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Stress Moderates the Effect of Childhood Trauma and Adversity on Recent Drinking in Treatment-seeking Alcohol-dependent Men

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Abstract

Objective—This study sought to clarify the relationship between childhood trauma and adversity with later alcohol consumption and the moderating effects of adult psychosocial stress.

Method—Seventy-seven recently abstinent alcohol-dependent men attending residential treatment programs were assessed. Childhood trauma/adversity was assessed with the Childhood Trauma Questionnaire (CTQ), drinks per drinking day (DDD) with the TimeLine Follow Back, and chronic psychosocial stress with the UCLA Stress Interview. Drinking and stress were retrospectively assessed for six months prior to the present treatment episode. Direct associations between childhood trauma/adversity and alcohol consumption and the moderating effects of recent psychosocial stress were assessed. All measures were considered as continuous variables.

Results—Pretreatment drinking severity (DDD) was associated with CTQ Total score ($p = .009$) and the Emotional Abuse ($p < .001$) and Physical Abuse ($p < .01$) subscales. UCLA Total Stress significantly moderated the effects of CTQ Total score on drinking severity ($p = .04$). Whereas higher CTQ scores were significantly associated with a greater amount of pretreatment drinking in participants with high UCLA stress scores ($p = .01$), CTQ scores were not associated with the amount of drinking in those with low UCLA stress scores ($p = .63$).

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Conclusions—Childhood trauma predicts drinking severity in alcohol-dependent men and this effect is stronger in participants with ongoing stress in adult life. These findings suggest that early childhood trauma/adversity may sensitize stress-response systems.

Keywords

stress; alcoholism; childhood trauma; men; trauma

INTRODUCTION

Over three million cases of childhood abuse and neglect are reported annually, with approximately 775,000 of these children showing substantiated evidence of abuse or neglect (U.S. Department of Health and Human Services, 2010). Childhood maltreatment can include both physical (e.g., trauma) and emotional threats or neglect (e.g., adversity); in turn, these experiences appear to predict a significant proportion of adult psychopathology (Afifi et al., 2008; Green et al., 2010). Evidence strongly supports an association between early childhood trauma/adversity with early-onset drinking and the development of future alcohol use disorders (Clark, Lesnick, & Hegedus, 1997; Keyes, Martins, Blanco, & Hasin, 2010; MacMillan et al., 2001). Using a self-report measure obtained from over 17,000 respondents, those reporting adverse childhood experiences endorsed dramatically greater rates of heavy drinking and self-reported alcoholism (Dube, Anda, Felitti, Edwards, & Croft, 2002). Furthermore, alcohol consumption, binge drinking, and alcohol dependence have been retrospectively associated with a prior history of childhood sexual (MacMillan et al., 2001; Mullen, Martin, Anderson, Romans, & Herbison, 1993) and physical (MacMillan et al., 2001; Trent, Stander, Thomsen, & Merrill, 2007) abuse. Although it may be presumed that the experience of childhood trauma and/or adversity may predict the severity of an alcohol use disorder once initiated, to our knowledge this relationship has not been assessed.

Whereas childhood trauma/adversity is a significant risk factor for alcohol-related problems in adulthood, more temporally congruent factors may also impact alcohol use. For example, recent stress is commonly associated with increased alcohol use (Allan & Cooke, 1985; Hart & Fazaa, 2004; Keyes, Hatzenbuehler, & Hasin, 2011) and a number of theoretical models have posited a relationship between stressful life events and an increased likelihood of drinking (Conger, 1956; Cooper, Russell, & George, 1988; Hull, 1981; Pohorecky, 1991; Sher & Levenson, 1982; Wilson, 1983). Furthermore, ongoing life stressors may strengthen the effects of early-life trauma/adversity on drinking. Specifically, early trauma/adversity may have a greater impact on drinking severity in individuals who have elevated levels of chronic stressors. Theoretically, the previous experience of childhood trauma/adversity may sensitize stress-response systems, and even minor stressors may become increasingly capable of triggering emotional/behavioral responses (C. Hammen, Henry, & Daley, 2000); this sensitized response may portend more severe drinking (Schepis, Rao, Yadav, & Adinoff, 2011).

