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Gender moderates the association between distress tolerance and alcohol use among individuals with opioid use disorder

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Abstract

Background: Alcohol use among individuals with opioid use disorder (OUD) can be dangerous, and understanding factors contributing to alcohol use in this population is important. The current study examined alcohol use among individuals with prescription OUD based on distress tolerance. It was hypothesized that individuals with greater distress tolerance abilities would have a lower frequency and quantity of alcohol use compared to individuals with less distress tolerance. It was also hypothesized that this association would differ based on gender.

Methods: A total of 122 individuals with prescription OUD participated in the current study. Participants completed questionnaires regarding demographics, distress tolerance, mental health symptoms, and frequency and quantity of alcohol in the past 30 days. A regression model was conducted using the alcohol-related variables as outcomes.

Results: There was a significant interaction between gender and distress tolerance on alcohol use frequency. Greater distress tolerance was associated with fewer alcohol use days in women, but there was no association between distress tolerance and alcohol use days in men.

Conclusions: The findings suggest that distress tolerance skills may be key to reducing alcohol use in women with prescription OUD.

Opioid use is a significant public health problem in the United States (Brady et al., 2015; Gostin et al., 2017). During 2016, 18 million Americans misused prescription drugs, and 2.7 million met criteria for opioid use disorder (OUD; Center for Behavioral Health Statistics and Quality, 2016; Hughes et al., 2016). A meta-analysis of US clinical trials found that 38%–45% of patients seeking treatment for OUD met criteria for an alcohol use disorder (Hartzler et al., 2010, 2011). In high doses, both opioids and alcohol independently induce respiratory depression, and concurrent abuse of these substances increases the risk of fatal

Contributors

AKG outlined the manuscript, conducted the analyses, wrote the methods and results, and coordinated the manuscript preparation and submission. JLJ assisted with analyses and wrote the discussion. ADM and CKH wrote the introduction. KTB and SEB provided edits on the manuscript and were responsible for study design and data collection. All authors have approved the final article.

Conflict of interest

No conflict declared.

overdose (Ferri et al., 2014; Sebanjo et al., 2007; Spanagel and Vengeliene, 2013). While extensive prior studies examine opioid and alcohol use individually, significantly less literature characterizes the prevalence, impact, and treatment of co-occurring opioid and alcohol use (Soyka, 2015). Understanding factors influencing alcohol use patterns in the opioid-dependent population is of grave importance.

Distress tolerance is the ability to withstand negative emotional states (Simons and Gaher, 2005) and is associated with alcohol use problems (Gorka et al., 2012; Holzhauer et al., 2017) and drinking to cope with negative emotions (Howell et al., 2010; Vujanovic et al., 2011). Low distress tolerance predicts opioid misuse among patients with chronic pain (McHugh et al., 2016), and opioid relapse is more likely among people with low distress tolerance (Strong et al., 2012). Further, brief treatment targeting distress tolerance can result in decreases in opioid relapse among individuals with OUD (Stein et al., 2015).

Individual differences in distress tolerance may be especially relevant to understanding alcohol use among individuals with OUD. Individuals with OUD report cravings when experiencing withdrawal symptoms, exposure to opioid drug cues, and emotional distress (Back et al., 2015; Hyman et al., 2007), therefore, individuals with OUD and a low threshold for tolerating distress may be at greater risk of consuming alcohol. Among individuals with OUD, women were more likely than men to use additional medications to enhance the effects of pain medication (Back et al., 2009) and reported greater opioid cravings (Back et al., 2011). Further, among individuals engaged in substance use treatment, depressive symptoms were associated with substance use problems among women low in distress tolerance, but this association was not significant for men (Ali et al., 2015).

Current study

The current study examined the association between distress tolerance and alcohol use among individuals who met criteria for prescription OUD. It was hypothesized that greater distress tolerance abilities would be associated with less alcohol use. Because several reports suggest that men with prescription OUD are more likely to use alcohol than women (Back et al., 2011; Hartzler et al., 2011), it was hypothesized that men would use more alcohol than women and that the association between distress tolerance and alcohol use would be moderated by gender.

Methods

Participants

A total of 122 non-treatment seeking participants were recruited as part of a larger laboratory study examining prescription opioid use and stress, which included an overnight hospital stay (Back et al., 2014). Participants had current (past 6 months) prescription OUD defined as meeting the DSM-IV (American Psychiatric Association, 2000) criteria for substance use dependence on opioid analgesics.

Measures

Demographics.—Participants were asked demographic questions including age, gender, marriage status, and employment status.

Prescription opioid use disorder.—Prescription OUD was assessed using a Structured Clinical Interview for DSM-IV (SCID-I; First et al., 2002). Only participants with current (past 6 months) prescription OUD were included in the study.

Alcohol use.—Alcohol use was assessed in an interview using the Timeline Follow-back (TLFB) questionnaire (Sobell and Sobell, 1992). Two alcohol use outcomes were calculated based on answers to the timeline follow-back in the past 30 days: a) percent days using alcohol and b) average number of standard drink units consumed on alcohol using days.

