In the Eye of the Drinker: Drinking Motives Influence the Effectiveness of Conditioning Implicit

Alcohol Attitudes

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Abstract

Risky alcohol use is prevalent among college students. Pre-intervention research has established methods of influencing alcohol cognition and reducing short-term alcohol consumption among students using evaluative conditioning (EC), repeatedly pairing alcohol with emotionally valenced images. Specifically, negative EC promotes negative attitudes toward alcohol, but additional research is needed to understand the range of EC effects and conditions under which it is or is not effective. For example, whether pairing alcohol with positive images promotes positive alcohol attitudes has not been tested. Further, drinking motives may influence the effectiveness of conditioning alcohol attitudes, since these motives are strongly associated with emotional stimuli like those presented in EC. The current experiment tested the interaction of drinking motives (coping and enhancement) and EC valence (negative or positive) on implicit alcohol avoidance. Participants ($N = 95$) were undergraduate students reporting active alcohol use. Results indicated no main effect of EC condition on implicit alcohol avoidance. However, drinking motives interacted with EC procedures assigned to participants. Those reporting greater *coping* motives exhibited less implicit alcohol avoidance following *negative* EC, whereas those reporting greater *enhancement* motives exhibited less alcohol avoidance following *positive* EC. Findings indicate drinking motives may influence the effectiveness of EC for altering alcohol attitudes. Negative EC did not promote alcohol avoidance among college students reporting higher coping motives, and positive EC only reduced avoidance among students reporting higher enhancement motives. These results indicate drinking motives interact with situational cues to impact both positive and negative responses to alcohol.

Keywords: Alcohol, implicit attitudes, evaluative conditioning, drinking motives, drinking behavior

In the Eye of the Drinker: Drinking Motives Influence the Effectiveness of Conditioning Implicit Alcohol Attitudes

College students engage in more risky alcohol use compared to similarly aged individuals not enrolled in college (White & Hingson, 2013). Alcohol attitudes predict students' high-risk drinking and pre-intervention research has targeted these attitudes using evaluative conditioning (EC), which repeatedly pairs alcohol images with emotionally valenced images (Houben, Haverman & Wiers, 2010). However, no published research has examined whether the impact of EC on alcohol attitudes is limited by individual differences in motivations for drinking. Specifically, college drinkers have different emotion-related drinking motives which may influence the effectiveness of emotion-based alcohol interventions (i.e., EC). College students drinking to alter emotions report more risky alcohol use compared to their socially motivated peers (Cooper, 1994; Martins, Bartholow, Cooper, Von Gunten, & Wood, 2018) and may display automatic tendencies to approach alcohol during undesirable affective states (Powell, 1995; Stewart, de Wit, & Eikelboom, 1984). These automatic responses have been targeted in pre-intervention research using EC, promoting negative alcohol attitudes and reducing short-term consumption (Houben et al., 2010a). However, research on well-established alcohol interventions for college students (Geisner, Varvil-Weld, Mittmann, Mallet, & Turrisi, 2015) and adolescents (Conrad, Castellanos-Ryan, & Mackie, 2011) indicate that chronic emotional states (i.e., depression, anxiety) may reduce their effectiveness. Whether alcohol-related individual differences linked to chronic emotional states (i.e., drinking motives) impact the effectiveness of a potential emotion-based intervention such as EC is unknown.

Cooper's (1994) conceptualization of drinking motives captures *social* (i.e., drinking to enjoy a party), *conformity* (i.e., drinking to fit in), *coping* (i.e., drinking due to negative

emotions) and *enhancement* motives (i.e., drinking to promote positive emotions). Coping and enhancement motives are more predictive of risky alcohol use and alcohol-related behaviors (i.e., poor self-care, risk-taking) compared to conformity and social motives (Cooper, 1994; Merrill, Wardell, & Read, 2014). Further, only coping and enhancement dimensions are associated with emotional motivations for drinking. (Cooper, 1994). For example, those higher in coping motives exhibit stronger alcohol-negative associations in memory, whereas individuals higher in enhancement motives demonstrate stronger alcohol-positive associations (Stewart, Hall, Wilkie, & Birsch, 2002). Relatedly, inducing negative moods promotes alcohol-approach associations among those higher in coping drinking motives (Ostafin & Brooks, 2010), while inducing positive moods similarly promotes alcohol-reward associations among those higher in enhancement motives (Birch et al., 2008). This suggests these drinking motives promote strong alcohol approach tendencies following exposure to emotional stimuli. Whether these emotion-related drinking motives interact with potential alcohol interventions that utilize emotional stimuli has not been tested.

