



The effect of rumination on craving across the continuum of drinking behaviour



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HIGHLIGHTS

- Rumination is a detrimental cognitive response that may be associated to craving
- We explored the causal impact of rumination on craving across different populations
- Rumination, relative to distraction, increased craving, in alcohol-dependent drinkers
- The effect of rumination was independent of baseline depression and rumination
- The effect of rumination on craving was maintained after a resting phase

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ABSTRACT

Background: Rumination is an abstract, persistent, and repetitive thinking style that can be adopted to control negative affect. Recent studies have suggested the role of rumination as direct or indirect cognitive predictor of craving experience in alcohol-related problems.

Aims: The goal of this study was to explore the effect of rumination induction on craving across the continuum of drinking behaviour.

Methods: Participants of three groups of alcohol-dependent drinkers ($N = 26$), problem drinkers ($N = 26$) and social drinkers ($N = 29$) were randomly allocated to two thinking manipulation tasks: distraction versus rumination. Craving was measured before and after manipulation and after a resting phase.

Results: Findings showed that rumination had a significant effect on increasing craving in alcohol-dependent drinkers, relative to distraction, but not in problem and social drinkers. This effect was independent of baseline depression and rumination and was maintained across the resting phase.

Conclusions: Rumination showed a direct causal impact on craving that is specific for a population of alcohol-dependent drinkers.

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1. Introduction

Craving has been conceptualized as a powerful subjective experience that motivates individuals to seek out and achieve a target, or

practice an activity, in order to reach its desired effects (Marlatt, 1987). This construct has long been identified as an important symptom in all alcohol use disorders that may lead to behavioural loss of control, has appeared to be a major risk factor in triggering relapse (Killen & Fortmann, 1997) and is considered the key treatment focus for alcohol use disorders (e.g. O'Malley, Krishnan-Sarin, Faren, Sinha, & Kreek, 2002; Paille et al., 1995).

A variety of approaches have been put forward for conceptualizing craving. Firstly, conditioning-based models share in common the

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conceptualization of craving as an epiphenomenon of addictive conditioning processes of two general classes: those that emphasize drug withdrawal and those that emphasize a drug's positive-incentive properties (see Skinner & Aubin, 2010). Secondly, psychobiological models share the tenet that craving is directly influenced by biological neural systems and by neurochemical individual differences (e.g., Robinson & Berridge, 2003). Thirdly, cognitive models purport that higher-order cognitive functioning and information processing configurations are instrumental in activating and exacerbating craving as opposed to craving being an autonomic state or primal drive (Tiffany, 1999). These models have emphasized the role of expectancies (Goldman & Rather, 1993; Marlatt, 1985; Stacy, 1997), propositional networks (Baker, Morse, & Shermann, 1987), problem-solving aspects of interrupted addictive sequences (Tiffany, 1999) and desire thinking (Caselli, Ferla, Mezzaluna, Rovetto, & Spada, 2012; Caselli, Soliani, & Spada, 2012; Caselli & Spada, 2010, 2011) as central to the craving experience.

Recently, a series of studies has suggested the role of rumination as a direct or indirect cognitive predictor of craving experience (Spada, Caselli, & Wells, *in press*). Rumination has been generally conceptualized as a coping strategy for controlling negative affect that is characterised by heightened self-focused attention involving voluntary, persistent, repetitive, and generic internal self-questioning regarding the causes, consequences, and symptoms of one's negative affect (e.g. *What does this mean about me? Why can't I handle things better? Why do I feel so bad?*; Lyubomirsky & Nolen-Hoeksema, 1993). It is well-established that rumination can remain elevated after partial and full remission from depression (Riso et al., 2003) and has been shown to be an important factor in vulnerability to major depressive disorder and correlated symptoms (e.g. Watkins, 2008).

Recent research has demonstrated that a general tendency to ruminate predicts levels of alcohol use and category membership as a problem drinker independently of depression (Caselli, Bortolai, Leoni, Rovetto, & Spada, 2008). In addition, rumination has been shown to be a risk factor for relapse for alcohol abusers at 3–6–12 months follow-up after treatment, independently of the initial level of alcohol use and depression (Caselli et al., 2010).