To examine these potential relationships, we retrospectively assessed childhood trauma and adversity, recent (six-month) alcohol use, and recent (six-month) stress in a group of treatment-seeking alcohol-dependent men. We hypothesized that (1) self-reported childhood

trauma/adversity would positively predict the amount of recent alcohol use in alcohol-dependent men, and (2) the relationship between childhood trauma/adversity and the amount of recent drinking would be moderated by self-reported stress, such that greater recent stress would amplify the association of childhood trauma/adversity with drinking.

MATERIALS AND METHODS

Participants

A total of 77 male alcohol-dependent individuals were recruited from a residential treatment center for alcohol dependence at the Dallas Veterans Administration (VA) Medical Center and from Homeward Bound, Inc. Patients met Diagnostic and Statistical Manual of Mental Disorders–Version IV (DSM-IV) criteria for alcohol dependence and reported alcohol as their primary drug of choice and heavy drinking for at least 90 days prior to admission. Exclusion criteria included other active Axis I mood, anxiety (except pre-existing PTSD due to interest in previous trauma), or psychotic disorders. All participants were enrolled in a residential drug and alcohol treatment program at the time of recruitment and assessments were performed following alcohol withdrawal. As there are marked sex differences in the stress response, only men were included in this study.

Study approval was obtained from the Institutional Review Board of the University of Texas Southwestern Medical Center at Dallas and the VA North Texas Health Care System. After a complete description of the study was provided to the participants, consent was obtained. Participants were compensated for their participation. Once eligibility was confirmed, trained research assistants administered all interviews and assessments. Axis I disorders were assessed using the Structured Clinical Interview for DSM IV-Axis I Disorders - Lifetime Version (SCID; (First, Spitzer, Gibbon, & Williams, 1996). The Drinker Inventory of Consequences - Lifetime Consequences (DrInC-2L; (W. R. Miller, Tonigan, & Longabaugh, 1995) assessed lifetime severity of alcohol-related problems and the TimeLine Follow Back (TLFB; (Sobell & Sobell, 1992) assessed drinking history. The TLFB yielded number of days alcohol was consumed and number of standard drinks consumed per day in the six months prior to treatment entry.

Measures

Childhood Trauma Questionnaire (CTQ)—The Childhood Trauma Questionnaire (CTQ) is a self-administered measure that screens for childhood abuse and neglect. Participants respond to 28 questions on a 5-point Likert scale ranging from *Never True* to *Very Often True*. Participants were asked to respond based on their experiences “growing up as a child or teenager.” The CTQ obtains information on five types of maltreatment including emotional, physical, and sexual abuse, and emotional and physical neglect. Items are summed to produce scaled scores ranging from 5–25 to quantify the severity of each type of maltreatment encountered; the higher the score, the greater the severity of maltreatment. CTQ items reflect common definitions of abuse and neglect as found in the childhood trauma literature. Acceptable psychometrics (i.e., internal consistency reliability coefficients .68 to .93; test-retest reliability .79 to .81) have been described for the CTQ for seven clinical and non-referred samples (Bernstein & Fink, 1998). The CTQ also includes a

3-item Minimization/Denial Scale for identifying false-negative trauma reports. Individuals who scored a 3 on this scale were excluded from analyses in this study.

TimeLine Follow Back (TLFB)—The TLFB procedure was developed as a way to aid in the recall of past drinking behaviors and has been shown to have high reliability and validity when individually administered by an interviewer (Sobell & Sobell, 1992). Alcohol consumption was converted into standard drink units and used to calculate drinks per drinking day (DDD) over a participant's lifetime. DDD over the six months prior to treatment was also calculated to coincide with the six-month time frame of the UCLA Life Stress Interview.