Distress tolerance scale.—The Distress Tolerance Scale (DTS; Simons and Gaher, 2005) was used to assess for distress tolerance abilities. The DTS is a 15-item Likert-type self-report scale with answer choices ranging from strongly agree (1) to strongly disagree (5). Higher scores indicate a higher ability to tolerate distress.

Mental health symptoms.—Participants completed the Beck Depression Inventory-II (BDI-II; Beck et al., 1996) to assess depressive symptoms in the past two weeks. Scores range from 0 to 63, with scores 14–19 indicating mild depression, scores 20–28 indicating moderate depression, and scores 29–63 indicating severe depression. Participants completed a Structured Clinical Interview for DSM-IV (SCID-I; First et al., 2002) to assess for current posttraumatic stress disorder (PTSD).

Study procedure

Participants were recruited through newspaper and other media advertisements. Interested individuals called the researchers and were screened on the phone for preliminary eligibility criteria for a larger experimental study which included a stress task with drug cues.

Exclusion criteria included pregnancy or nursing; BMI > 39; major medical problems or comorbid psychiatric conditions associated with the HPA axis; use of methadone or other opioid replacement therapies in the past three months; use of antihypertensive medications, beta-blockers, synthetic glucocorticoid therapy, or treatment with other agents that may interfere with stress response in the past month. Individuals who met criteria for abuse of other substances were included only if they identified POs as their primary drug of choice. Eligible participants were compensated \$50 if they completed a baseline survey which included both an interview (TLFB) and paper and pencil measures (DTS).

Data analysis

Separate main effects and interaction multivariate regression models were used to predict days of alcohol use and the amount of alcohol use in the past 30 days. Predictors included in the main effects model were age, gender, ethnicity (white vs. ethnic/racial minority), and distress tolerance. The interaction model included all variables in the main effects model and an interaction between distress tolerance and gender. Missing outcome data were handled

via Maximum Likelihood estimation with robust standard errors (MLR). All analyses were conducted in Mplus version 8.

Results

Descriptive statistics are presented in Table 1. In addition to meeting criteria for OUD, a minority of participants met criteria for current alcohol dependence (12.5%), alcohol abuse (8.3%), cannabis dependence (1.7%), cannabis abuse (9.1%), cocaine dependence (7.4%), cocaine abuse (0.8%), sedative dependence (11.6%), or sedative abuse (6.6%).

Results from the main effects model indicated that men (vs. women) and depressive symptoms were associated with less alcohol use days, while younger participants, men (vs. women), being married (vs. other marital status), and greater distress tolerance abilities were associated with amount of alcohol use on use days (see Table 2). However, these main effects should be interpreted with caution due to the presence of a significant interaction.

Results from the interaction regression model indicated that there was a significant interaction between gender and distress tolerance on alcohol use days (see Table 2). Tests of the simple slopes revealed that more distress tolerance was associated with less alcohol use days among women ($B = -19.22$, $p = .011$) but there was no significant association between distress tolerance and alcohol use days among men ($B = -8.67$, $p = .054$). Further, men (vs. women), less depressive symptoms, and unemployment status (vs. employed) were associated with more alcohol use days. There was no interaction between gender and distress tolerance on amount of alcohol used. However, men (vs. women) and younger (vs. older) participants used greater quantities of alcohol on alcohol use days (see Table 2).

Discussion

The current study addressed the gap in the literature regarding factors that influence alcohol use in conjunction with prescription OUD. Gender moderated the association between distress tolerance and frequency of alcohol use among individuals with prescription OUD. Distress tolerance was associated with alcohol use frequency among women, but not men. This new finding may provide insight into the increase in opioid-related deaths among women (March et al., 2018) due to the increased risk of overdose in concurrent alcohol and opioid use. Targeting distress tolerance among women with prescription OUD may be one method reduce alcohol use among women with prescription OUD.

Prior studies have noted gender discrepancies in opioid use patterns. Women have been found to be more likely than men to use opioids to cope with interpersonal stress and negative affect, and they were less likely to use by riskier use methods such as snorting or by injection (Back et al., 2011). Prior analyses have also found differences in primary motivation for use across different substance abusing populations, with prescription opioid users more likely than cocaine or cannabis users to use drugs to improve negative emotions, to test personal control, and to relieve physical discomfort (Hartwell et al., 2012). Consistent with the hypotheses and prior literature, there were gender discrepancies in alcohol use patterns in this non-treatment seeking prescription OUD population. We found that greater distress tolerance abilities were associated with less alcohol use days among women. We

noted that male gender was associated with both more alcohol use days and quantity on alcohol-using days. Although mental health severity likely impacts distress tolerance, distress tolerance stood out as a unique factor associated with alcohol use frequency among women even when mental health symptoms were included in the model. This suggests that potentially even if mental health symptoms are addressed, it still may be necessary to address distress tolerance in order to influence alcohol use among women with prescription OUD. However, it is important to note that participants were non-treatment seeking, so the findings may not generalize to treatment seeking individuals.

