



# HHS Public Access

Author manuscript

*Addict Res Theory*. Author manuscript; available in PMC 2016 November 01.

Published in final edited form as:

*Addict Res Theory*. 2015 ; 23(2): 148–155. doi:10.3109/16066359.2014.949696.

## Drinking motives among heavy-drinking veterans with and without posttraumatic stress disorder

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### Abstract

**Objective**—This study examined patterns of drinking motives endorsed by heavy drinking veterans who either did or did not meet criteria for posttraumatic stress disorder (PTSD).

**Method**—Data were collected from 69 veterans of Operations Enduring Freedom or Iraqi Freedom (OEF/OIF) who had screened positive for hazardous drinking. The sample was 91.3% male and 65.2% Caucasian. Based on a structured interview, 58% of the sample met criteria for PTSD.

**Results**—The PTSD group scored higher than the non-PTSD group on scales measuring drinking to cope with anxiety and depression and similarly to the non-PTSD group on scales measuring social, enhancement and conformity motives. Coping and social motives were significantly correlated with adverse alcohol consequences. Overall, the PTSD group showed stronger relations between coping scales and aspects of alcohol misuse, relative to the non-PTSD group.

**Conclusion**—These findings suggest first, that among heavy drinking OEF/OIF veterans there is a high base rate of PTSD. Second, coping motives are frequently reported in this population, and they seem to be related to a more severe pattern of alcohol-related consequences. These findings underscore the importance of assessing the interplay between PTSD and substance abuse in trauma-exposed samples.

### Keywords

Alcohol; comorbidity; drinking motives; PTSD; veterans

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### Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the article.

This work was conducted with support from National Institute of Alcohol Abuse and Alcoholism Grant K23AA016120 to Meghan E. McDevitt-Murphy, and with support from the Office of Research and Development, Memphis Veterans Affairs Medical Center, and the Tennessee Board of Regents, through the Center for Applied Psychological Research.

## Introduction

Posttraumatic stress disorder (PTSD) is frequently comorbid with alcohol misuse (Stewart, 1996). Combat veterans are at high risk for both, and for their co-occurrence (Ouimette, Ahrens, Moos, & Finney, 1997; Rona et al., 2009). This was evident among Vietnam veterans (Kulka et al., 1990) and several studies of Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) veterans have also reported high rates of co-occurring PTSD symptoms and alcohol misuse. One reported that 39% of the sample screened positive for either PTSD or alcohol related problems (Erbes et al., 2007). In a sample of veterans presenting to Veterans Affairs' Medical Center primary care clinic, 39% screened positive for PTSD and 26% screened positive for alcohol misuse (McDevitt- Murphy et al., 2010). In the Millennium Cohort Study, a large epidemiological study of military service personnel with OEF/OIF combat deployments, combat deployments and PTSD were associated with increased risk for alcohol misuse among military personnel (Jacobson et al., 2008).

The apparent association between PTSD and alcohol misuse in veterans is consistent with research across a broad array of populations suggesting that PTSD increases risk for hazardous drinking, perhaps even relative to other mood and anxiety disorders (McDevitt-Murphy, Murphy, Monahan, Flood, & Weathers, 2010). It has been postulated that drinking among individuals with PTSD is negatively reinforced by the reduction of negative affect, a process referred to as self-medication (Brady & Sinha, 2005; Brown & Wolfe, 1994; Khantzian, 1997). The self-medication explanation posits that persons with PTSD are at risk for substance abuse as a result of attempts to cope with their distressing symptoms (Breslau, Davis, & Schultz, 2003; Chilcoat & Breslau, 1998). This model has intuitive appeal and has received support in the literature. Several studies suggest that the onset of PTSD precedes substance abuse onset (Chilcoat & Breslau, 1998; Shipherd, Stafford, & Tanner, 2005), and that patients report self-medication as a motive (Bremner, Southwick, Darnell, & Charney, 1996; Brown, Stout, & Gannon-Rowley, 1998). Additionally, lab studies have found strong relationships between PTSD-related distress and substance craving in response to trauma-cue exposure (Coffey et al., 2002; Coffey, Stasiewicz, Hughes, & Brimo, 2006; Saladin et al., 2003). The combination of comorbid PTSD and substance use disorder (SUD) has been associated with a more severe and persistent course of both disorders (Brady, Killeen, Saladin, Dansky, & Becker, 1994; Ouimette, Ahrens, Moos, & Finney, 1998).

### Drinking motives and PTSD

Individuals' motives or reasons for drinking have been assessed and classified. This work suggests that there is a diverse group of reasons why individuals drink, which are relevant to drinking at both hazardous and non-hazardous levels. Building on the work of Cox and Klinger (1988), Cooper et al.'s (1995) motivational model asserts that people drink alcohol in order to modulate positive and negative emotions and that positively reinforced drinking and negatively reinforced drinking are distinct phenomena. Cooper developed the Drinking Motives Questionnaire (DMQ; Cooper et al., 1992). Results from a factor analysis of the DMQ suggested that individuals' reasons for drinking may be classified using four categories: enhancement (drinking for positive internal effects), social (drinking to increase positive social activity), coping (drinking to reduce negative affect related to anxiety or

depression) and conformity (drinking to avoid social rejection), resulting in the revised version of the DMQ (Cooper et al., 1994). The DMQ-R was further modified by Blackwell and Conrod (2003) to accommodate a five-factor model of drinking motives with drinking to cope with anxious feelings and drinking to cope with depressive feelings reflected as separate scales (Grant et al., 2007). The DMQ (in these various iterations) has been the most widely used measure of drinking motives in the literature.

