01$.

joyment and to identify enjoyable alcohol-free activities that take place on evenings when students might otherwise be drinking.

There was considerable variability in enjoyment ratings across activities, but, on the whole, students found alcohol-related activities more enjoyable than alcohol-free activities (see Figure 1). Enjoyment generally increased with increasing drinking quantity, reaching asymptote at five standard drinks. The most common alcohol-free activities on potential drinking evenings were doing schoolwork, hanging out with friends, watching movies, and spending time with

family (see Table 4). Solitary activities, such as schoolwork, were generally not enjoyable, whereas substance-free activities that included peers or dates were generally very enjoyable and comparable to alcohol-related activities (see Figure 2). It is noteworthy that even in this sample of heavy drinkers, there were numerous alcohol-free activities that students enjoyed as much as drinking.

The overall positive relation between drinking quantity and enjoyment is not surprising in this heavy drinking sample and may explain why many students continue to drink heavily despite the risk of alcohol-related problems.

Table 4
Number of Peers Present, Frequency of Occurrence, and Enjoyment Related to Alcohol-Free Evening Activities Among College Men and Women

Activity	Modal no. peers present	Men		Women	
		<i>n</i>	Mean enjoyment	<i>n</i>	Mean enjoyment
Academic activity	0	59	0.75	50	1.26
Hanging out with friends	4+	40	2.80	41	2.95
Watch movie at home	2-3	26	2.59	44	2.55
Time with family	4+	18	2.22	40	2.85
Eat at restaurant	4+	12	3.25	43	3.14
Movie theatre	1	17	3.18	32	3.09
Employment	0	24	1.38	15	1.40
Watch TV	0	15	1.93	18	1.89
Bar/party	4+	9	3.00	18	3.06
Pleasure reading	0	11	2.18	6	2.33
Travel/transit	0	8	1.38	7	1.29
Telephone/E-mail	2-3	2	3.50	11	2.55
Creative activities	0	4	2.75	7	3.14
Errands	1	4	1.75	7	1.43
Volunteer or extracurricular activities	4+	4	3.00	6	2.20
Theatre, museum, art exhibit	4+	3	3.67	6	3.50
Rest	0	4	1.75	4	2.50
Video games	2-3	7	2.29	0	
Sporting event (as spectator)	4+	3	3.33	4	2.50
Play team sport	4+	7	3.71	0	
Outdoor sports/nature	2-3	2	2.50	5	3.60
Coffee/dessert shop	1	0		7	3.00
Formal social event (e.g., wedding, dance)	2-3	1	3.00	5	3.00
Surf the Internet	0	5	1.40	1	1.00
Exercise	0	2	2.50	3	2.70
Leisure games (e.g., board games, chess, ping pong)	4+	3	3.00	2	3.00
Time at home with date	1	2	3.00	2	4.00
Vacation or sightseeing	1	2	3.00	2	4.00
Shop for clothing or leisure items	1	1	0.00	3	3.00
Eat or cook at home	1	0		3	3.70
Other activity		14	1.80	10	3.00

Note. Activity enjoyment was rated using a 5-point scale: 0 = *unpleasant/neutral*, 1 = *mildly pleasant*, 2 = *moderately pleasant*, 3 = *very pleasant*, 4 = *extremely pleasant*.

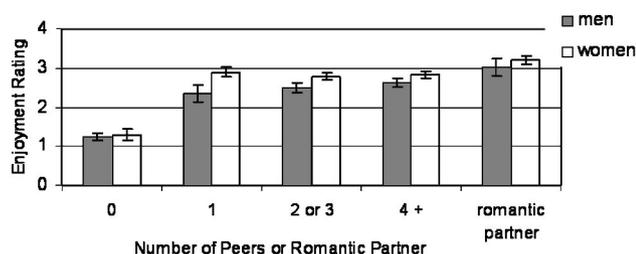


Figure 2. Impact of number of peers and presence of a date or romantic partner on alcohol-free activity enjoyment among men and women. Activity enjoyment was rated using a 5-point scale: 0 = *unpleasant/neutral*, 1 = *mildly pleasant*, 2 = *moderately pleasant*, 3 = *very pleasant*, 4 = *extremely pleasant*. The bars represent the mean enjoyment (± 1 standard error of the mean) rating for alcohol-free activities as a function of gender, and the number of peers present, or the presence of a date or romantic partner. Women reported significantly greater enjoyment from alcohol-free activities than did men. There was a significant positive relation between number of peers present and activity enjoyment among both men and women. The presence of a romantic partner was associated with significantly greater enjoyment among both men and women.

