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Impulsivity Moderates the Relationship Between Implicit Associations about Alcohol and Alcohol Use

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Abstract

Implicit associations about alcohol are strong predictors of alcohol use, as is the personality trait of impulsivity. This study examines the role of impulsivity as a moderator of the association between implicit associations about alcohol and alcohol use. Two hundred and nineteen participants completed measures of positive and negative implicit associations, as measured by the Implicit Association Test (IAT), and self-report questionnaires of impulsivity and alcohol use in the past month. Trait impulsivity was broken down into five facets identified in previous research. All facets of impulsivity and positive implicit associations about alcohol were positively correlated with past month alcohol use. The urgency facets (positive and negative) of impulsivity (acting rashly in response to strong positive or negative mood) moderated the relationship between positive implicit associations about alcohol and alcohol use. Compared to individuals low on positive or negative urgency, individuals high on positive or negative urgency tended to report acting more in line with their positive implicit associations by reporting more drinking in the past month.

Keywords

IAT; alcohol; impulsivity; urgency

Introduction

Implicit associations about alcohol and the personality trait impulsivity are two risk factors for alcohol use. Those who have higher levels of positive implicit associations about alcohol (Stacy & Wiers, 2010) and those who are more impulsive (Dick, et al., 2010) engage in heavier alcohol use. However, the interplay between implicit associations about alcohol and specific facets of impulsivity has not been examined. The present study tested the hypothesis that implicit associations about alcohol are more likely to impact the drinking behavior of impulsive individuals, who are more likely to act rashly based on urges.

The study of implicit associations fits into the larger context of dual process models that have become popular in many fields of psychology (see Smith & DeCoster, 2000 for review) and recently applied to addictive behaviors specifically (Deutsch & Strack, 2006; Evans & Coventry, 2006; Stacy, Ames, & Knowlton, 2004; Stacy & Wiers, 2010). While each dual process theory uses its own terminology, a common thread is that they generally

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propose two cognitive systems used for information processing: one that is based on controlled, explicit processes and another that is based on automatic, implicit associations.

In the alcohol literature, most research has focused on explicit cognition such as self-reported alcohol expectancies, which are strong predictors of alcohol use (Goldman, Del Boca, & Darkes, 1999; Jones, Corbin, & Fromme, 2001). In recent years, an increasing number of studies have examined implicit associations about alcohol as predictors of use (Rooke, Hine, & Thorsteinsson, 2008). Positive implicit associations about alcohol have consistently been shown to predict higher levels of alcohol use (Houben & Wiers, 2006; 2008; Jajodia & Earleywine, 2003; McCarthy & Thompsen, 2006). Implicit and explicit positive cognitions have also been found to be moderately correlated with one another and to make unique contributions to the prediction of drinking (Reich, Below, & Goldman, 2010).

Higher levels of negative implicit associations about alcohol have generally not been found to predict lower levels of alcohol use as one might intuitively expect (Jajodia & Earleywine, 2003; Pedersen, Treloar, Burton, & McCarthy, 2011). The reason for this consistent lack of association is not clear. One potential explanation put forth by Jadodia and Earleywine (2003) suggests that while negative implicit associations may cause some people to drink less, it may also be that those who drink more experience more negative consequences and thus develop stronger negative associations. The co-occurrence of these two processes in a sample could wash out any potential predictive validity of negative implicit associations.

Stacy and Wiers (2010) proposed a dual process model of alcohol use based on principles common to dual process theories. Their model proposes that explicit expectancies are most predictive of alcohol use for individuals with high levels of executive control because these individuals have greater access to their controlled (i.e., explicit) cognitive processes (Stacy & Wiers, 2010; Wiers & Stacy, 2006). Conversely, they propose that implicit associations are more predictive of alcohol use for those with poor executive control, as these individuals have less access to their controlled cognitive processes. A key criterion for implicit associations is that they occur automatically (De Houwer, Teige-Mocigemba, Spruyt, & Moors, 2009). In individuals with poor executive control, automatic processes, such as implicit associations, are a stronger predictor of behavior because these individuals are less likely or even incapable of overriding automatic processing.

