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The Association of Alcohol Consumption Patterns with Self-Rated Physical Health Problems and Psychiatric Distress among Afghanistan- and Iraq-Era U.S. Veterans

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Abstract

Alcohol misuse is associated with negative mental and physical health outcomes, which presents a public health concern in veterans. However, less is known regarding outcomes among veterans with low to moderate alcohol consumption. This study included veterans with military service in Iraq and/or Afghanistan ($N = 1,083$) who resided in the VA Mid-Atlantic region catchment area (North Carolina, Virginia, and parts of West Virginia). Participants completed a mailed survey that inquired about demographics, past-year alcohol consumption, self-rated physical health, and psychiatric symptoms. Logistic regression was used to evaluate associations between alcohol consumption and posttraumatic stress disorder (PTSD), depression, and self-rated physical health. Both non-drinkers and hazardous drinkers were more likely to endorse clinically significant PTSD and depression symptoms than moderate drinkers. Moderate drinkers were also less likely to report fair/poor health, after adjusting for demographics and psychiatric symptoms. Results overall showed a U-shaped curve, such that moderate alcohol use was associated with lower rates of mental health problems and fair/poor health. While the VA routinely screens for alcohol misuse, current results suggest that non-drinkers are also at risk for poor mental and physical health.

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Alcohol-Related Disorders; Depression; OEF=Operation Enduring Freedom; OIF=Operation Iraqi Freedom; Protective Factors; PTSD=Posttraumatic Stress Disorder; Veterans Health

1. Introduction

Given that U.S. veterans are more likely to report poor health status and serious psychological distress than non-veterans, the mental and physical health of veterans returning from deployment is a significant public health concern (Kramarow and Pastor, 2012; Smith and Team, 2009). Recently, much attention has been given to high rates of alcohol misuse among veterans who served in Iraq and Afghanistan (Burnett-Zeigler et al., 2011; Calhoun et al., 2008; Calhoun, Schry, Dennis et al., 2016; Eisen et al., 2012; Grossbard et al., 2016; Hawkins et al., 2010). This population endorses high rates of comorbidity between alcohol misuse and psychiatric disorders such as posttraumatic stress disorder (PTSD) and depression (Calhoun et al., 2016a; Seal et al., 2011; Thomas et al., 2010). Unhealthy alcohol use has well-known adverse effects including increased risk for hypertension, stroke, liver disease, and unintentional injuries and death (Rehm et al., 2010; Shield et al., 2013). In fact, the use of alcohol is the third most common preventable cause of death in the United States (Mokdad et al., 2004). Given the prevalence of alcohol misuse among veterans who served in Iraq and Afghanistan, it is essential in this population to characterize mental/physical health concerns associated with alcohol use.

The majority of studies examining risks associated with alcohol consumption and mental and physical health concerns in veterans who served during military operations in Iraq and Afghanistan have dichotomized alcohol consumption and examined correlates for those drinking at risky or hazardous levels (Burnett-Zeigler et al., 2011; Calhoun et al., 2008; Calhoun et al., 2016a; Eisen et al., 2012). Thus, less is known regarding the association between health concerns and other patterns of drinking in returning veterans. Among civilians, moderate or low-level drinking is associated with reduced distress compared to hazardous drinkers and abstainers (Rodgers et al., 2000a; Rodgers et al., 2000b). A similar relationship has been consistently observed between moderate or low-risk alcohol consumption and health benefits including lower levels of diabetes, cardiovascular disease, and mortality when compared to hazardous drinkers and abstainers (Costanzo et al., 2010; Rehm et al., 2010; Roerecke and Rehm, 2012; Ronksley et al., 2011). While controversy remains over the causes for the observed association, multiple studies have indicated that people consuming one to two standard drinks appear to have a cardiovascular event rate that is lower than people who do not drink at all (Costanzo et al., 2010; Rehm et al., 2010; Roerecke and Rehm, 2012; Ronksley et al., 2011). This relationship has often been described as a J-shaped or U-shaped curve such that greater risk of poor health is seen at both ends of the drinking continuum with moderate drinkers having lower risk than both abstainers and heavy drinkers (Kloner and Rezkalla, 2007; Marmot et al., 1981; Thompson, 2013). The presence of such a curve has strong implications for alcohol consumption recommendations.