Although Wechsler, Lee, Kue, and Lee (2000) found that frequent heavy drinkers were 21 times more likely to experience five or more different alcohol-related problems than students who were light or moderate drinkers, negative consequences are actually unlikely to occur on the majority of drinking episodes (e.g., Gruenewald, Johnson, Light, Lipton, & Saltz, 2003). In contrast, the likelihood of experiencing an enjoyable time while drinking is high and generally increases with greater consumption. In addition to being of relatively low probability compared with enjoyment, potential negative outcomes, such as poor academic performance, health problems, and alcohol dependence, are delayed, which might mitigate their influence on students' decision making. Indeed, there is evidence that heavy-drinking college students sharply discount the value of delayed outcomes (e.g., Kollins, 2003; Vuchinich & Simpson, 1998).

The present results are consistent with previous research demonstrating that students report positive outcomes associated with drinking. Finnish university students reported that drinking resulted in numerous social benefits (e.g., being less shy, getting to know someone better) as well as increased optimism and interpersonal problem solving (Nyström, 1992). College students also have reported that positive drinking outcomes, such as having fun, socializing, meeting new people, and expressing oneself, are more common than negative outcomes (Park, 2004). Our research group found that alcohol consumption was negatively related to life satisfaction among female students but showed a positive relation to social satisfaction among men (Murphy, McDevitt-Murphy, & Barnett, 2005). Another study showed that undergraduates who reduced their drinking following a brief intervention showed decreased social participation and enjoyment (Murphy, Correia, et al., 2005). Thus, alcohol use is often associated with enjoyment and

tangible social benefits for college students, and heavy drinkers who reduce their drinking may experience diminished social reinforcement.

Gender Differences in Activity Enjoyment

There was a potentially important gender difference in alcohol-free activities: Men were less likely to engage in alcohol-free activities that included peers or romantic partners and reported less enjoyment related to alcohol-free activities (see Figures 2 and 3). This gender difference might be partially responsible for the greater levels of alcohol consumption observed among college men (Johnston, O'Malley, & Bachman, 2002; O'Malley & Johnston, 2002), who may be especially reliant on alcohol as a social facilitator. Other research also suggests that men are less likely than women to develop close friendships (Hays & Oxley, 1986; Wheeler, Reis & Nezlek, 1983) and may experience more social benefits from drinking than women (Burda & Vaux, 1988; Murphy, McDevitt-Murphy, & Barnett, 2005; Nezlek, Pilkington, & Bilbro, 1994). It is interesting that, among men, the number of peers present during a drinking episode was a more important predictor of enjoyment than the number of drinks consumed. Among women, however, drinking quantity and the presence of a romantic partner were unique predictors of enjoyment. Men reported high but slightly diminished enjoyment on nights that they consumed more than five drinks, whereas women's enjoyment remained stable and high even on nights that they consumed nine or more drinks. This is somewhat surprising in light of the fact that men drink heavily more often than do women (O'Malley & Johnston, 2002) and generally maintain lower blood alcohol concentrations than women after equivalent consumption (Julien, 1995). However, men do experience a greater number of negative consequences related to their drinking (Perkins, 2002), which might contribute to diminished enjoyment after they consume large quantities of alcohol.

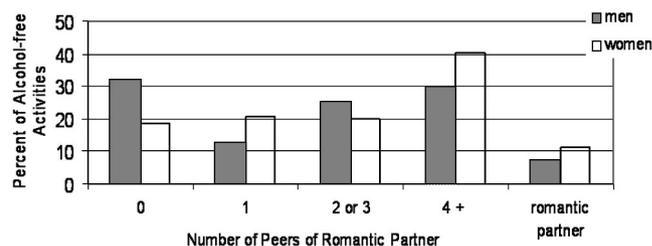


Figure 3. Impact of gender on the presence of peers or romantic partner on alcohol-free activities. The bars represent the percentage of alcohol-free activities that include 0, 1, 2-3, or 4 or more peers, and the percentage of alcohol-free activities that include a romantic partner, as a function of gender. Women's alcohol-free activities were significantly more likely to include a greater number of peers. Women's alcohol-free activities were slightly more likely to include a romantic partner, but the difference was not significant ($p < .06$).