Among all individuals, irrespective of OUD diagnosis, there are significant gender differences in alcohol use. Although men use alcohol more frequently and in higher amounts than women, this gender gap is becoming smaller in recent years and the effects of alcohol are more pronounced among women perhaps because women metabolize alcohol differently than men, yielding higher blood alcohol concentration in women compared to men even with the same amount of alcohol (for a review, see McHugh et al., 2017). This gender difference combined with the increased deaths due to prescription opioid use overdoses among women (March et al., 2018) suggests that the sex difference in metabolizing alcohol may exacerbate the gender differences that were found in the current study.

Strengths and limitations

Some of the strengths of the study include relatively robust sample size and use of well-validated assessment tools. Due to the cross-sectional nature of the study, causality between alcohol use and distress tolerance cannot be ascertained. While it seems reasonable that greater distress tolerance ability would enable someone to limit their alcohol intake in response to negative emotions more successfully, it is also possible that greater alcohol use hinders emotional regulation. Furthermore, given that the participants enrolled in the study were non-treatment seeking, their motives for use and associated distress tolerance abilities may be different from participants that are actively desiring to change their substance use patterns. The sample only included individuals who were able to schedule and attend an appointment, and our findings may not be generalizable to populations lacking this ability as their distress tolerance abilities and addiction severity may differ. It was not possible to examine gender as a moderator of the association between a posttraumatic stress disorder on alcohol use among this sample because less than 10% of the sample met criteria for posttraumatic stress disorder. Future research should recruit individuals with posttraumatic stress disorder and prescription OUD to examine the gender differences as well as differences based on distress tolerance within that sample.

Conclusions

As a legal substance of abuse, alcohol represents an important potential polysubstance risk in the prescription OUD population. Our work suggests a need to explore alcohol use patterns in patients with prescription OUD. Teaching distress tolerance skills to women with prescription OUD may decrease the likelihood of alcohol use, which could reduce significant consequences of concurrent opioid and alcohol use. Further work is needed to determine factors impacting the use of alcohol in men with prescription OUD.

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Table 1

Descriptive Statistics of Variables

	Total		Women		Men	
	<i>M (SD)</i>	% (<i>n</i>)	<i>M (SD)</i>	% (<i>n</i>)	<i>M (SD)</i>	% (<i>n</i>)
Age	35.21 (12.12)		37.57 (11.95)		33.08 (11.98)	
Gender (female)		47.50% (58)		-		-
Married (yes/no)		15.60% (19)		22.40% (13)		9.40% (6)
Unemployed (yes/no)		62.30% (76)		72.40% (42)		53.10% (34)
Depressive symptoms	14.26 (10.33)		14.75 (9.55)		13.83 (11.03)	
Current PTSD (yes/no)		9.00% (11)		5.20% (3)		12.5% (8)
Distress tolerance	3.50 (0.93)		3.50 (0.91)		3.49 (0.96)	
Percent alcohol use days	17.26 (26.70)		12.40 (22.25)		21.80 (29.74)	
Number of drinks on alcohol use days	2.89 (3.20)		1.83 (2.45)		3.88 (3.50)	

Table 2

Predictors of Alcohol Use.

	<u>Main Effects Model</u>		<u>Interaction Model</u>	
	β (SE)	<i>P</i>	β (SE)	<i>P</i>
Percent Alcohol Use Days				
Age	−0.09 (0.10)	.349	−0.09 (0.09)	.344
Gender	−0.16 (0.08)	.049	−0.16 (0.08)	.037
White (vs. racial/ethnic minority)	0.01 (0.11)	.920	0.01 (0.10)	.909
Married (vs. other relationship status)	0.02 (0.11)	.863	0.03 (0.11)	.775
Unemployed (vs. employed or student)	0.15 (0.08)	.070	0.17 (0.08)	.043
Depressive symptoms	−0.28 (0.13)	.037	−0.27 (0.13)	.039
Posttraumatic stress disorder	0.13 (0.13)	.306	0.15 (0.12)	.208
Distress tolerance	−0.09 (0.12)	.449	0.46 (0.29)	.106
Gender X distress tolerance	-	-	−0.57 (0.27)	.034
Number of drinks on drinking days				
Age	−0.27 (0.07)	< .001	−0.27 (0.07)	< .001
Gender	−0.21 (0.08)	.008	−0.21 (0.08)	.008
White (vs. racial/ethnic minority)	−0.09 (0.08)	.236	−0.09 (0.08)	.235
Married (vs. other relationship status)	−0.13 (0.07)	.049	−0.13 (0.07)	.055
Unemployed (vs. employed or student)	−0.06 (0.08)	.414	−0.06 (0.08)	.425
Depressive symptoms	0.03 (0.10)	.731	0.03 (0.10)	.730
Posttraumatic stress disorder	0.11 (0.07)	.138	0.11 (0.07)	.131
Distress tolerance	0.24 (0.10)	.016	0.28 (0.30)	.893
Gender X distress tolerance	-	-	−.04 (0.30)	.893
Association between percent drinking days and number of drinks				
Percent drinking days and number of drinks	0.28 (0.09)	.002	0.29 (0.09)	.002