Generally, coping motives for drinking are associated with worse drinking outcomes, in terms of alcohol related problems (Kuntsche, Knibbe, Gmel, & Engels, 2005). Research also indicates that drinking maintained by negatively reinforced motives has a stronger relationship to alcohol related problems than drinking maintained by positive ones (Martens, Ferrier, & Cimini, 2007). In one study, greater alcohol problem severity was associated with increased drinking in negative affective situations, whereas less severe hazardous drinking was associated with increased drinking in positive affective situations (Cunningham, Sobell, Sobell, Gavin, & Annis, 1995).

While no studies have reported on group differences between individuals with PTSD and those without, in terms of drinking motives, a few studies have examined the role of coping motives for drinking as a mediator of adverse consequences of alcohol use among individuals with PTSD. These studies have suggested that drinking to reduce the distress associated with anxious and depressive feelings accounts for unique variance in alcohol related consequences. Typically these studies have focused on “drinking to cope” and have found that coping motives mediate the relationship between PTSD symptoms and alcohol misuse (Kaysen et al., 2007; Ullman, Filipas, Townsend, & Starzynski, 2005). Thus, it is coping-driven drinking itself that leads to the greater problem severity among those with PTSD. This literature has tended to focus on female survivors of sexual assault trauma. There have been no studies of self-reported drinking motives among combat veterans with PTSD, although a related concept, alcohol related expectancies, has been explored in relation to PTSD. A measure of PTSD-related alcohol expectancies (Norman, Inaba, Smith, & Brown, 2008) was tested in a sample of veterans and differentiated between those with and without PTSD as well as those with and without alcohol use disorders (Norman et al., 2008).

### **The present study**

The purpose of the present study was to explore the differences in drinking motives between heavy-drinking OEF/OIF veterans who either did or did not meet criteria for PTSD. The focus on OEF/OIF veterans was intentional, given this group of veterans differs from other veteran cohorts (e.g. Persian Gulf, Vietnam, Korea) in a number of ways. For instance, according to a report by the RAND Corporation (Tanielian & Jaycox, 2008), veterans of current conflicts are likely to have served longer and more frequent deployments than in past wars, and the survivability of wounds sustained in combat is higher than in the past. As a result, veterans are returning home with significant physical and psychological injuries in unprecedented numbers, including PTSD, depression, traumatic brain injuries, spinal cord injuries and amputations (Tanielian & Jaycox, 2008). Although research that directly examines group differences between veterans is somewhat lacking, at least one study

suggests there are significant differences between OEF/OIF veterans, Persian Gulf veterans and Vietnam veterans with regard to age, gender, marital status, employment status, rates of incarceration, exposure to combat atrocities, substance abuse, violent behaviour and rates of disability due to PTSD (Fontana & Rosenheck, 2008). Furthermore, a system-wide study of veterans who received treatment through the Veterans Health Administration in 2004 revealed that, for veterans with a diagnosis of PTSD, the association between substance use disorders and mortality was most pronounced for the youngest age group, which largely consisted of OEF/OIF veterans (Bohnert et al., 2012), providing further evidence for group differences among veterans of differing wartime eras. Examining factors such as PTSD, alcohol use, alcohol-related consequences and drinking motives in a strictly OEF/OIF veteran sample allows for the opportunity to better identify risk factors and treatment targets within this population. For the present study, we hypothesised that PTSD would be associated with drinking to cope motives, and that veterans who met criteria for PTSD would show significantly higher levels of drinking to cope with both depressive and anxious feelings. We also explored the relations between PTSD symptoms and drinking motives, and the relations among drinking motives and characteristics of alcohol use, including quantity and frequency of alcohol use, frequency of heavy episodic drinking and alcohol-related consequences.

## Method

### Participants

The sample was comprised of 69 Operation Enduring Freedom and Operation Iraqi Freedom (OEF/OIF) veterans seeking health care at Memphis Veterans Affairs Medical Center facilities. The majority of participants ( $N=63$ ; 91.3%) were male and the mean age of participants was 32.2 years. A majority of the sample identified as Caucasian (65.2%,  $n=45$ ) or African American (27.5%,  $n=19$ ). The number of OEF/OIF deployments veterans reported ranged from 1 to 4 ( $M=1.48$ ,  $SD=0.70$ ), and veterans reported spending an average of 14.82 months ( $SD=8.56$ ) in a combat zone. The criterion for inclusion in the study was a score of at least 8 on the Alcohol Use Disorders Identification Test (AUDIT: Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), which is suggestive of hazardous drinking.

### Measures

**Clinician Administered PTSD Scale (CAPS)**—The CAPS (Blake et al., 1995) is a semi-structured clinical interview assessing the 17 symptoms of PTSD based on DSM-IV-TR criteria. Interviewers rate the frequency and intensity of each PTSD symptom on separate 5-point scales ranging from 0 to 4. These item ratings can be used to compute a total severity score (by adding all the frequency and all the intensity items). In addition to total PTSD severity, we computed a severity score for each of the DSM symptom clusters: reexperiencing (criterion B), avoidance and emotional numbing (criterion C), and hyperarousal (criterion D) and also separate scores for avoidance and numbing, given considerable evidence that these function as two distinct constructs (King, Leskin, King, & Weathers, 1998; Mansfield, Williams, Hourani, & Babeu, 2010). The CAPS can also be used to derive a PTSD diagnosis. The most widely used diagnostic rubric for the CAPS is referred to the Frequency-1/Intensity-2 (F1/I2) scoring rule. When used in this manner, items with a

frequency score of at least 1 and an intensity score of at least 2 are rated as positive (suggesting the symptom is present). If there is a positive rating for symptoms consistent with the DSM-IV algorithm of 1 re-experiencing symptom (cluster B in DSM), 3 avoidance/numbing symptoms (cluster C) and 2 hyperarousal symptoms (cluster D), the participant is said to meet criteria for PTSD. The CAPS has shown good internal consistency in a sample of combat veterans (Blake et al., 1995) and internal consistency in our sample was excellent ( $\alpha=0.94$ ).

