



Published in final edited form as:

Subst Use Misuse. 2019 ; 54(7): 1051–1059. doi:10.1080/10826084.2018.1517173.

Posttraumatic Stress and Hazardous Alcohol Use in Trauma-Exposed Young Adults: Indirect Effects of Self-Disgust

Hannah Sonnier, M.S., C. Alex Brake, M.A., Jessica Flores, B.A., and Christal L. Badour, Ph.D.*

Department of Psychology, University of Kentucky, Lexington, KY, USA

Abstract

Posttraumatic stress disorder (PTSD) and alcohol use disorders are highly co-occurring. Several explanatory models of the relation between PTSD and hazardous alcohol use have been identified. However, the exact nature of this relation is not fully understood. Self-disgust may explain the relation between PTSD symptoms and hazardous drinking. The goal of the current study was to examine whether there was an indirect effect of probable PTSD on hazardous alcohol use via two domains of self-disgust: (disgust with characteristics of the self, disgust with one's behavior). Participants were 376 undergraduate students who reported experiencing at least one Diagnostic and Statistical Manual for DSM Disorders, 5th edition-defined traumatic event. Participants completed self-report measures online, which assessed their trauma exposure, PTSD symptoms, self-disgust, and their alcohol use behaviors. Probable PTSD was indirectly associated with an increased likelihood of engaging in hazardous drinking through the pathway of increased disgust toward one's behaviors. Although probable PTSD was also positively linked to disgust with characteristics of the self, this form of self-disgust was associated with a decreased likelihood of engaging in hazardous drinking, leading to a negative indirect relationship between probable PTSD and hazardous drinking. Overall, this study suggests that the role of self-disgust in the association between PTSD and hazardous drinking is complex, highlighting the need for further research in this area.

Posttraumatic stress disorder (PTSD) is characterized by symptoms of trauma-related intrusions, avoidance of reminders of traumatic events, persistent changes in mood and cognitions, and increases in arousal and reactivity following exposure to a traumatic event (American Psychiatric Association [APA], 2013). Estimates using Diagnostic and Statistical Manual for DSM Disorders, 5th edition (DSM-5) criteria for PTSD suggest that lifetime prevalence of PTSD is 8.3% in a national sample (Kilpatrick et al., 2013). Individuals with PTSD frequently engage in hazardous alcohol use, defined as a pattern and/or quantity of alcohol use that places individuals at risk for adverse health outcomes (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993). Indeed, 36% - 52% of adults with PTSD meet criteria for a co-occurring alcohol use disorder (AUD; see Roberts, Roberts, Jones, & Bisson, 2015),

*Corresponding Author: Christal L. Badour, PhD, Christal.badour@uky.edu, Phone: (859) 323-3817, Address: 207-N Kastle Hall, University of Kentucky, Lexington, KY 40502.

Declaration of Interest: The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

making it the most common comorbid substance-related disorder among this group. Individuals with comorbid PTSD-AUD experience more severe symptoms than PTSD-only individuals (Blanco et al., 2013), as well as greater functional deficits and difficulty completing treatment programs (Riggs, Rukstalis, Volpicelli, Kalmanson, & Foa, 2003).

While there are several explanatory models that account for the relationship between PTSD and use of alcohol and other substances, the *negative reinforcement/self-medication hypothesis* appears to have the most empirical support (Haller & Chassin, 2014). This hypothesis asserts that individuals may use alcohol or other substances to reduce distressing emotions and memories associated with PTSD (Khantzian, 1985). Consistent with this model, Chilcoat and Breslau (1998) found that PTSD symptomatology greatly increased risk of developing a substance use disorder, while substance use only slightly increased the likelihood of developing PTSD. Daily fluctuations in PTSD symptoms are strongly linked to same-day and next day alcohol consumption among individuals with comorbid PTSD and alcohol dependence (Simpson, Stappenbeck, Luterek, Lehavot, & Kaysen, 2014).

Despite a wealth of research linking PTSD to hazardous alcohol use and AUD, research detailing the factors that underlie the relationship between PTSD symptoms and hazardous drinking still requires further examination. One factor that may be relevant in these relations is disgust. Disgust is a core negatively-valenced emotion established as early as Darwin, originally defined as a “distaste” for stimuli that have evolutionary connotations of contamination (Darwin, 1965/1872). However, disgust responses in humans have expanded to include not only food-based triggers, but also certain animals and animal products, stimuli associated with death and decay, and even interpersonal and moral violations (Rozin, 2015). As such, disgust has been theorized as an emotion central to many psychological disorders.

Multiple studies have demonstrated significant links between trauma exposure, PTSD symptoms, and feelings of disgust (Badour & Feldner, in press), including among those for whom the disgust response is directed toward the self (Brake, Rojas, Badour, Dutton, & Feldner, 2017; Dalgleish & Power, 2004; Rüsche et al., 2011). Disgust directed toward the self (i.e., *self-disgust*) refers to feelings of disgust and revulsion directed inwardly toward aspects of oneself, such as physical features, personality traits, or behaviors that are deemed important to the sense of self and not easily changed or cleansed (Powell, Simpson, & Overton, 2013, 2015). Although similarities exist between self-disgust and other cognitive/affective constructs such as shame, guilt, self-dislike, and self-criticism (Powell, Overton, & Simpson, 2013; Power & Dalgleish, 2008; Gilbert, Clarke, Hempel, Miles, & Irons, 2004), mounting evidence suggests self-disgust is a distinct embodied feeling state involving particularly strong visceral physical sensations and unique correlations with major personality traits that distinguish it from these other self-focused experience states (Penley & Tomaka, 2002; Powell et al., 2013; Roberts & Goldenberg, 2007). Furthermore, other work has argued that self-disgust encompasses extreme and problematic emotional responses that lead to maladaptive coping (Whelton & Greenberg, 2005), whereas self-criticism may be more cognitively-based and utilized for the purposes of either positive or negative change (Gilbert, Clarke, Hempel, Miles, & Irons, 2004).

