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Implicit Drinking Identity: Drinker + Me Associations Predict College Student Drinking Consistently

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Abstract

Predicting hazardous drinking in college students continues to be a serious priority. Emerging evidence suggests that implicit measures may offer additional insight in predicting unique variance in alcohol outcomes. Implicit drinking identity, in particular, may be a powerful predictor of alcohol use. The current study examined the predictive validity of three alcohol-related associations (e.g., drinking identity, alcohol approach, and alcohol cope) using adaptations of the Implicit Association Test (IAT) in a sample of 243 undergraduates. Confirming previous findings, drinking identity associations were the most consistent predictor of alcohol consumption and alcohol problems. They were the only associations that were unique predictors of alcohol use after controlling for other implicit associations. In comparison, alcohol cope and alcohol approach associations were weak but consistent predictors of alcohol consumption and alcohol problems. Although positively correlated with all drinking outcomes, neither set of associations predicted unique variance in the drinking outcomes when all implicit associations were included in the same model. Collectively, these results extend previous findings that implicit drinking identity may be a uniquely powerful tool for predicting alcohol outcomes and a potential target for clinical intervention and prevention efforts.

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Contributors

Dr. Lindgren co-designed the study, conducted the analyses, wrote the results and parts of the introduction and discussion, and edited all sections of the manuscript. Ms. Foster co-designed the study, oversaw data collection, wrote the method, and wrote part of the introduction. Ms. Westgate wrote the abstract and parts of the introduction and discussion. Dr. Neighbors consulted on study design and data analyses, helped oversee data collection, and wrote parts of the discussion. All authors have contributed to and approved the final manuscript.

Conflict of Interest

All authors declare that they have no conflicts of interest.

Keywords

implicit cognition; alcohol; drinking; identity; drinking motives

I. Introduction

Heavy drinking is a major concern among US college students (Johnston, O'Malley, Bachman, & Schulenberg, 2012). Much effort continues to be devoted to the identification of additional psychological mechanisms that might be targeted by interventions (e.g., Malloy, Goldman, & Kington, 2002; Nelson, Toomey, Lenk, Erickson, & Winters, 2010). Previous work has focused largely on explicit measures as predictors of drinking, but growing evidence suggests that implicit measures, including measures of implicit associations, also account for unique variance in drinking outcomes (e.g., Reich, Below, & Goldman, 2010; Roefs et al., 2011; Rooke, Hine & Thorsteinsson, 2008). An important step is determining which implicit associations are most strongly related to drinking (see Lindgren et al., 2012).

Implicit measures, such as the Implicit Association Test (IAT; Greenwald, McGhee, & Schwartz, 1998), may be useful for studying drinking for two reasons: first, they may capture associations or cognitions that participants are either unable or unwilling to report, and second, they may measure processes that differ from those assessed by traditional explicit/self-report measures (Strack & Deutsch, 2004; Stacy & Wiers, 2010). Implicit processes are thought to be reflexive, faster, and/or more impulsive and to be triggered when alcohol-related stimuli are encountered. Implicit alcohol-related associations have been found to predict alcohol outcomes (Reich et al., 2010; Roefs et al., 2011) and may serve as intervention targets (e.g., Wiers, Eberl, Rinck, Becker & Lindenmeyer, 2011). Multiple alcohol associations have been studied, and recent findings comparing the relative predictive utility of several implicit alcohol-related associations indicated that drinking identity associations were the strongest and most reliable implicit predictor of alcohol outcomes (see Lindgren et al., 2012).

The finding that drinking identity associations were a strong and reliable led to the current study. Its aim was to investigate implicit drinking identity and drinking outcomes in a sample that differs from Lindgren et al. (2012) on a number of characteristics (i.e., it is more ethnically diverse, has an older student population, has a greater number of commuter students, and drinks less on average). A secondary aim was to test the comparative predictability of implicit drinking identity in relation to implicit alcohol cope associations and implicit alcohol approach associations. The former (alcohol cope) was selected because it predicted drinking outcomes well in previous research (Lindgren et al., 2011) and moderated genetic polymorphisms linked to alcohol use (Hendershot, Lindgren, Tiang, & Hutchinson, 2012). The latter (alcohol approach) was selected because it is the most commonly studied (see Roefs et al., 2010).