EC manipulates emotional response by pairing alcohol images with valenced images (Jones, Fazio, & Olson, 2009). Pairing negative images with alcohol promotes greater implicit negativity toward alcohol and reduces alcohol consumption compared to alcohol/neutral image pairings (Houben et al., 2010a; Houben, Schoenmakers, & Wiers, 2010). To understand the general nature of alcohol EC effects, research is needed to determine whether positive alcohol EC also impacts alcohol attitudes. EC paradigms using positively valenced images promote positive attitudes when paired with non-alcohol stimuli (Hofmann, De Houwer, Perugini, Baeyens, & Crombez, 2010). However, whether positively valenced alcohol EC promotes positive alcohol attitudes has not been tested. Further, research has yet to examine the impact of

emotion-related drinking motives on EC, particularly since these motives likely influence responses toward emotional stimuli paired with alcohol during EC (Stewart et al., 2002).

The current research examined the influence of positive and negative EC on implicit alcohol motivations among college students. Consistent with Houben et al. (2010a; 2010b), negative EC was predicted to elicit greater alcohol avoidance compared to positive EC. However, the effectiveness of EC was expected to be affected by individual differences in emotion-related drinking motives (Stewart et al., 2002). We predicted higher coping motives would predict lower alcohol avoidance following negative EC (i.e., reducing the effectiveness of negative EC), since those higher in coping motives exhibit greater approach toward alcohol following negative-alcohol pairings (Ostafin & Brooks, 2010). Conversely, higher enhancement motives were expected to predict lower alcohol avoidance following positive EC (i.e., increasing the effectiveness of positive EC), since those higher in enhancement motives exhibit greater approach toward alcohol following positive-alcohol pairings (Birch et al., 2008).

Method

Participants

Participants were 95 (72.5% female) undergraduate university students ($M_{age} = 25.79$, $SD_{age} = 9.00$) who reported drinking any alcohol in the 3 months prior to the study. Participants identified as Caucasian (63.2%), African American (27.4%), and less than 10% identified as another race. Participants were compensated with course credit. A sensitivity power analysis indicated an approximately medium effect size ($R^2 = .07$) would provide 80% power to detect significant interaction effects with the recruited sample.

Procedure and Measures

Participants provided informed consent, answered a demographic survey, and completed self-report measures of lifetime and recent drinking behavior (Bartholow, Lust, & Tragesser, 2010) and drinking motives (Cooper, 1994). Participants were then randomly assigned to complete an EC procedure followed by an implicit measure of alcohol motivations. Lastly, participants were asked whether they noticed anything about the way images were presented during the EC task.

Drinking motives. Participants completed the Drinking Motives Questionnaire (DMQ) developed by Cooper (1994). Twenty items were rated on a 5-point scale, from 1 (*Almost never*) to 5 (*Almost always*). The DMQ contains 4 drinking motivation subscales including social, conformity, coping, and enhancement. Of interest to this experiment, items were averaged within each factor for coping (e.g., “To forget your worries”; $\alpha = .84$) and enhancement (e.g., “Because it is exciting”; $\alpha = .88$) drinking motives, with higher values indicating greater motivation to drink due to that factor.

Evaluative conditioning. The EC procedure was adapted from Hollands et al. (2011), showing 5 alcohol images (e.g., glass of beer) interspersed with either 5 positive (e.g., fireworks, beach) or negative (e.g., a man aiming a gun at the viewer) valenced images. Images were selected from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 1997) and presented across 100 trials using E-Prime software (Schneider, Eschman, & Zuccolotto, 2002). Trials consisted of an alcohol image (1s), followed by a positive or negative image (1s), and then a 500ms intertrial interval. To maintain attention, participants were instructed to hit the space bar when an image of a white circle appeared on the screen at random points during the task.

