Published in final edited form as:

J Dual Diagn. 2015 ; 11(2): 107–117. doi:10.1080/15504263.2015.1025013.

PTSD Symptoms, Emotion Dysregulation, and Alcohol-Related Consequences Among College Students with a Trauma History

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Abstract

Objective—Posttraumatic stress disorder (PTSD), alcohol use, and alcohol-related consequences have been linked to emotion dysregulation. Sex differences exist in both emotion regulation dimensions and alcohol use patterns. This investigation examined facets of emotion dysregulation as potential mediators of the relationship between PTSD symptoms and alcohol-related consequences and whether differences may exist across sexes.

Methods—Participants included 240 college students with a trauma history who reported using alcohol within the past three months and completed measures of PTSD symptoms, emotion dysregulation, alcohol consumption, alcohol-related consequences, and negative affect. The six facets of emotion dysregulation were examined as mediators of the relationship between PTSD symptoms and alcohol-related consequences in the full sample and by sex.

Results—There were differences in sexes on several variables, with women reporting higher PTSD scores and Lack of Emotional Awareness. Men reported significantly higher drinks per week in a typical week and a heavy week. There were significant associations between the variables for the full sample, with PTSD showing associations with five facets of emotion dysregulation subscales: Impulse Control Difficulties when Upset, Difficulties Engaging in Goal-Directed Behavior, Nonacceptance of Emotional Responses, Lack of Emotional Clarity, and Limited Access to Emotion Regulation Strategies. Alcohol-related consequences were associated with four aspects of emotion dysregulation: Impulse Control Difficulties when Upset, Difficulties Engaging in Goal-Direct Behavior, Nonacceptance of Emotional Responses, and Limited Access to Emotion Regulation Strategies. Two aspects of emotion regulation, Impulse Control Difficulties and Difficulties Engaging in Goal Directed Behavior, mediated the relationship between PTSD symptoms and alcohol-related consequences in the full sample, even after adjusting for the effects

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DISCLOSURES

Ms. Tripp, Dr. McDevitt-Murphy, Ms. Avery, and Dr. Bracken report no financial relationship with commercial interests and, outside of the listed affiliations and acknowledged grant funding, we have no additional income to report. Within the past three years, Ms. Tripp has been employed by the University of Memphis and Department of Veterans Affairs. Dr. McDevitt-Murphy has been employed by from University of Memphis. Ms. Avery has received funding from the University of Memphis and the Bureau of Prisons. Dr. Bracken has been employed by Fellowship Health Resources, the Bureau of Prisons, and the University of Memphis.

of negative affect. When examined separately by gender, Impulse Control Difficulties remained a mediator for men and Difficulties Engaging in Goal Directed Behavior for women.

Conclusions—These analyses shed light on processes that may underlie “self-medication” of PTSD symptoms. Gender-specific interventions targeting emotion dysregulation may be effective in reducing alcohol-related consequences in individuals with PTSD. Women may possibly benefit from interventions that focus on difficulties engaging in goal-directed behavior, while men may benefit from interventions that target impulse control difficulties when upset.

Keywords

posttraumatic stress disorder; emotion dysregulation; alcohol-related consequences; sex differences

Trauma exposure and posttraumatic stress disorder (PTSD) are common among college students, and PTSD frequently co-occurs with other mental health disorders (American Psychiatric Association, 2013). One study found that in a large sample of undergraduate college students, 85% reported experiencing a past Criterion A traumatic event, and over the course of two months 21% had experienced another Criterion A trauma (Frazier et al., 2009). While prevalence estimates of PTSD among college students have varied, studies have shown that approximately 6 to 12% of students with a history of trauma have sufficient symptoms of PTSD to elicit a diagnosis (Bernat et al., 1998; Frazier et al., 2009).

Alcohol use disorders are among the conditions most frequently comorbid with PTSD (Kessler et al., 1995). In one study, approximately two out of five students reported a binge episode (4 or more drinks for women, 5 or more for men) in the past two weeks (O'Malley & Johnston, 2002). There are various negative consequences of alcohol use among college students, including motor vehicular accidents, risky sex, sexual assault, fights, physical assaults, and fatalities (Hingson, Heeren, Winter, & Wechsler, 2005).

While the reasons for the high rates of alcohol abuse in this population are numerous (e.g., increased freedom, less parental control, a change in social dynamics; Corbin, Iwamoto, & Fromme, 2011; Turrisi, Mastroleo, Mallett, Larimer, & Kilmer, 2007), one contributing factor may be the experience of psychological trauma. In a study of mostly female college students, symptoms of posttraumatic stress explained 55% of the variance in alcohol use (Edwards, Dunham, Ries, & Barnett, 2006). Another study found that students with PTSD showed a more hazardous pattern of substance misuse than other students, even those meeting criteria for other diagnoses (McDevitt-Murphy, Murphy, Monahan, Flood, & Weathers, 2010). Some have speculated that alcohol use among individuals with PTSD is a form of “self-medication” (Leeies, Pagura, Sareen, & Bolton, 2010) and this may be true for some college students as well (Read, Merrill, Griffin, Bachrach, & Khan, 2014).

