

REGULAR ARTICLE

Impulsivity, Expectancies, and Evaluations of Expected Outcomes as Predictors of Alcohol Use and Related Problems

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Background: While the association between outcome expectancies and drinking is well documented, few studies have examined whether evaluations of expected outcomes (outcome evaluations) moderate that association. **Objectives:** The present study tested the hypotheses that outcome evaluations moderate the outcome expectancy-drinking association and that outcome expectancies mediate the association between impulsive personality and drinking. **Methods:** College students ($N = 201$; 55.5% female) enrolled in a mid-sized metropolitan university completed measures assessing outcome expectancies and evaluations, alcohol consumption, and drinking-related problems. **Results:** Consistent with study hypotheses, expectation of negative outcomes predicted lower levels of drinking, but only when these outcomes were evaluated as highly aversive. However, impulsivity was found to be a far stronger predictor of both drinking and related problems than were outcome expectancies or evaluations. **Conclusion:** The association between negative expectancy and drinking was moderated by negative evaluation, such that individuals who both expected that negative outcomes were likely to occur and who judged such outcomes as highly undesirable consumed significantly fewer drinks per week. Impulsivity was found to be a strong predictor of both alcohol consumption and alcohol-related problems.

Keywords: expectancy, evaluation, impulsivity, alcohol use, problem drinking

INTRODUCTION

College students consume alcohol at dangerous levels (1), drinking at a higher frequency and quantity and experiencing more negative effects than peers who do not attend college (2). More than 40% of college students engage in

binge drinking (3,4). Among heavy drinkers, 47% reported experiencing at least one negative alcohol-related consequence, while nearly 20% reported experiencing at least five, including blacking out and getting in trouble with police or campus security (3). Considerable research has documented an association between drinking and other high-risk behaviors, such as illicit drug use, unprotected sex, driving while intoxicated, and aggressive behavior (5–8).

Carter and colleagues (9) reviewed 18 studies that compared college students to non-student peers and found that students consistently consumed higher quantities of alcohol. Students also experienced more negative effects than non-students (2). In addition, college students living on-campus (men and women) were more likely to meet the diagnostic and statistical manual of mental disorders (DSM) criteria for alcohol dependence, while those living off-campus (men only) were more likely to meet criteria for alcohol abuse (10). Those in dormitory-style housing may experience less parent interaction and a larger group of peers, which can increase the likelihood of high-frequency alcohol consumption (9).

Expectancies (i.e., beliefs about the consequences of drinking) are associated with levels of drinking, especially among college students (11–13), with positive expectancies predicting heavier drinking and negative expectancies associated with lighter drinking (12,14,15). Positive outcomes, such as increased sociability, are more immediate and occur more frequently (16) than negative outcomes, such as hangovers (17). Because of frequent occurrence and immediate reinforcement, positive outcomes are more strongly associated with drinking and more readily accessible in memory than negative consequences (12). Challenging alcohol expectancies was found to lead to a reduction in positive expectancies and subsequent drinking (18).

In addition to expectancy, researchers have examined subjective evaluations of alcohol-related outcomes as

predictors of drinking. Generally, positive outcome evaluations predict increased alcohol consumption (15,19,20). The limited research on the association among these factors (i.e., how good or bad expected consequences of drinking will be if they were to occur) has yielded inconsistent results. Strong expectation and favorable evaluation for positive outcomes predicted greater alcohol use (15). Recent research has found that college students who evaluated problems negatively reported less drinking than those with less negative evaluations (21). Evaluations are important to consider, as drinkers perceive different outcomes as more or less desirable, independent of how likely they expect those consequences are to occur. There is a lack of research regarding outcome evaluations as moderators of the relationship between outcome expectancy and alcohol consumption.

In addition to outcome expectancies and evaluations, impulsivity has been shown to influence alcohol consumption. Buss and Plomin (22) defined impulsivity as an inability to resist strong urges and a tendency to respond to stimuli without thought or planning. Dick and colleagues (23) addressed the challenges of measuring impulsivity as it relates to alcohol use and supported the five-factor model adapted by Whiteside and Lynam (24): positive urgency, negative urgency, lack of perseverance, lack of planning, and sensation seeking. Sensation seeking is the personality trait found to be most consistently and strongly related to alcohol consumption among adolescents (25). Another study found that both sensation seeking and lack of premeditation predicted alcohol use (26,27). The impulsive trait of urgency (the tendency to act impulsively in response to intense emotions) predicted high levels of alcohol-related problems, regardless of levels of drinking (28) and drinking to cope with stressors (29). Sensation-seekers experience greater reward while intoxicated (30), strengthening positive expectancies and resulting in increased motivation to drink. Accordingly, outcome expectancy mediates the association between impulsivity and alcohol use (31), such that impulsivity predicts a stronger belief in expected positive outcomes, which results in increased alcohol use. Impulsive individuals also tend to have lower perception of risk (32).