Theory suggests that self-disgust may be involved in the development of negative self-directed attitudes that relate strongly to depression and other mental disorders (Overton et al., 2008; Ille et al., 2014; Powell et al., 2013). Similar negative self-directed expectations and attitudes are often present in individuals who experience PTSD symptoms following a traumatic event (Lee, Scragg, & Turner, 2001). There are at least two pathways through which feelings of self-disgust may emerge following a traumatic experience in a way that is expected to relate to PTSD symptomatology (Badour & Adams, 2015; de Jong & Borg, 2015). First, experiences involving moral or physical violation such as a sexual assault may result in the evaluation that one's body, sense of integrity or morality, or sense of safety has been permanently contaminated or altered in a way that gives rise to persistent and maladaptive feelings of self-disgust. Second, individuals may believe that they should have done something to prevent a traumatic event from occurring or may feel that their failure to act during a traumatic experience allowed something terrible to happen (e.g., preventing the deaths of civilians during combat). These types of appraisals may lead to feelings of self-disgust toward an individual's behavior as well to aspects of their character.

Despite strong theoretical links between PTSD and self-disgust, to date, only two empirical studies have documented a link between PTSD and self-disgust. First, Rüschi and colleagues (2011) demonstrated that individuals experiencing PTSD symptoms have stronger disgust-self association than healthy controls, and work by Brake and colleagues (2017) suggested that self-disgust may serve as a potential mechanism linking PTSD symptoms to other maladaptive outcomes, including suicide risk following exposure to trauma. Neither of these studies considered how self-disgust might relate to alcohol or other substance among individuals with elevated PTSD symptomatology. Considering the prevalence of hazardous alcohol use in individuals with PTSD, as well as the links between coping-related drinking behaviors and other negative self-directed emotions (Treeby & Bruno, 2012), understanding the role of self-disgust is an important and empirically-grounded next step.

Due to the complex nature of the relationship between PTSD and hazardous alcohol use, and the many factors that may predispose an individual to each, it is feasible that self-disgust might mediate the association between them. Overton and colleagues (2008) hypothesized that self-disgust plays a role in the development of the maladaptive emotional self-criticism that is associated with depression. It is possible that PTSD-related feelings of disgust toward characteristics of the self or toward one's behaviors might elicit drinking behaviors intended to lessen these negative feelings and perceptions. To our knowledge, no literature exists that investigates these relationships. Therefore, the current study examined whether PTSD symptoms evidenced an indirect effect on hazardous drinking through two domains of self-disgust (disgust with characteristics of the self, disgust with one's behavior) among a sample of trauma-exposed young adults with or without probable PTSD. Consistent with prior research, it was hypothesized that PTSD symptoms would positively relate to hazardous drinking behavior. Further, it was hypothesized that indirect effects of PTSD symptoms in predicting hazardous drinking behavior would emerge through positive associations with the two domains of self-disgust.

Method

Participants

Participants included 376 undergraduate students (77.9% female; $M_{\text{age}} = 19.00$, $SD = 1.87$) who reported experiencing at least one DSM-5-defined traumatic event (APA, 2013) who completed online batteries of questionnaires including the measures used in this study over the course of two semesters (sample 1: $n = 232$, sample 2: $n = 144$). Participants were 87.0% Caucasian, 6.4% African American, 1.6% Asian, 0.5% American Indian/Alaskan Native, 3.2% multi-racial, and 1.3% other. Hispanic ethnicity was endorsed by 4.5% of the sample. Most distressing traumatic events included sudden violent (17.0%) or accidental death of a loved one (15.7%), life-threatening illness or injury (13.6%), accident (13.6%), natural disaster, fire, or explosion (9.9%), sexual assault or other unwanted sexual experience (8.2%), physical assault (3.0%), combat (0.5%), and other (18.4%).

Measures¹

Traumatic event exposure.—The Life Events Checklist for DSM-5 (LEC-5; Weathers, Blake, et al., 2013) is an updated version of the original LEC (Gray, Litz, Hsu, & Lombardo, 2004) which is a widely used and psychometrically sound self-report questionnaire designed to assess lifetime trauma exposure. Respondents are presented with a list of 17 events defined by the DSM-5 as potentially traumatic (e.g. “natural disaster”) and are asked to indicate whether they experienced the event directly, witnessed the event, learned about the event occurring to someone close to them, or encountered the event as part of their job. Respondents are then asked to indicate which event (in the case of multiple events) they consider to be the “worst event” and to determine whether the event involved threatened or actual serious injury or death, sexual violence, or in the case of a death of a close family member or friend, whether the death was accidental or violent.