2. Method

2.1 Participants

Participants were 243 undergraduate students (82% women) from a large Southwestern university. They averaged 22.93 years old ($SD = 6.29$), and 34% identified as Caucasian, 21% as Asian/Pacific Islander, 19% as Black/African American, 6% as Multi-Ethnic, 0.4% Native American/American Indian, and 20% as other. Seventy percent identified as non-Hispanic/Latino and 30% as Hispanic/Latino.

2.2 Procedure

Participants were recruited via email and flyers to participate in a study on health behaviors. Students who met eligibility criteria (i.e., at least 18 years of age and a registered student) completed a computer-based assessment in the lab. Participants received course extra credit in exchange for participation. All procedures were approved by the university's institutional review board.

2.3 Measures

2.2.1 Implicit Association Tests (IATs)—Three IATs were used for this study: the drinking identity IAT (Lindgren et al., 2012), the alcohol approach IAT (Palfai & Ostafin, 2003), and the alcohol cope IAT (Lindgren et al., 2011). The IATs were presented using Inquisit 3.0 software (2010). IAT scores were calculated using the *D*-measure algorithm (Greenwald et al., 2003). The IAT contains seven blocks, several of which orient participants to the task, the stimuli, and the sorting rules they are to follow (see Nosek, Greenwald, & Banaji, 2007). The critical blocks involve sorting stimuli items that represent the four concepts in each IAT (e.g., drinker, non-drinker, me, not me) with two response options (left or right). For example, stimuli belonging to the “drinker” or “me” categories are sorted using a key on the left; stimuli belonging to the “non-drinker” or “not me” categories are sorted using a key on the right. After two blocks containing multiple trials, the pairings are switched: stimuli belonging to the “drinker” or “not me” categories are sorted using the left key; stimuli belonging to the “non-drinker” or “me” categories are now sorted using the right key. The order of the pairings is counterbalanced. Further details regarding the IAT can be found in Greenwald et al. (1998). IATs were presented in one of three randomly selected sequences. Data were screened for IAT order effects, and no significant differences were found.

The drinking identity IAT format and stimuli were identical to Lindgren et al. (2012) and measured participants' associations with “drinker” + “me” (& “non-drinker” + “not me”) versus “drinker” + “not me” (& “non-drinker” + “me”). The alcohol approach IAT used pictures of alcohol (wine, beer, and cocktails) and pictures of water. It measured participants' associations with “alcohol” + “approach” (& “water” + “avoid”) versus “alcohol” + “avoid” (& “water” + “approach”). The alcohol cope IAT used the same alcohol and water stimuli as the alcohol approach IAT and the same word stimuli as in Lindgren et al. (2011). It measured participants' associations with “alcohol” + “cope” (& “water” + “ignore”) versus “alcohol” + “ignore” (& “water” + “cope”).

2.2.2 Alcohol use—The Daily Drinking Questionnaire (DDQ; Collins et al., 1985; Kivlahan et al., 1990) measured alcohol consumption. It assesses the number of standard drinks consumed on each day of a typical week in the last three months. Relative to other drinking indices, the DDQ is a reliable index of problems related to alcohol among college students (Borsari, Neal, Collins, & Carey, 2001).

2.2.3 Alcohol-related problems—The Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989) is a 25-item measure assessing alcohol-related negative consequences in the last month. Responses range from “never” (0) to “10 times or more” (4). Two driving-related items were added. Cronbach's $\alpha = .86$.

2.2.4 AUDIT scores—The Alcohol Use Disorders Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001) consists of 10 items that incorporate alcohol abuse and dependence criteria and has been validated for use in college samples. Responses range from “never,” to “monthly,” to “daily or almost daily” (Babor et al., 2001). Cronbach's $\alpha = .79$.

3. Results

3.1 IAT Psychometric Properties

Please see Table 1 for descriptive statistics and correlations.