UCLA Life Stress Interview (UCLA)—The Life Stress interview is a semi-structured interview that obtains information on both chronic and episodic/acute stress in ten content areas: family relationships, independence from family, close friendships, romantic relationships, social life, school, work, finances, health of subject, and health of family (C. L. Hammen et al., 1995). Stress was modeled after the contextual threat approach of Brown and Harris (G. W. Brown & Harris, 1978). The participant rates chronic stress severity for each of the ten domains over the previous six months. Chronic stress severity ratings range from 1 (*exceptionally good*) to 5 (*extremely stressful and maladaptive*; Rao, Hammen, Ortiz, Chen, & Poland, 2008). Intraclass correlations for test-retest reliability ranged from .73 to .95 with a mean intraclass correlation of .88 (C. L. Hammen et al., 1995). For the purposes of this study, only 8 of the 10 content domains were queried; independence from family and school ratings were omitted as these domains were created for a younger target sample. UCLA severity ratings were totaled (8 to 40) to obtain participant ratings of total chronic stress. The UCLA chronic stress measure does not assess the number of stressful events.

Analytic Plan

All analyses were conducted using SPSS Version 20 (SPSS, Chicago). First, partial correlations were used to investigate the hypotheses that CTQ and DDD were directly related. As age (Keyes & Miech, 2013), education (Ross & Wu, 1995), and race/ethnicity (Caetano, 2003) are associated with drinking severity, these variables were considered as covariates in the partial correlations. Second, a model was developed to determine if the relation between CTQ and DDD was moderated by recent stress (i.e., UCLA total score). Finally, post-hoc analyses were conducted to determine if specific UCLA subscales moderated the relation between CTQ total score and DDD.

RESULTS

Two participants had missing alcohol use and stress data and were therefore excluded from all analyses. In addition, four individuals scored a three on the CTQ minimization/denial scale and were excluded from all analyses that included the CTQ.

The majority of the sample was Caucasian (71.8%) and was 41.9 (± 9.9) years old with 12.2 (± 1.8) years of education (Table 1). Two participants met the criteria for current PTSD and four met criteria for past (more than 6 months previous) PTSD. CTQ Total scores were 41.8 (± 15.1) on average and domain scores ranged from 6.0 (± 3.5) (Sexual Abuse) to 11.4 (± 4.7)

(Emotional Neglect). Participant ratings of psychosocial stress (UCLA) experienced in the past six months were 18.4 (± 5.2) on average. Both six-month and lifetime drinking on the TLFB revealed high levels of alcohol intake (see Table 1).

CTQ Total score ($r = .32, p < .01$) and the CTQ subscales Emotional Abuse ($r = .46, p < .001$) and Physical Abuse ($r = .33, p < .01$) were related to drinking severity (as measured by DDD) during the six months prior to treatment (controlling for age, race, and level of education). The CTQ Total score and UCLA Total Chronic Stress score were not significantly related ($r = .15, p = .22$).

Regression analyses were conducted to determine whether chronic stress (UCLA total score) moderated the relation between childhood trauma/adversity (CTQ total score) and pretreatment drinking (DDD). All analyses included age, race, and education as covariates. Analyses indicated a significant interaction between CTQ total score and UCLA total stress ratings ($\beta = 1.61; t = 2.09, p = .041; R^2 = .294$). As displayed in panel A of Figure 1, for those with low UCLA total stress scores, pretreatment DDD was not significantly different across high and low levels of childhood trauma ($t = .49, p = .63$). However, those with high UCLA total stress scores reported significantly greater pretreatment DDD if they also reported high levels of childhood trauma compared to those who reported lower levels of childhood trauma ($t = 2.71, p = .011$).