Several studies have provided support for the notion that individual differences in cognitive abilities moderate the association between implicit cognitions and alcohol use. One study examined response inhibition (e.g., Stroop task performance) as a moderator of implicit associations about alcohol on alcohol use (Houben & Wiers, 2009). In line with the Stacy and Wiers model (Stacy & Wiers, 2010; Wiers & Stacy, 2006), stronger implicit associations about alcohol were related to higher levels of alcohol use only for those with low levels of response inhibition. Other research has found a similar pattern of results using individual differences in working memory capacity as a moderator (Thrush, et al., 2008). Those with lower working memory capacity were more susceptible to the effect of implicit associations about alcohol on alcohol use.

It is important to note that both of these studies used cognitive function tasks to measure individual differences in executive control. The current study focused on specific facets of the personality trait of impulsivity. Impulsivity is a broad personality trait typically exemplified by low self-control and is strongly associated with elevated levels of alcohol use (e.g., Sher & Trull, 1994; see Dick, et al., 2010 for a review). Impulsivity has recently been broken down into five distinct facets, which has added increased precision in predicting risk taking behavior (Cyders, et al., 2007; Whiteside & Lynam, 2001). For example, positive and

negative urgency, the tendency to act rashly in response to strong positive or negative mood, have been found to be associated with increased frequency of binge drinking, whereas sensation seeking has been shown to be associated with increased frequency of drinking, not necessarily at a binge level (Cyders, Flory, Rainer, & Smith, 2009). Lack of premeditation and lack of perseverance are other facets of impulsivity and are typically associated with alcohol related problems (Cyders, et al., 2009).

It is not clear how these facets of trait impulsivity relate to the task measures of cognitive control previously discussed. As a starting point, literature reviews have been conducted to synthesize research on executive control and trait impulsivity and highlight the theoretical overlap of specific executive function tasks with specific facets of impulsivity (Dick et al., 2010; Nigg, 2000). Additionally, one study (Gay, Rochat, Billieux, d'Acremont, & Van Der Linden, 2008) found a small but significant overlap between the response inhibition task used by Houben and Wiers (2009) and the negative urgency facet of impulsivity. This highlights the possibility that negative urgency, and potentially positive urgency, may also strengthen the association between implicit associations about alcohol and alcohol use.

Overview and Predictions

Previous research has focused on cognitive processes moderating the association between implicit associations and alcohol use. The current study extends this model by examining personality traits as moderators. While we examined each facet of impulsivity, our a priori hypotheses focused on the positive and negative urgency facets. We propose that the very definition of urgency (to act rashly in the presence of a strong mood) implicates this trait in an increased reliance on automatic processing such as a greater influence of implicit associations on behavior. If implicit associations are automatic and urgency is exemplified by acting rashly in response to emotion, then it may be that high urgency individuals are most likely to be influenced by implicit associations because they do not expend the cognitive effort required to override such automatic influences. Specifically, we predicted the association between positive implicit associations and alcohol use would be stronger for individuals with higher levels of urgency (positive or negative) compared to those with lower levels of urgency.

The other facets of impulsivity (lack of premeditation, lack of perseverance, and sensation seeking) have not been found to be related to the inhibition of automatic processing (e.g., inhibition of prepotent responses on computer tasks; Gay et al., 2008) which suggests they will not moderate the relationship between implicit associations and alcohol use. While some research has found a marginal effect for a combined measure of lack of premeditation and lack of perseverance as a moderator of the relationship between implicit associations and alcohol use[1] (Friese & Hofmann, 2009) we did not have a priori predictions about lack of perseverance, lack of premeditation and sensation seeking. Rather we consider the present research an opportunity to tease apart and clarify the role of each facet of impulsivity in the moderation of the relationship between implicit associations and alcohol use.

Previous research has consistently found null effects for negative implicit associations predicting alcohol use (Jajodia & Earleywine, 2003; McCarthy & Thompsen, 2006; Pedersen, Treloar, Burton, & McCarthy, 2011), therefore we do not predict negative implicit associations will be related to alcohol use or interact with impulsivity to predict alcohol use.

