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

Elske Saleminka⁎, Marcella L. Woud, Marit Roos, Reinout Wiers, Kristen P. Lindgren

⁎ Corresponding author at: Department of Clinical Psychology, University of Utrecht, P.O. Box 80140, 3508 TC Utrecht, The Netherlands.
E-mail address: E.Salemink@uu.nl (E. Salemink).

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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edemic/occupational problems, and physiological dependence in college a wide range of negative consequences including poor self-care, aca-
ademic/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 im-

plicit 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-ap-
proach 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
s of psychopathology (e.g., anxiety, see Mathews & Mackintosh, 2000; Salemink, Van den Hout, & Kindt, 2009, 2010), and meta-an-
lyses 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 depicting typical student life sit-
uations 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 inter-
pretations, 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-relat-
ed 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-op-
timal, Wiers, Houben, Smulders, Conrod, & Jones, 2006).

It was hypothesized that a single-session of CBM-I training, com-
pared to a sham training, would lead to less alcohol-related inter-
pretive 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.