Additional post-hoc analyses that included age, race, and education as covariates were run to determine whether specific chronic stress subscale scores moderated the association of childhood trauma with pretreatment drinking (Figure 1). The association of CTQ Total score on DDD was significantly moderated by stress related to the UCLA Romantic Relationships ($\beta = 1.22; t = 2.53, p = .014; R^2 = .291$) and Finances ($\beta = 1.15; t = 2.20, p = .032; R^2 = .296$) subscales. Similar to the relationship observed for total chronic stress, those with low UCLA Romantic Relationship stress scores had similar DDD regardless of their reported level of childhood trauma ($t = .54, p = .59$). However, those who reported higher levels of UCLA Romantic Relationship stress and higher childhood trauma had higher DDD scores than those with high Romantic Relationship stress and low CTQ scores ($t = 3.59, p = .002$). Similarly, in men who reported low UCLA Financial Stress, DDD was similar across high and low CTQ scores ($t = 1.34, p = .19$). However, in men who reported higher levels of UCLA Financial Stress, higher childhood trauma scores yielded higher DDD ($t = 1.80, p = .09$) (see Figure 1 Panel C).

DISCUSSION

Childhood trauma/adversity, particularly emotional and physical abuse, was found to significantly predict recent drinking severity in alcohol-dependent men. Although childhood trauma/adversity has previously been shown to predict later alcohol use in the general population, to our knowledge, a relationship between childhood trauma/adversity and drinking severity in an alcohol-dependent population has not been demonstrated. Thus, not only is childhood abuse a marker of heightened risk for developing an alcohol use disorder, but this early trauma appears to predict disease severity many years following disease onset. The association of childhood trauma with later drinking severity is heightened by ongoing

stress, consistent with our hypothesis that the previous experience of childhood trauma/adversity may sensitize stress-response systems. Consequently, even minor (non-traumatic) stressors appear increasingly capable of accentuating drinking behaviors (Schepis et al., 2011).

The present findings are consistent with a robust literature linking the experience of childhood trauma with later alcohol use disorders and alcohol consumption (Clark et al., 1997; Kendler et al., 2000; Trent et al., 2007). Consistent with the literature that has demonstrated a history of physical abuse is a strong predictor of later alcohol use problems (Clark et al., 1997; Trent et al., 2007), we found childhood physical abuse was significantly associated with drinking severity in this alcohol-dependent sample. In contrast, although sexual abuse is often found to predict the later onset of alcohol problems (Kendler et al., 2000; Mullen et al., 1993), this relationship was not evident in our sample. As the association between childhood sexual abuse and subsequent alcohol use may be strongest in women (Widom, Ireland, & Glynn, 1995), our male-only sample and the relatively low levels of reported sexual abuse may have obscured this relationship. Overall, the prominent relationships among childhood physical and emotional abuse (but not sexual abuse or emotional or physical neglect) and drinking severity suggest a relative specificity in the association of childhood trauma/adversity and later alcohol use in adult alcohol-dependent men.

There was an interaction between childhood trauma/adversity and adult chronic stress in predicting drinking severity. Specifically, those with high levels of childhood trauma/adversity reported higher drinking severity if they also reported high versus low chronic stress. Level of chronic stress had no effect on drinking severity in those who reported low levels of childhood trauma/adversity. These findings extend the recent observations of Young-Wolff et al. (2012). In this report, over 4000 participants in the Virginia Adult Twin Study of Psychiatric and Substance Use Disorders study were assessed for childhood maltreatment, stressful life events, and alcohol use. In women, stressful life events independent of the individual's behavior were found to significantly interact with childhood maltreatment to predict drinking severity.

Our findings demonstrating an interaction between childhood trauma/adversity, drinking severity, and recent chronic stress were significant only for stressors associated with romantic relationships and finances. The patient population, recruited from a public sector and Veterans Administration hospital, may have been particularly susceptible to these types of stressors. Only forty-two percent were employed full-time, possibly leaving the under- or unemployed more predisposed to financial stressors. Similarly, only 8% were married, possibly heightening the likelihood of experiencing problems with romantic relationships rather than family. Other investigators have also reported a relationship between financial problems and drinking severity in a community sample (Jose, van Oers, van de Mheen, Garretsen, & Mackenbach, 2000) and problem drinkers (Humphreys, Moos, & Finney, 1996), higher levels of alcohol abuse in those who have been laid off (Catalano, Dooley, Wilson, & Hough, 1993), and increased binge drinking in the unemployed (Crawford, Plant, Kreitman, & Latham, 1987). A positive association has also been reported between divorce and unfavorable marital status with heavy drinking in men (Jose et al., 2000), between