The present study aimed to replicate prior findings that outcome expectancy mediates the relationship between impulsivity and alcohol consumption and between impulsivity and alcohol-related problems. This study intended to add to the literature by examining the hypothesis that outcome evaluations moderate the expectancy-drinking association, such that stronger positive expectancy combined with more positive evaluation of those consequences would result in heavier drinking. Similarly, it was hypothesized that evaluation of negative alcohol outcomes moderate the association between negative outcome expectancy and drinking, such that evaluating these outcomes more negatively increases the inverse relationship between negative expectancy and drinking. Conversely, evaluating these outcomes less negatively was hypothesized to reduce the relationship between negative expectancy and drinking.

TABLE 1. Descriptive statistics ($N = 201$).

Variable	<i>M</i>	Mdn	SD	Min	Max
Age	19.44	19.00	1.66	18	28
GPA	3.00	3.00	.47	1.60	4.00
Total weekly drinks	12.41	11.00	11.44	.00	48.00
Number of days per week drinking	2.19	2.00	1.47	.00	6.00
Number of days per week binge drinking ¹	.81	.00	1.30	.00	5.00
Global positive expectancy	2.91	2.95	.53	1.00	4.00
Global positive evaluation	3.50	3.23	.69	1.00	4.95
Global negative expectancy	2.62	2.56	.51	1.00	4.00
Global negative evaluation ²	4.00	4.06	.65	2.00	5.00
UPPS total score	2.21	2.22	.30	1.38	2.94
RAPI total Score	9.20	8.00	8.59	.00	54.00
	Value	Frequency	Percent		
Gender	Female	112	55.45		
	Male	89	44.06		
Class standing	Freshman	118	58.42		
	Sophomore	42	20.79		
	Junior	18	8.91		
	Senior	24	11.88		

Notes: ¹Binge drinking defined as ≥ 4 drinks for females and ≥ 5 drinks for males.

²Higher score = more negative evaluation.

METHODS

Participants

At a mid-sized metropolitan university, a convenience sample of undergraduate students between 18 and 25 years of age ($N = 201$, 55.5% female; M age = 19.4, standard deviation (SD) = 1.66; Table 1 provides additional descriptive information) were recruited through introductory-level psychology courses. Participants choosing to participate received credit toward a course requirement. Students in these courses understood that participating in research was voluntary and that they could choose activities other than research participation to fulfill this requirement.

Measures

Alcohol Consumption

A measure similar to the quantity-frequency index (QFI) (33) assessed drinking behavior. Participants were asked to refer to a typical week (i.e., a week that represented their usual level of consumption) during the previous three months and list how many drinks they consumed on each day. The sum of these responses was used as our measure of the total number of drinks consumed on a typical week (range: 0–48).

Comprehensive Effects of Alcohol

The comprehensive effects of alcohol (CEOA) (15) is a two-part questionnaire designed to assess expectancies and evaluations of potential alcohol outcomes. Participants were directed to respond with regard to the last three months. The first part lists 37 potential alcohol outcomes, such as “I would be outgoing”, which participants rate on a five-point Likert scale, from “strongly agree” to “strongly disagree”. In the second part, participants rate the same statements on a five-point Likert scale from “very good” to “very bad”. Outcomes are grouped into four positive factors (sociability, tension reduction, liquid courage, and sexuality) and three negative factors (cognitive and behavioral impairment, risk and aggression, and self perception). The measure also yields global positive outcome expectancy, global negative outcome expectancy, global positive outcome evaluation, and global negative outcome evaluation scores. The CEOA demonstrated adequate internal validity, construct validity, criterion validity, and temporal stability (15).

In all analyses, high scores on positive expectancy and on negative expectancy represented beliefs that such outcomes were likely to occur. High scores on positive evaluation indicated that positive outcomes were considered “good”, while high scores on negative evaluation indicated that negative outcomes were considered “bad”.

UPPS Impulsivity Scale

The UPPS (34) comprises 59 statements, such as “I quite enjoy taking risks”, which participants rate on a Likert scale from “not at all” to “very much”. The UPPS yields five subscales, as discussed earlier, and an overall impulsivity score. The UPPS has been shown to be a reliable and valid measure (34).