**Timeline Follow Back (TLFB)**—The TLFB (Sobell & Sobell, 1996) is a calendar-based assessment method used to obtain a participants' report of their alcohol use over the past month. Guided by an interviewer, participants report the number of standard drinks consumed on each day for the past 30 days. The TLFB has shown good psychometric properties in a sample of psychiatric outpatients with schizophrenia or major mood disorders demonstrating 30-day test-retest correlations ranging from 0.73 (heavy drinking days) to 1.00 (total drinks) (Carey, Carey, Maisto, & Henson, 2004).

**Drinker Inventory of Consequences (DrInC)**—The DrInC (Tonigan & Miller, 2002) is a 50-item self-report measure assessing adverse consequences related to alcohol abuse in five domains: Interpersonal, Intrapersonal, Physical, Social Responsibility and Impulse Control. Each item includes a lifetime score where the participant can endorse whether or not a given consequence has ever occurred (rated dichotomously), as well as a frequency rating for the past three months. The past three months elicits responses from participants on a 4-point Likert scale that ranges from (0) "Never" to (3) "Daily or almost every day". In a sample of alcohol abusing adults, the DrInC showed good internal consistency reliability at 0.93 (Blume, Schmalzing, & Marlatt, 2006). Analyses in this investigation used ratings from the past three months, which showed an overall Cronbach's alpha of 0.91.

**Modified Drinking Motives Questionnaire-Revised (DMQ-R)**—The Modified DMQ-R (Grant et al., 2007) is a 28-item measure of reasons for drinking, with each item loading onto one of five subscales: social, coping-anxiety (refers to drinking to cope with anxiety), coping-depression (refers to drinking to cope with depression), enhancement, or conformity. Participants are asked to consider their motives for drinking alcohol and to indicate on a 5-point scale ranging from 1 (never) to 5 (almost always) how often they drink for each motive listed. In a sample of undergraduate students, the modified DMQ-R showed adequate internal consistency reliability with subscale internal consistencies ranging from 0.66 to 0.91 (Grant et al., 2007). Although most of the research on the DMQ-R has been conducted with young adults, a recent investigation of the DMQ-R in a general adult sample with a mean age of 53 years old showed internal consistency coefficients in the range of 0.69 to 0.90 (Crutzen & Kuntsche, 2013). Curiously the DMQ-R showed subpar test-retest reliability coefficients in that study, all were less than 0.7, with the Conformity scale showing particularly limited stability ( $r=0.46$ ). Importantly, Crutzen and Kuntsche investigated the factor structure of the DMQ-R in their sample and found that the 4-factor structure that has been reported in young adult samples was replicated among adults. Internal consistency for the subscales in our sample ranged from 0.78 (conformity) to 0.96 (coping-depression). We also investigated the internal consistency separately by PTSD group

and found that the coefficients were similar for all of the DMQ scales, with the exception of Enhancement ( $\alpha=0.59$  for the PTSD group and  $0.85$  for the non-PTSD group). With the exception of the enhancement scale for the PTSD group, all of the alpha values were in the range of  $0.75$  to  $0.96$ .

## Procedure

Data for this investigation came from a sample of participants from a brief intervention study. Veterans were primarily recruited through the OEF/OIF Combat Veterans shared medical appointment (“Combat clinic”), a specialty clinic for OEF/OIF veterans which is the first visit to the Memphis VAMC for OEF/OIF veterans, irrespective of the presenting problem. Participants were invited to complete a screening packet containing the AUDIT during their clinic visit and if they screened positive on the AUDIT, they were invited to participate in the full brief intervention study. A small number of participants were recruited via posted signs and flyers throughout the medical center and they were screened over the phone. Participants who screened positive and who expressed interest were scheduled for a baseline appointment with a trained research assistant with subsequent visits to occur later. All data for this investigation were collected at the baseline assessment following an informed consent procedure.

## Data analysis plan

As a preliminary step, all variables were checked for skewness and kurtosis. The distributions for several of the drinking measures were skewed, and scores on these variables were transformed for the analyses. Following the recommendation of Tabachnick and Fidell (2001), outliers were corrected to one unit above the highest non-outlier value. We conducted *t*-tests to compare the PTSD and non-PTSD groups on five DMQ-R subscales. Next, we computed correlation coefficients to assess the relations among the DMQ-R subscales and the different PTSD severity scores. We also computed correlation coefficients to assess the strength of the relations between the DMQ-R subscales and various indicators of alcohol misuse severity, including several TLFB indices as well as DrInC scores.

## Results

Using the F1/I2 scoring rule (described in the “Method” section) for the Clinician Administered PTSD Scale, 58% ( $N=40$ ) of the sample met criteria for PTSD. The mean total severity score on the CAPS for the sample was 51.60. The mean number of drinks per week reported by participants was 17.06 ( $SD=21.37$ ) and mean number of drinking days per week was 2.60 ( $SD=2.10$ ). This level of consumption would place the average participant at approximately the 91st percentile, meaning that on average, participants in this study reported drinking more alcoholic drinks in a week than 91% of similarly aged men, according to a nationally representative sample (Chan, Neighbors, Gilson, Larimer, & Marlatt, 2007). Participants reported an average of 5.62 ( $SD=7.49$ ) heavy drinking episodes (defined as 5 or more drinks on one occasion for a man and 4 or more drinks on one occasion for a woman) throughout the month. Table 1 displays descriptive data for the main study variables, separated by PTSD status. *t*-test results are also provided in the table. There were no differences between the PTSD and non-PTSD groups on the TLFB drinking

variables related to quantity or frequency of alcohol use, or heavy episodic drinking. The PTSD and non-PTSD groups differed on two aspects of alcohol-related consequences: Total Consequences and Impulse Control, with the PTSD group showing a higher mean score for both. *t*-Tests for the 5 DMQ-R subscales showed that the PTSD and non-PTSD groups did not differ on social, enhancement or conformity motives. As expected, the PTSD group had significantly higher mean scores on Coping-Anxiety and Coping-Depression compared to the non-PTSD group.