Emotion Regulation

PTSD has also been linked to emotion regulation difficulties (also referred to as “emotion dysregulation;” Boden et al., 2013; Price, Monson, Callahan, & Rodriguez, 2006). Emotion regulation is defined by Gratz and Roemer (2004) as an ability to refrain from impulsive

behavior and engage in goal-directed behavior when experiencing negative emotions, acceptance of emotions, access to emotion regulation strategies perceived as effective, and understanding of emotions. Tull, Barrett, McMillan, and Roemer (2007) found that PTSD symptom severity was related to five facets of emotion dysregulation: Impulse Control Difficulties when Upset, Difficulties Engaging in Goal-Directed Behavior, Nonacceptance of Emotional Responses, Lack of Emotional Clarity, and Limited Access to Emotion Regulation Strategies. Weiss and colleagues (2012) found in a cross-sectional study that college students with probable PTSD reported significantly higher levels of emotion dysregulation relative to students without a history of trauma or those with a trauma history but not PTSD. Another cross-sectional study of retired police officers found that negative mood regulation, a construct similar to emotion dysregulation, was moderately associated with current PTSD severity. Adult PTSD severity was also found to mediate the relationship between childhood victimization and negative mood regulation, furthering evidence that PTSD symptoms may increase the likelihood of emotion dysregulation. A prospective study of individuals in treatment for PTSD found that baseline PTSD predicted future emotion dysregulation (Boden et al., 2013), indicating that the presence of PTSD symptoms may cause disruptions in overall emotional functioning beyond the symptoms alone. A treatment study of individuals with varying traumas and PTSD found that emotion dysregulation improved throughout the course of treatment, demonstrating that emotion dysregulation is possibly a consequence of PTSD (Jerud, Zoellner, Pruitt, & Feeney, 2014). Therefore, emotion dysregulation may be both a risk factor for (Boden et al., 2013; Lilly, London, & Bridgett, 2014), and a consequence of, PTSD (Kulkarni, Pole, & Timko, 2013).

Emotion dysregulation has also been linked to alcohol-related consequences. In a sample of primarily female college students, negative mood regulation expectancies and problem drinking were strongly inversely correlated, indicating that students who had poorer emotion regulation skills were more likely to report problematic drinking (Kassel, Jackson, & Unrod, 2000). Furthermore, negative mood regulation expectancies explained unique variance in predicting problem drinking, even after accounting for age, gender, and alcohol consumption.

Drinking to cope with negative affect may explain elevated alcohol use in individuals experiencing distress (Khantzian, 1997). Those with PTSD may use alcohol to dampen traumatic memories or “escape” from symptoms of PTSD (Brady, Back, & Coffey, 2004). Specifically within college students, individuals drank more on days characterized by higher anxiety, and students were more likely to drink to cope on days when they experienced sadness. Further, drinking to cope has been shown to moderate the relationship between anxiety and alcohol consumption (O’Hara, Armell, & Tennen, 2014). Grayson and Nolen-Hoeksema (2005) found that drinking to regulate emotions (drinking to cope with negative emotions and to enhance positive emotions) mediated the relationship between distress and alcohol-related problems in a sample of individuals who survived childhood sexual assault. Other research has linked emotion dysregulation to alcohol-related consequences (Dvorak et al., 2014; Magar, Phillips, & Hosie, 2008).

Given that PTSD may contribute to worse emotion dysregulation and that emotion dysregulation may contribute to substance misuse, we aimed to explore the role of emotion

dysregulation as a mechanism explaining the relationship between PTSD and alcohol misuse. As psychopathology has been shown to be a risk factor for emotion dysregulation, individuals with PTSD may demonstrate poorer emotion regulation (Gross & Munoz, 1995). This emotion dysregulation may cause these individuals to misuse alcohol to alleviate negative emotionality.

Sex Differences among PTSD, Emotion Dysregulation, Alcohol Consumption, and Alcohol-Related Consequences

Research has shown gender differences in PTSD symptoms, emotion dysregulation, alcohol use, and alcohol-related consequences. Women are at a higher risk of developing PTSD following a traumatic event (Breslau, 2011; Kessler et al., 1995); however, men are more likely to report heavier alcohol consumption (Perkins, 2002) and more alcohol-related consequences (Benton et al., 2004) than women. Men and women may have different emotion regulation styles. In a study that examined emotion regulation in adolescents, girls had higher scores on four facets of emotion dysregulation than boys: Lack of Emotional Clarity, Difficulties Engaging in Goal-Directed Behaviors when Distressed, Nonacceptance of Negative Emotional Responses, and Limited Access to Emotion Regulation Strategies (Neumann, van Lier, Gratz, Koot, 2010). Another study that examined sex as a moderator in the relationship between PTSD and emotion dysregulation in African American college students found that women with a probable diagnosis of PTSD reported higher levels of overall emotion dysregulation, Impulse Control Difficulties when Upset, Limited Access to Emotion Regulation Strategies, and Lack of Emotional Clarity than women without a possible diagnosis of PTSD. Interestingly, emotion dysregulation was not related to a possible PTSD diagnosis for men, indicating that emotion dysregulation may play an important role in the development or maintenance of PTSD for women only (Weiss, Tull, Dixon-Gordon, & Gratz, 2014). Given the gender differences in each of these variables of interest, it is possible that the relationships between these variables would differ for men and women.

