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PTSD-related alcohol expectancies and impulsivity interact to predict alcohol use severity in a substance dependent sample with PTSD

Katherine Schaumberg^{a,b}, Christine Vinci^{a,b}, Joseph S. Raiker^{a,b}, Natalie Mota^{a,b}, Michelle Jackson^{a,b}, Diana Whalen^{a,b}, Julie A. Schumacher^a, and Scott F. Coffey^{a,*}

^aUniversity of Mississippi Medical Center, United States

^bG.V. (Sonny) Montgomery Veteran Affairs Medical Center, United States

Abstract

Introduction—Problematic alcohol use is highly comorbid with posttraumatic stress disorder (PTSD), and prior work has demonstrated that individuals with PTSD may self-medicate with alcohol in an effort to reduce their symptoms. The combination of impulsivity and alcohol-related expectancies influences the development of problematic drinking patterns. When examining individuals diagnosed with PTSD, PTSD-related alcohol expectancies may be particularly relevant to the etiology of problematic drinking. To date, no studies have specifically examined PTSD-specific alcohol expectancies as they relate to alcohol use severity in a clinical sample.

Methods—The current study examined the relationship between impulsivity, PTSD-related alcohol expectancies, and severity of alcohol use in a sample of 63 individuals diagnosed with comorbid PTSD and substance use disorders who were receiving treatment in a residential substance use treatment program.

Results—Results indicated that PTSD-related alcohol expectancies moderated the relationship between impulsivity and alcohol use severity. Specifically, at low to moderate levels of positive PTSD-related alcohol expectancies, impulsivity significantly predicted alcohol use severity, while impulsivity had no impact on the prediction of alcohol use severity when such expectancies were high. Additionally, the relationship between impulsivity, expectancies, and alcohol use severity was significant for positive, but not negative, PTSD-related alcohol expectancies.

Conclusions—Overall, these results suggest that impulsivity and PTSD-related alcohol expectancies interact to predict alcohol use severity in a comorbid PTSD and substance dependent sample.

*Corresponding author at: Department of Psychiatry and Human Behavior, University of Mississippi Medical Center, Jackson, MS 39216, United States. scoffey@umc.edu (S.F. Coffey).

Contributors

Author Coffey designed the study and wrote the protocol. Authors Vinci and Jackson managed the literature searches and summaries of previous related work. Authors Schaumberg and Raiker undertook the statistical analysis, and authors Schaumberg, Raiker, Vinci, Mota, Jackson, and Whalen wrote the first draft of the manuscript. All authors contributed to and have approved the final manuscript.

Conflict of interest

All authors declare that they have no conflicts of interest.

Keywords

PTSD; Expectancies; Impulsivity; Alcohol

1. Introduction

Considerable research has examined the positive association between alcohol use and impulsivity (see Baer, 2002; Dick et al., 2010 for reviews). Further, impulsivity has primarily been presented as a trait influencing the development of later alcohol use problems (Dick et al., 2010). Research has also established that alcohol-related expectancies predict drinking behaviors and treatment outcomes (e.g., Barnwell & Earleywine, 2006; see Jones, Corbin, & Fromme, 2001, for review). Specifically, individuals reporting positive expectancies related to drinking (i.e., drinking will reduce distress) are more likely to be heavy drinkers (Southwick, Steele, Marlatt, & Lindell, 1981). Research on negative expectancies (i.e., drinking will increase distress) is more limited; however, negative expectancies appear to predict less problematic drinking (Lee, Greely, & Oei, 1999).

One model providing an account of how expectancies relate to the development of alcohol-related problems is the Acquired Preparedness Model, which posits that learned experiences, when combined with underlying personality traits (e.g., impulsivity), may place individuals at risk for developing alcohol use problems (Smith & Anderson, 2001). Studies have also suggested that expectancies interact with other traits to influence the likelihood of risky behaviors (e.g. Fischer, Smith, Anderson, & Flory, 2003; Kushner, Sher, Wood, & Wood, 1994). Further research on potential moderators of the relationship between expectancies and drinking outcomes is indicated, particularly in clinical samples.