We examined correlations between CAPS-derived PTSD severity scores and drinking motives subscales. In the full sample, only the coping motives scales were correlated with any PTSD severity indices. Coping-Anxiety was correlated significantly with every aspect of PTSD severity, ranging from a correlation of  $r=0.35$  ( $p=0.003$ ) for the avoidance symptoms of cluster C to  $r=0.49$  ( $p<0.001$ ) for hyperarousal (D symptoms). Similarly, Coping-Depression was significantly correlated with every aspect of PTSD severity, ranging from  $r=0.41$  for Avoidance to  $r=0.56$  ( $p<0.001$ ) for hyperarousal and for total severity. No other DMQ-R subscales were significantly correlated with any aspect of PTSD severity for the full sample. We also investigated these relationships separately by PTSD status and these findings are presented in Table 2. For the PTSD group, total PTSD severity, avoidance/numbing and hyperarousal were all significantly correlated with Coping-Depression and Coping-Anxiety motives. Of the 3 non-coping DMQ-R subscales, only Enhancement showed any relationship to any PTSD symptoms, and it was significantly correlated with hyperarousal. For the Non-PTSD group, total PTSD severity, B symptoms and D symptoms were all significantly correlated with Coping-Depression and Conformity motives. The correlation between hyperarousal symptoms and Coping-Anxiety also approached significance ( $p=0.053$ ). No other significant relationships emerged for the non-PTSD participants.

We examined correlations between DMQ-R scores and indicators of alcohol misuse severity for the full sample and also separately by PTSD/Non-PTSD status. For the full sample, drinking frequency was significantly correlated with Coping-Anxiety motives ( $r=0.273$ ;  $p=0.023$ ) and total DrInC score. Interpersonal and Impulse Control consequences were correlated all with all of the DMQ-R subscales, except for Conformity. Table 3 displays correlations between DMQR scores and various aspects of alcohol misuse severity, including quantity and frequency of alcohol use and alcohol-related consequences, separated by PTSD status. These results show that coping motives were significantly correlated with drinking frequency for the PTSD group and that none of the drinking motives scores were significantly correlated with drinking frequency, quantity or heavy episodic drinking for non-PTSD participants. With regard to alcohol-related consequences, the PTSD group showed significant, positive correlations between Coping-Anxiety, Coping-Depression and Social motives and three DrInC scales (Total, Interpersonal and Impulse Control). The PTSD group also showed a significant correlation between Enhancement motives and Impulse Control consequences and between Social motives and Physical consequences. For the Non-PTSD group, Coping-Anxiety, Enhancement and Conformity motives were all significantly correlated with Total consequences. Enhancement motives were correlated with Impulse Control consequences and Coping-Anxiety motives were correlated with Social Responsibility motives. Given that Coping-Anxiety and Coping-Depression were

significantly correlated with frequency of alcohol consumption as well as three DrInC scales, we conducted regression analyses to assess whether these coping motives scales explained unique variance in DrInC scores. In four separate hierarchical regressions predicting Total DrInC score and DrInC-Interpersonal consequences, the  $\beta$  coefficients for Coping-Anxiety and Coping-Depression were not statistically significant. However, for a regression predicting Impulse Control consequences, the Coping-Depression subscale was significant when added to the model after controlling for drinking frequency ( $F_{inc}(1, 37)=4.054$ ;  $\beta=0.301$ ;  $p=0.05$ ), suggesting that Coping-Depression predicted unique variance in Impulse Control consequences beyond that explained by drinking frequency. A hierarchical regression which entered Coping-Anxiety as a predictor of Impulse Control consequences following drinking frequency did not show the same pattern, and the coefficient for Coping-Anxiety was nonsignificant.

## Discussion

The purpose of the present investigation was to examine whether heavy-drinking OEF/OIF veterans with PTSD endorsed a different pattern of drinking motives than did veterans not meeting criteria for PTSD, and to examine the relations among drinking motives, alcohol misuse severity and PTSD symptoms in a sample of veterans. There has been no prior research looking at drinking motives related to PTSD among OEF/OIF veterans, although some prior research on other traumatised populations (Kaysen et al., 2007; Ullmann et al., 2005) led us to hypothesise that veterans who met criteria for PTSD would be more likely to endorse drinking motives suggestive of self-medication (specifically coping related motives) and that coping motives would be correlated with more severe patterns of alcohol misuse. Consistent with our predictions, veterans in this study who met criteria for PTSD were more likely to endorse coping motives (related to both anxiety and depression) for drinking than were non-PTSD veterans. This is noteworthy given that the non-PTSD participants were all combat-exposed and typically demonstrated some symptoms of PTSD short of the diagnostic threshold. In this sample, the PTSD group did not show a higher level of alcohol consumption or heavy episodic drinking, and PTSD severity was not correlated with these alcohol consumption variables.

This sample was comprised entirely of individuals classified as hazardous drinkers using the AUDIT, so the absence of a relationship between PTSD and alcohol consumption may have been due to a restriction in range in those variables. Although most prior studies have found relationships between PTSD and alcohol consumption, there have been other studies reporting no significant association in samples of Vietnam and Persian Gulf War veterans (Shipherd et al., 2005; Miller, Vogt, Mozley, Kaloupek, & Keane, 2006). Interestingly the PTSD and Non-PTSD groups differed with respect to the consequences of alcohol use. The PTSD group had a higher mean score for total alcohol-related consequences and for Impulse Control consequences, suggesting a tendency to drink in a riskier manner, despite similar levels of consumption to non-PTSD veterans.