Implicit alcohol motivation. An alcohol motivation Implicit Association Test (IAT) was modeled after Palfai and Ostafin (2003) and created using standard IAT procedures (Nosek, Greenwald, & Banaji, 2005). Participants sorted pictures (i.e., soft drinks or alcoholic beverages) and words (i.e., approach-related or avoidance-related) on a computer screen. In one set of critical trials, participants were instructed to sort alcohol images with avoidance-related words (i.e., “withdraw”) to one side of the screen and soft drinks with approach-related words (i.e., “forward”) to the other side of the screen. In another set of critical trials, these pairings were reversed. The order of critical trial blocks was randomly counterbalanced between participants. Reaction time-based D scores were calculated using the improved IAT scoring algorithm (Greenwald, Nosek, & Banaji, 2003), such that positive scores indicated stronger alcohol-avoidance associations and negative scores suggested stronger alcohol-approach associations.

Results

No significant main effect of EC condition on implicit alcohol avoidance was present, $t(93) = -1.56, p = .123, 95\% \text{ CI } [-0.29, 0.04]$, suggesting alcohol avoidance did not differ between negative EC ($M = 0.23, SD = 0.42$) and positive EC ($M = 0.36, SD = 0.40$). To examine the interactions between drinking motives and EC conditions on implicit alcohol avoidance, the PROCESS macro for SPSS 23 was used (version 3; Hayes, 2012). Emotion-related drinking motives (coping, enhancement) were individually entered as continuous predictor variables, while EC condition was entered as a dichotomous moderator variable. Coping motives were significantly related to implicit alcohol avoidance, $t(91) = -3.28, p = .002, b = -0.29, 95\% \text{ CI } [-0.46, 0.11]$, such that greater coping motives predicted lower implicit alcohol avoidance, regardless of condition. The interaction between coping motives and EC condition was also significant, $F(1,91) = 4.29, p = .041, \Delta R^2 = .039, 95\% \text{ CI } [0.002, 0.079]$. Conditional effects

indicated no relation between coping motives and alcohol avoidance among those in the positive EC condition, $t(91) = -0.76$, $p = .451$, $b = -0.04$ 95% CI [-0.15, 0.07]. However, higher coping motives predicted lower implicit alcohol avoidance in the negative EC condition, $t(91) = -3.71$, $p < .001$, $b = -0.20$, 95% CI [-0.31, -0.10] (see Figure 1).

INSERT FIGURE 1 HERE

Enhancement motives were significantly related to implicit alcohol avoidance, $t(91) = -2.69$, $p = .039$, $b = -0.14$, 95% CI [-0.25, -0.04], with greater enhancement motives predicting lower alcohol avoidance. The interaction between EC condition and enhancement motives was significant, $F(1,91) = 4.39$, $p = .039$, $\Delta R^2 = .043$, 95% CI [-0.101, -0.002]. Conditional effects indicated no relation between enhancement motives and implicit alcohol avoidance among participants in the negative EC condition, $t(91) = -0.09$, $p = .926$, $b = -0.01$, 95% CI [-0.12, 0.11]. However, in the positive EC condition, greater enhancement motives predicted lower implicit alcohol avoidance, $t(91) = -2.68$, $p = .009$, $b = -0.21$, 95% CI [-0.37, -0.05] (see Figure 2).

INSERT FIGURE 2 HERE

Contingency Awareness

Thirty participants indicated they noticed the association between alcohol and valenced (positive or negative) images during the EC task, so contingency awareness was added as an additional factor to prior analyses. Levels of implicit alcohol motivation did not differ between contingently aware and unaware participants, $p = .182$, and contingency awareness did not significantly interact with any factors, all $ps > .340$.