The objective of the current study was to examine the association between alcohol consumption and both mental and physical health in U.S. veterans who served during the wars in Iraq and Afghanistan. Subjective or self-rated physical health is a simple, global evaluation of how a person perceives his/her health. Self-rated health is strongly correlated with other direct measures of health and functioning and has been shown to predict mortality beyond other indicators of mortality risk such as blood pressure, body mass index, serum cholesterol levels, and chronic conditions in multiple studies (DeSalvo et al., 2006; Idler and Benyamini, 1997). A number of studies in civilian populations have suggested that moderate alcohol consumption is associated with a self-perception of good health (Poikolainen and Vartiainen, 1999; Poikolainen et al., 1996; San Jose et al., 1999; Van Dijk et al., 2004). The majority of this work, however, has not adjusted for the presence of mental health problems. Distress associated with mental health problems could impact perceptions of physical or general health (Beckham et al., 2002a; Calhoun et al., 2009; Schry et al., 2016). The current investigation examined the association between past-year alcohol consumption, self-rated health, and psychiatric distress in a large cohort of U.S. veterans with service in Iraq and/or Afghanistan.

2. Methods

2.1. Participants and Procedure

The sample in the current study ($N = 1,083$) were respondents to an anonymous mail survey conducted as part of the OEF/OIF Veterans Health and Needs Study (Calhoun et al., 2016a; Calhoun et al., 2016b; Crawford et al., 2015; Schry et al., 2015) who had adequate data on the measures described below. The OEF/OIF Veterans Health and Needs Study was sponsored by the VA Mid-Atlantic Mental Illness Research Education, and Clinical Center, which serves the Mid-Atlantic catchment area. The study identified a random sample of Afghanistan/Iraq-era veterans with a last known address in the VA Mid-Atlantic Region catchment area through a data use agreement with the VA Environmental Epidemiology Service. To be study eligible, veterans had to be eligible for VA healthcare with a valid address in the U.S. A modified Dillman procedure (Dillman, 2000) was utilized in which all participants received a pre-alert letter, the survey, and if needed, a follow-up letter and duplicate survey. The survey package included a cover letter, a 60-question survey, and a postage-paid business reply return envelope.

Of 5,000 veterans identified, 72 (1.4%) were determined to be ineligible (e.g., deceased, deployed) and 924 (18.5%) surveys were undeliverable (returned to sender). Of the 4,004 surveys that were delivered, 1,161 were completed and returned, resulting in a response rate of 29%, which is consistent with other published mail surveys involving Afghanistan/Iraq-era veteran samples (e.g., 22%-33%; Calhoun et al., 2008; Vogt et al., 2011). Rates of binge drinking (Calhoun et al., 2016b) and the association between PTSD and health (Schry et al., 2015) have previously been reported on this sample.

As previously reported (Calhoun et al., 2016a; Calhoun et al., 2016b; Schry et al., 2015), demographic characteristics of this sample have been compared between early responders (i.e., responders to the first survey wave; $n = 978$) and later responders (second wave; $n = 183$) in order to assess possible non-response bias following the continuum of resistance

model (Lin and Schaeffer, 1995). These analyses revealed little difference between early and late responders (Calhoun et al., 2016b). Respondents to the first wave were slightly older ($M = 39$) than later respondents ($M = 38$) and were more likely to be married (73% vs. 63%), but there were no differences in the proportion of women, minorities, enlisted soldiers, veterans who served in the Reserves/National Guard, veterans who screened positive for PTSD or depression, the proportion that used VA healthcare, or in the proportion of participants who suffered a service-connected injury (Calhoun et al., 2016b). Importantly, late responders did not differ from early responders in the proportion of veterans who drank alcohol (83.1% vs. 82.6%, $OR = 1.04$; 95% CI [0.68–1.60]), engaged in hazardous drinking (19.0% vs. 20.9%; $OR = 0.89$, 95% CI [0.59–1.33]), or reported fair/poor health (21.8% vs. 23.8%; $OR = 0.89$, 95% CI [0.61–1.31]).

