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Impulsivity and Comorbid PTSD-Binge Drinking

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Abstract

Objective: Trauma exposure is common, with estimates of 28 to 90% of adults reporting at least one traumatic event over their lifetime. Those exposed to traumatic events are at risk for alcohol misuse (i.e., binge drinking), posttraumatic stress disorder (PTSD), or both. A potential underlying mechanism for this comorbidity is increased impulsivity—the tendency to act rashly. Little work to date has examined the impact of different impulsogenic traits on this comorbidity.

Methods: This study (n = 162) investigated trauma-exposed young adults (age 21–30) who had endorsed a lifetime interpersonal trauma. Additionally, three impulsogenic traits (motor, non-planning, and attentional) were measured.

Results: Over and above the covariates for age, gender, race, and traumatic events, greater attentional impulsivity was associated with greater likelihood of meeting criteria for PTSD and binge drinking, compared to meeting criteria for PTSD, binge drinking, or neither. Neither non-planning impulsivity nor motor impulsivity exerted unique effects.

Conclusions: Young adults who report difficulty attending to immediate stimuli within their environment may be unable to think about and/or process the traumatic event, potentially increasing risk for PTSD and maladaptive coping skills to manage this distress (e.g., alcohol misuse, binge drinking).

Keywords

Trauma; PTSD; binge drinking; impulsivity; young adults

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Traumatic events are common. An estimated 28–90% of people report lifetime exposure to at least one traumatic event (Benjet et al., 2016). People exposed to traumatic events are at elevated risk for a host of negative outcomes, including Post Traumatic Stress Disorder (PTSD) and alcohol misuse (Grant et al., 2015). These problems often co-occur as a 41.8% lifetime prevalence of alcohol misuse was reported among adults diagnosed with PTSD in the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Pietrzak et al., 2011). Cisler et al. (2012) found that trauma exposure may operate as a risk factor for subsequent development of depression, alcohol misuse, and PTSD symptoms in adolescents. Similarly, people with comorbid PTSD and alcohol misuse report lower quality of life, experience more adverse clinical outcomes, and are more susceptible to re-victimization than those with either condition alone (Debell et al., 2014; Stewart, 1996).

One theory to explain the co-occurrence of PTSD and alcohol misuse is the shared vulnerability model, which posits some factors underlie risk for both conditions (Elwood, Hahn, Olatunji, & Williams, 2009). Higher levels of impulsivity—generally defined as a tendency to act rashly or to engage in potentially risky behavior without adequate forethought (Moeller, Barratt, Dougherty, Schmitz, & Swann, 2001) – may be associated with heightened risk for comorbid presentations of PTSD and alcohol misuse, relative to risk for either PTSD or alcohol misuse alone (Miller, 2003; Weiss, Tull, Viana, Anestis, & Gratz, 2012). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Ed (APA, 2013) now includes “reckless and self-destructive behavior” (i.e., impulsive behavior) as a symptom of PTSD. Trauma reminders that provoke high negative affect may increase the likelihood of impulsive responses, such as drinking more than intended or using alcohol as a means of coping with distress (Dixon, Leen-Feldner, Ham, Feldner, & Lewis, 2009). Thus, individuals with impulsive dispositions may be particularly at risk for developing alcohol misuse and PTSD following trauma (James, 2014; Weiss et al., 2012). Because the construct of impulsivity is multi-faceted (Patton, Stanford, & Barratt, 1995), there is need for a better understanding of which impulsivity related traits are most relevant in increased risk for PTSD and alcohol misuse.

