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The reinforcing value of alcohol in a drinking to cope paradigm

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ABSTRACT

Background: Alcohol use is often regarded as a means of coping with sadness and distress. The present research was conducted to explore the relation between negative mood and the reinforcing value of alcohol, while clarifying the role of coping motives.
Methods: Participants with a history of recent alcohol use ($N = 44$; 72% female) attended a laboratory session and were randomly assigned to either a negative ($n = 22$) or a neutral ($n = 22$) mood condition. A manipulation check confirmed that participants in the negative mood condition, but not the neutral mood condition, displayed a significant increase in negative affect. The multiple choice procedure (MCP) was used to measure the reinforcing value of alcohol after the mood manipulation.
Results: Regression models employing the MCP crossover point as the dependent variable and mood condition (neutral or negative) and drinking to cope as predictors indicated that a model with an interaction term accounted for the most variance.
Conclusions: These results suggest that the relation between mood and the reinforcing value of alcohol is moderated by drinking to cope, and help clarify the conditions under which drinking to cope may lead to negative outcomes.

1. Introduction

Young adults aged 18–25 report the highest rates of heavy episodic drinking (or binge drinking; five or more drinks on the same occasion at least once in the last 30 days) and heavy drinking (heavy drinking episodes on at least five different days in the past 30 days) (Substance Abuse and Mental Health Services Administration, 2010). Additionally, young adults aged 18–22 who are enrolled full-time in college are more likely than their peers who were not enrolled full time to use alcohol and to engage in heavy episodic and heavy drinking. Students who engage in heavy episodic drinking are at an elevated risk to experience a range of alcohol-related problems, including unsafe sexual practices, suffering an injury, driving while intoxicated, or displaying impaired academic performance (Wechsler et al., 2000). Therefore, college students present as a population in need of further exploration concerning alcohol consumption antecedents.

One area of study that has yielded promising data to inform prevention and intervention work with college students has been that of drinking motives. Drinking motives represent a subjectively derived decisional framework for alcohol consumption that is based on an individual's personal experience, current environment/situation, and alcohol expectancies (Cooper, 1994; Cox and Klinger, 1988). Previous work examining alcohol use motives among college students has shown that social enhancement motives are the most commonly indicated reasons for consuming alcohol (Stewart et al., 1996). Although drinking to enhance social experiences may be common, drinking to cope with negative affect represents a potentially more deleterious motive for drinking among young adults (Park and Levenson, 2002). Previous studies investigating drinking to cope highlight the importance of the potential relation between negative mood and alcohol consumption (Lewis et al., 2008). The current study was the first to use an imaginal mood induction procedure (MIP) to determine how negative affect and drinking motives affect the relative reinforcing value of alcohol. Behavioral theories of choice characterize substance abuse as state in which the relative reinforcement derived from substance use remains high compared to other concurrently available reinforcers, despite the potential negative physical and psychosocial consequences of substance use (Bickel et al., 2000). Recent studies applying theories of behavioral choice to college student drinking in the natural environment have demonstrated that the frequency, quantity, and negative consequences of alcohol use are inversely related to the amount of reinforcement derived from drug-free activities (e.g., school work, relationships, employment; Correia et al., 2003, 2002, 1998); increases in substance-free activities, like exercise, can lead to decreases in substance use (Correia

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et al., 2005); reduced drinking following a brief motivational intervention is associated with an increased proportion of reinforcement being derived from substance-free activities (Murphy et al., 2005). Further, alcohol use generally decreases if access to alternative reinforcers is increased (Higgins et al., 2004). Taken together, these studies suggest that the relative reinforcing value of alcohol is dynamic and may be influenced by both interoceptive and exteroceptive stimuli and events.

To measure the relative reinforcing value of alcohol compared to substance-free alternatives, the current study used the multiple choice procedure (MCP), a method that allows discrete choices between a drug and an alternative. The datum of interest is referred to as the *crossover point*, the point at which a participant stops choosing the drug and begins to choose the substance-free alternative (Griffiths et al., 1996). The crossover point indicates the relative reinforcing value of the drug. To date, the laboratory version of the MCP has been used to study cocaine (Jones et al., 1999;), sedatives-hypnotics (Mintzer and Griffiths, 1998), caffeine (Garrett and Griffiths, 1998), nicotine (Griffiths et al., 1996), marijuana (Greenwald and Stitzer, 2000), and MDMA (Tancer and Johanson, 2007). Recent studies have validated the MCP with college student drinkers (Benson et al., 2009; Little and Correia, 2006). Responses to the MCP not only have been shown to be sensitive to environmental stimuli, such as reinforcer magnitude (Griffiths et al., 1996) and delays associated with alternative reinforcers (Little and Correia, 2006), but also individual difference variables, such as drug dependence (Garrett and Griffiths, 1998), and drug deprivation (Griffiths et al., 1996). However, no studies have used the MCP to measure the degree to which internal processes, such as affect and motives, influence the reinforcing value of alcohol.

We hypothesized that individuals in a negative affect induction group would report a higher crossover point on the MCP when compared to those in a neutral mood induction group, thus indicating that negative affect increases the relative reinforcing value of alcohol. We also hypothesized that individuals that reported a greater level of drinking to cope would also report higher crossover points on the MCP, and that drinking to cope would moderate the relation between induced mood and the relative reinforcing value of alcohol.

2. Method

2.1. Participants

In order to complete the study, participants had to report alcohol consumption at least four times in the prior 28 days and consumption of at least two standard drinks on at least one occasion, be at least 21 years of age, and report no use of prescription drugs for physical or psychological ailments. Participants were mostly female (72.3%) and Caucasian (86.4%) and mean age was 21.9 years old. Of the 44 participants in the laboratory study, 22 were randomly assigned to the negative affect induction condition and 22 to the neutral affect condition. There were no significant differences between the neutral and negative affect groups in terms of demographics and alcohol-related variables at the start of the study.