2.2. Measures

2.2.1. Alcohol Consumption—A modified version of the consumption items of the World Health Organization's Alcohol Use Disorders Identification Test (AUDIT-C; Babor et al., 2001) was used to assess alcohol consumption in the past year. Following procedures used for quantity-frequency assessment (Rodgers et al., 2000a), a measure of consumption was constructed from the two AUDIT-C questions: 1) How often did you have a drink containing alcohol in the past year, and 2) How many drinks did you have on a typical day when you were drinking in the past year? Based on overall consumption, individuals were categorized into four groups largely based on National Institute on Alcohol Abuse and Alcoholism (NIAAA) recommended healthy limits for men and women. Groups included (1) non-drinkers (reported no alcohol use in the past year), (2) occasional drinkers (reported drinking monthly or less and had no drinking days of 5 or more drinks), (3) moderate drinkers (up to 7 drinks per week for women, up to 14 drinks per week for men, and with no drinking days of 5 or more drinks), (4) hazardous drinkers (8 or more drinks per week for women, 15 or more drinks per week for men, or any drinking days of 5 or more drinks).

2.2.2. Self-rated health—A single item from the Medical Outcomes Study 12-item short-form (SF-12; Ware et al., 1996) was used to assess veterans' self-rated health. Participants were asked to rate their general health by answering the following question: "In general, would you say your health is:" Response options were excellent, very good, good, fair, or poor. Using this single item is a reliable (Zajacova & Dowd, 2011; Crossley & Kennedy, 2002; Lundberg & Manderbacka, 1996) and well-validated method for assessing self-rated health (DeSalvo et al., 2006; Idler & Benyamini, 1997; Mavaddat et al., 2014). For example, a large prospective cohort study of over 20,000 veterans has indicated that a single self-rated health item has comparable area under the curve (AUC) statistics when predicting mortality as the full SF-36 physical component score (DeSalvo et al., 2005). Responses were dichotomized such that ratings of excellent, very good, and good were combined in one category and ratings of fair and poor were combined to comprise the other category.

2.2.3. PTSD and Depression—The PTSD Checklist (PCL; Weathers et al., 1993) was administered to assess PTSD symptoms. The PCL is a well validated self-report measure consisting of 17 items that correspond to the DSM-IV diagnostic symptoms of PTSD (McDonald and Calhoun, 2010). For the current study, a cut score of 50 was used to

determine probable PTSD. The Patient Health Questionnaire – 2 (PHQ-2; Spitzer et al., 1999) was used to screen for the presence of depression. Participants with total scores of three or higher were considered to have screened positive for depression. Criterion and construct validity of scores from the PHQ-2 has been established (Kroenke et al., 2003).

2.2.4. Demographic characteristics and military history—Participants completed multiple survey items assessing demographic characteristics, including age, gender, race, and marital status. Participants were asked multiple questions about their military careers, including whether they suffered an injury during their deployment that resulted in a service-connected disability rating by VA.

2.2.5. Cigarette smoking—Smoking status was assessed via a single item that asked, “Have you ever smoked cigarettes?” Response choices included: “yes, still smoking every day”; “yes, still smoking some days”; “yes, but no longer smoke at all”; and “no, never smoked”.

2.2.6. Health service utilization—Use of healthcare services was assessed with a single item which queried use of VA for health care since their last deployment at three levels: all VA use, dual use (VA and non-VA), or no VA healthcare.

2.2.7. Combat exposure—The Combat Experiences Scale (Hoge et al., 2004) was used to assess combat exposure. Participants indicated whether or not they had experienced 17 different combat situations during their deployment(s). The total number of endorsed experiences was summed to result in a total score ranging from zero to 17.