Study Aims

Prior research has shown that PTSD and alcohol-related consequences are often associated and that emotion dysregulation has been linked to both PTSD and alcohol-related consequences. Thus we investigated whether emotion dysregulation mediated the relationship between PTSD symptoms and hazardous drinking among college students who had experienced a traumatic event and currently used alcohol. Because negative affect is related to all of the variables of interest (Cohn, Hagman, Moore, Mitchell, & Ehlke, 2014; Martens et al., 2008; Salsman & Linehan) and we were more interested in the ability to regulate emotion, not the negative emotion itself, we chose to adjust for the effects of negative affect in our mediation models. Given evidence of gender differences in each variable of interest, we also investigated the relationships among these variables by sex to examine any potential differences between men and women. We chose a sample of college students, given the high rate of trauma exposure (Vrana & Lauterbach, 1994) and alcohol-related consequences (Weschler & Nelson, 2008) in this population. Young adults' emotion

regulation skills are still developing (Park, Edmondson, & Lee, 2011), and PTSD symptoms and alcohol-related difficulties can interfere significantly with relationships and academic success (American Psychiatric Association, 2013; Perkins, 2002). We hypothesized that overall emotion dysregulation would mediate the relationship between PTSD and alcohol-related consequences, even after adjusting for the effects of negative affect. We conducted exploratory analyses for the various facets of emotion dysregulation. We anticipated unique results for men and women given evidence of gender differences in the variables of interest; however, specific predications could not be made due to the novelty of this research.

METHODS

Participants and Procedure

Participants ($N = 240$) were adult undergraduate college students from introductory psychology courses at a large urban university in the southeastern United States. Participants provided informed consent and completed questionnaires via an online survey, and there originally were 1,070 individuals who completed the survey. Based on pilot testing and inspection of the distribution of completion times in the dataset, individuals who completed the survey in less than 25 minutes ($n = 215$) were removed prior to analyses as this reflected a lower bound on valid completion of the battery. Individuals under the age of 18 were also excluded ($n = 22$), as they were instructed not to complete the survey. We also excluded participants who did not report experiencing of a traumatic event meeting Criterion A in the DSM-IV criteria for PTSD ($n = 58$) and those who did not report alcohol use in the past 3 months ($n = 535$). We excluded recent alcohol abstainers, as past literature has documented an association between PTSD and alcohol-related consequences, but not consumption (McDevitt-Murphy et al., 2010), and we wanted to include only those who are active drinkers in order to accurately assess alcohol-related consequences and reduce a bias towards reporting no consequences. The resulting sample was primarily female (70%, $n = 168$) with a mean age of 21.43 years ($SD = 4.80$). The majority of participants were Caucasian (60%, $n = 145$) or African American (29%, $n = 69$), while the remainder of participants were Hispanic or Latino (3%, $n = 8$), Asian (1%, $n = 3$), multiracial (2%, $n = 4$), Native Hawaiian or Pacific Islander or American Indian or Alaskan Native ($<1\%$, $n = 1$), or other (4%, $n = 10$). As this was an online survey, a description of the study was provided in writing, and participants provided their consent before proceeding to the questionnaires. This study was conducted in accordance with the Declaration of Helsinki and the university Institutional Review Board approved all procedures prior to conducting the study.

Measures

Trauma and PTSD symptoms—Participants provided information about their traumatic experiences using the Life Events Checklist (LEC; Blake et al., 1995). Participants were asked to indicate if they directly experienced, witnessed, or learned about 17 potentially traumatic events. The PTSD Checklist-Specific (PCL-S; Weathers, Litz, Huska, & Keane, 1993) was used to assess past month symptoms of PTSD. The PCL-S is a brief self-report inventory that corresponds to the DSM-IV criteria for PTSD. Items are rated on a scale from 1 (*Not At All*) to 5 (*Extremely*), with total scores ranging from 17 to 85. The stressor-specific version of the PCL asks people to respond with respect to a specific traumatic experience.

Participants were asked to respond to the PCL with respect to the “worst event” identified on the LEC. Internal consistency for the PCL in this sample was excellent ($\alpha = .93$).

Alcohol use—Participants’ alcohol use was assessed with a modified version of the Daily Drinking Questionnaire (DDQ; Collins, Park, & Marlatt, 1985), which asks participants to record alcohol use during a typical week in the past month and the heaviest drinking week within the last 3 months. We individually summed the number of drinks consumed per day in both a typical drinking week in the past month and heaviest drinking week in the past 3 months. This version of the measure has been widely used to assess alcohol consumption in college student samples (Marlatt et al., 1998; Murphy et al., 2004)

Alcohol-related consequences—The Young Adult Alcohol Consequence Questionnaire (YAACQ; Kahler, Strong, & Read, 2005) is a 48-item measure that assesses eight domains of alcohol-related consequences: Social/Interpersonal, Academic/Occupational, Risky Behavior, Impaired Control, Poor Self-Care, Diminished Self-Perception, Blackout Drinking, and Physiological Dependence. Participants were asked to rate each item using a dichotomous “yes/no” format to indicate if they had ever experienced each problem as a result of using alcohol. Cronbach’s alpha in this sample was .94.