PTSD severity was correlated with the coping motives scales. This suggests that while in the present sample PTSD severity was not associated with the amount of alcohol consumed, it may be associated with the situations in which alcohol is consumed. Veterans with PTSD



endorsed higher levels of coping motives than non-PTSD veterans, providing some support for the idea that the relation between PTSD and alcohol misuse may be due, at least in part, to self-medication. It is also important to point out, however, that the PTSD participants endorsed similar levels of other motives to non-PTSD participants, suggesting that these are also important determinants of drinking among veterans with PTSD. Taken together, this pattern suggests that treatment efforts directed at reducing alcohol misuse among persons with PTSD should address the coping function of alcohol use, but should not focus exclusively on this function.

Within the full sample, all of the PTSD severity scores were related to both aspects of coping motives for drinking and none of the severity scores were associated with any other motives. However, we examined the matrix of relationships among PTSD and Non-PTSD participants separately because it is important to understand the relations among PTSD symptoms and drinking motives for veterans who have diagnosable PTSD. For these veterans, coping motives were associated with total PTSD severity, emotional numbing and hyperarousal symptoms. It was somewhat surprising that reexperiencing symptoms were not significantly related to any aspect of drinking motives for PTSD veterans, given that substance abuse is conceptualised as a method of blocking out unwanted memories. On the whole, prior studies have more frequently reported associations between the reexperiencing and hyperarousal symptoms and substance abuse, and less frequently found avoidance and numbing symptoms to be significantly related to substance use/abuse (Simons, Gaher, Jacobs, Meyer, & Johnson-Jimenez, 2005; Stewart, Conrod, Samoluk, Pihl, & Dongier, 1999; Read, Brown, & Kahler, 2004). Another curious finding was that conformity motives showed several significant relationships with PTSD symptoms (total severity, reexperiencing and hyperarousal symptoms) for Non-PTSD veterans, but not PTSD veterans. It bears mentioning that the items on the coping scales of the DMQR are not specific to PTSD symptoms. It would be interesting to examine in a future study the extent to which the DMQR coping scales correlate the measure of PTSD-alcohol expectancies (Norman et al., 2008).

On the whole, the drinking motives showed stronger relations to alcohol misuse severity for PTSD veterans, relative to Non-PTSD veterans. Coping-Anxiety, Coping-Depression and Social motives were all related to several aspects of drinking consequences for PTSD veterans, but showed few significant relations to consequences for Non-PTSD veterans. For PTSD veterans, the two Coping motives scales were significantly correlated with frequency of drinking. Coping motives were also correlated with Interpersonal consequences and Impulse Control consequences. Regression analyses suggested that Coping-Anxiety did not explain unique variance in alcohol-related consequences, however, when controlling for alcohol use frequency. Coping-Depression motives did explain unique variance in Impulse Control consequences, even after controlling for drinking frequency. This suggests that, while motives reflecting drinking to cope with anxiety and with depression seemed to show similar patterns generally, they may contribute to drinking-related impulsivity differently. That is, it may be that the phenomena of depression, itself, is associated with impulsivity that is heightened while drinking whereas drinking to cope with anxiety results in increased impulsivity by virtue of higher levels of alcohol consumption. Interestingly, social motives were not correlated with alcohol consumption, but were correlated with several aspects of

alcohol-related consequences. This finding suggests that drinking with friends may result in worse decision-making in the context of alcohol, irrespective of the amount of alcohol consumed.

The cross-sectional nature of this study limits causal interpretations, however these findings lead to some hypotheses that may be tested in future studies. Specifically, we might predict that PTSD symptoms lead to a more hazardous pattern of alcohol use, if not higher consumption levels, and that this is mediated by drinking motives. A prior study of trauma survivors found that the relation between dysphoria symptoms (which included anger, depression and arousal) was fully mediated by drinking to cope, while trauma-specific symptoms (which included intrusion, avoidance, dissociation and self-perception) were partially mediated by drinking to cope, suggesting that factors other than coping motives were also at play (Kaysen et al., 2007). However, another prior study suggests that individuals' drinking motives may be independent of trauma exposure (and may pre-date exposure), and that pre-trauma drinking motives may influence which trauma survivors are at highest risk for hazardous drinking later (Beseler, Aharonovich, & Hasin, 2011). Another limitation we wish to point out is that we used only a single measure of drinking motives and it is possible this population of heavy drinkers might engage in alcohol use for reasons not assessed by the DMQ-R.

A strength of this study is the use of thorough assessment methods, including a gold-standard structured interview measure of PTSD and a detailed measure of alcohol consumption. This study had some notable limitations. Primary among them, the limited number of female veterans in the sample precluded an examination of the role of gender. Another potentially important limitation of the study is small sample size, which limited our ability to detect significant relationships. Future research should use longitudinal methods to determine order of onset of PTSD and alcohol misuse in conjunction with drinking motives.