Probable PTSD.—Probable PTSD was assessed using the PTSD Checklist for DSM-5 (PCL-5; Weathers, Litz, et al., 2013). The PCL-5 is a 20-item self-report measure to indicate past-month frequency of posttraumatic stress symptoms. Respondents review a list of potential symptoms (e.g. “Repeated, disturbing, and unwanted memories of the stressful experience”) and rate the severity of each symptom on a 5-point Likert scale (0 = Not at all, 4 = Extremely). Total symptom severity was determined as a continuous summation of scores across all items (range 0-80). Consistent with recommendations in a college student sample, probable PTSD was defined as scoring a 37 or higher on the PCL-5 (Blevins et al., 2015). The PCL-5 demonstrates robust internal consistency, test-retest reliability, and convergent and discriminant validity (Blevins et al., 2015). Internal consistency in the current samples was excellent (sample 1: $\alpha = .94$; sample 2: $\alpha = .95$).

Self-disgust.—Self-disgust was assessed using the Self-Disgust Scale (SDS; Overton et al., 2008) The SDS is an 18-item self-report measure that assesses self-disgust on a 7-point Likert-type scale (1 = “Strongly agree”, 7 = “Strongly disagree”). Using factor analysis,

¹The following measures were also administered to participants in both samples, but were not included in the manuscript because they were not deemed relevant to the specific aims of the current study: Difficulties with Emotion Regulation Scale, Dimensional Obsessive Compulsive Scale, Five Factor Mindfulness Scale-Short Form, Three Domains of Disgust Scale, UPPS-P Impulsive Behavior Scale.

Overton and colleagues (2008) demonstrated that items on this scale best represented two domains of self-disgust (range 5-35): disgust toward aspects of oneself (SDS-self [5 items]; e.g., “I find myself repulsive”) and disgust toward aspects of one’s behavior (SDS-ways [5 items]; e.g., “I often do things I find revolting”). Higher scores reflect higher self-disgust. The SDS demonstrates high internal consistency, good test-retest reliability, and convergent validity with established measures of disgust (Overton et al. 2008). Internal consistency in the current sample was good for the SDS-self scale (sample 1: $\alpha = .81$; sample 2: $\alpha = .85$) and acceptable to good for the SDS-ways scale (sample 1: $\alpha = .83$ sample 2: $\alpha = .77$).

Hazardous drinking.—An index of problematic alcohol use was established using the Alcohol Use Disorders Identification Test (AUDIT; Bohn, Babor, & Kranzler, 1995) self-report measure. This 10-item self-report questionnaire assesses alcohol consumption behavior (e.g., “How often do you have six or more drinks on one occasion?”) and alcohol-related problems (e.g., “have you or someone else been injured as a result of your drinking?”). Scores on individual items range from 0-4, with a score of 8 or above distinguishing hazardous drinkers (i.e., those who have an increased risk of developing alcohol-related problems) from non-hazardous drinkers (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001; Bohn et al., 1995). This measure demonstrates strong validity and efficiency in identifying hazardous or harmful drinking (de Meneses-Gaya, Zuardi, Loureiro, & Crippa, 2009) and has been validated across genders and in a wide range of racial/ethnic groups (Allen, Litten, Fertig, & Babor, 1997; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993; Saunders, Aasland, Amundsen, & Grant, 1993). Internal consistency in the current samples was good (sample 1: $\alpha = .87$; sample 2: $\alpha = .85$).

Procedure

Participants were recruited from undergraduate psychology courses to participate in an online research study in exchange for course credit. All procedures were approved by the University IRB and participants provided written informed consent online prior to beginning the survey. Participants used Qualtrics, a secure online survey platform, to complete a demographic questionnaire as well as the LEC, PCL-5, AUDIT, SDS and several other questionnaires not relevant to the current study.

Data Analytic Approach

The SDS-self and SDS-ways scales exhibited substantial positive skew indicative of non-normally distributed data; these variables were thus square-root transformed prior to all analyses. Independent-samples *t*-tests, and chi-square tests of independence were first examined among study variables. A process analysis was then conducted in SPSS 24 using the PROCESS custom dialog (Hayes, 2012) to test the hypothesis that probable PTSD should relate to hazardous drinking through its associations with the two domains of self-disgust, while accounting for biological sex (male, female), which has been linked to differences in PTSD symptomatology, self-disgust, and drinking behavior in prior studies (LaBrie, Lac, Kenney, & Mirza, 2011; Palmeira, Pinto-Gouveia, & Cunha, in press; Tolin & Foa, 2006). A bias-corrected (BC) 95% confidence interval (CI) was used as the criterion for evaluating significance of the indirect effect. A bootstrapping approach with 5000 resamples was employed to assess for the significance of the indirect effects. Significance of the

indirect effect is determined if zero is not included in the CI generated based on the established sampling distribution.

Results

Descriptive statistics.

Participants in sample 1 ($Mage = 18.67$, $SD = 0.94$) were significantly younger than those in sample 2 ($Mage = 19.53$, $SD = 2.69$) $t(165.07) = 3.73$, $p < .001$. However, inclusion of age as a covariate did not change any of the results and was thus not retained as a covariate in final models. No other demographic differences were observed across samples. There were also no differences in the proportion of participants meeting criteria for probable PTSD or hazardous drinking. There were no differences in scores on the SDS-self or SDS-ways scales. Thus, for all remaining analyses data were combined into a single sample.