conflicts in interpersonal relationships and hazardous drinking in Iraqi and Afgan war Veterans (Scott et al., 2013), and romantic breakup stress and substance use in adolescents (Low et al., 2012). However, previous studies have not consistently identified specific stressors as more (or less) related to alcohol use [for review see (Keyes et al., 2011)]. In addition, it should be noted that low levels of support in a UCLA chronic stress domain resulted in a higher stress rating. Thus, other domains (e.g. family, work) may not have moderated drinking severity due to a relative lack of variance in our population.

The moderating effects of chronic stress on the association of childhood trauma with adult drinking severity may explain, at least in part, the mixed findings on the association between stress and drinking reported in the literature. In non-alcohol dependent individuals, for example, there are studies both supporting (Jose et al., 2000; Keyes et al., 2011; Mulia, Ye, Zemore, & Greenfield, 2008) and rejecting (Brennan, Schutte, & Moos, 1999; Breslin, O’Keeffe, Burrell, Ratliff-Crain, & Baum, 1995; Helzer, Badger, Searles, Rose, & Mongeon, 2006; McCreary & Sadava, 2000; Rohsenow, 1982; Schroder & Perrine, 2007) a positive relationship between stressful events and drinking. Laboratory studies of alcohol dependent participants suggest that psychosocial stress increases drinking (P. M. Miller, Hersen, Eisler, & Hilsman, 1974; Thomas, Bacon, Randall, Brady, & See, 2011), stress-induced alcohol craving is associated with later relapse (Sinha et al., 2011), and stressful life events are associated with relapse (S. A. Brown, Vik, Patterson, Grant, & Schuckit, 1995; Keyes et al., 2011). A comprehensive review by Keyes et al. (2011) conceded that while extensive research examining the effects of stress on drinking has been conducted, very few large-scale epidemiological studies have assessed the association of stressful life events with the course of alcohol use disorders after initial onset. Our findings indicate the role of childhood trauma may be critical in understanding the relationship between stress and drinking behaviors in adults following disease onset.

Our findings suggest that ongoing stressors may heighten drinking in non-remitted alcohol-dependent men reporting high levels of childhood trauma. Whereas drinking abstinence should be the primary focus in the treatment of alcohol-dependent patients, the importance of ongoing stress, particularly in those with a history of childhood trauma/adversity, should also be addressed. Childhood trauma should be assessed in all patients. Individuals with high childhood trauma exposure and high current psychosocial stress may require more intensive interventions. Considering the findings of the current study, future research examining whether stress also moderates the association of childhood trauma with alcohol relapse is warranted.

Methodological strengths of the current study include a carefully screened, select population of alcohol-dependent participants. Participants had no active comorbid anxiety or mood disorders, except two with PTSD. Thus, stress was minimally confounded by the effects of other psychiatric disorders, although this also limits generalization of our findings to a select clinical population. Although participants with anxiety (except PTSD) and mood disorders were excluded, participants often reported high levels of pretreatment stress. In contrast to the vast majority of literature assessing trauma, we utilized a continuous measure of trauma. This reflects the common occurrence of trauma in our population of alcohol-dependent men and acknowledges the spectrum of trauma severity. Potential weaknesses include the use of