2.3. Analyses

Seventy-eight cases were omitted from analyses due to missing data on the measure of alcohol consumption, sex, four or more items on the PCL, or both items on the PHQ, resulting in an analysis sample of 1,083 veterans. Logistic regression was used to evaluate both the unadjusted and adjusted associations between alcohol consumption and PTSD, depression, and self-rated health. For adjusted models examining probable PTSD and depression, covariates included age, sex, race, marital status, income, time since deployment, and combat exposure. For the adjusted model examining self-rated health, covariates included age, sex, race, marital status, income, time since deployment, combat exposure, smoking status, use of VA healthcare, PTSD and depression. Given small cell sizes in some demographic variables, the following variables were dichotomized: race (White vs. Non-White), marital status (married or living together as married vs. non-married), income (< \$20,000 vs. \$20,000). The reference category for all analyses examining alcohol consumption was moderate drinking. Missing data were imputed using multiple imputation with ten iterations using the Monte Carlo Markov chain method. All analyses were conducted using SAS software version 9.4 (SAS, Inc., Cary, NC).

3. Results

Demographic characteristics of the sample are presented by drinking status in Table 1. The mean age of the sample was 38.9 ($SD=9.86$). The majority of the sample was Caucasian

(70.9%), male (82.8%) and married (71.0%). Thirty-five percent of the sample ($n = 381$) reported using VHA healthcare. Seventeen percent of the sample did not drink alcohol, 21.8% reported drinking occasionally (monthly or less), 42.6% were moderate drinkers (1-7 drinks per week for women; 1-14 drinks per week for men; with no drinking days of 5 or more drinks), and 18.7% consumed more than NIAAA guidelines for number of drinks per week or number of drinks per day and were classified as hazardous drinkers.

As shown in Table 1, drinking patterns differed by several demographic variables, including age, gender, race, income level, marital status, smoking status, and VA health care user status. Mean number of combat experiences also differed by drinking pattern. A small proportion of non-drinkers were under 30 (17%), whereas 39% of hazardous drinkers were under 30. Veterans with the highest income (greater than \$75K per year) disproportionately endorsed light and moderate drinking patterns. Veterans with the lowest incomes were more heavily represented at both non-drinking and hazardous drinking levels. Compared to single and divorced veterans, married veterans had lower rates of hazardous drinking. Additionally, those who fell under the hazardous drinking group had higher mean number of combat experiences, and were more likely to endorse current smoking.

Results examining the association between alcohol consumption and psychiatric distress in the form of PTSD and depression are shown in Table 2. As shown in Figure 1, the unadjusted proportion of veterans who screened positive for PTSD or depression by levels of alcohol consumption formed a U-shaped curve. Both non-drinkers and hazardous drinkers were more likely to have PTSD and depression symptoms than moderate drinkers. Occasional drinkers were not significantly different than moderate drinkers. These results held after adjusting for demographic variables, number of years since last deployment, and levels of combat exposure (see Table 2).

Twenty-two percent of the sample ($n = 240$) perceived their health to be fair or poor. Both unadjusted and adjusted results of models examining self-rated health are shown in Table 3. Bivariate results indicated that older age, being non-married, being a minority, having low income, current smoking, and increased combat exposure, were all significantly associated with increased reports of fair or poor health. Veterans who reported using VA healthcare were also significantly more likely to report fair/poor health than veterans not using VA healthcare. Both PTSD and depression were strongly related to lower self-rated health. Results of the fully adjusted model indicated that non-drinkers were significantly more likely than moderate drinkers to report fair/poor health (Table 3). While bivariate analyses indicated that hazardous drinkers were significantly more likely to report fair/poor health compared to moderate drinkers, this effect was no longer statistically significant in the fully adjusted model that controlled for demographic factors, years since deployment, combat exposure, PTSD, depression, and smoking status (see Table 3).

4. Discussion

This survey of Iraq- and Afghanistan-era veterans found that, relative to non-drinkers and hazardous drinkers, moderate drinkers reported lower rates of probable PTSD and depression. Similarly, both non-drinkers and hazardous drinkers were more likely to report

fair or poor self-rated physical health when compared to moderate drinkers. Effects generally persisted when covarying sociodemographic factors and smoking status. However, when accounting for covariates, the difference between hazardous and moderate drinking in odds of reporting fair or poor self-rated physical health was no longer significant.