Of the total sample, 33.2% ($n = 125$) exceeded the cutoff for hazardous drinking and 10.4% ($n = 39$) for probable PTSD. Table 1 displays results from t -tests and chi-square tests among primary study variables. Consistent with prior research, individuals with probable PTSD reported higher scores on the SDS-self and SDS-ways scales compared to trauma-exposed individuals without probable PTSD. Hazardous drinkers reported higher scores on the SDS-ways scale compared to non-hazardous drinkers, and women reported higher scores on the SDS-self scale compared to men.

Primary hypothesis testing.

Figure 1 shows the results of process analysis demonstrating the relationship between probable PTSD and hazardous drinking as well as the indirect effects of the two aspects of self-disgust on that association. The omnibus regression model accounted for a small, but significant portion of the total variance of hazardous drinking (Nagelkerke $R^2 = 3.83$; $-2LL = 457.70$, $p = .03$). The total effect (c path) of probable PTSD on hazardous drinking was not significant. Consistent with hypotheses, relations between probable PTSD and SDS-self (path a_1) and between probable PTSD and SDS-ways (path a_2) were significant and positive. Similar positive associations emerged between SDS-ways and hazardous drinking after controlling for both sex and probable PTSD (path b_2). There was also a significant positive indirect effect of probable PTSD on hazardous drinking through SDS-ways (path ab_2). In contrast to expectations, a significant negative association between SDS-self and hazardous drinking emerged after accounting for sex and probable PTSD (path b_1), resulting in a significant negative indirect effect of PTSD on hazardous drinking through the pathway of SDS-self (path ab_1). Examination of the contribution of individual covariates of sex and probable PTSD suggested that both variables served in conjunction to suppress the negative relationship between SDS-self and hazardous drinking due to their positive associations with SDS-self, suggesting the presence of indirect mediation (MacKinnon, Fairchild, & Fritz, 2007).²

²We also examined alternative models with total PTSD symptom severity and each of the four PTSD symptom clusters (re-experiencing, avoidance, negative alterations in cognition and mood, arousal and reactivity) as separate predictors, and the pattern or results was similar to the primary models presented

Discussion

The self-medication hypothesis suggests that a primary mechanism of PTSD-AUD comorbidity involves engagement in drinking to cope with PTSD symptoms or to reduce other negative affective experiences. The relationship between PTSD and coping-related drinking is well-established (e.g., Simpson et al., 2014), but not well understood. Emerging research suggests a connection between PTSD and self-disgust (Rüsch, et al., 2011; Brake et al., 2017), but much of the relationship between PTSD, self-disgust, and other relevant constructs and behaviors has yet to be examined. The current study supports the preliminary hypothesis that PTSD symptoms may be indirectly associated with hazardous drinking via links with self-disgust; however, this association appears to be complex.

In accordance with previous research (Rüsch, et al., 2011; Brake et al., 2017), the present results offer further evidence that PTSD symptomatology is positively associated with self-disgust. Specifically, individuals with probable PTSD reported higher disgust toward characteristics of themselves (SDS-self) as well as toward their own behavior (SDS-ways) compared to trauma exposed individuals without PTSD. Consistent with theoretical expectations, individuals classified as hazardous drinkers also reported higher disgust toward their own behavior compared to non-hazardous drinkers, and probable PTSD was indirectly associated with hazardous drinking through the pathway of increased SDS-ways. Pending replication in a prospective study, these preliminary results suggest the possibility that individuals with PTSD may be more likely to experience disgust toward their own behaviors, and this may in turn, lead to increased hazardous drinking, perhaps in an effort to cope with feelings of self-disgust. However, given that temporal associations among constructs cannot be established via cross-sectional data, it is equally plausible that feelings of disgust with one's behavior are elicited by drinking behavior in individuals with PTSD. There may be indeed a bidirectional relationship between self-disgust and drinking behavior among individuals with PTSD. Longitudinal research is necessary to explore these possibilities.

Several findings in this study were counter to expectations. First, a direct association between probable PTSD and hazardous drinking was not found. Although several studies have shown that PTSD prospectively predicts drinking problems (Danielson et al., 2009; Wolitzky-Taylor, Bobova, Zinbarg, Mineka, & Craske, 2012), others have failed to document direct links between PTSD and drinking-related outcomes (Najdowski & Ullman, 2009; Walsh et al., 2012), suggesting that PTSD and problem drinking (including hazardous drinking) might be linked via indirect pathways through other intervening factors. Indeed, although the magnitude of the relationship was small, we did find in the current study that probable PTSD was indirectly associated with hazardous drinking via links with self-disgust. In addition to the expected pattern of findings outlined above, whereby probable PTSD was positively associated with hazardous drinking through the pathway of increased SDS-ways, another unexpected indirect pathway also emerged. Specifically, when controlling for sex and probable PTSD, SDS-self was actually associated with a decreased likelihood of being classified as a hazardous drinker, suggesting that the overlap between SDS-self and both sex and probable PTSD were suppressing a significant negative association between probable PTSD and hazardous drinking. This negative association was surprising, and the reason for its emergence is not entirely clear. Although we might expect

greater disgust toward one's characteristics to lead to more hazardous drinking (particularly coping-related drinking), it is easy to imagine that individuals who perceive aspects of their character or personality to be disgusting may be less likely to seek out socially-mediated drinking activities that are common among college students. Instead, such individuals may engage in more isolated coping-related drinking behavior; however, the preliminary nature of the current findings preclude examination of such nuanced questions. It will thus be important for future studies examining links between self-disgust and drinking behavior to consider the context in which drinking occurs as well as motives and expectations for use.