3.1.1 Descriptive Statistics and Internal Consistencies—Internal consistencies were correlations of *D* scores from IAT blocks 3 and 6 and from IAT blocks 4 and 7. Correlations typically range from .5 to .7 (see Greenwald et al., 2003). All IATs were within that range.

3.1.2 Zero-order Correlations—The IATs were correlated with one another. The strongest correlation was between the alcohol approach and alcohol cope IAT. IAT scores were positively correlated with alcohol outcomes. Drinking identity IAT scores were consistently and positively correlated with all of the drinking variables. Alcohol cope and alcohol approach IATs were also correlated with the drinking variables, but the correlations were smaller in magnitude.

3.2 Regression Analyses

3.3.1 Analytic plan—Regression was used to test whether the IATs predicted unique variance in alcohol consumption, problems, and AUDIT scores after controlling for gender. Because none of the drinking outcomes approximated a normal distribution, count regression models were used. These models allow one to fit outcome variables with a range of distributions in addition to the normal distribution (see Atkins & Gallop, 2007; Cohen, Cohen, West, & Aiken, 2003). Models for each drinking outcome were fit with a negative binomial log link. Three models were run, one for each outcome. For each model, the ratio of deviance to degrees of freedom was close to 1, indicating good fit. Participant gender was dummy coded, 0 = men, 1 = women, and all terms were entered simultaneously. Please see Table 2.

3.3.2 Alcohol consumption—Coefficients for parameter estimates for all IATs were positive. Only the drinking identity IAT accounted for significant unique variance in alcohol consumption/

3.3.3 Alcohol problems—The drinking identity and alcohol cope IATs positively predicted alcohol problems, but the alcohol approach IAT negatively predicted alcohol problems. The drinking identity IAT accounted for significant unique variance in alcohol problems, and there was a marginal effect of the alcohol cope IAT.

3.3.4 AUDIT Scores—The drinking identity and alcohol cope IATs were positively predictive of AUDIT scores. However, only the drinking identity IAT accounted for significant unique variance in AUDIT scores.

4. Discussion

This study extended recent work (Lindgren et al., 2012) investigating the relative contribution of implicit alcohol-related associations in predicting drinking outcomes. The associations measured in the current study had reasonable internal consistencies and were positively related to drinking outcomes. The strongest relations were observed for the drinking identity associations; and those associations were the most consistent predictors of unique variance in the drinking outcomes, replicating Lindgren et al.

Study findings have several implications. The current study relied on an undergraduate sample that differed demographically from those previously studied (see Gray et al., 2011; Lindgren et al., 2012), but its findings, like those from the other studies, indicated that drinking identity associations were reliable predictors of alcohol-related outcomes. Moreover, this study is the second to suggest that drinking identity associations are stronger, more consistent predictors of alcohol outcomes relative to other alcohol-related associations. Alcohol research may, therefore, benefit from including drinking identity measures and considering drinking identity as an intervention target. Greater consideration of drinking identity, whether using implicit or explicit measures, would also be consistent with a recent reformulation of the theory of planned behavior (see Fekadu & Kraft, 2001) that demonstrated that including measures of identification with a behavior increases the predictability of that behavior. Moving forward, it will be important to investigate drinking identity associations prospectively; in younger and older populations both in and outside the US; and in relation to other well-validated predictors of drinking as well as to actual drinking (vs. self-reported consumption).

The current study also addressed a gap in previous research. Lindgren et al. (2012) evaluated implicit alcohol cope associations but did so using the brief IAT (BIAT) format versus the traditional IAT format. Their BIAT had poor internal consistency, making it difficult to interpret the weak correlations and relations observed. The current study used the traditional IAT format, which yielded a more internally consistent measure of alcohol-cope associations. On the one hand, this format was an improvement, and stronger relations were observed between alcohol cope associations and some of the alcohol outcomes. On the other hand, the format change did not yield stronger support for alcohol cope associations predicting unique variance in alcohol outcomes relative to the other alcohol-related associations. Future research should clarify best practices for capturing implicit alcohol cope associations and investigate whether those associations are particularly important for specific sub-populations.