[1]Friese and Hofmann (2009) did not use the same measure of lack of premeditation and lack of perseverance (Eysenck I7 scale; Eysenck, Daum, Schugens, & Diehl, 1990) as used in the present study (UPPS; Whiteside & Lynam, 2001). However the UPPS lack of premeditation and lack of perseverance scales were derived in part from the Eysenck I7 scale and include many of the same items as the Eysenck I7 scale.

Method

Participants

Participants were 219 (48% male, 52% female) undergraduate students ranging in age from 18 to 27 (M = 19.10; SD = 1.23). Represented racial groups included 86% White, 8% African American, 4% Asian, and 2% answered "other." The ethnicity of the sample was predominantly non-Hispanic (98%). Participants were all enrolled in an introductory to psychology class and received course credit in exchange for their participation.

Materials and Procedure

Study procedures were approved by the Institutional Review Board at the University of Missouri. After giving informed consent, participants were set up in a private cubicle with a computer and first completed the Implicit Association Test (IAT). Upon completion of the IAT, participants completed the remaining questionnaires using MediaLab software (Empirisoft, New York, NY).

Implicit Alcohol Associations—The IAT (Greenwald, McGhee, & Schwartz, 1998) was used to assess implicit cognitions about alcohol. The IAT is an indirect measure of the association between *attributes* (e.g., positive, negative) and *targets* (e.g., flowers, insects). The first application of the IAT in research was the measurement of implicit attitudes about race (e.g., implicit attitudes about Black vs. White Americans; Greenwald, McGhee, & Schwartz, 1998). Traditionally the IAT uses a bipolar scale (positive vs. negative) for attribute categories. In the present study the IAT has been modified in two important ways: 1.) modified to assess implicit attitudes about alcohol (instead of race) and 2.) modified to assess positive and negative implicit associations with alcohol using two unipolar scales (positive vs. neutral and negative vs. neutral). This second modification allows for separate analysis of positive and negative implicit associations, which increases precision in measurement because on a bipolar scale high negative implicit associations cannot be differentiated from low positive implicit associations whereas using two unipolar scales they can be differentiated. Support has been found for internal consistency reliability and validity for the modified alcohol IAT (McCarthy & Thompsen, 2006).

The IAT used in the current study assessed both positive and negative associations about alcohol. Word lists were modeled after previous IAT studies (Jajodia & Earleywine, 2003; McCarthy & Thompsen, 2006). *Target* categories were alcohol (e.g., vodka, beer) and mammals (e.g., goat, rabbit). *Attribute* categories were positive (e.g., happy, attractive), negative (e.g., dangerous, sick), and neutral (e.g., basic, historical). See Table 1 for a complete list of words used in the present study.

The IAT consisted of 13 blocks in which participants used a left hand key and right hand key on standard computer keyboard to categorize words to the target and attribute categories, combinations of which appeared on the left and right hand side of the computer screen with the word presented in the middle. The first block was a simple orientation in which participants categorized words to one of the two target categories (alcohol vs. mammals). The remaining 12 blocks consisted of 4 sets of 3 blocks each. The four sets were: A.) alcohol/positive vs. mammal/neutral, B.) alcohol/neutral vs. mammal/positive, C.) alcohol/negative vs. mammal/neutral, and D.) alcohol/neutral vs. mammal/negative. Each set consisted of one practice block with just the attribute categories (e.g., positive vs. neutral or negative vs. neutral), one practice block with the attribute and target categories paired (e.g., alcohol/positive vs. mammal/neutral), and a test block with the same attribute and target pairing.

The difference, or *D* score, between reaction times when positive or neutral attributes were paired with alcohol constituted the positive IAT (e.g., the difference between reaction times for sets A and B) and the difference, or *D* score, for negative and neutral attributes constituted the negative IAT (e.g., the difference between reaction times for sets C and D). The sets of attribute pairings were counterbalanced to account for potential order effects. Recommended procedures for data cleaning and improved scoring of the IAT (computation of *D* scores) were followed (Greenwald, Nosek, & Banaji, 2003).

Impulsivity—Two measures of impulsivity were administered, the positive urgency measure (PUM; Cyders, et al., 2007) and a multifaceted scale of impulsive behavior (UPPS-R; Whiteside & Lynam, 2001).