Discussion

The current research extends work on EC through the inclusion of alcohol/positive pairings and the examination of emotion-related drinking motives. Contrary to predictions, no

differences in alcohol avoidance emerged between negative and positive EC. While the implicit avoidance observed following negative EC is consistent with prior research (Houben et al., 2010a; 2010b), the implicit avoidance observed following positive EC is inconsistent with research demonstrating positive EC's ability to promote positive attitudes toward non-alcohol stimuli (Hofmann et al., 2010). This finding may suggest positive EC does not effectively induce positive alcohol attitudes; additional research with alternative dependent measures is needed to assess this possibility. Consistent with prior research, higher coping and enhancement drinking motives were negatively related to implicit alcohol avoidance (Cooper, 1994; Martins et al., 2018).

Drinking motives interacted with EC procedures in predicting implicit alcohol motivation. Among participants assigned to negative EC, higher coping motives predicted lower implicit alcohol avoidance. Conversely, among those assigned to positive EC, higher enhancement motives similarly predicted lower alcohol avoidance. Viewing emotional stimuli paired with alcohol may promote greater motivation to approach alcohol among those higher in emotional drinking motives matching the valence of the EC stimuli. These results are in line with studies demonstrating similar patterns between drinking motives and alcohol associations following exposure to emotional stimuli (Birch et al., 2008; Stewart et al., 2002). Whereas prior studies have established EC's usefulness in promoting negative attitudes toward alcohol (Houben et al., 2010a; 2010b), the current experiment demonstrates emotion-related drinking motives may impact the effectiveness of EC among college students. For example, college students higher in coping motives may demonstrate greater approach toward alcohol following negative EC.

Limitations include the lack of a neutral EC condition, pairing alcohol with neutrally valenced images, restricting the interpretation of these results. The current study also only

examined implicit alcohol motivations as an outcome and other implicit alcohol measures, such as identity, are similarly predictive of drinking behavior (Lindgren et al., 2013). Finally, the present research is a preliminary study and did not include follow up data to examine the impact on drinking behavior after participation in the experiment. Despite these limitations, the present study provides novel contributions to the literature by examining both positive and negative alcohol EC and by providing an initial demonstration of emotion-related individual differences influencing the effectiveness of interventions utilizing emotional stimuli. The interaction of emotion-related drinking motives with immediate manipulations of positive and negative alcohol associations should be considered in the development of interventions to reduce college drinking.

References

- Bartholow, B. D., Lust, S. A., & Tragesser, S. L. (2010). Specificity of P3 event-related potential reactivity to alcohol cues in individuals low in alcohol sensitivity. *Psychology of Addictive Behaviors, 24*(2), 220-228.
- Birch, C. D., Stewart, S. H., Wiers, R. W., Klein, R. M., MacLean, A. D., & Berish, M. J. (2008). The mood-induced activation of implicit alcohol cognition in enhancement and coping motivated drinkers. *Addictive Behaviors, 33*(4), 565-581.
- Conrad, P. J., Castellanos-Ryan, N., & Mackie, C. (2011). Long-term effects of a personality-targeted intervention to reduce alcohol use in adolescents. *Journal of Consulting and Clinical Psychology, 79*, 296-306.
- Cooper, M. L. (1994). Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment, 6*(2), 117-128.
- Farris, S. R., Ostafin, B. D., & Palfai, T. P. (2010). Distractibility moderates the relation between automatic alcohol motivation and drinking behavior. *Psychology of Addictive Behaviors, 24*(1), 151-156.
- Geisner, I. M., Varvil-Weld, L., Mittmann, A. J., Mallett, K., & Turrissi, R. (2015). Brief web-based intervention for college students with comorbid risky alcohol use and depressed mood: Does it work, and for whom? *Addictive Behaviors, 42*, 36-43.
- Greenwald, A. G., Nosek, B. A., & Banaji, M. R. (2003). Understanding and using the implicit association test: I. An improved scoring algorithm. *Journal of Personality and Social Psychology, 85*(2), 197-216.