Although a number of different impulsogenic traits have been studied, three that have received considerable attention are motor, non-planning, and attentional impulsivity. Motor impulsivity is one’s likelihood of acting in the spur-of-the-moment without thinking. In contrast, non-planning is difficulty with forethought and self-control related to future events. Attentional impulsivity is the inability to control thought processes and stay focused on one idea (Patton et al., 1995). Attentional impulsivity has been associated with PTSD (Netto et al., 2016) and inconsistently linked to alcohol misuse (Dick et al., 2010; Handley, 2011). Disrupted attentional processes, including difficulties inhibiting or controlling shifting patterns of attention in response to cues, contribute to maintenance of some posttraumatic stress symptoms (i.e., intrusive thoughts, flashbacks) (Bardeen & Orcutt, 2011). It is plausible that attentional impulsivity may be particularly related to PTSD and alcohol misuse given its demonstrated association with PTSD and equivocal association with substance use in prior studies where trauma history was not directly considered (Wit, 2008). Additionally, motor and non-planning impulsivity may be related to comorbid PTSD and alcohol misuse as some people with PTSD have a foreshortened sense of future which may relate to impaired capacity to consider consequences of behavior (e.g., doing things without

thinking/motor impulsivity or not making decisions in a self-controlled manner/non-planning).

This study aims to investigate three different impulsogenic traits (motor, non-planning, and attentional) as predictors of comorbid PTSD and alcohol misuse, specifically binge drinking, among young adults. As our study included a community sample of young adults who did not have alcohol use disorder (discussed more below), and we measured frequency and amount of alcohol use, we wanted to use an index of alcohol misuse that could be compared across studies (i.e., NIAAA's standard binge drinking). Additionally, binge drinking itself has been linked to a host of adverse outcomes (Cisler et al., 2012). The current study investigates these associations over and above the effects of age, sex, race, and number of traumatic events. We hypothesize that attentional impulsivity will confer risk for comorbid PTSD-binge drinking. Given the paucity of research focusing on non-planning and motor impulsivity, we will test in an exploratory manner whether they are associated with comorbid PTSD-binge drinking.

Method

Procedure

Two hundred and fifty-four young adults between the ages of 21 and 30 were recruited to take part in a larger experimental study examining associations between traumatic stress and alcohol use following an applied stressor in young adults. All variables used in the current study were assessed at the baseline visit of this larger study. Informed consent was obtained for all study participants, and this study was conducted in accordance with the Declaration of Helsinki, including the IRB at the first author's institution. Participants were provided a description of the risks and benefits of the study, and were also told that they could choose to end participation at any time with no penalty.

Participants

Participants for the original larger study were recruited through community advertisements and evaluated following consent to determine whether they met criteria for one of three groups: the control group, trauma-exposed (TE) group, or PTSD group. Participants were eligible for the PTSD group if they experienced interpersonal trauma, including emotional, sexual, or physical abuse, and met *DSM-IV* criteria for PTSD (Weathers, 1993). Participants were eligible for the TE group if they reported interpersonal trauma but did not meet full diagnostic criteria for PTSD (i.e., 30 or higher). Participants were eligible for the control group if they did not experience interpersonal trauma and did not meet criteria for PTSD. Thus, the larger study sample ($N = 254$) is comprised of individuals with and without trauma exposure and those with and without PTSD. In terms of the larger study, because the focus was on mechanisms for the development of alcohol use disorder, and the protocol involved an alcohol consumption task (beer taste test paradigm), participants were required to have reported that they consumed alcohol on four or more days in the past month and beer at least once in the past month. However, those with *DSM-IV* defined alcohol dependence were excluded from participating.

Participants for the current study included only the subset of participants from the larger study who were exposed to interpersonal trauma (i.e., TE and PTSD groups) and who were not missing data on binge drinking and PTSD diagnoses (n = 162). Descriptive information on these 162 included participants is below. Due to the aims and procedures used in the larger study

Measures

Covariates

Age, Sex, and Race: Young adults reported on their age (M = 24.61, SD = 2.61), sex (59.9% female), and race (82.7% Caucasian, 9.9% African-American, 7.4% Other). A dummy-coded variable comparing Caucasians to all other participants was created.