Finally, given that the magnitude of the effects found in this study were quite small, it will be critical for future studies to examine other possible indirect pathways through which PTSD may be related to hazardous drinking. In particular, it may be useful to consider the role of co-occurring depression, given that depression has been previously linked to both alcohol use and self-disgust (e.g., Overton et al., 2008; Powell et al., 2013, 2014; Sullivan, Fiellin, & O'Connor, 2005).

Previous theory and research has linked self-disgust with PTSD symptoms (Badour & Adams, 2015; Brake et al., 2017), as well as associated symptoms of depression (Overton et al., 2008). Separate facets of self-disgust, self and ways, have also been examined in symptomatic contexts, and disgust toward characteristics of oneself rather than disgust toward one's behaviors has more often been predictive of future symptomatology (Overton et al., 2008) and self-damaging behaviors including suicide (Brake et al., 2017) and nonsuicidal self-injury (Smith, Steele, Weitzman, Trueba & Meuret, 2015). Given this previous evidence, it was surprising to find that the facet of disgust toward one's behaviors, rather than oneself, provided a positive indirect link between probable PTSD and hazardous drinking. These findings are additionally in contradiction to previous research noting an inverse relationship between maladaptive alcohol use and guilt, a separate but related negative emotion often experienced in response to specific behaviors or events (Treeby & Bruno, 2012). Consistent with the theory outlined in the introduction, it is possible that elevated disgust toward one's behaviors while experiencing PTSD symptoms might increase one's motivation to engage in alcohol use. In contrast, disgust toward other characteristics of the self while experiencing PTSD symptoms may actually decrease one's motivation to engage in alcohol use overall, or in certain contexts, for reasons that are as of yet unknown.

In addition to the cross-sectional design precluding conclusions regarding temporality, several other limitations of this study must be taken into account. Participants in this study were drawn from an unselected convenience sample of trauma-exposed college students. Given the nature of the sample, it is not surprising that the majority of participants did not meet criteria for probable PTSD. This sample also included predominantly young, White, and female participants, which may limit the generalizability of these findings, particularly given the unique patterns of drinking observed among college students. Finally, this study relied on self-report measures of PTSD symptoms and alcohol use, and both the method and order of assessments may have biased the responses compared to use of structured interviews and biological assessments of alcohol use (e.g., urine drug screens). Future studies should also examine how self-disgust relates to different motives for using alcohol

use (e.g., coping-motivated drinking) and whether the pattern of findings observed in this study are similar following different types of traumatic experiences.

If the present findings are found to replicate among a clinical or treatment-seeking sample of individuals with PTSD, there may be important clinical implications. Self-disgust may be an important construct to take into account during assessment to determine which individuals experiencing PTSD symptoms might be at-risk for developing AUD. Trauma-exposed individuals with particularly strong feelings of self-disgust at their behaviors or related feelings of inappropriate guilt may benefit from interventions that dissuade them from seeking alcohol to reduce these feelings. Similarly, amelioration of feelings of self-disgust at one's behaviors may be an appropriate avenue for intervening in individuals without clinical levels of PTSD symptoms who may engage in hazardous drinking.

Despite these limitations, this study provides preliminary data on an interesting relationship in need of further examination. Self-disgust is emerging as a potential risk factor for psychopathologies typified by negative self-concept. This study contributes to a growing literature examining potential mediators in the relation between PTSD and hazardous drinking, as well as analyzing the role of the under-investigated construct of self-disgust.

Acknowledgements:

The authors would like to acknowledge support from the National Institute on Drug Abuse and Office of Research on Women's Health grant K12 DA035150 (Badour, C.L.; PI: Curry). The views expressed in this article are those of the authors and do not necessarily reflect the position or policy of National Institutes of Health or the United States government. All other authors have no conflicts of interest to disclose.