Emotion dysregulation—Self-reported emotion dysregulation was assessed with the 36-item Difficulties in Emotion Regulation Scale (DERS; Gratz & Roemer, 2004). Each of the six subscales assesses a different aspect of emotion dysregulation: Impulse Control Difficulties when Upset (IMPULSE; $\alpha = .85$), Difficulties Engaging in Goal-Directed Behavior (GOALS; $\alpha = .87$), Nonacceptance of Emotional Responses (NONACCEPT; $\alpha = .89$), Lack of Emotional Clarity (CLARITY; $\alpha = .81$), Limited Access to Emotion Regulation Strategies (STRATEGIES; $\alpha = .86$), and Lack of Emotional Awareness (AWARE; $\alpha = .86$). Items are scaled from 1 (*Almost Never*) to 5 (*Almost Always*). After reverse scoring some items, items may be summed to create a score from 36 to 180 with higher scores indicating higher emotion regulation deficits. Cronbach’s alpha for the full scale for this sample was .93.

Negative Affect: To measure negative affect we used the Positive and Negative Affect Schedule - Negative Affect scale (PANAS-NA; Watson, Clark, & Tellegen, 1988). This is a 10-item scale that measures different aspects of negative affect such as feelings of guilt, hostility, and nervousness within the past week. The PANAS has been validated in a college student sample (Watson, Clark, & Tellegen, 1988), and Cronbach’s alpha for the Negative Affect scale for this sample was .89.

Data Analysis Plan

Prior to conducting our analyses, we inspected the distributional properties of all variables. Using Tabachnick and Fidell’s (2007) recommendation we corrected any outliers, defined as 3.29 standard deviations above the mean, by assigning a new value that was one value above the most extreme non-outlier value. The first set of analyses was to examine the zero-order correlations among the key variables of interest: PTSD symptoms, emotion dysregulation, alcohol use, and alcohol related consequences. Next, we examined the indirect effects by

calculating bias-corrected 95% confidence interval using bootstrapping, which makes no assumptions about the sampling distribution of the indirect effect (Hayes, 2013). The PROCESS procedure outlined by Hayes (2013) provided estimates of the indirect effect of PTSD on problematic alcohol use through emotion dysregulation subscales while adjusting for negative affect. A nonparametric bootstrap method of 5,000 samples using a confidence interval of 95% was used to test the indirect effect of PTSD symptoms on alcohol-related consequences through the pathway of the six dimensions of emotion dysregulation simultaneously. Significant findings were indicated by a 95% confidence interval that excluded the value zero. We repeated this procedure within men and women separately.

RESULTS

Participants were asked to select the “worst” trauma they had experienced, with transportation accident ($n = 44$, 18%) being the most frequent, followed by sudden, unexpected death of a loved one ($n = 29$, 12%), sudden, violent death ($n = 27$, 11%), sexual assault ($n = 24$, 10%), physical assault ($n = 21$, 9%), severe human suffering ($n = 21$, 9%), life threatening illness or injury ($n = 16$, 7%), assault with a weapon ($n = 15$, 6%), natural disaster ($n = 13$, 5%) “other” stressful event or experience ($n = 12$, 5%), serious accident ($n = 5$, 2%), fire/explosion ($n = 3$, 1%), captivity $n = 2$, 1%), other unwanted sexual experience ($n = 1$, <1%), and combat or exposure to a war-zone ($n = 1$, <1%). There were 6 (3%) individuals who did not report their worst trauma. Table 1 shows a list of means and standard deviations for PCL-S, DERS, and alcohol variables for the full sample and separately by sex. Forty (16%) individuals who completed PCL-S were above the preliminary suggested cut-point of 44 for a positive PTSD screen (Ruggiero, Del Ben, Scott, & Rabalais, 2003). The average DERS score in this sample (88.16 for women; 84.97 for men) was slightly higher than the score Gratz and Roemer (2004) reported in their validation study of the DERS (77.99 for women; 80.66 for men), although this may be due to the fact that the current sample was trauma-exposed while the former was not. T-tests showed differences between sexes on several variables, with women endorsing higher scores on PCL-S [$M = 32.27$, $SD = 13.93$, $t(231) = -2.58$, $p < .05$, two-tailed] than men ($M = 27.53$, $SD = 11.09$), and women also reported significantly higher scores on Lack of Emotional Awareness [$M = 21.74$, $SD = 5.25$, $t(234) = -2.00$, $p < .05$, two-tailed] than men ($M = 20.19$, $SD = 5.93$). Men reported significantly higher scores on DDQ quantity-typical [$M = 10.60$, $SD = 10.83$, $t(236) = 3.69$, $p < .001$, two-tailed] than women ($M = 6.31$, $SD = 6.84$). Men also reported significantly higher scores on DDQ quantity-heavy [$M = 19.89$, $SD = 17.75$, $t(238) = 3.78$, $p < .001$, two-tailed] than women ($M = 12.04$, $SD = 13.26$).

Correlation coefficients were computed to determine the associations among the DERS total, DERS subscales, PCL-S, DDQ, YAACQ, and PANAS-NA (Table 2). All DERS total and subscales were significantly and positively correlated (p 's $< .05$) with one another with the exception of Lack of Emotional Awareness, which was not significantly correlated with three other subscales and was inversely correlated with Nonacceptance of Emotional Responses ($r = -.12$, $p = .01$). PCL-S score was positively correlated with YAACQ and PANAS-NA, but not typical or heaviest week drinking. DERS was positively correlated with YAACQ but not typical or heavy week drinking from the DDQ. PANAS-NA was correlated with DERS and DERS subscales, with the exception of AWARE. PANAS-NA

was correlated with YAACQ and DDQ quantity-heavy but not DDQ quantity-typical. All DERS subscales other than AWARE and CLARITY were significantly correlated with YAACQ scores. Given these correlations, the mediation analyses used YAACQ scores instead of DDQ scores as the dependent variable.

