



Full length article

Psychosocial stress increases craving for alcohol in social drinkers: Effects of risk-taking

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ABSTRACT

Background: Exposure to stress and trait impulsivity are independent predictors of relapse in recovering alcoholics, but potential mechanisms that link these two risk-factors in terms of their putative additive or interactive contributions to relapse are not known. The aim of this study was to use a model of stress-induced relapse to test the hypothesis that acute psychosocial stress increases craving for alcohol in social drinkers. We also tested the hypothesis that change in craving could be explained by variability in impulsivity and risk-taking.

Methods: Participants completed questionnaires to assess drinking behaviour (Alcohol Dependence Questionnaire [ADQ]; and an Alcohol Use Disorders Identification Test [AUDIT]), craving (Desires for Alcohol Questionnaire [DAQ] and impulsivity (Barrett Impulsiveness Scale [BIS]). Participants also completed two computer tasks to assess risk-taking and impulsivity, the Balloon Analogue Risk Test (BART) and a continuous performance task (CPT). Participants then underwent the Trier Social Stress Test (TSST), and completed a final DAQ to assess post-stress craving.

Results: Participants showed an increase in craving following exposure to the TSST. In addition, risk-taking was positively correlated with change in craving.

Conclusions: Our data suggests that acute psychosocial stress increases subjective craving in social drinkers, but that the effects may be trait-dependent, with stress-induced increases in craving correlated with risk-taking.

1. Introduction

Long-term excessive alcohol use may escalate into alcohol addiction ('alcoholism', including tolerance, withdrawal, compulsive alcohol seeking, anhedonia, social/familial problems) (Skinner and Allen, 1982) in some individuals. Like many addictions, alcoholism is a chronic, relapsing disorder. Despite decades of accumulating evidence for the need to address chronic relapse in treatment programs, little cogent progress has been made (Harris and Koob, 2017).

Psychological stress is an important risk factor for relapse in abstinent alcoholics, and the neural mechanisms by which stress induces relapse are fairly well established. Chronic alcohol use results in neuroadaptations, in particular, in stress and reward pathways. Subsequently, alcoholic patients show dysfunction of stress (e.g., sympathetic adrenomedullary axis [SAM] and hypothalamic pituitary adrenocortical axis [HPA]) pathways, characterized by (for example) dysregulation of the cortisol response (Kreek and Koob, 1998), and/or

deficits in emotional regulation (Sinha, 2001). These neuroadaptations may lead to alcoholic patients showing increases in craving for alcohol in response to stress, and thus being particularly at risk of relapse. However, there is significant variability in risk of relapse within patient groups, making it very difficult to predict the latency to, and likelihood of, relapse in individuals (Sinha et al., 2011).

Trait impulsivity – the tendency to take risks, or act without adequate forethought or reflection (Dalley et al., 2011) – is a risk factor in predicting those who develop compulsive (addictive) states and those at high risk of relapse following treatment (Bowden-Jones et al., 2005; Lawrence et al., 2009). In fact, trait impulsivity has been shown, in animal models, to be a potential causative factor for compulsive drug seeking, with drug-naïve animals high in trait impulsivity being more at risk of developing compulsive drug seeking (Belin et al., 2008; Molander et al., 2011). In addition, impulsivity and cumulative stress interact to predict problem drinking in healthy (social) drinkers (Fox et al., 2010). It may be, therefore, that those high in impulsivity would

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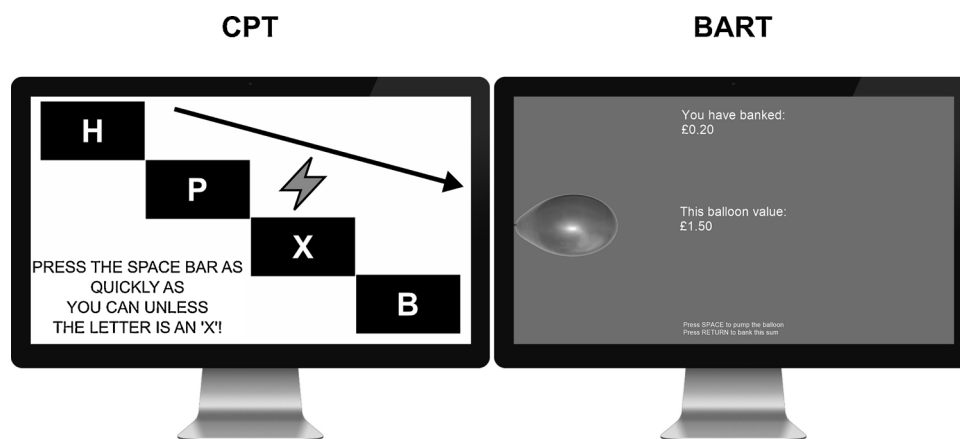


Fig. 1. Screenshots of computer tasks administered to participants. CPT – continuous performance task; BART – balloon analogue risk task.

show increased stress-induced craving.