Trauma-Related Severity: Using the Life Events Checklist (LEC; (Gray, Litz, Hsu, & Lombardo, 2004)) participants indicated whether they had experienced or witnessed a range of potentially traumatic events (e.g., sexual assault, natural disaster, car accident) and count scores were created for each participant for number of endorsed event types. On average, participants reported experiencing or witnessing 1.59 potentially traumatic event types (SD = 1.13).

A Priori Predictors

Impulsiveness: Participants completed the Barratt Impulsiveness Scale (BIS; (Patton et al., 1995)). Items were grouped into three impulsiveness subscales to correspond with the three impulsivity-related traits identified in Patton et al. (1995)'s analyses: motor impulsiveness (e.g., "I act on the spur of the moment"), attentional impulsiveness (e.g., "I don't concentrate easily"), and non-planning impulsiveness (e.g., "I plan for job security"). Answer choices ranged from 1 (rarely/never) to 4 (almost always/always). Cronbach's Alpha for non-planning impulsiveness was within acceptable levels (i.e., .755). However, Cronbach's alphas for attentional and motor impulsiveness were below acceptable levels ((Nunnally & Bernstein, 1978); <.70; i.e., .568, .655). Therefore, one item from the attentional impulsiveness scale ("I am a steady thinker") and two items from the motor impulsiveness scale ("I am happy-go-lucky" and "I am future-oriented") were omitted. Resulting reliabilities for attentional and motor impulsiveness were within acceptable limits (i.e., . 759, .736). Mean scores were 14.39 (SD = 3.97; range: 7–24; 7 items), 18.34 (SD = 4.30; range: 11–35; 9 items), and 14.19 (SD = 5.14; range: 14–40; 11 items) for attentional, motor, and non-planning impulsiveness, respectively.

Outcome

PTSD and Binge Drinking Groups: The PTSD Checklist (PCL; (Weathers, 1993)) was used as a measure of probable PTSD in the past month and the Timeline Followback for binge drinking (TLFB; (Sobell, Brown, Leo, & Sobell, 1996)). Using the PCL cut score criteria from prior literature (Yehuda et al., 2005), individuals with scores of 30 or higher and who met the minimum symptoms per symptom cluster were given a diagnosis of PTSD.

Using the TLFB, individuals reported drinks each day in the past 30. Using NIAAA's criteria of 4 drinks per occasion for females and 5 for males (NIAAA, 2015), we created a

dichotomous score indicating if participants engaged in past month binge drinking. A grouping variable was created to indicate whether individuals endorsed (a) PTSD and binge drinking, (b) binge drinking but not PTSD, (c) PTSD but not binge drinking, or (d) neither. There were 63 (38.9%) individuals meeting both criteria, 62 (38.3%) meeting criteria for just binge drinking, 16 (9.9%) meeting criteria for just PTSD, and 21 (13%) meeting neither criteria.

Data Analytic Plan—In order to test the effects of study predictors (and in particular facets of impulsiveness) on group membership, multinomial logistic regression analyses were conducted in Mplus Version 6.0 (Muthen & Muthen; 2010). To reduce nonessential multicollinearity prior to conducting logistic regression analyses, continuous variables were centered (Cohen, 2003). Missing data on endogenous variables were estimated as a function of the observed exogenous variables under the missingness at random assumption (Schafer & Graham, 2002). Specifically, full information maximum likelihood (FIML) is the default in Mplus and used in these analyses.

Results

Correlations

Table 1 provides the zero-order Pearson (between two continuous variables), Tetrachoric (two dichotomous variables), and Biserial (dichotomous and continuous variables) correlations among study variables.

