



Reducing alcohol-related interpretive bias in negative affect situations: Using a scenario-based Cognitive Bias Modification training paradigm



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HIGHLIGHTS

- A novel computerized training was designed to reduce alcohol-related interpretations bias in negative affective situations.
- Training, compared to a sham condition, resulted in weaker alcohol-related interpretive bias in negative affect situations.
- These effects were not moderated by the strength of coping motives and no effects on drinking behavior were observed.

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ABSTRACT

Problematic alcohol use is associated with drinking alcohol to reduce negative mood states (negative reinforcement motive). Further, heavy drinking individuals tend to interpret ambiguous situations as alcohol-related (interpretive bias). The current experimental study aimed to examine the role of alcohol-related interpretive biases in negative-affect drinking. It was hypothesized that a single-session Cognitive Bias Modification of Interpretation (CBM-I) training condition (compared to a sham condition) would lead to less alcohol-related interpretations of negative affect situations, and less alcohol consumption while being in a negative mood state. The most pronounced effects were expected in individuals who drink alcohol to cope with anxiety. Moderate to heavy drinking university students ($N = 134$) were randomly assigned to a CBM-I or a sham condition. Interpretations were assessed during and after the training session. Drinking was assessed in a lab-based drink test and one week later using a self-report measure. With respect to alcohol-related interpretive bias, this bias was weaker in the CBM-I compared to the sham condition during the training session. This effect was not moderated by coping-anxiety motives, and did not generalize to another interpretation measure. No training effects were found on drinking behavior in the lab or on self-reported daily-level use. In sum, the CBM-I training condition was associated with lower alcohol-related interpretive bias scores during training. Generalization to another interpretation measure or to drinking behavior was not observed. Future research could explore providing multiple training sessions in order to strengthen the effects of the CBM-I training.

1. Introduction

Problematic alcohol use, as compared to occasional alcohol use, is associated with specific motives for drinking, especially negative reinforcement drinking (drinking alcohol to reduce a negative mood state) (Koob & Volkow, 2010). The literature on drinking motives postulates that individuals drink alcohol in order to attain certain affective changes (Cox & Klinger, 1988). Four types of drinking motives have been identified, i.e., social, enhancement, conformity, and coping motives (Cooper, 1994). Various studies showed that these motives are

related to levels of alcohol consumption, in samples of adolescents (Kuntsche, Knibbe, Gmel, & Engels, 2006) and a large sample of undergraduates from 10 different countries ($n = 8468$; Couture et al., 2017; Mackinnon, Couture, Cooper, Kuntsche, O'Connor, Stewart, & DRINC team, 2017). Further, drinking motives have been shown to be proximal mechanisms mediating the effects of expectancies on various alcohol outcomes (Kuntsche, Wiers, Janssen, & Gmel, 2010) and the effects of personality on problematic drinking (Adams, Kaiser, Lynam, Charnigo, & Milich, 2012). Adolescents and young adults mainly report to drink for positive reinforcement motives (i.e., social and

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enhancement, Kuntsche, Knibbe, Gmel, & Engels, 2005; Mackinnon et al., 2017). But note that while coping motives are endorsed less frequently as key reasons for drinking in college students, they are the only drinking motive that predicts unique variance in alcohol-related problems after controlling for alcohol consumption (Cooper, 1994; Kuntsche et al., 2005). For example, using a longitudinal design, Merrill, Wardell, and Read (2014) found that coping motives predicted a wide range of negative consequences including poor self-care, academic/occupational problems, and physiological dependence in college students.

Cognitive models argue that a second factor that is important in understanding problematic drinking is automatically activated (or implicit) biases in information processing (Wiers et al., 2007). Indeed, meta-analyses revealed that implicit processes are reliably related to alcohol use and add unique predictive power to the prediction of drinking, above and beyond measures of explicit processes (e.g., self-report questionnaires assessing alcohol outcome expectancies or self-generation; Reich, Below, & Goldman, 2010; Rooke, Hine, & Thorsteinsson, 2008). Alcohol-related interpretive biases belong to the group of alcohol-related implicit processes and reflect the tendency to interpret ambiguous, potentially alcohol-relevant information in an alcohol-related (rather than neutral) way. Association paradigms are commonly used to assess alcohol-related interpretations. Using this paradigm, an ambiguous word (e.g., 'draft') would be presented, and participants are asked to write down the first word that comes into their mind. Studies have consistently shown that drinking is associated with generating more alcohol-related (e.g., 'beer') than neutral (e.g., 'baseball') words, and that word association tasks are better predictors of future alcohol use than self-report questionnaires (i.e., self-generated alcohol expectancies) (Stacy, 1997; Stacy, Ames, & Grenard, 2006). Other studies have presented outcomes of drinking as ambiguous words or short phrases (e.g., 'celebrating house mate's birthday') and participants rate how well an alcohol-related and an alcohol unrelated interpretation fit with the original ambiguous sentence (Woud, Becker, Rinck, & Salemink, 2015). Using this approach with positive and negative drinking outcomes presented in short phrases, recent studies showed that interpretive biases in negative affect situations are specifically related to coping (and not enhancement) motives (Salemink & Wiers, 2014), and predict drinking prospectively (Woud, Becker et al., 2015).

