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Resolving an Identity Crisis: Implicit Drinking Identity and Implicit Alcohol Identity Are Related but Not the Same

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Abstract

Two variations of the Implicit Association Test (IAT), the Drinking Identity IAT and the Alcohol Identity IAT, assess implicit associations held in memory between one's identity and alcohol-related constructs. Both have been shown to predict numerous drinking outcomes, but these IATs have never been directly compared to one another. The purpose of this study was to compare these IATs and evaluate their incremental predictive validity. US undergraduate students ($N = 64$, 50% female, mean age = 21.98 years) completed the Drinking Identity IAT, the Alcohol Identity IAT, an explicit measure of drinking identity, as well as measures of typical alcohol consumption and hazardous drinking. When evaluated in separate regression models that controlled for explicit drinking identity, results indicated that the Drinking Identity IAT and the Alcohol Identity IAT were significant, positive predictors of typical alcohol consumption, and that the Drinking Identity IAT, but not the Alcohol Identity IAT, was a significant predictor of hazardous drinking. When evaluated in the same regression models, the Drinking Identity IAT, but not the Alcohol Identity IAT, was significantly associated with typical and hazardous drinking. These results suggest that the Drinking Identity IAT and Alcohol Identity IAT are related but not redundant. Moreover, given that the Drinking Identity IAT, but not the Alcohol Identity IAT, incrementally predicted variance in drinking outcomes, identification with drinking behavior and social groups, as opposed to identification with alcohol itself, may be an especially strong predictor of drinking outcomes.

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Keywords

Alcohol use; Hazardous drinking; Drinking identity; Alcohol identity; Implicit association test

1. Introduction

Two variants of the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998) measure implicit associations between one's identity (the self) and alcohol-related constructs. IATs are computer-administered reaction time tasks thought to assess the relative strength of associations between constructs held in memory and have demonstrated utility for predicting hazardous drinking, often predicting above and beyond self-report questionnaires (for reviews, see Lindgren, Neighbors, Gasser, Ramirez, & Cvencek, 2016a; Reich, Below, & Goldman, 2010). The Drinking Identity IAT (DI-IAT; Lindgren et al., 2013b) assesses the relative associations between the constructs *me* (stimuli: me, my, mine, and self) and *not me* (stimuli: they, them, theirs, other) with the constructs *drinker* (stimuli: drinker, drink, drunk, and partier) and *non-drinker* (stimuli: non-drinker, abstainer, sober, and abstain). The Alcohol-Identity IAT (AI-IAT; Gray, LaPlante, Bannon, Ambady, & Shaffer, 2011), also includes the constructs (and identical stimuli) for *me* and *not me*, but assesses their associations with alcohol and water (stimuli: images of alcohol or water, respectively). Both IATs have good psychometric properties and are positively associated with a range of drinking outcomes (Caudwell & Hagger, 2014; Gray et al., 2011; Lindgren et al., 2016a). The DI-IAT has been more widely implemented. It predicts unique variance in multiple drinking outcomes after controlling for other well-validated cognitive factors (e.g., alcohol expectancies, drinking motives, drinking norms; Lindgren, Ramirez, Olin, & Neighbors, 2016b), as well as other alcohol-related IATs (Lindgren et al., 2013a; 2013b), thereby highlighting the unique role of alcohol-related identities as predictors of hazardous drinking.

Despite their similarities, the DI-IAT and the AI-IAT have not been evaluated in the same study. Therefore, it is unknown whether these IATs assess redundant information or whether one is more positively linked to drinking outcomes than the other. Thus, the primary aims of this study were to investigate their relation to one another, the incremental validity of each IAT separately after controlling for explicit drinking identity (which, to date, is unknown for the AI-IAT), and the incremental validity of each IAT when both were included in the same model. We hypothesized that the IATs would be moderately correlated, but not fully redundant. Competing hypotheses were offered and tested regarding the incremental validity of each IAT. First, it is possible that the DI-IAT may be a stronger predictor of drinking outcomes than the AI-IAT. Associations with behaviors and a social group are theorized to be important for substance-related identities (Frings & Albery, 2015), and the category labels and stimuli for the DI-IAT include words that involve drinking behavior and social groups (e.g., drink, partier), whereas the AI-IAT contains only pictures of alcohol itself (e.g., beer, wine). Conversely, AI-IAT may be a stronger predictor than the DI-IAT. Alcohol itself is more proximal to actual drinking outcomes, and the AI-IAT focuses only on alcohol.