Implications for Prevention and Treatment Programs

A primary implication of behavioral theories of choice and behavioral economics is that the decision to use alcohol is related to the availability and value of alcohol relative to the availability and value of alcohol-free activities (Bickel & Vuchinich, 2000; Higgins et al., 2003; Vuchinich & Heather, 2003). Therefore, as a general rule, prevention approaches should attempt to decrease access to alcohol and to increase access to enjoyable alcohol-free alternatives. This strategy is consistent with one of the recommendations of the National Institute on Alcohol Abuse and Alcoholism panel on preventing and treating college alcohol problems (National Institute on Alcohol Abuse and Alcoholism, 2002). The panel noted that "many students, especially at residential colleges, have few adult responsibilities and a great deal of unstructured free time, and there are too few social and recreational options" (DeJong & Langford, 2002, p. 144). Although some prevention programs have attempted to increase students' access to alcohol-free activities (DeJong & Langford, 2002), this is the first study to directly measure the value of potential alternatives. In light of our finding that college drinkers find alcohol use highly enjoyable, prevention programs that focus on increasing alcohol-free reinforcement need to be guided by careful measurement of the particular alcohol-free activities that heavy-drinking students enjoy. The current results suggest that heavy-drinking students enjoy dating, other social activities, movies, eating at restaurants, cultural activities such as theater and museums, creative activity, and sports. However, some of the activities that were rated as highly enjoyable were only endorsed by a small segment of our sample, which suggests that prevention programs should assess the preferences of the population of interest or, if possible, conduct an individual-level assessment of highly valued alcohol-free alternatives. For example, our results indicate that going to a coffee shop may be a more valued alcohol-free activity for women, whereas playing team sports may be a more appealing activity for men. It is possible that the low frequency of some highly enjoyable activities is related to constraints on the availability of the activity. Students might participate in activities such as attending theater or art exhibits more frequently if those activities were readily available. Alternatively, low participation rates might indicate that the activity, although enjoyable, is not a highly valued reinforcer and might not provide an effective alternative to drinking. This illustrates the complexity involved with designing prevention programs that attempt to reduce drinking by increasing participation in alcohol-free activities and the need for further research on student activity participation and substance use.

Some heavy drinkers may lack the social skills required in alcohol-free social situations (Kushner, Sher, & Erickson, 1999). Universities should attempt to provide alcohol-free contexts that facilitate dating and other social interactions and make extra efforts to promote these activities to male students. Providing such opportunities for 1st-year students might help them to develop social skills earlier in their college career and make them less reliant on alcohol-related socialization. Students with more severe substance abuse may require interventions that attempt to increase access to

substance-free sources of reinforcement, such as social skills training, behavioral activation, or community reinforcement (Jacobson et al., 1996; Lejuez, Hopko, LePage, Hopko, & McNeil, 2001).

Limitations and Future Research Directions

Previous research that examined reinforcement and substance abuse among college students used reinforcement survey instruments to quantify alcohol-related and alcohol-free reinforcement (Correia et al., 2003). The TLFB measure used in this study is more methodologically rigorous than reinforcement surveys and provides detailed information that might benefit prevention programs. However, this measure did not include indexes of reward value other than enjoyment, such as time and money allocation (Murphy & Vuchinich, 2002; Tucker, Vuchinich, & Rippins, 2002), and only measured evening activities. Although evening activities may serve as important substitutes for substance use, the decision to drink is undoubtedly influenced by the availability and value of reinforcing activities throughout the day. For example, students who have rewarding activities during the day (e.g., class, exercise, hobbies) may be less likely to drink heavily because of the possibility that this would compromise their activities during the subsequent day. Future research should address these limitations and measure more general patterns of time allocation, money allocation, and enjoyment.