- Hayes, A. F. (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
- Hofmann, W., De Houwer, J., Perugini, M., Baeyens, F., & Crombez, G. (2010). Evaluative conditioning in humans: a meta-analysis. *Psychological Bulletin*, 136(3), 390-421.
- Hollands, G. J., Prestwich, A., & Marteau, T. M. (2011). Using aversive images to enhance healthy food choices and implicit attitudes: An experimental test of evaluative conditioning. *Health Psychology*, 30(2), 195-203.
- Houben, K., Havermans, R. C., & Wiers, R. W. (2010). Learning to dislike alcohol: Conditioning negative implicit attitudes toward alcohol and its effect on drinking behavior. *Psychopharmacology*, 211(1), 79-86.
- Houben, K., Schoenmakers, T. M., & Wiers, R. W. (2010). I didn't feel like drinking but I don't know why: The effects of evaluative conditioning on alcohol-related attitudes, craving and behavior. *Addictive Behaviors*, 35(12), 1161-1163.
- Jones, C. R., Fazio, R. H., & Olson, M. A. (2009). Implicit misattribution as a mechanism underlying evaluative conditioning. *Journal of Personality and Social Psychology*, 96(5), 933-948.
- Lang, P. J., Bradley, M. M., & Cuthbert, B. N. (1997). International affective picture system (IAPS): Technical manual and affective ratings. *NIMH Center for the Study of Emotion and Attention*, 39-58.
- Lindgren, K. P., Neighbors, C., Teachman, B. A., Wiers, R. W., Westgate, E., & Greenwald, A. G. (2013). I drink therefore I am: Validating alcohol-related implicit association tests. *Psychology of Addictive Behaviors*, 27(1), 1-13.

- Martins, J. S., Bartholow, B. D., Cooper, M. L., Von Gunten, C. D., & Wood, P. K. (2018). Associations between executive functioning, affect-regulation drinking motives, and alcohol use and problems. *Psychology of Addictive Behaviors*, 32(1), 16-28.
- Merrill, J. E., Wardell, J. D., & Read, J. P. (2014). Drinking motives in the prospective prediction of unique alcohol-related consequences in college students. *Journal of Studies on Alcohol and Drugs*, 75(1), 93-102.
- Nosek, B. A., Greenwald, A. G., & Banaji, M. R. (2005). Understanding and using the Implicit Association Test: II. Method variables and construct validity. *Personality and Social Psychology Bulletin*, 31(2), 166-180.
- Ostafin, B. D., & Brooks, J. J. (2011). Drinking for relief: Negative affect increases automatic alcohol motivation in coping-motivated drinkers. *Motivation and Emotion*, 35(3), 285-295.
- Powell, J. (1995). Conditioned responses to drug-related stimuli: Is context crucial? *Addiction*, 90, 1089–1095.
- Schneider, W., Eschman, A., & Zuccolotto, A. (2002). *E-Prime*. Psychology Software Incorporated.
- Stewart, J., De Wit, H., & Eikelboom, R. (1984). Role of unconditioned and conditioned drug effects in the self-administration of opiates and stimulants. *Psychological Review*, 91(2), 251-268.
- Stewart, S. H., Hall, E., Wilkie, H., & Birch, C. (2002). Affective priming of alcohol schema in coping and enhancement motivated drinkers. *Cognitive Behaviour Therapy*, 31(2), 68-80.

White, A., & Hingson, R. (2013). The burden of alcohol use: Excessive alcohol consumption and related consequences among college students. *Alcohol Research: Current Reviews*, 35(2), 201-218.

Figure 1. Interaction between EC condition (negative, positive) and coping motives predicting implicit alcohol avoidance. Higher values on the y-axis indicate greater avoidance motivation toward alcohol. Higher values on the x-axis indicate greater coping drinking motives. Coping motives are graphed at -1 SD (lower), at the mean (moderate), and +1 SD (higher). *** $p < .001$.

Figure 2. Interaction between EC condition (negative, positive) and enhancement motives predicting implicit alcohol avoidance. Higher values on the y-axis indicate greater avoidance motivation toward alcohol. Higher values on the x-axis indicate greater enhancement drinking motives. Enhancement motives are graphed at -1 SD (lower), at the mean (moderate), and +1 SD (higher). $**p < .01$