These findings suggest the hypothesis that craving for alcohol serves the regulatory function of activating behaviours (drinking) that have previously been found to control perseverative thinking patterns (Nolen-Hoeksema, Stice, Wade, & Bohon, 2007; Spada & Wells, 2009; Spada et al., *in press*). This cognitive regulatory function of alcohol use may be learned as a consequence of its psychopharmacological effects of disrupting the higher-order cognitive functions necessary for rumination. Thus, rumination may play a causal role, as a residual symptom, in inducing craving for alcohol because (1) it contributes to the escalation and persistence of negative cognitive-affective states (like depression) that can trigger craving for maladaptive coping strategies such as alcohol use; and (2) it may directly activate craving for alcohol as a response aimed at controlling the ruminative process itself. Conversely, alcohol abuse often results in substance-induced depression which may, in turn, sustain the tendency to ruminate. This could represent a maintenance mechanism that highlights the long-term counterproductive effect of alcohol use as a cognitive regulatory strategy.

The purpose of this study was to undertake a first experiment to explore the direct causal effect of rumination induction on craving whilst considering different levels of problem drinking (from social drinking to alcohol dependence). The experimental hypotheses under test were: (1) The induction of rumination would have a stronger effect on increasing craving than the control condition of distraction; (2) the causal effect of rumination on craving would be stronger for alcohol-dependent drinkers rather than other drinking categories; (3) the effect of rumination on craving for alcohol-dependent drinkers will tend to remain significantly higher after a resting phase because of the difficulties these drinkers may encounter in autonomous disengagement from perseverative thinking, without the use of an external agent (alcohol).

2. Method

2.1. Participants

The study involved three samples: alcohol-dependent drinkers, problem drinkers and social drinkers. All these samples shared the same inclusion criteria: (1) at least 18 years old, (2) understand written and spoken Italian, (3) absence of other substance use in the last 12 months (with the exception of tobacco); (4) absence of cognitive deficit or mental retardation, (5) absence of severe organic disorders. Three additional inclusion criteria were specified: (1) a score of more than 7 on the Alcohol Use Disorder Identification Test (AUDIT) for problem drinkers and alcohol-dependent drinkers, (2) diagnosis of Alcohol Dependence on the basis of DSM-IV-TR (APA, 2000) diagnostic criteria for alcohol-dependent drinkers, (3) report of drinking alcoholic beverages at least one time per week in the last month for social drinkers. This information was collected through a brief assessment interview.

Alcohol-dependent drinkers were recruited from individuals seeking treatment for alcohol-related problems at the Addiction Center of *Strutture Residenziali Gruppo CEIS, Modena, Italy*. They were all starting a residential treatment based on a contingency management model just after a detoxification focused hospitalization. The alcohol-dependent group consisted of 26 patients (8 females) with a mean age of 44.69 years ($SD = 10.58$, $Range = 26–65$). The average number of years of schooling was 10 ($SD = 3.3$, $Range = 5–18$). The average AUDIT score was 27.46 ($SD = 8.2$, $Range = 14–40$), which is within the highest range for risk of alcohol dependence (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The average duration of alcohol-related problems, as emerged from the preliminary diagnostic interview, was 4.5 years ($SD = 3.0$, $Range = 0.5–15$).

Problem Drinkers and Social Drinkers were recruited through leaflets and advertisements in the local health services of Modena, Italy and matched on age and gender with the alcohol-dependent drinkers. The Problem Drinkers sample consisted of 26 individuals (7 female) with a mean age of 38 years ($SD = 9.5$, $Range = 26–63$), a mean number of years of schooling of 12 ($SD = 3.7$, $Range = 8–18$) and a mean AUDIT score of 10.92 ($SD = 4.28$, $Range = 8–20$). The Social Drinkers sample consisted of 29 individuals (9 female) with a mean age of 42.14 ($SD = 11.1$, $Range = 25–65$), a mean years of schooling of 14 ($SD = 3.9$, $Range = 8–18$) and a mean AUDIT score of 3.17 ($SD = 1.63$, $Range = 1–6$). The majority of the whole sample (95%) were Caucasian.

2.2. Materials

2.2.1. The alcohol use disorders identification test

(AUDIT; Babor, de la Fuente, Saunders, & Grant, 1992). AUDIT was developed as a screening tool by the World Health Organisation for early identification of problem drinkers. AUDIT consists of ten questions regarding recent alcohol consumption, alcohol dependence symptoms, and alcohol-related problems. Respondents are asked to choose one of five statements (per question) that most applies to their use of alcohol beverages over the past year. Responses are scored from 0 to 4 in the direction of problem drinking. The summary score for the total AUDIT ranges from 0, indicating no presence of problem drinking

behaviour, to 40 indicating marked levels of problem drinking behaviour and alcohol dependence. The threshold for indicating possible problem drinking pathology is a score of 8. This instrument has been extensively used and possesses good validity and reliability (Hester & Miller, 1995).

2.2.2. Beck Depression Inventory

(BDI; Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). The BDI is a 21-item self-report measure of symptoms of depression. Higher scores indicate higher levels of depression. This measure has been used

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