These results are generally consistent with research on civilian populations, in which the lowest risk for psychological distress has been observed in those who consume alcohol occasionally or moderately (Rodgers, Korten, Jorm, Christensen, et al., 2000a; Rodgers, Korten, Jorm, Jacomb, et al., 2000b). In addition, longitudinal research conducted across 14 countries indicated that moderate baseline alcohol consumption predicted lower incidence of depression or generalized anxiety disorders (Bellos et al., 2016). Our results regarding self-rated physical health complement previous literature reporting health benefits of occasional to moderate alcohol consumption, including diabetes, cardiovascular disease, and mortality (Costanzo et al., 2010; Rehm et al., 2010; Roerecke and Rehm, 2012; Ronksley et al., 2011). In the current report, we found that potential positive health correlates of moderate alcohol consumption extended to Iraq- and Afghanistan-era veterans' self-ratings of health. Bearing in mind evidence that self-rated health outperforms socioeconomic status in predicting change in health over time (Singh-Manoux et al., 2005), this pattern of findings contributes a valuable veteran perspective on the debate regarding potential benefits of moderate alcohol consumption.

Although the so-called U-shaped curve of self-rated health as a function of alcohol consumption level has been previously reported (Kloner and Rezkalla, 2007; Marmot et al., 1981; Thompson, 2013), this study is among the first that has accounted for the effects of psychological distress on self-ratings of general health. Statistically controlling for distress is vital, given that distress significantly decreases self-ratings of physical health (Beckham, Vrana, et al., 2002; Calhoun et al., 2009; Schry et al., 2016). While moderate drinkers were lower on measures of psychological distress than abstainers and heavy drinkers (Table 2), we found that even with these markers in the models, moderate drinkers rate their overall health better. This suggests that the perception of better physical health among moderate drinkers is not explained simply by lower levels of generalized distress or somatization from psychiatric disorders.

This study included over 25% women veterans, which is significant given that many studies of veterans are not powered to detect gender effects. Although previous studies of Iraq- and Afghanistan-era veterans have used a single cut score for both men and women (Scott et al., 2013; Street et al., 2013), there is evidence that the threshold for increased health risk associated with alcohol consumption is lower for women (Nolen-Hoeksema, 2004). With this in mind, we used NIAAA guidelines in establishing different alcohol consumption thresholds for men and women. Our use of a lower threshold for women in classifying hazardous alcohol consumption increases estimated prevalence rates (Hoggatt et al., 2015) and maximized sensitivity in detecting risky drinking habits.

Reported rates of fair/poor health and hazardous drinking were at an expected level in the sample. Approximately 25% of the Iraq- and Afghanistan-era veterans in this study reported fair or poor health. This is a significantly higher proportion than the general United States

population, where representative samples found that 10-17% of people report fair or poor health (Idler et al., 2000; Shi and Starfield, 2000). However, the rates of fair or poor health are elevated in the sample region (i.e., Virginia, North Carolina) where survey respondents reside (Hays et al., 1996). The hazardous drinking rate reported is similar to that of smaller samples of treatment-seeking Iraq- and Afghanistan-era veterans, whose self-reported hazardous drinking rates were 26% in primary care (McDevitt-Murphy et al., 2010) and 22% in a VA electronic medical record review (Calhoun et al., 2008). The rates of hazardous drinking reported here are higher than the 8% rate reported in a sample of primary care veterans over 65 years of age (Kirchner et al., 2007). This is likely due to the well-established negative relationship between advanced age and rates of hazardous drinking.