2. Method

2.1. Participants

Participants were 64 undergraduate students (50% women) from a large public Pacific Northwestern university (age: $M = 21.98$, $SD = 0.88$). Forty-two percent identified as White, 39% as Asian, 8% as multiracial, 6% as African American and 5% as Native Hawaiian, Pacific Islander, or unknown. Five percent identified as Hispanic or Latino.

2.2. Procedure

Procedures were approved by the university's Institutional Review Board. Students were invited via email to take part in a study on cognitive factors in drinking. Eligible students (at least 21 years old, a full-time student) came to the lab to complete a computer-based assessment. Participants were paid \$15.

2.3. Measures

2.3.1. Implicit Association Tests (IATs)—Two IATs were included in the study. The DI-IAT (Lindgren et al., 2013b) assessed the associations between “me” (vs. “not me”) and “drinker” (vs. “non-drinker”). The AI-IAT (adapted from Gray et al., 2011) assessed the associations between “me” (vs. “not me”) and alcohol (vs. *water*). Both IATs used the traditional seven-block structure (Greenwald et al., 1998) and were computer-administered. Each block contains multiple trials in which participants are presented with a single stimulus and are asked to sort it according to the categories listed on the left or right side of the screen (using the *d* key for left and the *k* key for right) as quickly and accurately as possible. Blocks 1, 2, and 5 are practice blocks for learning the sorting rules. Blocks 3, 4, 6, and 7 are critical blocks, in which two categories are sorted on the same side using the same key. For example, in Blocks 3 and 4, one sorts “drinker” and “me” stimuli on the left and “non-drinker” and “not me” stimuli on the right. The order is reversed for Blocks 6 and 7: one sorts “drinker” and “not me” stimuli on the left and “non-drinker” and “me” stimuli on the right. The sorting speed (reaction time) for the first pairing (“drinker” and “me” vs. “non-drinker” and “not me”) is compared to the sorting speed for the second pairing (“non-drinker” and “me” vs. “drinker” and “not me”). The difference in sorting speed is a proxy for the relative strength of the implicit associations (i.e., shorter sorting speed for the first pairing compared to the second would indicate a relatively stronger implicit drinking identity). The order in which IATs were presented was randomized across participants. IATs were interspersed among self-report measures.

IAT scores were calculated using the *D*-score algorithm (Greenwald, Nosek, & Banaji, 2003). Data were screened following practices recommended by Nosek and colleagues (2007). *D*-scores were calculated such that higher scores indicated stronger associations with drinker and me (DI-IAT) or alcohol and me (AI-IAT). Internal consistencies (calculated by creating *D*-scores for Blocks 3 & 6 and Blocks 4 & 7 and correlating them; see Greenwald et al., 2003) were .49 (DI-IAT) and .46 (AI-IAT).

2.3.2. Explicit Drinking Identity—The Alcohol Self-Concept Scale (ASCS) assessed explicit drinking identity (Lindgren et al., 2013b). It is a 5-item measure examining the

extent to which drinking alcohol plays a role in an individual's life and personality (e.g., "Drinking is part of who I am"). Participants rated their agreement using a 7-point scale ($-3 = \textit{strongly disagree}$ and $3 = \textit{strongly agree}$). Cronbach's Alpha = 0.89.

2.3.3. Drinking Outcomes—The Daily Drinking Questionnaire (DDQ; Collins, Parks & Martlatt, 1985) examined participants' typical alcohol consumption in the last three months. Participants reported the number of standard drinks they consumed on each day of a typical week and were summed to represent total drinks per week. The Alcohol Use Disorder Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), a 10-item measure evaluating consumption, consequences, and symptoms of dependence, was used as an index for hazardous drinking. Items were summed. Cronbach's Alpha = 0.98.