1.1. PTSD-related alcohol expectancies

Examination of the relationship between PTSD and alcohol use is important, as these disorders are highly comorbid (Pietrzak, Goldstein, Southwick, & Grant, 2011). One mechanism by which PTSD and alcohol use disorders may be associated is via the self-medication hypothesis, that is, the use of alcohol and/or drugs to manage symptoms of PTSD (e.g., Hruska & Delahanty, 2012; Kaysen et al., 2007). Positive expectancies for PTSD-symptom relief might, therefore, play an important role in self-medicating behavior with alcohol (e.g., Hruska & Delahanty, 2012). Studies investigating alcohol expectancies in trauma-exposed samples indicate that alcohol expectancies are associated with elevated symptoms of PTSD (Peters, Khondkaryan, & Sullivan, 2012; Simpson, 2003; Ullman, Filipas, Townsend, & Starzynski, 2005), as well as alcohol-related problems (Bedard-Gilligan, Kaysen, Desai, & Lee, 2011; Peters et al., 2012; Ullman et al., 2005). Furthermore, alcohol expectancies related to PTSD symptoms appear relevant to alcohol use. In one study, negative PTSD-related alcohol expectancies discriminated between individuals with PTSD and those with an alcohol use disorder, relative to those with no diagnosis, while positive PTSD-related alcohol expectancies discriminated those with an alcohol use disorder from those without an alcohol use disorder (Norman, Inaba, Smith, & Brown, 2008).

1.2. Current study

The present paper examined the impact of impulsivity and both positive and negative PTSD-related alcohol expectancies as predictors of alcohol use severity in a sample of individuals with comorbid PTSD and alcohol dependence. We hypothesized that positive expectancies would moderate the relationship between impulsivity and severity of alcohol use, such that individuals with high levels of both impulsivity and PTSD-related alcohol expectancies would evidence the highest levels of alcohol use severity. No specific hypothesis was made for negative expectancies, given the inconclusive findings of previous studies.

2. Material and methods

2.1. Participants and procedures

Participants included 63 individuals (60.3% men) recruited between 2009 and 2011 from a residential substance use disorder treatment facility, with an average age of 33.95 ($SD = 10.48$). Participants were 85.7% Caucasian, 12.7% African American, and 1.6% Other.

Participants were taken from a larger IRB-approved treatment study examining the efficacy of trauma-focused exposure therapy for PTSD (reference masked for review). A description of the objectives of the larger study was provided to individuals upon presentation to treatment. Participants completed screening measures, and eligible participants were invited to complete a comprehensive assessment. See (reference masked for review) for detailed descriptions of these assessment methods.

All participants had comorbid diagnoses of non-combat related PTSD, and alcohol and drug dependence according to the Diagnostic and Statistical Manual of Mental Disorders criteria (4th ed., text rev.; American Psychiatric Association, 2000), the National Women's Study PTSD Module (Resnick, 1996), the Clinician Administered PTSD Scale (Blake et al., 1995) and Computerized Diagnostic Interview Schedule (Robins et al., 2000). Participants endorsed a median of eight lifetime traumas. Among the most commonly endorsed were: 84.1% physical attack or abuse, 67.1% sexual assault/attempted sexual assault, 66.7% accident, and 41.3% natural disaster. Most commonly endorsed drug diagnoses were as follows: 47.6% cocaine, 39.7% opiate, 36.5% sedative, and 30.2% marijuana.

2.2. Measures

2.2.1. PTSD-Alcohol Expectancy Questionnaire (P-AEQ; Norman et al., 2008)—

The P-AEQ is a 27-item questionnaire assessing individuals' beliefs regarding the effect of alcohol use on PTSD symptom management. The P-AEQ is comprised of two factors: the positive subscale (indicating the belief that alcohol use will reduce PTSD symptoms; $\alpha = .91$) and the negative subscale (indicating the belief that alcohol will make PTSD symptoms worse; $\alpha = .94$). The P-AEQ demonstrated good internal consistency for the current study ($\alpha = .87$ and $.90$ for the positive and negative subscales, respectively).

2.2.2. Difficulties in Emotion Regulation Scale—Impulsivity subscale (DERS-I; Gratz & Roemer, 2004)—

The Impulsivity subscale of the DERS includes six items evaluating difficulty controlling impulsive behavior. The DERS demonstrates good

reliability along with acceptable construct and predictive validity (Gratz & Roemer, 2004; Gratz & Tull, 2010). In this study, Cronbach's alpha for the Impulsivity subscale was .88.