If we were better able to predict those that were at risk of stress-induced relapse, for example, by understanding more about underlying traits that put some at higher risk, this would help in the development of stratified interventions to prevent relapse. A logical first step to gaining this increased understanding of how personality traits might influence relapse is to characterize personality traits in relation to stress-induced craving in healthy, social drinkers. This first step will allow us to determine if there exists a generalized mechanism by which personality traits impact upon stress-induced changes in alcohol craving. The first aim of this study was therefore to test the hypothesis that an acute psychosocial stressor (the Trier Social Stress Test [TSST]; Kirschbaum et al., 1993) would increase subjective craving for alcohol in a healthy (non-alcoholic) sample of social drinkers. The second aim was to test the hypothesis that different subtypes of impulsivity and risk-taking would influence stress-induced craving for alcohol, with those high in impulsivity and risk-taking showing higher rates of stress-induced craving.

2. Methods

2.1. Participants

Thirty-one undergraduate participants were recruited (11 male; mean age = 21.68 years [SD = 3.4]) following an internal advertisement via email or by word-of-mouth. Participants were initially screened for suitability using a series of self-report measures: exclusion criteria included aged < 18; currently undergoing treatment for alcoholism; in the past year, undergoing any treatment for anxiety or depression. As an additional measure to screen for depression and anxiety, potential participants were also asked to complete the Patient Health Questionnaire for Depression and Anxiety (PHQ-4; Kroenke et al., 2009). A key exclusion criterion was scoring high (> 5) on the PHQ-4; however, no participants in the current study scored > 5. The study was approved in its current form by the University of Portsmouth Science Faculty Ethics Board (ref: SFEC 2016-068).

2.2. Alcohol use and drinking behavior

To assess drinking behavior, participants reported the total units of alcohol usually consumed each day. Participants also completed an adapted 12-item version of the Alcohol Dependence Questionnaire (ADQ; Skinner and Allen, 1982) and the Alcohol Use Disorders Identification Test (AUDIT; Bush et al., 1998). AUDIT is scored on a scale of 0–40, where scores of > 20 would be considered dependent on alcohol, and > 30 severely dependent. The ADQ is based primarily on diagnosing the physiological aspects of alcohol dependence (e.g., withdrawal), and has been shown to have good psychometric properties

as a test of alcohol dependence, including having cross-cultural and clinical efficacy (Allen et al., 1994; Doyle and Donovan, 2009; Willenbring and Bielinski, 1994). The ADQ is scored on a scale of 0–47, with scores > 21 being classified as dependent on alcohol, and > 30 as severely dependent.

2.3. Impulsivity and risk-taking

Impulsivity and risk-taking were assessed using both questionnaire (explicit) methods and computer based (implicit) measures. The Barratt Impulsiveness Scale (BIS-11; Patton et al., 1995) is a validated and reliable questionnaire designed to assess the personality/behavioral construct of “impulsivity”. It has been used both in research and clinical settings for many years, and is the most widely used psychometric instrument for assessing impulsivity. Implicit measures of impulsivity and risk-taking involved two computer tasks, the Conners Continuous Performance Test (CPT; impulsivity) (Conners et al., 2003; Epstein et al., 2003) and the Balloon Analogue Risk Task (BART; risk-taking) (Lejuez et al., 2002), respectively (see Fig. 1).

The CPT is a neuropsychological test of impulsivity that has been shown to be efficacious in differentiating impulsive clinical (e.g., attention-deficit hyperactivity disorder [ADHD], conduct disorder) and non-impulsive (normative) populations (Epstein et al., 2003). In this task, the participant was faced with a blank computer screen, upon which letters flashed every 2-s, and remained for 0.5-s. The participant was asked to press the space bar on the keyboard as quickly as possible after each letter flashed up, except when the letter was ‘X’, when they should withhold responding. Dependent measures for this task included reaction time (ms), errors of omission (failing to press the space bar on all non-‘X’ letters), and errors of commission (pressing the space bar following ‘X’ presentations).

The BART is designed as a proxy measure of real-world ‘risk-taking’ behavior by examining balances between potential for reward and loss. During the task, participants were given the opportunity to earn a (virtual) financial reward in return for inflating a balloon by clicking the space bar on the computer. Each click of the space bar inflated the balloon and increased the money on the counter until at some point, the balloon over-inflated and exploded. If the balloon exploded, the participant lost the money accrued on that trial. Alternatively, the participant was free to collect their winnings at any time (prior to the balloon exploding) and bank the money from that trial. The explosion point was withheld allowing for analysis of the early (pre-experience) responses, as well as the changes in responses after learning.

2.4. Craving

Craving was assessed using the 14-item version of the Desires for Alcohol Questionnaire (DAQ; Kramer et al., 2010). Participants rated

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