## References

- Babor, TF.; Higgins-Biddle, JC.; Saunders, JB.; Monteiro, MG. The Alcohol Use Disorders Identification Test: Guidelines for use in primary care. 2. Geneva: World Health Organisation; 2001.
- Beseler CL, Aharonovich E, Hasin DS. The enduring influence of drinking motives on alcohol consumption after fateful trauma. *Alcoholism: Clinical and Experimental Research*. 2011; 35:1004–1010.
- Blackwell, E.; Conrod, PJ. A five-dimensional measure of drinking motives. Department of Psychology, University of British Columbia; 2003. [Unpublished manuscript]
- Blake DD, Weathers FW, Nagy LM, Kaloupek DG, Gusman FD, Charney DS, Keane TM. The development of a clinician-administered PTSD scale. *Journal of Traumatic Stress*. 1995; 8:75–90. [PubMed: 7712061]
- Blume AW, Schmaling KB, Marlatt GA. Recent drinking consequences, motivation to change, and changes in alcohol consumption over a three month period. *Addictive Behaviors*. 2006; 31:331–338. [PubMed: 15979813]
- Bohnert KM, Ilgen MA, Rosen CS, Desai RA, Austin K, Blow FC. The association between substance use disorders and mortality among a cohort of Veterans with posttraumatic stress disorder: Variation by age cohort and mortality type. *Drug and Alcohol Dependence*. 2012; 128:98–103. [PubMed: 22974491]

- Brady KT, Killeen T, Saladin ME, Dansky B, Becker S. Comorbid substance abuse and post-traumatic stress disorder: Characteristics of women in treatment. *The American Journal on Addictions*. 1994; 3:160–164.
- Brady KT, Sinha R. Co-occurring mental and substance use disorders: The neurobiological effects of chronic stress. *American Journal of Psychiatry*. 2005; 162:1483–1493. [PubMed: 16055769]
- Bremner JD, Southwick SM, Darnell A, Charney DS. Chronic PTSD in Vietnam combat veterans: Course of illness and substance abuse. *American Journal of Psychiatry*. 1996; 153:369–375. [PubMed: 8610824]
- Brown P, Stout R, Gannon-Rowley J. Substance use disorder-PTSD comorbidity: Patients' perceptions of symptom interplay and treatment issues. *Journal of Substance Abuse Treatment*. 1998; 15:445–448. [PubMed: 9751003]
- Brown PJ, Wolfe J. Substance abuse and post-traumatic stress disorder comorbidity. *Drug and Alcohol Dependence*. 1994; 35:51–59. [PubMed: 8082556]
- Carey KB, Carey MP, Maisto SA, Henson JM. Temporal stability of the timeline followback interview for alcohol and drug use with psychiatric outpatients. *Journal of Studies on Alcohol and Drugs*. 2004; 65:774–781.
- Chan KK, Neighbors C, Gilson M, Larimer ME, Marlatt GA. Epidemiological trends in drinking by age and gender: Providing normative feedback to adults. *Addictive Behaviors*. 2007; 32:967–976. [PubMed: 16938410]
- Chilcoat HD, Breslau N. Investigations of causal pathways between PTSD and drug use disorders. *Addictive Behaviors*. 1998; 23:827–840. [PubMed: 9801719]
- Chilcoat HD, Breslau N. Posttraumatic stress disorder and drug disorders: Testing causal pathways. *Archives of General Psychiatry*. 1998; 55:913–917. [PubMed: 9783562]
- Coffey SF, Saladin ME, Drobles DJ, Brady KT, Dansky BS, Kilpatrick DG. Trauma and substance cue reactivity in individuals with comorbid posttraumatic stress disorder and cocaine or alcohol dependence. *Drug and Alcohol Dependence*. 2002; 65:115–127. [PubMed: 11772473]
- Coffey SF, Stasiewicz PR, Hughes PM, Brimo ML. Trauma-focused imaginal exposure for individuals with comorbid posttraumatic stress disorder and alcohol dependence: Revealing mechanisms of alcohol craving in a cue reactivity paradigm. *Psychology of Addictive Behaviors*. 2006; 20:425–435. [PubMed: 17176177]
- Cooper ML. Motivations for alcohol use among adolescents: Development and validation of a four-factor model. *Psychological Assessment*. 1994; 6:117–128.
- Cooper ML, Frone MR, Russell M, Mudar P. Drinking to regulate positive and negative emotions: A motivational model of alcohol use. *Journal of Personality and Social Psychology*. 1995; 69:990–1005. [PubMed: 7473043]
- Cooper ML, Russell M, Skinner JB, Windle M. Development and validation of a three-dimensional measure of drinking motives. *Psychological Assessment*. 1992; 4:123–132.
- Cox WM, Klinger E. A motivational model of alcohol use. *Journal of Abnormal Psychology*. 1988; 97:168–180. [PubMed: 3290306]
- Crutzen R, Kuntsche E. Validation of the four-dimensional structure of drinking motives in adults. *European Addiction Research*. 2013; 19:222–226. [PubMed: 23392053]
- Cunningham JA, Sobell MB, Sobell LC, Gavin DR, Annis HM. Heavy drinking and negative affective situations in a general population and a treatment sample: Alternative explanations. *Psychology of Addictive Behaviors*. 1995; 9:123–127.
- Erbes C, Westermeyer J, Engdahl B, Johnsen E. Posttraumatic stress disorder and service utilization in a sample of service members from Iraq and Afghanistan. *Military Medicine*. 2007; 172:359–363. [PubMed: 17484303]
- Fontana A, Rosenheck R. Treatment-seeking veterans of Iraq and Afghanistan: Comparison with veterans of previous wars. *Journal of Nervous and Mental Disease*. 2008; 196:513–521. [PubMed: 18626291]
- Grant VV, Stewart SH, O'Connor RM, Blackwell E, Conrod PJ. Psychometric evaluation of the five-factor modified drinking motives questionnaire – Revised in undergraduates. *Addictive Behaviors*. 2007; 32:2611–2632. [PubMed: 17716823]