Final Study Model

In multinomial logistic regression models, those who endorsed more traumatic events were more likely to meet criteria for both PTSD and binge drinking, compared to just binge drinking alone. Those who were older were more likely to meet criteria for both PTSD and binge drinking, compared to just PTSD alone. No other covariates differentiated those groups. Additionally, no covariates predicted risk for PTSD and binge drinking, versus neither. Those who reported higher levels of attentional impulsivity were more likely to meet criteria for both PTSD and binge drinking, compared to just binge drinking, just PTSD, or neither. Specifically, a one-unit increase in attentional impulsiveness is associated with a .750 ($p < .01$), .776 ($p < .05$), and .329 ($p = .05$) decrease in the relative log odds of being in the binge drinking only, PTSD only, and neither PTSD nor binge drinking groups, compared to the PTSD-binge drinking group. See Table 2 for complete study findings.

Discussion

With the introduction of the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM–5; (APA, 2013)) came the inclusion of “reckless and self-destructive behavior” as a symptom of PTSD, acknowledging the impact of impulsivity-related behaviors in the disorder. The current study sought to clarify links between three different impulsogenic traits (motor, non-planning, and attentional) and comorbid PTSD and binge drinking. We hypothesized that higher levels of attentional impulsivity would predict risk for this comorbidity. Our study hypotheses was supported. Specifically, individuals reporting

higher levels of attentional impulsivity were at greater risk for comorbid PTSD and binge drinking (versus only PTSD or only binge drinking). Increased levels of motor or non-planning impulsivity did not confer this risk.

This effect of attentional impulsivity on comorbid PTSD and binge drinking is consistent with, and also adds to, prior literature. Bardeen and Orcutt (Bardeen & Orcutt, 2011) found that those who score lower on attentional control tend to show higher levels of PTSD. Neto et al. (2016) did not find evidence that motor and non-planning impulsivity were related to the development of PTSD. Interestingly, much of the prior work examining associations between attentional impulsivity or related constructs and substance use have failed to find a significant effect (Cyders, Flory, Rainer, & Smith, 2009; Handley, 2011). However, these studies have not included traumatic event exposure from their models. It is possible that following trauma exposure, attentional processes are exhausted via heightened arousal and re-experiencing symptoms (Buckley, Blanchard, & Neill, 2000), such that those who have particular difficulty attending to immediate stimuli in their environment may be unable to process the traumatic event, increasing risk for PTSD and maladaptive coping skills to manage this distress (e.g, risky substance use). Thus, attentional impulsivity may have a unique impact on substance use in the context of a traumatic event and strongly influence comorbid PTSD-binge drinking compared to either condition alone. To our knowledge, this is the first study finding that higher levels of attentional impulsivity are related to increased risk for comorbid PTSD-binge drinking in a sample of trauma-exposed young adults.

Although the current study adds to the literature on correlates of PTSD-binge drinking comorbidity, it is important to acknowledge its limitations. Analyses included a cross sectional design with only one time point. Thus, we are unable to determine whether greater attentional impulsivity prospectively predicts heightened risk for PTSD-binge drinking, or whether this comorbidity increases risk for attentional impulsivity. Additionally, individuals with alcohol dependence were excluded, so the range is limited with regard to binge drinking. Finally, while we examined three of the most commonly studied impulsogenic traits, there are others that are also worthy of investigation. For instance, negative urgency (which occurs when individuals make decisions quickly under conditions of distress) may be another important facet of impulsivity (Wardell, Quilty, & Hendershot, 2016). Those with high negative urgency often turn to substance use under significant distress (Kaiser et al., 2012;(Adams, Kaiser, Lynam, Charnigo, & Milich, 2012) and substance using individuals with PTSD have exhibited behaviors mediated by negative urgency (Weiss et al. 2015). This direction of research may prove to be a significant contributor in the context of PTSD-binge drinking comorbidity.