2.2.3. Alcohol Dependence Scale (ADS; Skinner & Horn, 1984)—The ADS is a 25-item self-report questionnaire providing a quantitative measure of severity of alcohol problems over the past 12 months. This questionnaire has shown adequate test–retest reliability, internal consistency, and predictive validity (Connor, Young, Williams, & Ricciardelli, 2000; Ross, 1990; Skinner & Horn, 1984). In this sample, Cronbach's alpha was .89.

2.2.4. Impact of Event Scale— Revised (IES-R; Weiss & Marmar, 1997)—The 22-item IES-R measures the subjective response to a specific traumatic event in the following areas: intrusion, avoidance, and hyper-arousal. This scale has demonstrated good discriminative and predictive validity (Hyer & Brown, 2008; Weiss, 2007). In this study, Cronbach's alpha was .91.

3. Calculation

3.1. Analytic plan

Normality was verified¹ and bivariate correlations between impulsivity, P-AEQ positive and negative expectancies, PTSD symptom severity, and alcohol use severity were computed. Subsequently, separate models were estimated using the PROCESS SPSS macro (Hayes, 2013) to examine P-AEQ positive and negative expectancies as potential moderators of the relationship between impulsivity and alcohol use severity. All variables were mean-centered prior to analyses and corrected for heteroscedasticity as recommended (Hayes, 2013; Hayes & Cai, 2007).

4. Results

4.1. Descriptive statistics and bivariate correlations

Pearson product-moment correlations indicated significant positive relationships between impulsivity and alcohol use severity ($r = .42, p < .01$), impulsivity and PTSD symptom severity ($r = .25, p < .05$), and P-AEQ positive expectancies and alcohol use severity ($r = .25, p < .05$). A significant negative relationship was found between P-AEQ positive and negative expectancies ($r = -.66, p < .001$). There was no significant relationship between impulsivity and P-AEQ positive or negative expectancies or between PTSD symptom severity and P-AEQ expectancies.

4.2. Impulsivity

Results revealed a significant conditional effect of impulsivity on alcohol use severity at the mean value for P-AEQ positive expectancies (see Table 1). Similarly, there was a significant

¹Initial examination of skewness for all variables in the model revealed a significant skew for positive expectancies (Skew = -1.13 ; $SD = .30$). Analyses conducted using a square-root transformation of this variable indicated an identical pattern of results relative to the analyses conducted using the variable in its original metric therefore all models include the variable in its original metric to facilitate interpretability.

conditional effect of impulsivity on alcohol use severity at the mean value of P-AEQ negative expectancies.

4.3. Expectancies

Results revealed a significant conditional effect of P-AEQ positive expectancies on alcohol use severity at the mean value of impulsivity (see Table 1). In contrast, negative expectancies did not exert a significant conditional effect on alcohol use severity at the mean value of impulsivity.

4.4. Interaction effects (impulsivity $\times$ positive/negative expectancies)

A significant moderation of P-AEQ positive expectancies (see Table 1), but not P-AEQ negative expectancies, on the relationship between impulsivity and alcohol use severity was found. Specifically, at lower positive expectancies, there was a significant positive relationship between impulsivity and alcohol use severity; however, as positive expectancies increased, the relationship between impulsivity and alcohol use severity was reduced.

4.5. Exploration of interaction effect

The slope of the relationship between impulsivity and alcohol use severity was computed for scores corresponding to the 10th, 25th, 50th, 75th, and 90th percentiles of positive expectancies to examine the effect of impulsivity on alcohol use severity at varying levels of P-AEQ positive expectancies. This analysis (Fig. 1) revealed that impulsivity was associated positively with alcohol use severity at lower levels of P-AEQ positive expectancies; however, as expectancies increased, the relationship between impulsivity and alcohol use severity weakened. A supplemental analysis utilizing the Johnson–Neyman technique (Hayes, 2013; Johnson & Fay, 1950) revealed that increasing impulsivity was associated with increasing alcohol use until a participant's positive expectancies exceeded a raw score of 55.79, corresponding to approximately the 73rd percentile.

5. Discussion

The current investigation indicated that PTSD-related alcohol expectancies and impulsivity predicted alcohol use severity in a sample of individuals receiving treatment in a residential substance use disorder treatment program. Specifically, as PTSD-related alcohol expectancies increased, the relationship between impulsivity and alcohol use severity weakened. These results point to a need for assessing both impulsivity and expectancies in individuals with a substance use disorder and considering the relative interaction between these two constructs depending on the severity of one or the other, as this may aid in identifying primary versus secondary targets for treatment.