Next, we examined the relationship between PCL-S and YAACQ through the pathway of emotion dysregulation using the PROCESS multiple mediators analyses (Hayes, 2013). The DERS subscales were simultaneously tested as mediators of the relationship between PCL-S and YAACQ using 5,000 bootstrap samples and the models controlled for PANAS-NA. Results of these analyses are presented in Table 3. PCL-S had an indirect effect on YAACQ through two of the six DERS subscales: Impulse Control Difficulties and Difficulties in Engaging in Goal-Directed Behavior.

To determine whether sex differences existed, the same analyses were conducted with the sample split by sex. For men, the indirect path through Impulse Control Difficulties was significant (Table 4); whereas for women, the path through Difficulties in Engaging in Goal-Directed Behavior was significant (Table 5).

DISCUSSION

The purpose of the present research was to investigate the relationships among PTSD symptoms, alcohol-related consequences, and facets of emotion dysregulation. Specifically, we examined whether multiple types of emotion dysregulation mediated the relationship between PTSD symptoms and alcohol-related consequences after adjusting for the effects of negative affect in a sample of trauma-exposed undergraduate students. We also investigated sex differences in these relationships. We found only one difference between sexes in emotion dysregulation, with women scoring higher on Lack of Emotional Awareness. These findings differ from Gratz and Roemer's (2004) study that found that men scored higher on only Lack of Emotional Awareness and also another previous study that found that adolescent females scored higher on four of six emotion dysregulation dimensions (Neumann et al., 2010).

PTSD was associated with alcohol-related consequences, which is consistent with previous research (Read et al., 2012). Also consistent with prior research (Weiss, Tull, Lavender, & Gratz, 2013; Weiss et al., 2012), we found a positive relationship between PTSD symptoms and emotion dysregulation, and this was true for five of the six subscales: Impulse Control Difficulties when Upset, Difficulties Engaging in Goal Directed Behavior, Nonacceptance of Emotional Responses, Lack of Emotional Clarity, and Limited Access of Emotion Regulation Strategies. Typical week drinking was only correlated with one aspect of emotion dysregulation, Lack of Emotional Clarity, although this was a weak correlation ($r = .13$). Heaviest week drinking was not associated with any aspects of emotion dysregulation. The scale assessing alcohol-related consequences was correlated with nearly every aspect of emotion dysregulation. PTSD and emotion dysregulation showed stronger relationships to alcohol-related consequences than to typical alcohol consumption. It is possible that PTSD and emotion regulation deficits are more related to drinking to cope with negative mood states, which may be characterized by episodes of binge drinking, than to

typical week drinking (which may be more influenced by social factors). Drinking for coping reasons has previously been demonstrated to be associated with a riskier pattern of drinking (Kuntsche, Knibbe, Gmel, & Engels, 2005). It is also possible that students with higher symptom levels are more vulnerable to the negative consequences of heavy drinking, perhaps due to engaging in impulsive behavior while drinking.

Looking more specifically at facets of emotion dysregulation, PTSD symptoms had an indirect effect on alcohol-related consequences through Impulse Control Difficulties and Difficulties Engaging in Goal-Directed Behavior in the full sample. When we examined men and women separately, Impulse Control Difficulties remained significant only for men. Men with higher PTSD symptoms may have a higher level of impulsivity that leads to reckless behaviors such as risky alcohol use. For example, one study found that impulsivity mediated the relationship between gender and risk for alcohol problems, in that men had higher levels of motor impulsivity that accounted for the significant difference between genders in alcohol problems (Stoltenberg, Batien, & Birgenheir, 2008). Our findings are consistent with other research that has linked trauma, impulsivity and alcohol-related consequences (Marshall-Berenz, Vujanovic, & MacPherson, 2011; Weiss, Tull, Anestis, & Gratz, 2013), although much of the existing literature uses a definition of impulsivity that includes sensation seeking, lack of perseverance of behaviors, urgency, and lack of premeditation, and this study refers to impulse control with respect to emotion regulation (difficulty remaining in control of behaviors when emotionally upset). It is important to note that urgency, or engaging in impulsive behaviors when experiencing negative affect, and impulse control difficulties are very similar constructs, and urgency may be higher in individuals with PTSD (Weiss, Tull, Anestis, & Gratz, 2013). Interestingly, for women Impulse Control Difficulties when Upset did not mediate the relationship between PTSD symptoms and alcohol-related consequences when all subscales were tested simultaneously, which is inconsistent with findings from research done in clinical samples (Weiss et al., 2013). It is possible that for our sample, which was a college attending and non-treatment seeking group, difficulties controlling impulses when upset play less of a role in alcohol-related consequences than in individuals seeking treatment.