2.2. Measures

2.2.1. Alcohol survey. A modified version of the daily drinking questionnaire (DDQ; Collins et al., 1985) was used to assess the average amount of alcohol participants consumed during the previous four weeks. Participants were asked to indicate how much alcohol they consumed on average for each day of the week for the past four weeks. Participants also reported the number of times they engaged in an episode of binge drinking during the last 28 days.

2.2.2. The multiple choice procedure (MCP). The MCP was adapted from Griffiths and colleagues' (1993) work with pentobarbital. This version of the MCP included 42 discrete choices between escalating amounts of money and a set amount of alcohol. As discussed in Section 1, the MCP is sensitive to several parameters, including delay, magnitude, and drug versus placebo. More details regarding the administration of the MCP will follow in Section 2.3.

2.2.3. Drinking motives questionnaire (DMQ). The DMQ (Cooper, 1994) is a 20-item questionnaire used to assess motives for drinking; only the 5 items used to assess coping motives were used in the current study. Each item has a 5-point response option, ranging from 1 (almost never/never) to 5 (almost always/always). Instructions directed participants to consider all the times they drank alcohol and to indicate how often they drank for each reason (e.g., "I drink to forget my worries"). This measure has shown adequate psychometric properties in large samples of adolescents and adults (Cooper, 1994; Cooper et al., 1995). More recently, this measure has been used in a college population (e.g., Simons et al., 2005, 2000). The coping scale demonstrated an internal consistency of .84 in the current study.

2.2.4. Positive and negative affect scale (PANAS). The PANAS (Watson et al., 1988) consists of two 10-item scales, one measuring positive affect and the other measuring negative affect. Previous alcohol related studies reported that the PANAS retained acceptable internal consistency (Colder, 2001; Stein et al., 2000). The current study demonstrated acceptable internal consistency for the positive PANAS items at time 1 ($\alpha = .84$) and time 2($\alpha = .89$), as well as the negative PANAS items at time 1($\alpha = .76$) and time 2 ($\alpha = .83$). This measure was used as a manipulation check and to determine the emotional state of the participants before and after the affect induction procedure.

2.2.5. Life events checklist (LEC). The LEC (Gray et al., 2004) includes a list of 17 potentially traumatic events (e.g., sexual assault, physical assault, transportation accident). Participants indicated whether they have experienced each event, have witnessed the event happening to someone else, or have learned about the event happening to someone close to them. The LEC was used to identify an event that the participant could write about during the MIP.

2.3. Procedure

All procedures were approved by the Auburn University Institutional Review Board. Participants were chosen based on their responses to survey questions completed on-line prior to study invitation. Eligible individuals were invited to participate in a single laboratory study in exchange for extra credit in a psychology course. These participants were also informed that the laboratory sessions may involve the optional consumption of alcohol, and that they may gain access to up to $20.

Participants were instructed to abstain from any illicit drug use for the 24 h preceding their scheduled session and to refrain from alcohol use the day of their sessions. Each laboratory sessions involved one participant and one experimenter. All laboratory sessions occurred in a private laboratory. The laboratory was equipped with a telephone and a list of emergency phone numbers, adequate workspace for completing questionnaires and for alcohol administration, a sofa and a variety of recreational activities including a television with a DVD player, a computer with Internet access, video games, magazines, and art supplies while they were waiting for the session to end. Snacks and non-alcoholic beverages were available. Total session time was approximately three hours (one-half hour to complete surveys, affect induction, and MCP, one-half hour to drink any alcohol that was provided through the MCP, and two hours to ensure that all participants have returned to a BAC less than or equal to .002 by the end of the session).

All participants were required to provide age verification in the form of a valid government issued ID, and were asked again whether they were taking any prescription medication for which alcohol use is contraindicated or had used any recreational drugs in the last 24 h to prevent potential drug interactions. Female participants were told that they should not participate in the study if they could be pregnant. For safety considerations, all participants were given a breathalyzer test to confirm BAC of .000 prior to the start of the session.

Eligible participants then read and signed an informed consent form. All participants completed a pre-mood induction packet including the alcohol survey, DMQ, and PANAS. Next, participants engaged in a MIP designed to induce either a neutral or negative mood (conditions were randomly assigned prior to sessions). A between-subject approach was used to protect against potential carryover effects related to the induced moods (Van Der Does, 2002). Individuals in the neutral group generated three lists (fruits, vegetables, trees) for 10 min to serve as a distraction task from free flowing thought. Participants in the negative mood group were instructed to think about their saddest, most distressing life event reported on life events checklist in their survey questionnaire and to spend 10 min making a list of words or phrases that reminded them of this event. After the MIP was completed, participants completed a post-mood induction packet, including the PANAS and the MCP.

The MCP included money choices ascending from $0 to $20 in 50 cents increments, while the alcohol choice remained at "up to two standard drinks" for each discrete choice item. The alcohol variable was defined on the MCP survey as "up to two 12 ounce beers, two 5 ounce glasses of wine, or two mixed drinks with each containing 1 ounce of alcohol." After completing the packet, participants were instructed to draw a number from an opaque bag and they subsequently received the choice stimulus (alcohol or money) that corresponded with the number drawn. If the randomly drawn choice indicated money, cash payment was provided immediately. If the choice indicated for the participant to be given alcohol, the participant was asked which alcoholic beverage was preferred and it was provided immediately. Alcohol was consumed during the session and participants were given 30 min in which to complete as much of their alcoholic beverages as they wished. Participants were shown a selection of beers, wines, and liquor (served as a shot or with