- Jacobson IG, Ryan MAK, Hooper TI, Smith TC, Amoroso PJ, Byoko PJ, ... Bell NS. Alcohol use and alcohol related problems before and after military combat deployment. *Journal of the American Medical Association*. 2008; 300:663–675. [PubMed: 18698065]
- Kaysen D, Dillworth TM, Simpson T, Waldrop A, Larimer ME, Resick PE. Domestic violence and alcohol use: Trauma-related symptoms and motives for drinking. *Addictive Behaviors*. 2007; 32:1272–1283. [PubMed: 17098370]
- Khantzian EJ. The self-medication hypothesis of substance use disorders: A reconsideration and recent applications. *Harvard Review of Psychiatry*. 1997; 4:231–244. [PubMed: 9385000]
- King DW, Leskin GA, King LA, Weathers FW. Confirmatory factor analysis of the Clinician-Administered PTSD Scale: Evidence for the dimensionality of post-traumatic stress disorder. *Psychological Assessment*. 1998; 10:90–96.
- Kulka, R.A.; Schlenger, W.E.; Fairbank, J.A.; Hough, R.L.; Jordan, B.K.; Marmar, C.R.; Weiss, D.S. Trauma and the Vietnam War generation: Report of findings from the National Vietnam Veterans Readjustment Study. New York: Brunner/Mazel; 1990.
- Kuntsche E, Knibbe R, Gmel G, Engels R. Why do young people drink? A review of drinking motives. *Clinical Psychology Review*. 2005; 25:841–861. [PubMed: 16095785]
- Mansfield AJ, Williams J, Hourani LL, Babeu LA. Measurement invariance of post-traumatic stress disorder symptoms among U.S. military personnel. *Journal of Traumatic Stress*. 2010; 23:91–99. [PubMed: 20135678]
- Martens MP, Ferrier AG, Cimini MD. Do protective behavioral strategies mediate the relationship between drinking motives and alcohol use in college students? *Journal of Studies on Alcohol and Drugs*. 2007; 68:106–114. [PubMed: 17149524]
- McDevitt-Murphy ME, Murphy JG, Monahan CJ, Flood AM, Weathers FW. Unique patterns of substance misuse associated with PTSD, depression, and social phobia. *Journal of Dual Diagnosis*. 2010; 6:94–110. [PubMed: 20582229]
- McDevitt-Murphy ME, Williams JL, Bracken KL, Fields JA, Monahan CJ, Murphy JG. PTSD symptoms, hazardous drinking, and health functioning among U.S.OEF/OIF veterans presenting to primary care. *Journal of Traumatic Stress*. 2010; 23:108–111. [PubMed: 20104586]
- Miller MW, Vogt DS, Mozley SL, Kaloupek DG, Keane TM. PTSD and substance-related problems: The mediating roles of disconstraint and negative emotionality. *Journal of Abnormal Psychology*. 2006; 115:369–379. [PubMed: 16737401]
- Norman SB, Inaba RK, Smith TL, Brown SA. Development of the PTSD-alcohol expectancy questionnaire. *Addictive Behaviors*. 2008; 33:841–847. [PubMed: 18261858]
- Ouimette PC, Ahrens C, Moos RH, Finney JW. Posttraumatic stress disorder in substance use patients: Relationship to 1-year posttreatment outcomes. *Psychology of Addictive Behaviors*. 1997; 11:34–47.
- Ouimette PC, Ahrens C, Moos RH, Finney JW. During treatment changes in substance abuse patients with posttraumatic stress disorder: The influence of specific interventions and program environments. *Journal of Substance Abuse Treatment*. 1998; 15:555–564. [PubMed: 9845869]
- Read JP, Brown PJ, Kahler CW. Substance use and posttraumatic stress disorders: Symptom interplay and effects on outcome. *Addictive Behaviors*. 2004; 29:1665–1672. [PubMed: 15451135]
- Rona RJ, Jones M, Iversen A, Hull L, Greenberg N, Fear NT, ... Wessely S. The impact of post-traumatic stress disorder on impairment in the UK military at the time of the Iraq war. *Journal of Psychiatric Research*. 2009; 43:649–655. [PubMed: 18950801]
- Saladin ME, Drobles DJ, Coffey SF, Dansky BS, Brady KT, Kilpatrick DG. PTSD symptom severity as a predictor of cue-elicited drug craving in victims of violent crime. *Addictive Behaviors*. 2003; 28:1611–1629. [PubMed: 14656549]
- Shipherd JC, Stafford J, Tanner LR. Predicting alcohol and drug abuse in Persian Gulf war veterans: What role do PTSD symptoms play? *Addictive Behaviors*. 2005; 30:595–599. [PubMed: 15718078]
- Simons JS, Gaher RM, Jacobs GA, Meyer D, Johnson-Jimenez E. Associations between alcohol use and PTSD symptoms among American Red Cross Disaster Relief workers responding to the 9/11/2001 attacks. *American Journal of Drug and Alcohol Abuse*. 2005; 31:285–304. [PubMed: 15912717]

- Sobell, LC.; Sobell, MB. Timeline Followback user's guide: A calendar method for assessing alcohol and drug use. Toronto, Canada: Addiction Research Foundation; 1996.
- Stewart SH. Alcohol abuse in individuals exposed to trauma: A critical review. *Psychological Bulletin*. 1996; 120:83–112. [PubMed: 8711018]
- Stewart SH, Conrod PJ, Pihl RO, Dongier M. Relations between post-traumatic stress symptom dimensions and substance dependence in a community-recruited sample of substance-abusing women. *Psychology of Addictive Behaviors*. 1999; 13:78–88.
- Tabachnick, BG.; Fidell, LS. Using multivariate statistics. 5. Boston, MA: Allyn and Bacon; 2006.
- Tanielian, T.; Jaycox, LH., editors. Invisible wounds of war: Psychological and cognitive injuries, their consequences, and services to assist recovery. Santa Monica, CA: RAND Corporation; 2008.
- Tonigan JS, Miller WR. The Inventory of Drug Use Consequences (InDUC): Test-retest stability and sensitivity to detect change. *Psychology of Addictive Behaviors*. 2002; 16:165–168. [PubMed: 12079257]
- Ullman SE, Filipas HH, Townsend SM, Starzynski LL. Trauma exposure, post-traumatic stress disorder and problem drinking in sexual assault survivors. *Journal of Studies on Alcohol*. 2005; 66:610–619. [PubMed: 16331846]

**Table 1**

PTSD symptom severity, alcohol consumption, alcohol consequences and drinking motives, separately by PTSD diagnostic status.