Difficulties Engaging in Goal-Directed Behavior also mediated the relationship between PTSD symptoms and alcohol-related consequences in the full sample, and these results remained significant for women when the sample was split by sex. It is possible that for women, PTSD symptoms, especially “difficulty concentrating,” interferes with motivation to attend to tasks when distressed. Conversely, alcohol use provides short-term symptom reduction. For women struggling with intense negative affect who have difficulty conceiving and tracking even short-term goals, a pattern of risky alcohol use could develop due to the immediate relief it provides. Past research has found relationships between PTSD hyperarousal symptoms (which includes difficulty concentrating) and alcohol consumption (Duranceau, Fetzner, & Carleton, 2014). Further, in that study distress tolerance had an indirect effect on alcohol consumption through the pathway of hyperarousal symptoms. These findings are somewhat consistent with the present findings, indicating that individuals with poor coping skills may be led to use alcohol in the face of difficulties with hyperarousal or goal-achievement. Experimental studies have also shown evidence of a temporal relationship between state distractibility, a component of self-control, to alcohol

consumption. For example, one study found that when male social drinkers were given a reason to restrict their alcohol consumption (due to a future driving test), those whose self-control resources were depleted through instructions to suppress thoughts about a white bear consumed more alcohol than a control group who were instructed to complete arithmetic problems (Muraven et al., 2002). These findings provide evidence that those individuals who demonstrate lower self-control via distractibility, as may be the case in individuals with PTSD who have difficulty concentrating and completing tasks, may be more likely to engage in risky alcohol consumption.

Four facets of emotion dysregulation did not function as mediators of the relationship between PTSD and alcohol-related consequences in the full sample when all subscales were tested simultaneously: Nonacceptance of Emotional Responses, Lack of Emotional Clarity, Limited Access to Emotion Regulation Strategies, and Lack of Emotional Awareness. These dimensions of emotion dysregulation may not impact the relationship between PTSD symptoms and alcohol-related consequences among trauma-exposed undergraduate students or they may not impact the relationship when considered with other emotion regulation facets.

This manuscript sheds light on some of the factors that may contribute to risky drinking among college students, which is an important public health problem (Wechsler, Lee, Kuo, & Lee, 2000). These findings are consistent with prior research linking emotion dysregulation to PTSD, suggesting that individuals with PTSD symptoms and emotion dysregulation may use alcohol as a coping mechanism, possibly leading to problems from alcohol use (Corbin, Farmer, & Nolen-Hoekesma, 2013; Martens et al., 2008). Prior research has shown relationships between emotion dysregulation and alcohol use (Axelrod, Pereplechikova, Holtzman, & Sinha, 2011; Berking et al., 2011; Fox, Hong, & Sinha, 2008; Weiss, Tull, Viana, Anestis & Gratz, 2012). Our findings diverge from a previous study that found that emotion dysregulation did not mediate the relationship between PTSD and alcohol misuse in a sample of active duty, pre-deployment, military service members (Klemanski, Mennin, Borelli, Morrissey, & Aikins, 2012). It is possible that Klemanski and colleagues did not find the same mediational effect for alcohol misuse because the study excluded individuals with substance abuse or dependence, while the current study did not have this exclusion criterion. It is also possible that these related constructs, alcohol misuse (i.e., both symptoms and consequences of alcohol abuse) and alcohol use consequences (i.e., social, academic/occupational, impaired control due to alcohol use), are unique enough to yield different results. Further, another discrepancy is that the previous study examined DERS total score as a mediator rather than DERS subscales, and it is possible that an examination of each DERS subscale may have lead to more findings. Their findings still suggest that the presence of PTSD and emotion dysregulation may lead to poorer outcomes. Our findings also suggest that risky drinking in college students with a trauma history may manifest differently by sex. It is possible that trauma-exposed men with PTSD symptoms display higher levels of externalizing behaviors (e.g., impulse control difficulties), while for women PTSD may be associated with internalizing behavior (e.g., difficulties with goal-directed behavior) but that both of these lead to alcohol-related consequences. This is consistent with past research that has found that men are more likely to display externalized

behavior, while women display internalized behavior (Leadbeater, Kuperminc, Blatt, & Hertzog, 1999).

It is important to note that there are several limitations to the current research. PTSD symptoms were measured with a self-report questionnaire rather than a diagnostic interview, limiting our ability to draw conclusions about individuals who meet diagnostic criteria for PTSD. This concern is tempered by the fact that the PCL has shown exceptional psychometric characteristics in a broad range of populations (Blanchard, Jones-Alexander, Buckley, & Forneris, 1996; Bollinger, Cuevas, Vielhauer, Morgan, & Keane, 2008; Wilkins, Lang, & Norman, 2011), including college students (Adkins, Weathers, McDevitt-Murphy, & Daniels, 2008). The cross-sectional nature of the data limited us from examining change over time or directional relationships. We also used a sample of college students with a trauma history who reported alcohol use during the previous three months, and these findings may not generalize to different populations. To better understand these relationships, future research should include longitudinal designs so that the temporal implications of the meditational model could be examined. As the current study did not include a measure of alcohol as self-medication, or drinking to cope, we were unable to conclude whether emotion dysregulation mediates the relationship between PTSD and drinking to cope. Future studies should examine whether drinking to cope does in fact show similar associations with PTSD and emotion dysregulation. Additionally, it would be informative to use structured interview measures of all of the constructs in order to gather more descriptive information and determine if these relationships differ in more severe populations. Although our subsample size of 70 examining mediation in men was small for many analyses, this was well over the suggested minimum of 25 for bootstrapping mediation (Preacher & Hayes, 2004). There were also a large number of individuals who were excluded for completing the survey too quickly. It is possible that these individuals may have differed from individuals who spent more than 25 minutes on the survey (e.g., greater psychopathology); therefore, it is a limitation that we did not compare those individuals we excluded. Last, we did not compare effect size differences between men and women in this study; therefore, we do not have a clear understanding on the exact sex differences in these meditational models.