The PUM is a 14 item measure that assesses an individual's tendency to act rashly in response to intense positive mood (e.g., "When overjoyed, I feel like I can't stop myself from going overboard."). Items were rated on a 1 (Very much like me) to 4 (Not at all like me) scale (responses were later recoded so higher scores indicated stronger affirmative responses). Previous research has found the PUM to be positively correlated with frequency and quantity of drinking in young adults (Cyders et al., 2007). In the present data, the PUM had acceptable internal consistency (α = .93).

The UPPS-R is a 45 item measure that consists of four scales representing different facets of impulsivity: negative urgency (e.g., "Sometimes when I feel bad, I can't seem to stop what I am doing even though it is making me feel worse."), sensation seeking (e.g., "I welcome new and exciting experiences and sensations, even if they are a little frightening and unconventional."), premeditation (e.g., "My thinking is usually careful and purposeful."), and perseverance (e.g., "I finish what I start."). Items were scored on a 1 (Agree strongly) to 4 (Disagree strongly) scale. In the present data, the internal consistency for each scale was acceptable: negative urgency, α = .84 (12 items); sensation seeking, α = .86 (12 items); premeditation, α = .85 (11 items); perseverance, α = .83 (10 items).

Alcohol use—Participants completed 4 items related to their drinking during the 30 days prior to participation in the study: "How many times have you had at least one drink of alcohol", "On the days you drank, on average, how many drinks did you have", "How many times did you have 5 or more drinks of alcohol at one time", and "What is the largest number of drinks you had on any day in the last 30 days". In the present data, the standardized values of the 4 alcohol use items had an acceptable internal consistency (α = .90). A factor score using the regression method was therefore created to represent a composite of alcohol involvement during the last 30 days.

Data Analytic Plan

To test study hypotheses, all variables were mean centered and separate hierarchical regressions were run for each facet of impulsivity (positive urgency, negative urgency, sensation seeking, premeditation, and perseverance) with each category of implicit associations (positive and negative) on past month alcohol use. In each equation, gender was entered on the first step, followed by the main effects for the respective impulsivity variable and respective implicit association variable, and finally the interaction between the impulsivity variable and the implicit association variable. Moderation was determined by the significance of the change in R^2 in the final step. Results

Descriptive Statistics[2]

A factor score was used in all analyses to represent a composite of alcohol involvement during the past few days, though the individual item descriptives are as follows: "How many

times have you had at least one drink of alcohol" (M = 4.92, SD = 5.71, range 0 to 30), "On the days you drank, on average, how many drinks did you have" (M = 3.76, SD = 3.53, range 0 to 20), "How many times did you have 5 or more drinks of alcohol at one time" (M = 2.93, SD = 4.14, range 0 to 20), and "What is the largest number of drinks you had on any day in the last 30 days" (M = 6.45, SD = 6.37, range 0 to 30). The factor score composite variable was normally distributed (skew = .82, kurtosis = −.06).

Gender differences were examined on all variables. Men reported higher levels of drinking during the previous month (M = 0.26 vs. −0.23; $t_{(213)}$ = 3.78, p < .001). Men were also higher on sensation seeking (M = 3.15 vs. 2.87; $t_{(217)}$ = 3.72, p < .001) and marginally higher on positive urgency (M = 1.85 vs. 1.70; $t_{(217)}$ = 1.92, p = .06), whereas women held stronger negative implicit associations (M = 0.40 vs. 0.29; $t_{(213)}$ = 2.09, p = .04). Men and women did not differ significantly on the other variables.

Descriptive statistics and partial correlations between variables, controlling for gender, are presented in Table 2. All facets of impulsivity were positively related to past month alcohol use. Also, positive implicit associations were positively related, but negative implicit associations were unrelated, to past month alcohol use.