Rutgers Alcohol Problems Inventory

The Rutgers Alcohol Problems Inventory (RAPI) (35) presents 18 potential drinking-related consequences, which are rated in terms of how frequently they have occurred in the past year. It yields a total score representing the degree of alcohol-related problems experienced and has an internal consistency of .92.

Procedure

The study was approved by the Towson University Institutional Review Board. Information about the study was posted on a psychology department research pool website. Participants who signed up to participate reported to an assigned classroom where a co-investigator reviewed the study information sheet (in lieu of a consent form to preserve anonymity) and administered the surveys. The information sheet assured participants of their anonymity by indicating that no names would be linked with responses, as well as explained the purpose, procedure, risks, and benefits of the study. Surveys were administered to groups of up to 30 participants at a time. Upon entering the room, participants were asked to place a check next to their name on a list of registered participants. When finished, participants placed the questionnaires in a box to

ensure that there was never a direct exchange of responses between the participant and the researcher. Questionnaires were counterbalanced to reduce order effects. Participants were given the opportunity to ask questions.

Data Analysis

Data analyses were performed using SPSS v. 17. Mediation and moderation were tested using the methodology described by Baron and Kenny (36). In a test of mediation using hierarchical regression, the independent variable is entered on Step one and the mediator on Step two. Full mediation is reflected by a significant change in R^2 from Step one to Step two and by a reduction in the coefficient of the independent variable to non-significance in the second step. This drop to non-significance results from the inclusion of the mediator in the second step as a significant predictor.

The hypotheses of the present study were tested with four sets of two-step, hierarchical regressions. Each set comprised two regressions: one for positive expectancy and one for negative expectancy. The first set of regressions tested impulsivity (UPPS total score) as a predictor of number of drinks per week, mediated by expectancy. The second set of regressions tested positive expectancy and negative expectancy as mediators of the association between impulsivity and alcohol-related problems (RAPI total score).

The third set of regressions examined positive and negative expectancy as predictors of drinks per week, moderated by positive evaluation and negative evaluation, respectively. As per Baron and Kenny’s methodology, a significant moderation effect is reflected by a significant R^2 change from Step one to Step two and a significant coefficient of the interaction term in Step two. In the first regression of this set, positive expectancy and positive evaluation were entered as predictors on the first step and the interaction (positive expectancy multiplied by positive evaluation) was entered on the second step. In the second regression of this set, negative expectancy and negative evaluation were entered on the first step and the interaction term (negative expectancy multiplied by negative evaluation) was entered on the second step.

The fourth set of regressions tested expectancy as a predictor of RAPI total score, moderated by evaluation. In the first regression of this set, positive expectancy and positive evaluation were entered on the first step, while the interaction between positive expectancy and positive evaluation was entered on the second step. Finally, in the second regression of this set, negative expectancy and negative evaluation were entered on Step one, while the interaction between negative expectancy and negative evaluation was entered on Step two. All data were mean centered prior to analysis. The strongest correlation between independent variables was positive expectancy and negative expectancy ($r = .63$). Other correlations were moderate and ranged from $r = -.31$ (negative evaluation and UPPS total score) to $r = .17$ (positive evaluation and UPPS total score).

TABLE 2. Impulsivity as predictor of drinks per week, mediated by outcome expectancy.

	Step 1				Step 2			
	<i>B</i>	SE	β	R^2	<i>B</i>	SE	β	ΔR^2
UPPS total score	13.84	2.83	.38***		11.90	2.96	.32***	
Positive expectancy				.14	3.29	1.75	.15 ^{NS}	
<i>F</i> for change in R^2				23.97***				.02
UPPS total score	13.84	2.83	.38***		13.71	2.95	.37***	
Negative expectancy					.28	1.75	.01 ^{NS}	
<i>F</i> for change in R^2				23.97***				.03 ^{NS}

Notes: NS – non-significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

RESULTS

Expectancy as Mediator of Impulsivity on Drinking and Problems

Participants reported consuming a mean of 12.27 (SD = 11.40) drinks per week. Table 2 shows the results of the first set of regressions. While the results of these analyses support the hypothesis that UPPS total score predicts drinking, neither positive expectancy nor negative expectancy was found to be a significant mediator of this relationship. Rather, UPPS total score continued to be the only significant predictor of drinking in the second step of each regression.