This study has several limitations. First, the cross-sectional nature of the study prevented analyses of the longitudinal effect of alcohol consumption on self-rated health and medical morbidity. Such analyses have been conducted previously, resulting in conflicting findings about the potentially protective effects of moderate alcohol consumption (Ronksley et al., 2011; Stockwell et al., 2016). While the response rate of the current study is consistent with other published mail surveys of Iraq- and Afghanistan-era veterans (Calhoun et al., 2008; Vogt et al., 2011), results may not generalize to all veterans of armed conflicts in Iraq and Afghanistan. Additionally, the sampling region (Mid-Atlantic U.S.) may affect results, since rates of alcohol consumption and binge drinking vary by state (CDC, 2012; Haughwout, 2015). Furthermore, the use of self-report data is a limitation; future studies may benefit from using objective healthcare utilization data, including diagnoses and procedure codes. In addition, given the survey response format, we were unable to categorize women veterans drinking above NIAAA guidelines (i.e., >3 drinks per day) as hazardous drinkers. Since the survey did not include data on past alcohol use disorders, it was not possible to examine whether poor self-rated health among alcohol abstainers is explained by problematic past alcohol use. One meta-analysis, however, compared former drinkers to long-term alcohol abstainers and found no difference in medical morbidity (Roerecke and Rehm, 2011). Other studies accounting for the effects of former drinking have found that the effects of moderate alcohol consumption on mortality and cardiovascular disease persist (Plunk et al., 2014; Ronksley et al., 2011). It is possible that poor health (e.g., fatty liver or diabetes) was a potential reason that veterans in this study abstained from alcohol. This interpretation is consistent with cross-sectional research documenting that young adults who abstain from alcohol are more likely to have a chronic medical illness (Ng Fat and Shelton, 2012), though the directionality of that relationship is unclear.

This study has several potential implications. First, this cohort of recent veterans have high levels of fair/poor self-rated health despite their relatively young age which has significant implications for VA healthcare needs and utilization. Second, there is a relatively high level of hazardous drinking. While the VA routinely screens for alcohol misuse, current results suggest that non-drinkers are also at risk for poor mental and physical health. Screening for history of alcohol problems may also be warranted to identify those at most risk. Moderate drinking appears to be a marker for a number of protective factors (e.g., marital status, income, lower levels of combat exposure) which may mitigate against the potential deleterious effects of alcohol. Substance abuse interventions that involve increasing social support (e.g., family involvement) and employment may help mitigate against deleterious

effects of alcohol by serving as motivation for people to keep their drinking in check since heavy drinking would be incompatible with success in these life areas.

Conclusion

In the current study of Iraq- and Afghanistan-era veterans, moderate alcohol consumption was associated with significantly lower rates of PTSD, depression, and poor self-rated health. These results add to the limited literature on Iraq- and Afghanistan-era veterans by providing data on varying associations with alcohol consumption in a sample that included veterans who were not seeking care at the VA. While these data add to the debate on potentially beneficial effects of moderate alcohol consumption on psychological distress and global self-rated health, it is critically important to recognize that cross-sectional data cannot test causation or effects over time. Longitudinal research is needed to further examine the association between patterns of alcohol use and health outcomes in veterans.

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Figure 1. Association of drinking category with self-rated health and psychiatric distress

Note: PTSD = posttraumatic stress disorder. MDD = major depressive disorder.

Table 1Demographic Characteristics of Veterans by Drinking Status ($N = 1083$).

	Non-drinkers ($n=184$) N (%)	Occasional Drinkers ($n=236$) N (%)	Moderate Drinkers ($n=461$) N (%)	Hazardous Drinkers ($n=202$) N (%)
Age Group ***				
21-29	31 (16.9%)	59 (25.0%)	105 (22.8%)	79 (39.3%)
30-39	44 (24.0%)	63 (26.7%)	106 (23.0%)	48 (23.9%)
40	108 (59.0%)	114 (48.3%)	249 (54.1%)	74 (36.8%)
Female gender *	37 (20.1%)	56 (23.7%)	64 (13.9%)	29 (14.4%)
Race ***				
African-American	54 (29.3%)	36 (15.3%)	66 (14.5%)	26 (12.9%)
Caucasian	107 (58.2%)	163 (69.1%)	341 (74.0%)	157 (77.7%)
Other	23 (12.5%)	37 (15.7%)	54 (11.7%)	19 (9.4%)
Current income ***				
< \$20K	31 (17.1%)	20 (8.6%)	22 (4.6%)	30 (14.9%)
\$20K-\$75K	92 (50.8%)	113 (48.7%)	193 (42.6%)	111 (55.2%)
> \$75K	58 (32.0%)	99 (42.7%)	238 (52.5%)	60 (29.9%)
Marital status *				
Married/living as married	134 (72.8%)	174 (73.7%)	338 (73.3%)	118 (58.4%)
Single, never married	25 (13.6%)	25 (10.6%)	64 (13.9%)	48 (23.8%)
Divorced/separated/other	25 (13.6%)	37 (15.7%)	59 (12.8%)	36 (17.8%)
Smoking Status ***				
Never Smoker	122 (66.7%)	133 (56.6%)	260 (56.4%)	71 (35.2%)
Former Smoker	38 (20.7%)	75 (31.9%)	136 (29.5%)	55 (27.2%)
Current Smoker	23 (12.5%)	27 (11.5%)	65 (14.1%)	76 (37.6%)
VA Health Care User ***	97 (54.5%)	71 (31.4%)	137 (30.6%)	76 (39.2%)
Mean number of combat experiences (SD) **	3.81 (4.06)	3.64 (3.90)	3.88 (3.90)	5.07 (4.27)
Mean number of years since last deployment (SD)	3.95 (1.81)	4.17 (1.79)	3.94 (1.91)	3.83 (1.96)