References

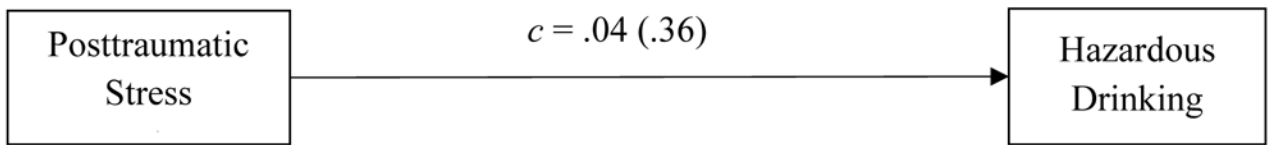
- Allen J, Litten R, Fertig J, & Babor T (1997). A review of research on the Alcohol Use Disorders Identification Test (AUDIT). *Alcoholism: Clinical and Experimental Research*, 21, 613–619.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed). Washington, DC: Author.
- Babor TF, Higgins-Biddle JC, Saunders JB, & Monteiro MG (2001). *The Alcohol Use Disorders Identification Test: Guidelines for Use in Primary Care*. World Health Organization, 2nd ed.
- Badour CL, & Adams TG (2015). Contaminated by trauma: understanding links between self-disgust, mental contamination, and post-traumatic stress disorder In Overton PG, Powell PA, and Simpson J (eds.), *The Revolting Self: Perspectives on the Psychological, Social, and Clinical Implications of Self-Directed Disgust* (pp.127–149). London: Karnac Books Ltd.
- Badour CL, & Feldner MT (in press). The role of disgust in posttraumatic stress: A critical review of the empirical literature. *Psychopathology Review*.
- Blanco C, Xu Y, Brady K, Perez-Fuentes G, Okuda M, & Wang S (2013). Comorbidity of posttraumatic stress disorder with alcohol dependence among US adults: Results from National Epidemiological Survey on Alcohol and Related Conditions. *Drug and Alcohol Dependence*, 132, 630–638. [PubMed: 23702490]
- Blevins C, Weathers F, Davis M, Tracy W, & Domino J (2015). The posttraumatic stress disorder checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress*, 28, 489–498. [PubMed: 26606250]
- Bohn MJ, Babor TF, & Kranzler HP (1995). The Alcohol Use Disorders Identification Test (AUDIT): Validation of a Screening Instrument for Use in Medical Settings. *Journal of Studies on Alcohol*, 56, 423–432. [PubMed: 7674678]

- Brake CA, Rojas SM, Badour CL, Dutton CE, & Feldner MT (2017). Self-disgust as a potential mechanism underlying the association between PTSD and suicide risk. *Journal of Anxiety Disorders*.
- Chilcoat HD, & Breslau N (1998). Investigations of causal pathways between PTSD and drug use disorders. *Addictive Behaviors*, 23(6), 827–840. [PubMed: 9801719]
- Dagleish T, & Power MJ (2004). Emotion-specific and emotion-non-specific components of posttraumatic stress disorder (PTSD): Implications for a taxonomy of related psychopathology. *Behavioral Research and Therapy*, 42 (9), 1069–1088.
- Danielson C, Amstatder A, Dangelmaier R, Resnick H, Saunders B, & Kilpatrick D (2009). Trauma-related risk factors for substance abuse among male versus female young adults. *Addictive Behaviors*, 34, 395–399. [PubMed: 19110381]
- Darwin CR (1965/1872). *The Expression of the Emotions in Man and Animals*. University of Chicago Press: Chicago.
- de Meneses-Gaya C, Zuardi A, Loureiro S, & Crippa J (2009). Alcohol use disorders identification test (AUDIT): An updated systematic review of psychometric properties. *Psychology & Neuroscience*, 2, 83–97.
- Gilbert P, Clarke M, Hempel S, Miles JN, & Irons C (2004). Criticizing and reassuring oneself: An exploration of forms, styles and reasons in female students. *British Journal of Clinical Psychology*, 43(1), 31–50. [PubMed: 15005905]
- Gray M, Litz B, Hsu J, & Lombardo T (2004). Psychometric properties of the Life Events Checklist. *Assessment*, 11(4), 330–341. [PubMed: 15486169]
- Haller M, & Chassin L (2014). Risk pathways among traumatic stress, posttraumatic stress disorder symptoms, and alcohol and drug problems: A test of four hypotheses. *Psychology of Addictive Behaviors*, 23(3), 841–851.
- Hayes AF (2012). PROCESS: A versatile computational tool for observed variable mediation, moderation, and conditional process modeling [White paper]. Retrieved from <http://www.afhayes.com/public/process2012.pdf>
- Ille R, Schögl H, Kapfhammer HP, Arendasy M, Somer M, & Schienle A (2014) Self-disgust in mental disorders -- symptom-related or disorder-specific? *Comprehensive Psychiatry*, 55, 938–943. [PubMed: 24480418]
- Khantzian EJ (1985). The Self-medication hypothesis of addictive disorders: Focus on heroin and cocaine dependence. *American Journal of Psychiatry*, 142, 1259–1264. [PubMed: 3904487]
- Kilpatrick DG, Resnick HS, Milanak ME, Miller MW, Keyes KM, & Friedman MJ (2013). National estimates of exposure to traumatic events and PTSD prevalence using DSM-IV and DSM-5 criteria. *Journal of Traumatic Stress*, 26, 537–547. [PubMed: 24151000]
- LaBrie J, Lac A, Kenney S, & Mirza T (2011). Protective behavioral strategies mediate the effect of drinking motives on alcohol use among heavy drinking college students: Gender and race differences. *Addictive Behaviors*, 36, 354–361. [PubMed: 21215529]
- Lee DA, Scragg P, & Turner S (2001). The role of shame and guilt in traumatic events: A clinical model of shame-based and guilt-based PTSD. *British Journal of Medical Psychology*, 74, 451–466. [PubMed: 11780793]
- MacKinnon D, Fairchild A, & Fritz M (2007). Mediation analysis. *Annual Review of Psychology*, 58, 593–614.
- Najdowski C, & Ullman S (2009). Prospective effects of sexual victimization on PTSD and problem drinking. *Addictive Behavior*, 34, 965–968.
- Overton PG, Markland FE, Taggart HS, Bagshaw GL, & Simpson J (2008). Self-disgust mediates the relationship between dysfunctional cognitions and depressive symptomatology. *Emotion*, 8(3), 379–385. [PubMed: 18540753]
- Palmeira L, Pinto-Gouveia J, & Cunha M (in press). The role of self-disgust in eating psychopathology in overweight and obesity: Can self-compassion be useful? *Journal of Health Psychology*.
- Penley J, & Tomaka J (2002). Associations among the Big Five, emotional responses, and coping with acute stress. *Personality and Individual Differences*, 32, 1215–1228.