There are several clinical implications of our findings. It may be important to assess for PTSD symptoms, alcohol use, alcohol-related consequences, and emotion regulation skills in individuals presenting for treatment with a history of trauma. Teaching individuals who have been exposed to trauma strategies for impulse control and focusing on goal-directed behavior when distressed may help those with PTSD symptoms and alcohol-related consequences as these domains may be related. In fact, emotion regulation treatments have been shown to effectively improve PTSD symptoms (e.g., Skills Training in Affect and Interpersonal Regulation; Cloitre, Koenen, Cohen, & Han, 2002) and risky behaviors (e.g., deliberate self-harm; Gratz, Levy, & Tull, 2012); therefore these treatments may reduce both PTSD symptoms and risky alcohol use in college students with these co-occurring problems. Women with PTSD symptoms may have difficulty reaching short-term goals, as well as concentrating and completing tasks, and distress associated with this may lead to alcohol-related consequences. Men with PTSD symptoms may have impulse control difficulties, which results in more alcohol-related problems. Providing individuals with PTSD symptoms

with tools to accept and regulate negative emotional states may lead to healthier coping styles that do not include alcohol.

Acknowledgments

This material is based on work funded by the National Institute on Alcohol Abuse and Alcoholism (NIAAA) #K23AA016120 awarded to Meghan McDevitt-Murphy, Ph.D.

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Table 1

Means and Standard Deviations of demographics, PTSD Symptoms, Emotion Dysregulation, Alcohol Variables, and Negative Affect and Differences by Sex

Measure	Full Sample (<i>n</i> = 240)		Women (<i>n</i> = 168)		Men (<i>n</i> = 72)		<i>t</i>	<i>df</i>
	<i>M</i> (<i>SD</i>)		<i>M</i> (<i>SD</i>)		<i>M</i> (<i>SD</i>)			
Age (years)	21.43 (4.80)		21.52 (5.08)		21.24 (4.11)		-.42	235
PCL-S	28.61 (12.08)		32.27 (13.93)		27.53 (11.09)		-2.58*	231
DERS	87.45 (16.92)		88.16 (17.45)		84.97 (15.85)		-1.50	234
DERS-IMPULSE	11.91 (3.58)		11.95 (3.73)		11.82 (3.23)		-.15	234
DERS-GOALS	13.05 (3.92)		13.20 (3.81)		12.71 (4.19)		-.88	234
DERS-NONACCEPT	11.67 (5.37)		11.78 (5.82)		11.42 (4.17)		-.53	181,26
DERS-CLARITY	12.91 (2.26)		12.90 (2.19)		12.94 (2.44)		.10	124,98
DERS-STRATEGIES	16.66 (5.25)		16.98 (5.47)		15.93 (4.67)		-1.41	234
DERS-AWARENESS	21.27 (5.50)		21.74 (5.25)		20.19 (5.93)		-2.00*	234
YAACQ	8.51 (8.45)		7.93 (8.30)		9.88 (8.70)		1.64	237
DDQ quantity-typical	7.61 (8.46)		6.31 (6.84)		10.60 (10.83)		3.69***	236
DDQ quantity-heavy	14.39 (15.15)		12.04 (13.26)		19.89 (17.75)		3.78***	238
PANAS-NA	20.07 (7.78)		20.41 (7.98)		19.29 (7.30)		-1.02	232

Note. PCL-S = PTSD Checklist Stressor Specific; DERS = Difficulties in Emotion Regulation Scale; IMPULSE = Impulse Control Difficulties; GOALS = Difficulties Engaging in Goal-Directed Behavior; NONACCEPT = Nonacceptance of Emotional Responses; CLARITY = Lack of Emotional Clarity; STRATEGIES = Limited Access to Emotion Regulation Strategies; AWARE = Lack of Emotional Awareness YAACQ = Young Adult Alcohol Consequences Questionnaire; DDQ = Daily Drinking Questionnaire; PANAS-NA = Positive and Negative Affect Scale-Negative Affect.

Asterisks indicate significant differences between men and women:

* $p < .05$

** $p < .01$

*** $p < .001$

Table 2

Correlations between Emotion Dysregulation, PTSD Symptoms, Alcohol Variables, and Negative Affect

Measure	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. DERS total	.72***	.74***	.72***	.49***	.87***	.35***	.53***	.25**	.05	.01	.57**
2. DERS-IMPULSE	--	.42***	.50***	.27***	.67***	.02	.42**	.26**	.06	-.05	.50**
3. DERS-GOALS	--	--	.48***	.20***	.65***	.12	.38**	.29**	.11	.07	.46**
4. DERS-NONACCEPT	--	--	--	.23***	.70***	-.12*	.47**	.26**	.07	.01	.57**
5. DERS-CLARITY	--	--	--	--	.30***	.25***	.15*	.10	.13*	.02	.24**
6. DERS-STRATEGIES	--	--	--	--	--	.04	.59**	.22**	.03	.01	.59**
7. DERS-AWARE	--	--	--	--	--	--	-.07	-.12	-.10	-.01	.09
8. PCL-S	--	--	--	--	--	--	--	.20**	.10	.15	.45**
9. YAACQ	--	--	--	--	--	--	--	--	.38***	.51***	.26**
10. DDQ-typical	--	--	--	--	--	--	--	--	--	.89***	.09
11. DDQ-heavy	--	--	--	--	--	--	--	--	--	--	.13*
12. PANAS-NA	--	--	--	--	--	--	--	--	--	--	--