Implicit Associations about Alcohol X Impulsivity Interactions

The equations for positive urgency, negative urgency, and sensation seeking as moderators of the effect of positive implicit associations about alcohol on past month alcohol use are shown in Table 3. Positive implicit associations about alcohol interacted with positive urgency (β = .13, p < .05, f^2 = .02; see Figure 1, Panel A) and negative urgency (β = .13, p < .05, f^2 = .02; see Figure 1, Panel B) to predict past month alcohol use. Simple slopes for the significant interactions were analyzed according to the procedure recommended by Aiken and West (1991). As predicted, positive implicit associations were related to increased alcohol use for individuals high (+1 SD) in positive urgency (β = .39, p < .001; $t_{(204)}$ = 3.01, p = .003) but not low (−1 SD) in positive urgency (β = .12, p = .19, $t_{(204)}$ = 1.00, p = .32; the same pattern was found for negative urgency (high (+1 SD): β = .37, p < .001, $t_{(204)}$ = 3.51, p =.001; low (−1 SD): β = .11, p = .25, $t_{(204)}$ = .35, p = .73). Positive implicit associations about alcohol marginally interacted with sensation seeking in the prediction of past month alcohol use (β = .12, p = .06, f^2 = .02). The interactions between positive implicit associations about alcohol and premeditation and perseverance were not significant.[3]

Negative implicit associations about alcohol were not directly related to past month alcohol use and did not interact with any component of impulsivity to predict past month alcohol use.

[2]Four participants were excluded from analyses involving the IAT due to incomplete data. Four (Note: a different four from IAT missing) participants were excluded from analyses involving past month alcohol use due to incomplete data.

[3]To analyze the relative strength of the two significant interactions (positive urgency x positive implicit associations (PUM x Positive IAT) and negative urgency x positive implicit association (NU x Positive IAT)) a regression equation that included positive urgency, negative urgency, positive implicit associations, and the two two-way interactions (controlling for gender) was computed. The R^2 of this regression was comparable to the individual regression equations (R^2 = .18) and the pattern of effects remained the same (PUM x Positive IAT: β = .10, p = .17; NU x Positive IAT: β = .08, p = .24), however only the main effects for negative urgency (β = .16, p = .04) and positive implicit associations (β = .24, p < .001) were significant at p < .05. A regression equation including all of the above variables with the addition of sensation seeking and its interaction with positive implicit associations was also computed. The R^2 for this equation increased to .20, the pattern of effects remained the same, however only the main effects for sensation seeking (β = .13, p = .049) and positive implicit associations (β = .24, p < .001) were significant at p < .05. Since the interaction terms did not reach significance in the combined regression equations their relative strength cannot be determined.

Discussion

Recent research has highlighted the importance of examining implicit associations about alcohol as predictors of drinking behavior (Stacy & Wiers, 2010). Further, the dual process model of cognition hypothesizes that implicit associations about alcohol may be particularly important in decision making for certain individuals (e.g., Stacy & Wiers, 2010). The current project was designed to extend this model by testing specific facets of impulsivity that could strengthen the association between positive implicit associations about alcohol and drinking behavior. Results showed that for individuals high in the urgency facet of impulsivity, positive implicit associations about alcohol were more strongly related to alcohol use compared to individuals low in urgency. In other words, individuals high in urgency made decisions to drink alcohol that were more in line with their implicit associations than individuals low in urgency. Findings were consistent for both facets of urgency: acting rashly in response to strong positive mood and strong negative mood. Consistent with previous research, negative implicit associations about alcohol were not related to alcohol use.

The other facets of impulsivity, lack of premeditation and lack of perseverance, did not moderate the relationship between implicit associations and alcohol use, though there was a marginal effect for sensation seeking. This finding is consistent with the Gay et al. (2008) finding showing overlap between response inhibition and urgency and lend further support that lack of premeditation, lack of perseverance, and sensation seeking may not be related to the inhibition of automatic processes.