Table 3 shows the results of the second set of regressions, which tested impulsivity as a predictor of alcohol-related problems, mediated by expectancy. Both regressions showed significant increases in R^2 after adding expectancy as a predictor. While positive expectancy and negative expectancy both predicted alcohol-related problems, UPPS total score remained the strongest predictor in the model. In these two regressions, the mediators (positive expectancy and negative expectancy) accounted

for little variance relative to UPPS total score, suggesting partial mediation.

Evaluation as Moderator of Expectancy on Drinking and Problems

As can be seen in Table 4, the results failed to support our hypothesis that positive evaluation would moderate the association between positive expectancy and drinking. However, the results did support our hypothesis that negative evaluation moderated the association between negative expectancy and drinking. Specifically, as the interaction between negative expectancy and negative evaluation increased (i.e., as negative outcomes were considered both more likely and more aversive), alcohol consumption decreased significantly.

Table 5 shows the results of the fourth set of regressions, which tested outcome expectancy as a predictor of alcohol-related problems (RAPI total score), moderated by outcome evaluation. Neither positive nor negative evaluations were found to moderate the association between positive or negative expectancies, respectively, and RAPI score.

TABLE 3. Impulsivity as a predictor of alcohol-related problems (RAPI), mediated by outcome expectancy.

	Step 1				Step 2			
	<i>B</i>	SE	β	R^2	<i>B</i>	SE	β	ΔR^2
UPPS total score	13.55	1.86	.47***		11.84	1.96	.41***	
Positive expectancy				.22	2.73	1.11	.17*	
<i>F</i> for change in R^2				53.23***				6.04*
UPPS total score	13.55	1.86	.47***		12.38	1.93	.43***	
Negative expectancy					2.20	1.10	.13*	
<i>F</i> for change in R^2				53.23***				4.04*

Notes: NS – non-significant.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

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TABLE 4. Outcome expectancy as predictor of drinks per week, moderated by outcome evaluation.

	Step 1				Step 2			
	<i>B</i>	SE	β	R^2	<i>B</i>	SE	β	ΔR^2
Positive expectancy	4.86	1.73	.23**		5.42	1.80	.25**	
Positive evaluation	1.91	1.28	.12 ^{NS}		1.75	1.29	.11 ^{NS}	
Pos exp * Pos eval					2.22	1.98	.09 ^{NS}	
				.08				.01
<i>F</i> for change in R^2				6.46**				1.26 ^{NS}
Negative expectancy	1.44	1.74	.07 ^{NS}		1.81	1.73	.08 ^{NS}	
Negative evaluation	-5.13	1.47	-.28**		-4.45	1.48	-.24**	
Neg exp * Neg eval					-5.54	2.55	-.17*	
				.09			.03	
<i>F</i> for change in R^2				7.22**			4.73*	

Notes: *NS* – non-significant.* $p < .05$.** $p < .01$.*** $p < .001$.

TABLE 5. Outcome expectancy as predictor of alcohol-related problems, moderated by outcome evaluation.

	Step 1				Step 2			
	<i>B</i>	SE	β	R^2	<i>B</i>	SE	β	ΔR^2
Positive expectancy	4.18	1.15	.26***		4.26	1.20	.26***	
Positive evaluation	1.13	.88	.09 ^{NS}		1.09	.90	.09 ^{NS}	
Pos exp * Pos eval					.33	1.36	.02 ^{NS}	
				.08				.00
<i>F</i> for change in R^2				9.54***				.06 ^{NS}
Negative expectancy	3.81	1.12	.23**		3.80	1.12	.23**	
Negative evaluation	-2.89	.92	-.21**		-2.75	.94	-.20**	
Neg exp * Neg eval					-1.28	1.63	-.05 ^{NS}	
				.12				.00
<i>F</i> for change in R^2				12.96***				.62 ^{NS}

Notes: *NS* – non-significant.* $p < .05$.** $p < .01$.*** $p < .001$.

DISCUSSION

Consistent with the study hypotheses, the association between negative expectancy and drinking was moderated by negative evaluation, such that individuals who both expected negative outcomes to be likely and who judged such outcomes as highly undesirable consumed significantly fewer drinks per week. Individuals who perceived negative outcomes as both unlikely and who did not consider them to be unfavorable consumed more drinks per week. Positive expectancy and negative expectancy predicted alcohol-related problems, while negative evaluation was inversely related to alcohol-related problems. Positive evaluation, however, was not related to drinking or to associated problems. One explanation for these findings is that positive outcomes occur more immediately and thus are stronger reinforcers (17). When positive consequences are expected to occur with considerable frequency, individuals will drink regardless of how “good” those positive consequences are expected to be. Negative outcomes occur

more distally from drinking and therefore have a weaker association with drinking. Heavier consumption increases the likelihood of experiencing negative consequences and thus increases the expectation of such consequences. But, negative consequences alone do not deter drinking, in part, because positive consequences are more strongly associated with drinking and, in part, because negative consequences may be delayed from discrete drinking episodes. However, drinking is reduced when the anticipated negative consequence is considered sufficiently bad to override the anticipated reinforcing effects of alcohol.