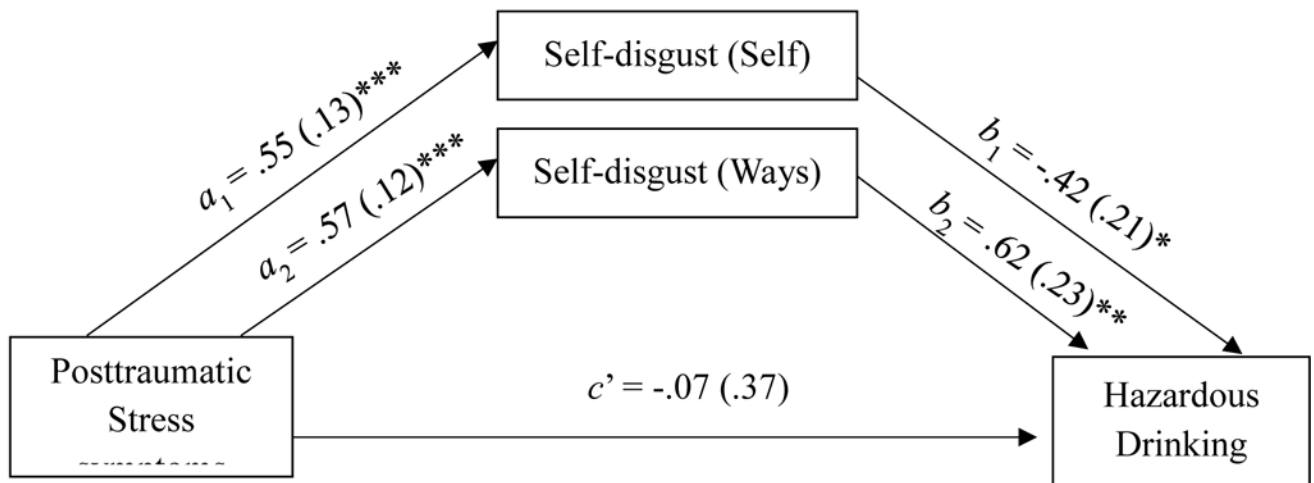
- Powell P, Overton P, & Simpson (2014). The revolting self: An interpretative phenomenological analysis of the experience of self-disgust in females with depressive symptoms. *Journal of Clinical Psychology*, 70, 562–578. [PubMed: 24114769]
- Powell P, Simpson J, & Overton P (2013). When disgust leads to dysphoria: A three-wave longitudinal study assessing the temporal relationship between self-disgust and depressive symptoms. *Cognition and Emotion*, 27, 900–913. [PubMed: 23410007]
- Powell P, Simpson J, & Overton P (2015). An introduction to the revolting self: Self-disgust as an emotion schema In Powell P, Overton P, & Simpson J (Eds.), *The revolting self: Perspectives on the psychological, social, and clinical implications of self-directed disgust* (1-24). London: Karnac Books Ltd.
- Power M, & Dalgleish T (2008). *Cognition and emotion: From order to disorder* (2nd ed). Hove: Psychology Press.
- Riggs DS, Rukstalis M, Volpicelli JR, Kalmanson D, & Foa EB (2003). Demographic and social adjustment characteristics of patients with comorbid posttraumatic stress disorder and alcohol dependence: Potential pitfalls to PTSD treatment. *Addictive Behaviors*, 28(9), 1717–1730. [PubMed: 14656555]
- Roberts T, & Goldenberg J (2007). Wrestling with nature: An existential perspective on the body and gender in self-conscious emotions In Tracy JL, Robins RW, & Tangney JP (Eds.), *The self-conscious emotions: theory and research* (pp. 389–406). New York, NY: Guilford Press.
- Roberts NP, Roberts PA, Jones N, & Bisson JI (2015). Psychological interventions for post-traumatic stress disorder and comorbid substance use disorder: A systematic review and meta-analysis. *Clinical Psychology Review*, 38, 25–38. [PubMed: 25792193]
- Rozin P (2015) *Psychology of Disgust*. International Encyclopedia of the Social & Behavioral Sciences, 2nd Ed Elsevier Ltd.
- Rüsch N, Schulz D, Valerius G, Stiel R, Bohus M, & Schmahl C (2011). Disgust and implicit self-concept in women with borderline personality disorder and posttraumatic stress disorder. *European Archives of Psychiatry and Clinical Neurosciences*, 261(5), 369–376.
- Saunders J, Aasland O, Amundsen A, & Grant M (1993). Alcohol consumption and related problems among primary health care patients: WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption I. *Addiction*, 88, 349–362. [PubMed: 8461852]
- Saunders J, Aasland O, Babor T, De La Fuente J, & Grant M (1993). Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO collaborative project on early detection of persons with harmful alcohol consumption-II. *Addiction*, 88, 791–804. [PubMed: 8329970]
- Simpson J, Hillman R, Crawford T, & Overton PG (2010). Self-esteem and self-disgust both mediate the relationship between dysfunctional cognitions and depressive symptoms. *Motivation and Emotion*, 34(4), 399–406.
- Simpson TL, Stappenbeck CA, Luterek JA, Lehavot K, & Kaysen DL (2014) Drinking motives moderate daily relationships between PTSD symptoms and alcohol use. *Journal of Abnormal Psychology*, 123(1), 237–247. [PubMed: 24661174]
- Smith NB, Steele AM, Weitzman ML, Trueba AF, & Meuret AE (2015). Investigating the role of self-disgust in nonsuicidal self-injury. *Archives of Suicide Research*, 19(1), 60–74. [PubMed: 25010258]
- Sullivan L, Fiellin D, & O'Connor P (2005). The prevalence and impact of alcohol problems in major depression: A systematic review. *The American Journal of Medicine*, 118, 330–341. [PubMed: 15808128]
- Tolin D, & Foa E (2006). Sex differences in trauma and posttraumatic stress disorder: A quantitative review of 25 years of research. *Psychological Bulletin*, 132, 959–992. [PubMed: 17073529]
- Treeby M, & Bruno R (2012). Shame and guilt-proneness: Divergent implications for problematic alcohol use and drinking to cope with anxiety and depression symptomatology. *Personality and Individual Differences*, 53(5), 613–617.
- Walsh K, Danielson C, McCauley J, Hanson R, Smith D, Resnick H, Saunders B, & Kilpatrick D (2012). Longitudinal trajectories of posttraumatic stress disorder symptoms and binge drinking among adolescent girls: The role of sexual victimization. *Journal of Adolescent Health*, 50, 54–59. [PubMed: 22188834]