A complete understanding of the interplay between impulsivity, mood, implicit associations, and alcohol use is limited in the present study due to the cross-sectional design and lack of experimental mood manipulation. However one possible explanation for the findings that positive and negative urgency strengthens the relationship between implicit associations and alcohol use but the other facets of impulsivity do not is that urgency, by definition, is more than a general personality trait assumed to be equally influential in all contexts. Rather, it is a measure of one's tendency in the presence of intense mood. To this end most items on the urgency scales include statements directly about mood such as "When I am really excited…" or "When I am upset…." The presence of an intense mood, particularly for individuals high in urgency, can create a cognitive load (Kron, Schul, Cohen, & Hassin, 2010; Verbruggen & De Houwer, 2007) that reduces the resources available to the executive control system that typically keeps automatic processing such as implicit associations in check. Therefore urgency, rather than the other facets of impulsivity that do not consider the context of mood, is more likely to affect the relationship between implicit associations and alcohol use

The relationship between urgency, mood, and automatic processes is further demonstrated by recent research that has found positive implicit associations about alcohol actually increase after a mood induction for individuals high on negative urgency and that alcohol expectancies were more accessible (as measured by reaction time) for high urgency (positive and negative) individuals (Treloar & McCarthy, 2012). Furthermore, positive urgency has been shown to predict increased risk taking behavior (on a computer task) and increased alcohol consumption after a positive mood induction (Cyders et al., 2010). These studies provide experimental evidence that mood directly affects the cognition and behavior of individuals high in urgency.

The present findings map onto the previous research on executive control, implicit associations, and alcohol use. Trait urgency and performance on executive control tasks moderate the relationship between implicit associations and alcohol use in a similar pattern:

high urgency and low executive control are both associated with increased influence of implicit associations about alcohol on alcohol use. However, the extent to which the constructs measured by self-reported urgency and executive control tasks overlap or are related to each other in the prediction of alcohol use cannot be determined from the present findings. There is tentative evidence showing the two constructs are related, though the magnitude of the relationship suggests there is significant variance yet to be explained ($r = .24$; Gay et al., 2008).

The present study is limited by both a retrospective account of alcohol use and a lack of behavioral measures. Future research incorporating trait impulsivity and implicit associations with cognitive control tasks, mood inductions, and behavioral assessments is needed in order to more precisely understand the relationship between urgency and executive control, particularly in the context of alcohol use and implicit associations about alcohol. Ecological momentary assessment (EMA) data, specifically, would also shed more light on the relationship between urgency, mood, and implicit associations. The present results are interpreted as the presence of intense mood plays a unique role when considering the relationship between implicit associations and drinking behavior in impulsive individuals (i.e., that it increases the relationship by creating a cognitive load). EMA methods could directly test that hypothesis by measuring mood during drinking episodes. It is also important for future research to examine the transaction between urgency and the development of implicit associations about alcohol over time as adolescents onset to drinking. The present research used a sample of college students for whom alcohol use was already established. Research on the developmental processes between urgency and implicit associations would increase the generalizability of the current findings as well as increase our understanding of the dual process model in the initiation of alcohol use and the development of alcohol use problems.

The current study highlights the importance of examining implicit associations about alcohol, particularly in disinhibited individuals and contributes to our knowledge of the dual process model of alcohol use. Prevention or early intervention efforts could build from this work by identifying youth high in urgency and working to decrease the development of positive associations about alcohol. Recent work has shown that implicit associations about alcohol can be reduced through training that includes tasks that modify an individual's cognitive biases and that such training reduces relapse rates in alcoholics (Wiers, Eberl, Rinck, Becker, & Lindenmeyer, 2011). A similar intervention specifically conducted under intense mood conditions may be particularly useful for individuals with high levels of urgency.

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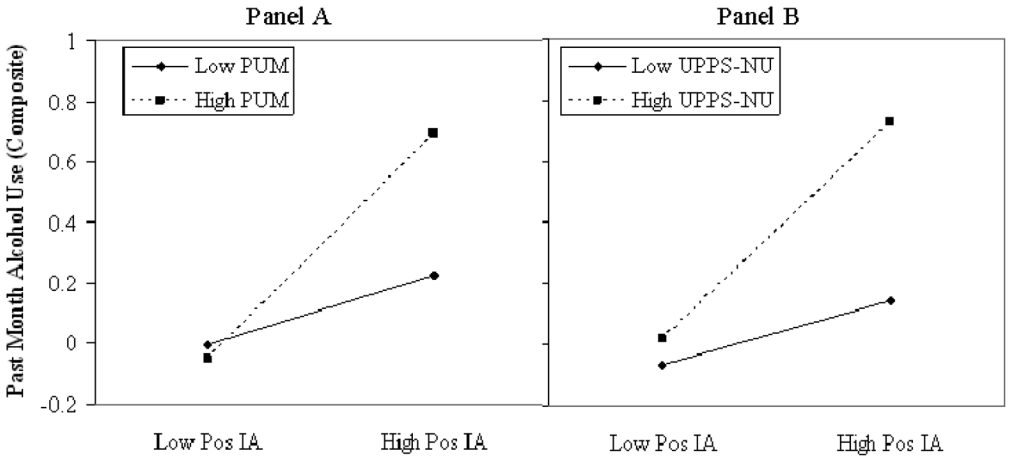