a retrospective self-report to assess childhood trauma, although this measure has demonstrated validity and reliability (Bernstein & Fink, 1998). The UCLA Stress Interview was administered by an interviewer, providing structured prompts and requiring the interviewer to query and clarify specific areas of stress. However, this measure did not assess the temporal association of stress and alcohol use or alcohol-independent and alcohol-dependent stress events, and both drinking severity and chronic stress were cumulative six-month measures [see Keyes et al. (2011) for discussion of methodological difficulties in assessing alcohol-stress interactions]. While confounds [e.g., effort after meaning (Bartlett, 1932), retrospective reporting] could result in inappropriately strong apparent relationships between reports of stress and alcohol use, this did not appear to be the case. With respect to the alcohol use measure, our data were subject to a restricted range of values. Because all study participants had a current diagnosis of alcohol dependence, the amount of reported alcohol consumption was uniformly high. This high level of alcohol consumption limits the variability in the sample and decreases the likelihood of detecting relationships between the constructs of interest. Nevertheless, in participants with high CTQ scores, moderating effects of stress were observed in alcohol-dependent participants with respect to drinking severity (low stress group – 14.9 DDD, high stress group – 26.1 DDD). All of our measures required retrospective recall of events and a relatively large window of time for which stress scores were generated. The task of recalling chronic stressors encountered over a six-month period and subjectively rating their stressfulness can be difficult, and thus may be prone to recall error. Finally, as there are significant gender differences in childhood trauma and stress response (Seo et al., 2011; Widom, White, Czaja, & Marmorstein, 2007), our findings cannot be generalized to women.

Findings presented are consistent with the possibility that the sensitizing effect of childhood trauma may accentuate even minor (non-traumatic) stressors and lead to an increase in drinking severity in alcohol-dependent men. Thus, due to significant stressors inherent during the recovery process, treatment-seeking individuals who have experienced high levels of childhood trauma may be particularly vulnerable to relapse. The moderating effect of stress on the relationship between childhood trauma and drinking severity suggests a strong need for coping skills, stress management training, and pharmacological treatment early in the recovery process.

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Figure 1.

The effect of childhood trauma/adversity [measured by the Childhood Trauma Questionnaire (CTQ)] upon pretreatment drinks per drinking day (DDD) is moderated by 2a) recent Total Life Stress (measured by the UCLA Life Stress Interview; $t = 2.09$, $p = 0.041$), 2b) Romantic Relationship stress ($t = 2.53$, $p = 0.014$), and 2c) Financial stress ($t = 2.20$, $p = 0.032$). *Denotes significant difference ($p < 0.01$) between low vs. high CTQ in those with high stress.

Table 1

Sample characteristics

	M (SD) or count (%)
Age	41.9 (9.9)
Years of Education	12.2 (1.8)
Race	
White	51 (71.8%)
African American	10 (14.1%)
Hispanic	5 (7.0%)
Other	2 (2.8%)
Marital Status	
Single	32 (45.1%)
Married	6 (8.5%)
Separated	8 (11.3%)
Divorced	24 (33.8%)
Living together	1 (1.4%)
Occupation	
Full-time	30 (42.3%)
Part-time	3 (4.2%)
Student	1 (1.4%)
Unemployed	30 (42.3%)
Other	7 (9.8%)
CTQ ¹ Total	41.8 (15.1)
CTQ Emotional Abuse	8.8 (4.9)
CTQ Physical Abuse	8.2 (3.8)
CTQ Sexual Abuse	6.0 (3.5)
CTQ Emotional Neglect	11.4 (4.7)
CTQ Physical Neglect	7.4 (2.8)
Drinks per Drinking Day 6 months Pretreatment	19.2 (12.3)
Total Drinks 6 Months Pretreatment	2982.2 (2195.2)
Total Drinking Days Pretreatment	151.5 (43.0)
DrInC-2L ²	39.0 (5.6)
UCLA Stress Interview; Subject Rating	
Total	18.4 (5.2)
Close Relationships	1.7 (1.0)
Romantic Relationships	2.3 (1.3)
Social Life	2.1 (1.1)

	M (SD) or count (%)
Family Relationships - Quality	2.3 (1.2)
Work	2.9 (1.4)
Finances	3.5 (1.5)
Health - Subject	1.7 (0.9)
Health - Family	2.0 (1.4)

¹CTQ = Childhood Trauma Questionnaire;

²DrInC-2L = Drinker Inventory of Consequences - Lifetime Consequence