In addition to these study limitations, the lack of similarity between some study findings and other research is important to note. Specifically, our current study sample showed much higher rates of PTSD and binge drinking, compared to epidemiological studies (e.g., (Kachadourian, Pilver, & Potenza, 2014; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995). We also did not replicate the findings that there are sex differences in PTSD prevalence and binge drinking (Kachadourian et al., 2014; Pietrzak, Goldstein, Southwick, & Grant, 2012). It is very likely that the discrepancy between our community-based findings and those of prior studies – particularly those using national samples – was due to our over-

sampling of those with PTSD to test study aims, only including individuals who had consumed alcohol on four or more days in the past month (and also consumed beer in the past month), and our choice to balance the number of men and women in the study. Additional work examining sex differences in the associations among impulsivity, trauma, PTSD, and binge drinking using alternative sampling procedures is needed.

Despite these limitations, the results of this investigation demonstrate that attentional impulsivity may be an important construct for better understanding PTSD-binge drinking comorbidity. The study advances this literature in several ways. Specifically, those reporting high levels of attentional impulsivity after a traumatic event appear to be a high risk group on whom prevention/intervention efforts for PTSD and binge drinking should be focused. Furthermore, it may be useful to screen individuals in terms of their attentional impulsivity following trauma in an effort to identify those most in need of intervention.

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Table 1.

Correlations among Study Variables (n = 162).

	1.	2.	3.	4.	5.	6.	7.	8.	9.
1. Age	--								
2. Gender	−.149	--							
3. Race	−.032	−.174*	--						
4. Number of Traumatic Events	.108	−.025	.123	--					
5. Non-planning Impulsiveness	.167	−.137	.024	.386**	--				
6. Attentional Impulsiveness	−.001	−.077	.043	.221	.531***	--			
7. Motor Impulsiveness	.028	.011	.112	.315**	.540***	.527***	--		
8. PTSD-Binge Drinking vs Binge Drinking	−.001	−.026	−.141	−.315**	.024	−.332*	−.127	--	
9. PTSD-Binge Drinking vs PTSD	−.122	−.082	−.111	.111	−.011	−.237	−.198	--	--
10. PTSD-Binge Drinking vs Neither	.052	.056	−.101	−.000	−.391*	−.318 (p = .052)	−.416*	--	--

Note. PTSD = Posttraumatic stress disorder.

* $p < .05$

** $p < .01$

*** $p < .001$.

In group comparisons, PTSD-Binge Drinking group is coded 0, and Binge Drinking only, PTSD only, and neither groups were coded 1 (i.e., negative correlations indicate higher values for the comorbid group); 0 = females, 1 = males; 0 = Caucasian, 1 = African-American or those self-reporting as Other.

Table 2.

Multinomial Logistic Regression Model (n = 162).

	PTSD-Binge Drinking versus Neither			PTSD-Binge Drinking versus PTSD Only			PTSD-Binge Drinking versus Binge Drinking Only		
Predictor	**Standardized *B***	***SE***	**Odds Ratio**	**Standardized *B***	***SE***	**Odds Ratio**	**Standardized *B***	***SE***	**Odds Ratio**
Age	−.047	.183	1.036	−.451 *	.203	.776	−.018	.219	.993
Gender	−.008	.170	.967	−.248	.253	.476	−.090	.209	.823
Race	−.229	.187	.462	−.443	.247	.325	−.281	.182	.597
Number of Traumatic Events	.307	.267	1.680	.468	.290	1.810	−.693 **	.224	.529
Non-planning Impulsiveness	−.274	.346	.911	.370	.401	1.099	.288	.457	1.055
Attentional Impulsiveness	−.329 (p = .05)	.168	.842	−.776 *	.368	.739	−.750 **	.279	.809
Motor Impulsiveness	−.584	.312	.784	−.334	.624	.901	.369	.224	1.087

*Note. B = S*tandardized regression coefficient. *SE* = Standard error; PTSD = Posttraumatic stress disorder.

* $p < .05$

** $p < .01$

*** $p < .001$.

Negative coefficients indicate lower odds of being in the specific group (e.g., Binge Drinking only) compared to the PTSD and Binge Drinking group; for Gender: 0 = females, 1 = males; for Race: 0 = Caucasians, 1 = African-Americans or those self-reporting as Other.