Finally, results were surprisingly weak with respect to the predictive validity of alcohol-approach associations. They were, at best, weakly predictive of the alcohol outcomes when the zero-order correlations were examined, and did not significantly predict unique variance in the alcohol outcomes relative to the other alcohol-related associations. These findings were consistent with Lindgren et al. (2012), but less robust than have been reported elsewhere (e.g., Roefs et al., 2011). This discrepancy may be due to sample differences – i.e., the current sample and Lindgren et al. (2012)'s sample included drinkers and non-drinkers whereas other studies focused on participants with AUDIT scores of 8 or more (e.g., Ostafin & Palfai, 2006; Palfai & Ostafin, 2003). In the current study, only 32 participants met similar criteria, a sub-sample that did not yield adequate statistical power for testing that hypothesis. Future research should continue to investigate the predictive validity of alcohol approach associations.

In conclusion, the current research suggests that implicit alcohol associations play an important role in predicting hazardous drinking. Implicit drinking identity, in particular, emerged as a powerful and unique indicator of alcohol use, even when compared to other implicit predictors, and it may be a promising target for future clinical interventions and prevention efforts.

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Highlights

- We investigated three alcohol-related Implicit Association Tests (IATs).
- We tested whether they predicted unique variance in three alcohol-related outcomes.
- Each IAT was positively correlated with the outcomes.
- Only the drinking identity IAT predicted unique variance in the outcomes.

Table 1

Zero-order Correlations and Descriptive Statistics for Study Variables

Variables	1	2	3	4	5	6	M	SD	Internal Consistency
IATs									
1. Drinking Identity	--	.22**	.20**	.29***	.24***	.36***	-0.10	0.44	.54
2. Alcohol Cope		--	.48***	.17*	.14*	.18**	-0.40	0.44	.58
3. Alcohol Approach			--	.16*	.11	.14*	-0.28	0.42	.57
Alcohol Outcomes									
4. Alcohol Consumption				--	.64***	.76***	3.91	5.68	N/A
5. Alcohol Problems					--	.73***	2.80	4.41	.86
6. AUDIT						--	3.82	4.18	.79

Note. N = 244. IATs were scored such that higher scores indicated stronger associations with the constructs described in the IAT's name. Alcohol consumption = number of drinks consumed on a typical week in the last three months; Alcohol Problems = score on the Rutgers Alcohol Problem Index; AUDIT = scores on the Alcohol Use Disorders Identification Test.

* $p < .05$.

** $p < .10$.

*** $p < .001$.

Table 2

Negative Binomial Regression Models Predicting Alcohol Outcomes from IATs.

	B	SE B	t	Cohen's d
Alcohol Consumption				
Gender	−0.47	0.25	−1.88 [†]	0.26
Drinking Identity IAT	0.80	0.19	4.25 ^{***}	0.58
Alcohol Cope IAT	0.24	0.23	1.07	0.15
Alcohol Approach IAT	0.22	0.24	0.91	0.13
Alcohol Problems				
Gender	−0.46	0.27	−1.72 [†]	0.24
Drinking Identity IAT	0.97	0.27	3.61 ^{***}	0.50
Alcohol Cope IAT	0.47	0.25	1.89 [†]	0.26
Alcohol Approach IAT	−0.09	0.27	−0.31	0.04
AUDIT Scores				
Gender	−0.42	0.15	−2.75 ^{**}	0.38
Drinking Identity IAT	0.76	0.16	4.76 ^{***}	0.66
Alcohol Cope IAT	0.27	0.17	1.53	0.21
Alcohol Approach IAT	0.01	0.17	0.04	0.01

Note. Gender was dummy-coded (0 = men, 1 = women). Cohen's $d = 2t / df$. The regression models used generalized linear models with a negative binomial log link. Alcohol consumption = number of drinks consumed on a typical week in the last three months; Alcohol Problems = score on the Rutgers Alcohol Problem Index; AUDIT = scores on the Alcohol Use Disorders Identification Test.

[†] $p < .061$.

^{*} $p < .05$.

^{**} $p < .01$.

^{***} $p < .001$.