Future research might use a similar measurement strategy to examine individual differences in proportional reinforcement from substance use relative to substance-free activities (Correia et al., 1998). This might operationalize an important feature of young adult substance misuse: devoting considerable time and resources to substance use and neglecting other important activities. Existing substance abuse measures provide information on consumption levels and substance-related problems, but they do not describe the relative prominence of substance use in the student's overall lifestyle, which may be more predictive of the course of substance use over time (Murphy, Correia, et al., 2005; Tucker, Vuchinich, & Rippins, 2002).

Because the current study is cross-sectional and does not experimentally manipulate drinking or other activities, we were unable to evaluate the economic relations between alcohol use and alcohol-free activities. Longitudinal research that examined the reciprocal relations between drinking and other activities over time could more conclusively identify activities that serve as substitutes for and complements to drinking. For example, our results show that every drinking episode occurred in a social context and that drinking quantity was positively correlated with the number of peers present, which suggests that alcohol consumption and social activity might be complementary reinforcers. If this were the case, then increasing opportunities for social interaction might actually increase drinking levels. Although research with adults suggests that substance use and social activity might be substitutes (Green & Fisher, 2000; Rachlin, 2000), it is possible the contextual features of the college environment result in complementary relations between alcohol use and social interaction. It should also be

noted that economic relations between commodities are not necessarily symmetrical (Bickel, DeGrandpre, & Higgins, 1995; Petry & Bickel, 1998); increases in drinking could result in increases in social activity, but increases in social activity might not increase drinking. In a previous study we found that treatment-induced reductions in drinking were associated with reductions in social activity (Murphy, Correia, et al., 2005), but because we did not manipulate social activity we cannot assume that the relation is symmetrical.

These relations might also be influenced by income (Carroll, 1999), which, in the case of college students, might be best approximated by discretionary leisure time. Increased participation in alcohol-free activities might be more likely to decrease substance use if there are greater constraints on total leisure time, creating a stronger zero-sum effect across these activity domains. Most college students attend class only for approximately 15 hr per week, which leaves them with ample time to drink and to participate in a number of alcohol-free activities. Basic animal research shows that drug consumption decreases with decreasing income (e.g., total available session time or lever presses), and Carroll (1999) noted that "the optimal economic conditions for reducing drug intake are low income, high drug price, and most important, the availability of an alternative nondrug reinforcer" (pp. 324–325). Students might reduce their drinking if they had less free time, which would make it more difficult to drink heavily without infringing on academic or other demands. Indeed, a recent prospective study showed that freshman drinking levels were highest when academic demands were low (i.e., early in the semester and during semester breaks) and lowest when academic demands were high (i.e., during finals; Del Boca, Darkes, Greenbaum, & Goldman, 2004). Data from the College Alcohol Study, a nationally representative sample of 17,592 college students, suggest that students' marijuana use is negatively related to time spent studying (Bell, Wechsler, & Johnston, 1997) and that students who volunteer are at lower risk for binge drinking (Weitzman & Kawachi, 2000). Although it would be difficult for colleges and universities to substantially alter students' academic and community service requirements, such drastic measures might be necessary in light of the fact that college drinking has been a substantial public health problem for the past 50 years and extant prevention efforts have not resulted in substantial population-level reductions in drinking or harm. However, short of a drastic change in the structure of the full-time college experience, there are also relatively easily implemented strategies that might increase students' engagement in academic, professional, and service activities and reduce unstructured leisure time, such as stronger contingencies on class attendance (e.g., pop quizzes, penalties for unexcused absences) and programs that are aimed at increasing students' awareness of available internship, employment, and volunteer experiences.

Conclusion

This study analyzed college drinking using a behavioral choice or economic framework (Vuchinich & Heather, 2003). Student drinkers provided detailed information on

their evening activities, including drinking quantities, activity descriptions, peer involvement, and subjective enjoyment ratings. Although students found alcohol-related activities highly enjoyable, we identified a number of alcohol-free activities that occurred frequently in this sample and were as enjoyable as drinking. This information could be used to inform future prevention and intervention efforts that attempt to increase the availability of enjoyable alternatives to alcohol and drug use. However, future research is needed to (a) fully translate behavioral-economic concepts such as income and reinforcement into variables that can be measured in the natural environment, (b) determine whether there are activities that serve as economic substitutes or complements to substance use, and (c) devise procedures for manipulating these variables in the natural environment to reduce substance use.

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