Note. Percentages may not add up to 100% due to missing data. For tests of group differences by drinking category (chi-square or ANOVA):

* $p < .01$,

** $p < .001$,

*** $p < .0001$.

Table 2

Logistic regression models for probable PTSD and depression by alcohol intake.

Drinking Category	Probable PTSD				Probable Depression			
	Unadjusted		Adjusted ^f		Unadjusted		Adjusted ^f	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Nondrinker	2.92**	[1.18, 4.71]	2.39*	[1.35, 4.04]	2.58**	[1.65, 4.04]	2.12*	[1.31, 3.43]
Occasional	0.98	[0.56, 1.71]	0.86	[0.46, 1.58]	1.11	[0.68, 1.81]	0.99	[0.59, 1.65]
Moderate	1	–	1	–	1	–	1	–
Hazardous	3.65**	[2.32, 5.74]	3.23**	[1.90, 5.48]	3.81**	[2.51, 5.79]	3.12**	[1.99, 4.90]

Note. OR=odds ratio. CI=confidence interval.

^f Adjusted for age, sex, race, marital status, income, years since last deployment, and combat exposure.

* p<.01;

** p<.0001

Table 3

Logistic regression models of self-rated fair/poor health status.

Variable	Unadjusted		Adjusted ^f	
	OR	95% CI	OR	95% CI
Age				
21-29 (reference)	—	—	—	—
30-39	0.99	[0.67, 1.54]	1.46	[0.85, 2.50]
40+	1.55*	[1.08, 2.21]	2.82***	[1.72, 4.62]
Male Sex	1.18	[0.80, 1.74]	1.15	[0.71, 1.86]
Race (Ref: Caucasian)	0.62*	[0.46, 0.84]	0.74	[0.51, 1.07]
Marital Status (Ref: Married)	0.69*	[0.50, 0.93]	0.88	[0.58, 1.31]
Low Income	2.15***	[1.52, 3.04]	1.43	[0.87, 2.35]
Years since last deployment	1.08	[0.99, 1.16]	1.04	[0.94, 1.15]
Combat Exposure	1.10***	[1.06, 1.14]	1.05	[1.00, 1.10]
Smoking Status				
Never Smoker (reference)	—	—	—	—
Former Smoker	1.04	[0.74, 1.47]	1.05	[0.70, 1.58]
Current Smoker	1.78**	[1.23, 2.57]	1.57	[1.00, 2.49]
Probable PTSD	10.08***	[6.92, 14.70]	3.04***	[1.84, 5.02]
Probable Depression	8.02***	[5.68, 11.33]	3.63***	[2.33, 5.64]
VHA Health Care User	3.33***	[2.46, 4.49]	1.75**	[1.23, 2.50]
Drinking Status				
Nondrinker	2.72***	[1.84, 4.03]	1.78**	[1.12, 2.84]
Occasional	1.20	[0.79, 1.81]	1.28	[0.81, 2.02]
Moderate (reference)	1	—	1	—
Hazardous	2.16***	[1.46, 3.19]	1.27	[0.78, 2.06]

Note. OR = Odds Ratio. CI = confidence interval.

*
p<.05,**
p<.001***
p<.0001^f
Adjusted for all other variables in the model.