Figure 1. Interactions of Urgency and Positive Implicit Associations Predicting Alcohol Use
Note: PUM = positive urgency; UPPS-NU = negative urgency; Pos IA = positive implicit associations about alcohol. High and low values are +/− 1 SD.

Table 1

Implicit Association Test word list

Alcohol	Mammals	Positive	Neutral	Negative	Neutral
vodka	goat	happy	basic	dangerous	elaborate
rum	sheep	attractive	historical	sick	tall
whiskey	rabbit	sociable	brown	angry	daily
beer	donkey	confident	stationary	mean	compact
gin	elephant	sexy	steep	depressed	related
tequila	llama	relaxed	sandy	unhappy	digital

Table 2

Partial Correlations and Descriptive Statistics Controlling for Gender

Measure	1	2	3	4	5	6.	7	8
1. Pos IA	___							
2. Neg IA	.21**							
3. PUM	.13†	.15*						
4. NU	.13†	.05	.51***					
5. SS	.11	.01	.09	.15*				
6. Premed.	.16*	.16*	.23***	.27***	.16*			
7. Persev.	−.06	.13†	.30***	.33***	−.24***	.47***		
8. Alc. use	.26***	.10	.15*	.22**	.18**	.37***	.20**	
M	.22	.35	1.77	2.40	3.00	2.01	1.95	0
SD	.36	.38	.56	.52	.58	.49	.49	1.00

Note: Pos IA = positive implicit associations, Neg IA = negative implicit associations, PUM = positive urgency measure, NU = UPPS negative urgency, SS = UPPS sensation seeking, Premed. = UPPS premeditation, Persev. = UPPS perseverance;

† p < .10.

* p < .05.

** p < .01.

*** p < .001.

Table 3

Moderation Analyses of Past Month Alcohol Use

Variables entered on step	B	SE B	β
Equation for PUM (R^2 = .16, $F_{(4, 204)}$ = 9.59, p < .001)			
Constant	.23	.095	
Covariate (R^2change = .058, p < .001)			
Gender	−.47	.13	−.23***
Main effects (R^2change = .083, p < .001)			
PUM	.19	.12	.11†
Positive IAT	.68	.18	.25***
Interaction (R^2change = .017, p = .05)			
PUM x Positive IAT	.64	.32	.13*
Equation for UPPS-NU (R^2 = .17, $F_{(4, 204)}$ = 10.58, p < .001)			
Constant	.23	.095	
Covariate (R^2change = .058, p < .001)			
Gender	−.46	.13	−.24***
Main effects (R^2change = .097, p < .001)			
UPPS-NU	.30	.12	.16**
Positive IAT	.66	.17	.25***
Interaction (R^2change = .016, p = .05)			
UPPS-NU x Positive IAT	.68	.34	.13*
Equation for UPPS-SS (R^2 = .17, $F_{(4, 204)}$ = 10.15, p < .001)			
Constant	.23	.095	
Covariate (R^2change = .058, p < .001)			
Gender	−.46	.13	−.24***
Main effects (R^2change = .093, p < .001)			
UPPS-SS	.25	.11	.15*
Positive IAT	.67	.17	.25***
Interaction (R^2change = .015, p = .06)			
UPPS-SS x Positive IAT	.52	.27	.12†

Note: Gender was coded 0 = male, 1 = female; PUM = positive urgency measure, UPPS-NU = UPPS negative urgency, UPPS-SS = UPPS sensation seeking;

† p < .10.

* p < .05.

** p < .01.

*** p < .001