Training procedures have been developed that aim to change implicit processing biases (Cognitive Bias Modification or CBM, MacLeod, 2012), including interpretation biases. While training paradigms have developed and tested for some alcohol-related biases (e.g., alcohol-approach and alcohol attentional biases; for an overview, see Wiers, Gladwin, Hofmann, Salemink, & Ridderinkhof, 2013), alcohol-related interpretive bias training, however, has received less attention. This is surprising as interpretive bias training has a long tradition with other forms of psychopathology (e.g., anxiety, see Mathews & Mackintosh, 2000; Salemink, Van den Hout, & Kindt, 2009, 2010), and meta-analyses revealed higher effect sizes for CBM targeting interpretive bias than attentional bias (Cristea, Kok, & Cuijpers, 2015; Hallion & Ruscio, 2011).

Two recent studies sought to modify alcohol-related interpretive bias (CBM-I training) and test its role in drinking (Hutschemaekers, Woud, Becker, & Rinck, 2016; Woud, Hutschemaekers, Rinck, & Becker, 2015). Both studies applied a single-session CBM-I training where participants received brief scenarios describing typical student life situations with a clear positive social context (e.g., being with friends, joining a party). Participants were trained to interpret the situation as non-alcohol related. Results are mixed. In Hutschemaekers et al., the CBM-I training did not result in a reduction of alcohol-related interpretations, while in Woud, Hutschemaekers et al., only the condition to increase alcohol-interpretations was successful. Regarding effects on drinking behavior, Woud, Hutschemaekers et al. observed no training effects on actual drinking in a beer drink test in the lab, and both

studies observed no effects on self-reported drinking in daily life.

Several reasons may account for the mixed findings. First, in both studies, the training contained exclusively positive social situations and positive affect, which is consistent with the general aim of understanding the role of interpretation biases in drinking. However, if we want to increase our understanding of more problematic drinking, then limiting training to positive social situations and affect may be sub-optimal, as problematic drinking is more directly associated with coping drinking motives (Cooper, 1994), and thus with negative affect situations. Second, while Woud, Hutschemaekers et al. (2015) training concerned positive contexts, actual drinking behavior was assessed in the lab at the university, ostensibly a more neutral context. Thus, there was likely a mismatch in valence between the training and the lab-based drinking outcome measure, which could have hampered transfer of the training (Foa & Kozak, 1986). Third, self-reported daily-level alcohol use was not linked to participants' emotional state prior to drinking. As a result, it is unclear whether the drinking outcome reflects drinking in positive or negative emotional contexts (or some mixture), and whether there was a match between the emotional valence in the training and real-life drinking situations. Matching the emotional state prior to and during actual drinking with the emotional state described in the CBM-I scenarios should, therefore, facilitate the impact of the newly trained bias on emotional drinking. As such, in order to increase our understanding of problematic drinking and the role of alcohol-related interpretations, crucial next steps are to (1) train individual to make non-alcohol-related interpretations in negative affect situations, and (2) test the effects of that training on negative affect drinking.

The central aims of the current study are training *and* testing the effects of CBM-I on drinking behavior in negative affective situations. Therefore, a novel scenario-based CBM-I training was developed that specifically targets alcohol-related interpretation bias in negative affect situations. The scenario paradigm was used (Mathews & Mackintosh, 2000), as it is a well-established method with high ecological validity and realism (Menne-Lothmann et al., 2014). Further, it provides the possibility to capture the complex relationship between affect and drinking (i.e., association tasks that rely on single words are sub-optimal, Wiers, Houben, Smulders, Conrod, & Jones, 2006).

It was hypothesized that a single-session of CBM-I training, compared to a sham training, would lead to less alcohol-related interpretative bias, especially in coping-motivated individuals. It was also hypothesized that the CBM-I (compared to the sham) training would result in less negative affect drinking, especially in coping-drinkers. Negative affect drinking was assessed in the lab where a negative mood induction was combined with a taste test (Field & Eastwood, 2005), and self-reported daily-level alcohol use and mood state was assessed online one week after the lab session.

2. Method

2.1. Participants

Students from the University of Amsterdam completed the Alcohol Use Disorders Identification Test (AUDIT, Saunders, Aasland, Babor, De La Fuente, & Grant, 1993) during a mass screening; individuals with an AUDIT score of 6 or higher (Reinert & Allen, 2007) were invited to participate. Participants were informed at the time of recruitment that the experiment involved the tasting of an alcoholic beverage (i.e., beer). In total 164 students participated, however 30 students scored below our AUDIT cut-off during the lab session and one participant failed to provide follow-up data on time, resulting in a final sample of $N = 133$ (28 males, mean age = 22.3, $SD = 4.8$, Table 2). All participants provided written informed consent, and the study was approved by the Ethics Review Board of the University of Amsterdam. Participants received course credit or 10 euros for participation.

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