3. Results

3.1. Descriptive Statistics and Correlations

See Table 1 for means and correlations between the study measures¹. The IATs were significantly, but moderately correlated with each other ($r = .36$), and each was significantly associated with explicit drinking identity and both drinking outcomes (r 's between .29 and .52). Mean D -scores were significantly different from zero for both IATs, but were positive for the DI-IAT ($M = .17$, $t_{58} = 3.53$, $p = .001$) and negative for the AI-IAT ($M = -.38$, $t_{59} = -9.03$, $p < .001$), indicating that participants were more likely to associate "me" with "drinker" than with "non-drinker" but more likely to associate "me" with water than alcohol.

3.2. Regression Analyses

The drinking outcome variables were positively skewed. Thus, count regression models with a negative binomial log link were used to test the primary aims. First, models evaluated whether each IAT significantly predicted the outcomes after controlling for explicit identity. Then models evaluated the IATs simultaneously. All models included sex as a covariate.

When evaluated separately, the DI-IAT and the AI-IAT were both significantly and positively associated with alcohol consumption even after controlling for explicit identity (see Table 2). When evaluated simultaneously, the DI-IAT, but not the AI-IAT, was significantly and positively associated with alcohol consumption.

When evaluated separately, the DI-IAT, but not the AI-IAT, was significantly and positively associated with hazardous drinking. The same pattern of findings was observed when evaluating the IATs simultaneously.

4. Discussion

This is the first study we know of to compare the DI-IAT and AI-IATs. They were related to one another, but not redundant, suggesting functional differences between identification as a drinker, which involves alcohol, a behavior, and a social group, and identification with

¹Of the 64 participants, 53 reported drinking alcohol in the previous three months, and had stronger mean D -scores than 11 non-drinkers for the DI-IAT (drinkers: $M = 0.23$, $SD = 0.38$; non-drinkers: $M = -0.08$, $SD = 0.28$; $t_{57} = 2.87$, $p = .011$) and the AI-IAT (drinkers: $M = -0.31$, $SD = 0.29$; non-drinkers: $M = -0.71$, $SD = 0.28$; $t_{58} = 3.85$, $p = .002$).

alcohol, which involves the substance only. The DI-IAT was the more robust predictor of typical and hazardous drinking relative to the AI-IAT, a finding consistent with the hypothesis that identification with a drinker social group (as well as the behavior and alcohol) might make the DI-IAT a stronger predictor of drinking outcomes. Identification with drinking social groups may be particularly important in college given that students predominantly drink in social settings (O'Hara, Armeli, & Tennen, 2015), endorse social drinking motives more than other types of motives (Kuntsche, Knibbe, Gmel & Engels, 2005) and that drinking for social reasons is positively associated with problematic drinking (Vaughan, Corbin, & Fromme, 2009). The importance of identification with social groups has also been previously demonstrated among members of AA and NA: they showed improved treatment outcomes if identification with recovery groups was strong (Buckingham, Frings, & Albery, 2013). Given these findings, novel intervention strategies that seek to reduce identification with drinking social groups may be important to consider on college campuses.

Second, this study is also the first we know of to show that the AI-IAT is a significant positive predictor of typical consumption (but not hazardous drinking) after controlling for explicit identity, providing further support that implicit measures assess a meaningful aspect of drinking identity that may be unavailable for introspection or that participants may be unwilling to report. The DI-IAT was also positively associated with both typical consumption and hazardous drinking after controlling for explicit drinking identity replicating previous studies (Lindgren et al., 2016a), which may add some confidence that the study's novel findings will replicate.

We also note differences in the overall mean *D*-scores for the DI-IAT and AI-IAT. Both scores were significantly different from zero but in opposite directions—the mean DI-IAT *D*-score was positive whereas the mean *D*-score on the AI-IAT was negative. Typically, DI-IAT scores are positive for individuals who drink and negative for those who do not (Lindgren et al., 2013b), which was the case in this study. In contrast, for the AI-IAT, which has been less studied, it appears that scores are simply less negative for drinkers compared to non-drinkers. While that pattern might indicate that participants identified more strongly with the construct of drinker (and the social identity and behavior) versus with alcohol, it might simply reflect the IAT's construction. It is a relative measure: each IAT has different contrast categories (e.g., AI-IAT: alcohol vs. water; DI-IAT: drinker vs. non-drinker), and those categories are integral to the overall *D*-score [e.g., the AI-IAT assesses the strength of associations between alcohol + me (and water + not-me) vs. alcohol + not-me (vs. water + me)]. Thus, the negative overall mean for AI-IAT may be a reflection of participants having strong associations with water.