- Weathers FW, Litz BT, Keane TM, Palmieri PA, Marx BP, & Schnurr PP (2013). The PTSD Checklist for DSM-5 (PCL-5). Scale available from the National Center for PTSD at www.ptsd.va.gov.
- Weathers FW, Blake DD, Schnurr PP, Kaloupek DG, Marx BP, & Keane TM (2013). The Life Events Checklist for DSM-5 (LEC-5). Scale available from the National Center for PTSD at www.ptsd.va.gov.
- Whelton WJ, & Greenberg LS (2005). Emotion in self-criticism. *Personality and Individual Differences*, 38(7), 1583–1595.
- Wolitzky-Taylor K, Bobova L, Zinbarg R, Mineka S, & Craske M (2012). Longitudinal investigation of the impact of anxiety and mood disorders in adolescence on subsequent substance use disorder onset and vice versa. *Addictive Behaviors*, 37, 982–985. [PubMed: 22503436]

A



B



$ab_1 = -.23 (.14)$, 95% Bias Corrected CI [-.59, -.02]
 $ab_2 = .35 (.17)$, 95% Bias Corrected CI [.09, .75]

Figure 1. Diagram of the hypothesized indirect effects model predicting hazardous drinking ($N=376$). A: The total effect of probable PTSD on hazardous drinking. B: The indirect effects model. Unstandardized coefficients are displayed with corresponding standard errors in parentheses. Sex (male, female) was evaluated as a covariate in the total effect and indirect effects model. $*p < .05$, $***p < .001$

Table 1.

Descriptive Information among Primary Study Variables

	Probable PTSD + (<i>n</i> = 39)		Probable PTSD - (<i>n</i> = 337)		
	<i>M</i> (<i>SD</i>) or <i>n</i> (%)		<i>M</i> (<i>SD</i>) or <i>n</i> (%)		<i>t</i> or χ^2 <i>p</i>
1. SDS-self	16.26 (7.07)		11.89 (5.32)		-4.41 < .001
2. SDS-ways	16.00 (5.79)		11.91 (4.96)		-4.59 < .001
3. Hazardous drinkers	13 (10.4)		26 (10.4)		0.00 .99
4. Sex (female)	39 (84.6)		337 (77.2)		1.13 .29
Non-Hazardous Drinkers					
	Hazardous Drinkers (<i>n</i> = 125)		Non-Hazardous Drinkers (<i>n</i> = 251)		
	<i>M</i> (<i>SD</i>) or <i>n</i> (%)		<i>M</i> (<i>SD</i>) or <i>n</i> (%)		<i>t</i> or χ^2 <i>p</i>
1. SDS-self	12.21 (5.54)		12.41 (5.75)		0.24 .81
2. SDS-ways	13.06 (5.23)		11.97 (5.15)		-2.02 .04
3. Sex (female)	91 (72.8)		202 (68.9)		2.86 .09
	Female (<i>n</i> = 293)		Male (<i>n</i> = 83)		
	<i>M</i> (<i>SD</i>) or <i>n</i> (%)		<i>M</i> (<i>SD</i>) or <i>n</i> (%)		<i>t</i> or χ^2 <i>p</i>
1. SDS-self	12.76 (5.89)		10.87 (4.59)		-2.89 .004
2. SDS-ways	12.12 (5.25)		13.08 (4.96)		1.65 .10

Note: SDS = Self-Disgust Scale; Untransformed means presented in table for ease of interpretation. *t*-tests performed on square-root transformed variables for SDS-self and SDS-ways