It is notable that impulsivity was no longer a relevant predictor of alcohol use severity at high levels of PTSD-related alcohol expectancies. According to the Acquired Preparedness Model, for instance, one would hypothesize that impulsivity would be particularly relevant in predicting alcohol use severity when PTSD-related alcohol expectancies are high. Differences between the current sample and less severe populations may inform the

interpretation of this finding. For example, high levels of mean impulsivity and PTSD-related alcohol expectancies could have influenced outcomes in the present sample.

5.1. Limitations

Limitations of the current study are as follows. First, the sample size was relatively small reducing the likelihood of detecting small effects. There was limited racial/ethnic diversity among the participants, and these results may not generalize to all racial/ethnic groups. Regarding measures used, impulsivity was measured as a general construct; however, impulsivity is often conceptualized as multi-faceted (e.g., Whiteside & Lynam, 2001) limiting the interpretation of the present findings.

5.2. Clinical implications

Recent work has examined psychopharmacological interventions for improving impulsive behaviors among highly impulsive alcohol-using populations (Schmaal et al., 2012). While these interventions may be promising, psychological interventions (e.g., mindfulness-based interventions, cognitive behavioral therapy [CBT]) may also be beneficial given their successful implementation in treatment of other disorders characterized by impulsivity (e.g. Soler et al., 2012).

Substance use treatment also provides a context where individuals engage in new learning – facilitating shifts in alcohol expectancies – resulting in more successful treatment and maintenance of treatment gains. One recent examination of a CBT program for alcohol dependent individuals found that post-treatment, expectancies related to use had changed (Young, Connor, & Feeney, 2011). Thus, the evaluation of similar interventions on the impact of PTSD-related alcohol expectancies may be indicated.

5.3. Future directions

Future directions include examining PTSD-related alcohol expectancies, impulsivity, and their interaction as predicting outcomes during treatment and through follow-up assessments in individuals diagnosed with comorbid PTSD and substance use disorders. Future investigations may also focus on the impact of decreasing positive PTSD-related alcohol expectancies on treatment outcomes. To date, interventions targeting positive alcohol expectancies in college students have demonstrated greater efficacy relative to didactic learning in reducing positive alcohol expectancies (see Scott-Sheldon, Terry, Carey, Garey, & Carey, 2012, for meta-analysis).

5.4. Conclusions

The current investigation is the first to examine the relationship between PTSD-related alcohol expectancies, impulsivity, and alcohol use severity in a sample of individuals diagnosed with comorbid PTSD and alcohol dependence receiving substance use treatment. Findings suggest that PTSD-related alcohol expectancies interact with impulsivity to predict severity of alcohol use at treatment entry. Providers should assess both impulsivity and PTSD-related alcohol expectancies, in addition to alcohol use and PTSD symptom severity, when working with individuals with comorbid PTSD and substance use disorders.

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HIGHLIGHTS

- A clinical sample of alcohol and drug dependent individuals with PTSD is examined.
- PTSD-related alcohol expectancies are evaluated.
- Positive expectancies and impulsivity interact to predict alcohol use severity.
- Negative expectancies do not relate to impulsivity or alcohol use severity.

Fig. 1.

The relationship between impulsivity and alcohol use severity at increasing levels of expectancies. Closed circles represent expectancy percentiles at which the relationship between impulsivity and alcohol is statistically significant. Closed triangles represent expectancy percentiles at which the relationship between impulsivity and alcohol is not statistically significant.

Table 1

The moderating effect of positive and negative expectancies on the relationship between impulsivity and alcohol use severity.

	b	SE	t	p
<i>Positive expectancies</i>				
b ₁ Impulsivity → alcohol use severity	0.54	0.14	3.79	0.0004
b ₂ Positive expectancies → alcohol use severity	0.23	0.09	2.47	0.02
b ₃ Impulsivity × positive expectancies → alcohol use severity	-0.03	0.01	-2.37	0.02
<i>Negative expectancies</i>				
b ₁ Impulsivity → alcohol use severity	0.61	0.16	3.87	0.0003
b ₂ Negative expectancies → alcohol use severity	-0.10	0.14	-0.71	0.48
b ₃ Impulsivity × negative expectancies → alcohol use severity	0.004	0.02	0.22	0.82

Note. b-Values for b₁ and b₂ reflect unstandardized conditional coefficients when the value of the alternate predictor variable is equal to the mean (e.g., b₁ equal 0.54 at the average level of positive expectancies).

SE = standard error.