With regard to limitations, the sample consisted of undergraduates and whether results generalize to other populations of drinkers warrants future research. It is possible that the DI-IAT is a robust predictor of drinking for college students, who predominantly drink in social settings (O'Hara, Armeli, & Tennen, 2015), but this may not be the case for populations of drinkers who are less likely to drink in social contexts. Also, the study may have been underpowered to detect small to medium effects (e.g., AI-IAT as a unique

predictor of hazardous drinking) due to the small sample size. Replication with larger samples and additional alcohol-related outcomes will be important.

Ultimately, both variants of alcohol-related IATs appear related to one another and associated with typical drinking above and beyond explicit drinking identity. However, only the DI-IAT was associated with hazardous drinking after controlling for explicit drinking identity, and it was a stronger predictor of drinking outcomes. These findings potentially highlight the importance of identification with drinking as a behavior and drinking social groups.

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Highlights

- We compared two alcohol-related identity implicit association tests (IATs).
- The two IATs were the Drinking Identity IAT and the Alcohol Identity IAT.
- We tested if each predicted incremental variance in typical and hazardous drinking.
- Both IATs were positively correlated to each other and both drinking outcomes.
- Only the Drinking Identity IAT predicted unique variance in drinking outcomes.

Table 1

Correlation Matrix for Study Variables

Measure	<i>M</i> (<i>SD</i>)	1	2	3	4	5
1. Drinking Identity IAT	0.17 (0.38)	—				
2. Alcohol Identity IAT	-0.38 (0.33)	.36**	—			
3. Explicit Drinking Identity ^a	-1.93 (1.16)	.34**	.39**	—		
4. Typical Alcohol Consumption ^b	9.64 (11.14)	.43**	.29*	.63**	—	
5. Hazardous Drinking ^c	7.45 (5.87)	.52*	.34**	.38**	.52**	—

Note. IAT = Implicit Association Test; higher scores on IATs indicate stronger drinking and alcohol identities;

^a derived from the Alcohol Self-Concept Scale; higher scores indicate greater identification with drinking alcohol;

^b number of standard drinks derived from the Daily Drinking Questionnaire;

^c summary score derived from the Alcohol Use Disorders Identification Test;

* $p < .05$

** $p < .01$.

Table 2

Negative Binomial Regression Models Predicting Drinking Outcomes

Predictors	Typical Alcohol Consumption ^a			Hazardous Drinking ^b		
	Exp (b)	SE b	p	Exp (b)	SE b	p
<i>Drinking Identity IAT Model</i>						
Sex	0.56	0.36	.101	0.60	0.21	.017
Drinking Identity IAT	3.46	0.50	.014	2.06	0.24	.002
Explicit Drinking Identity ^c	1.23	0.13	.123	1.28	0.07	.001
<i>Alcohol Identity IAT Model</i>						
Sex	0.44	0.29	.004	0.53	0.19	.001
Alcohol Identity IAT	3.00	0.53	.037	1.78	0.30	.056
Explicit Drinking Identity	1.29	0.12	.043	1.31	0.07	<.001
<i>Combined IAT Model</i>						
Sex	0.48	0.34	.032	0.53	0.21	.003
Drinking Identity IAT	3.23	0.49	.018	2.28	0.28	.003
Alcohol Identity IAT	2.39	0.62	.158	1.63	0.34	.153

Note. Exp (b) represents exponentiated coefficients. Sex was dummy-coded (0 = men, 1 = women); IAT = Implicit Association Test; higher scores on IATs indicate stronger drinking and alcohol identities;

^a number of standard drinks derived from the Daily Drinking Questionnaire;

^b summary score derived from the Alcohol Use Disorders Identification Test;

^c derived from the Alcohol Self-Concept Scale; higher scores indicate greater identification with drinking alcohol.