Note. PCL-S = PTSD Checklist Stressor Specific; YAACQ = Young Adult Alcohol Consequences Questionnaire; DDQ = Daily Drinking Questionnaire; DERS = Difficulties in Emotion Regulation Scale; IMPULSE = Impulse Control Difficulties; GOALS = Difficulties Engaging in Goal-Directed Behavior; NONACCEPT = Nonacceptance of Emotional Responses; CLARITY = Lack of Emotional Clarity; STRATEGIES = Limited Access to Emotion Regulation Strategies; AWARE = Lack of Emotional Awareness; PANAS-NA = Positive and Negative Affect Scale-Negative Affect.

*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$

Table 3

Summary of Mediation Analysis on the Full Sample (5,000 bootstrap samples; $n = 231$) with Each DERS Subscale Tested Simultaneously while Adjusting for Negative Affect

Independent Variable (IV)	Mediating variable (M)	Dependent variable (DV)	Coefficient	SE	95% CI
PCL-S	---	YAACQ	.09	.10	[-.109, .297]
PCL-S	IMPULSE	YAACQ	.05	.03	[.002, .111]*
PCL-S	GOALS	YAACQ	.07	.02	[.028, .121]*
PCL-S	NONACCEPT	YAACQ	.04	.03	[-.020, .109]
PCL-S	CLARITY	YAACQ	.00	.01	[-.004, .031]
PCL-S	STRATEGIES	YAACQ	-.09	.05	[-.195, .005]
PCL-S	AWARE	YAACQ	.01	.01	[-.004, .025]

Note. CI = confidence interval; PCL-S = PTSD Checklist Stressor Specific; DERS = Difficulties in Emotion Regulation Scale; YAACQ = Young Adult Alcohol Consequences Questionnaire; IMPULSE = Impulse Control Difficulties; GOALS = Difficulties Engaging in Goal-Directed Behavior; NONACCEPT = Nonacceptance of Emotional Responses; CLARITY = Lack of Emotional Clarity; STRATEGIES = Limited Access to Emotion Regulation Strategies; AWARE = Lack of Emotional Awareness.

* Statistical significance determined by confidence intervals excluding zero.

Table 4

Summary of Mediation Analysis for Men (5,000 bootstrap samples; $n = 70^1$) with Each DERS Subscale Tested Simultaneously while Adjusting for Negative Affect

Independent Variable	Mediating Variable	Dependent Variable	Coefficient	SE	95% CI
PCL-S	---	YAACQ	.09	.10	[-.109, .297]
PCL-S	IMPULSE	YAACQ	.11	.07	[.012, .293]*
PCL-S	GOALS	YAACQ	.01	.04	[-.044, .107]
PCL-S	NONACCEPT	YAACQ	.02	.03	[-.017, .137]
PCL-S	CLARITY	YAACQ	.00	.03	[-.341, .088]
PCL-S	STRATEGIES	YAACQ	-.08	.07	[-.293, .027]
PCL-S	AWARE	YAACQ	.01	.02	[-.021, .082]

Note. PCL-S = PTSD Checklist Stressor Specific; DERS = Difficulties in Emotion Regulation Scale. YAACQ = Young Adult Alcohol Consequences Questionnaire; IMPULSE = Impulse Control Difficulties; GOALS = Difficulties Engaging in Goal-Directed Behavior; NONACCEPT = Nonacceptance of Emotional Responses; CLARITY = Lack of Emotional Clarity; STRATEGIES = Limited Access to Emotion Regulation Strategies; AWARE = Lack of Emotional Awareness.

¹ Sample size reduced due to missing data on some variables.

* Statistical significance determined by confidence intervals excluding zero.

Table 5

Summary of Mediation Analysis for Women (5,000 bootstrap samples; $n = 161$) with Each DERS Subscale Tested Simultaneously while Adjusting for Negative Affect.

Independent Variable (IV)	Mediating variable (M)	Dependent variable (DV)	Coefficient	SE	95% CI
PCL-S	---	YAACQ	.04	.06	[-.084, .165]
PCL-S	IMPULSE	YAACQ	.02	.04	[-.045, .096]
PCL-S	GOALS	YAACQ	.10	.03	[.044, .176] *
PCL-S	NONACCEPTANCE	YAACQ	.01	.04	[-.077, .088]
PCL-S	CLARITY	YAACQ	.00	.01	[-.011, .020]
PCL-S	STRATEGIES	YAACQ	-.05	.07	[-.187, .076]
PCL-S	AWARE	YAACQ	.01	.01	[-.006, .034]

Note. PCL-S = PTSD Checklist Stressor Specific; DERS = Difficulties in Emotion Regulation Scale. YAACQ = Young Adult Alcohol Consequences Questionnaire; IMPULSE = Impulse Control Difficulties; GOALS = Difficulties Engaging in Goal-Directed Behavior; NONACCEPT = Nonacceptance of Emotional Responses; CLARITY = Lack of Emotional Clarity; STRATEGIES = Limited Access to Emotion Regulation Strategies; AWARE = Lack of Emotional Awareness.

¹ Sample size reduced due to missing data on some variables.

* Statistical significance determined by confidence intervals excluding zero.