	PTSD ( <i>n</i> =40) M (SD)	Non-PTSD ( <i>n</i> =29) M (SD)	<i>t</i> -Statistic (df)
<i>PTSD</i>			
CAPS total severity	70.18 (16.57)	25.96 (13.02)	<i>t</i> (67)= -11.93 **
<i>Alcohol consumption</i>			
Drinks per week	18.01 (24.11)	15.75 (17.21)	<i>t</i> (67)= -0.43
Drinking days per week	2.55 (2.18)	2.68 (2.00)	<i>t</i> (63)=0.24
Heavy drinking episodes	5.93 (8.00)	5.21 (6.84)	<i>t</i> (67)= -0.15
<i>Alcohol-related consequences</i>			
Total consequences	10.98 (10.31)	6.44 (5.10)	<i>t</i> (60.24)= -2.40 *
Physical	2.58 (2.66)	2.17 (1.93)	<i>t</i> (66.45)=0.28
Interpersonal	2.45 (2.72)	1.07 (0.92)	<i>t</i> (65.80)= -1.90
Intrapersonal	1.88 (2.38)	0.86 (1.25)	<i>t</i> (65.89)= -1.15
Impulse control	3.23 (3.30)	1.79 (1.68)	<i>t</i> (60.95)= -2.36 *
Social responsibility	1.18 (1.72)	0.55 (0.74)	<i>t</i> (65.75)= -1.02
<i>Drinking motives</i>			
Social	2.71 (1.19)	2.66 (0.80)	<i>t</i> (66.66)= -0.20
Coping-Anxiety	2.93 (1.16)	2.12 (0.87)	<i>t</i> (67)= -3.16 **
Coping-Depression	2.83 (1.30)	1.71 (0.86)	<i>t</i> (66.54)= -4.30 **
Enhancement	2.48 (1.20)	2.42 (0.81)	<i>t</i> (66.67)= -0.25
Conformity	1.25 (0.47)	1.14 (0.35)	<i>t</i> (67)= -1.12

"Heavy" drinking episodes were defined as 5 or more drinks for a man, or 4 or more drinks for a woman on a single occasion.

\*  $p < 0.05$ ;

\*\*  $p < 0.01$ .

**Table 2**

Correlations between drinking motives, PTSD symptom severity and symptom clusters.

	Coping-Anxiety	Coping-Depression	Social	Enhancement	Conformity
<i>PTSD<sup>a</sup></i>					
Total severity	0.35*	0.35*	0.12	0.29	0.08
(B) Re-experiencing	0.12	0.12	0.03	0.12	0.03
(C) Avoid/Numb	0.35*	0.31*	0.11	0.22	0.20
Avoidance	0.21	0.21	0.12	0.14	0.16
Numbing	0.32*	0.28	0.07	0.20	0.17
(D) Hyperarousal	0.37*	0.42**	0.15	0.37*	-0.13
<i>Non-PTSD<sup>b</sup></i>					
Total severity	0.34	0.46*	0.02	-0.11	0.48**
(B) Re-experiencing	0.33	0.41*	-0.01	-0.10	0.52**
(C) Avoid/Numb	0.06	0.23	-0.05	-0.06	0.19
Avoidance	-0.02	-0.01	0.05	-0.15	-0.02
Numbing	0.09	0.28	-0.09	0.03	0.24
(D) Hyperarousal	0.36	0.40*	0.08	-0.10	0.41*

<sup>a</sup> *n*=40,<sup>b</sup> *n*=29.\* *p*<0.05,\*\* *p*<0.01.

**Table 3**  
Correlations between drinking motives, alcohol consumption and alcohol-related consequences by PTSD status.

	Coping- Anxiety	Coping- Depression	Social	Enhancement	Conformity
<i>PTSD<sup>a</sup></i>					
Drinks per week	0.20	0.20	0.00	-0.02	-0.13
No. drinking days	0.34*	0.34*	0.00	0.03	0.17
No. heavy days	0.26	0.30	0.13	0.13	-0.03
Total consequences	0.33*	0.33*	0.43**	0.29	0.06
Physical	0.14	0.08	0.35*	0.13	0.02
Interpersonal	0.36*	0.34*	0.37*	0.30	0.11
Intrapersonal	0.17	0.16	0.11	0.08	-0.03
Impulse	0.36*	0.41**	0.45**	0.32*	0.10
Social responsibility	0.25	0.21	0.30	0.20	0.11
<i>Non-PTSD<sup>b</sup></i>					
Drinks per week	0.20	0.15	0.25	0.00	0.06
No. drinking days	0.23	0.05	0.10	-0.13	0.11
No. heavy days	0.08	0.06	0.13	-0.10	0.05
Total consequences	0.43*	0.33	0.31	0.45*	0.46*
Physical	0.31	0.11	0.16	0.32	0.35
Interpersonal	0.22	0.27	0.23	0.28	0.21
Intrapersonal	0.02	0.10	0.04	0.04	0.15
Impulse control	0.32	0.14	0.34	0.44*	0.36
Social responsibility	0.37*	0.36	0.20	0.32	0.12

<sup>a</sup>  $n=40$ ,

<sup>b</sup>  $n=29$ .

\*  $P<0.05$ ,

\*\*  $P<0.01$ .