While much research has focused on the efficacy of modifying expectancy as a means to reduce problem drinking (37–39), the present study speaks to the importance of outcome evaluation, specifically negative evaluation, in reducing problematic drinking. Research has found that considering future consequences may decrease alcohol consumption and aggression (40). Similar to the conclusion of Bushman and colleagues (40), if awareness and anticipation

can be increased before engaging in alcohol consumption, individuals may be less likely to drink heavily.

Prior research found that outcome expectancy mediates the association between impulsivity (measured by aggression and delinquency) and alcohol use in adolescents (31). However, the present study failed to find a mediating effect of expectancy on the relationship between impulsivity and alcohol consumption. This contradiction may be a result of methodological differences, such as the assessments used to measure impulsivity and expectancy.

Finn and colleagues (41) found that negative expectancies did not reduce alcohol consumption among drinkers who reported high impulsivity. In the present study, positive and negative expectancies were found to partially mediate the relationship between impulsivity and alcohol-related problems. Opinions in the literature are divided as to the appropriateness of considering partial mediation a noteworthy finding (42,43) and the mediators (positive expectancy and negative expectancy) accounted for little variance relative to impulsivity. Impulsivity, also referred to in the literature as “behavioral disinhibition” and “behavioral undercontrol” (23), which refers to specific traits related to acting rashly in the face of strong emotions, acting without thinking, and seeking out novel experiences and sensations, might be a more important target for intervention than expectancy.

When interpreting these results, several limitations should be considered. First, our sample was one of convenience, consisting of university students enrolled in psychology courses. While this may reduce generalizability in some cases, the population of interest for this particular study is college students. Data were cross-sectional; therefore, it is not possible to infer a temporal sequence among expectancy, alcohol consumption, and alcohol-related problems. While it is understood that alcohol expectancy develops well before first-hand encounters with drinking (44), it is also true that expectancy changes over time as a result of drinking experiences (45). This is also likely true for evaluations.

Given the cross-sectional nature of the design, another concern is that impulsivity and alcohol consumption are confounded. However, this concern is unlikely for several reasons. First, our measure of alcohol consumption did not ask participants to report on whether their drinking was out of their control; rather, participants were simply asked to report on the typical quantity and frequency of their consumption. This is unlikely to influence their responses to the measure of impulsivity. Moreover, the UPPS-P does not include items asking about substance use to assess impulsivity with one exception (i.e., I have difficulty controlling cravings [e.g., food; cigarettes]). Second, the order in which measures were administered was counterbalanced so that completion of one measure did not have an undue influence on participant responses to other measures. Finally, impulsivity only accounted for about 14% of the variance in self-reported consumption suggesting that, while related, the two measures do not measure the same construct.

Future studies should consider methodology that includes multiple data collection points, such as an online journal, to track potential changes in expectancy and evaluation

resulting from discrete drinking episodes and to examine the temporal sequencing among impulsivity, expectancies, and drinking (e.g., 6,46). Another limitation of this study is the potential for unreliable self-report data, though no identifying information was collected from participants. Moreover, students reported drinking a median of 11 drinks per week suggesting that our participants were willing to acknowledge potentially heavy levels of alcohol consumption.

Despite these limitations, the present study contributes to our understanding of the relationships among impulsivity, outcome expectancy, and alcohol consumption and related problems. While several studies have controlled for outcome evaluation, the findings of the present study highlight the importance of examining evaluations as predictors of drinking and as moderators of the expectancy-drinking relationship. When considered together, alcohol outcome evaluation and expectancy may be useful cognitive targets in reducing alcohol consumption. Specifically, clinicians might help clients become more aware of the impact of negative outcomes, in order to increase negative evaluation and thereby decrease drinking. Future research, with larger samples, should continue to assess the direct and indirect effects of impulsivity and outcome evaluation on drinking behavior. Further, clinicians might consider impulsivity and outcome evaluation when addressing motivations for alcohol use and readiness to change drinking behavior.

Declaration of Interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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