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Alcohol Misuse and Psychological Resilience among U.S. Iraq and Afghanistan Era Veteran Military Personnel

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Abstract

Objective—The present study sought to investigate the longitudinal effects of psychological resilience against alcohol misuse adjusting for socio-demographic factors, trauma-related variables, and self-reported history of alcohol abuse.

Methodology—Data were from National Post-Deployment Adjustment Study (NPDAS) participants who completed both a baseline and one-year follow-up survey (N=1090). Survey questionnaires measured combat exposure, probable posttraumatic stress disorder (PTSD), psychological resilience, and alcohol misuse, all of which were measured at two discrete time periods (baseline and one-year follow-up). Baseline resilience and change in resilience (increased

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Contributors

Ms. Green wrote the first version of the manuscript. Dr. Youssef participated in edits of the manuscript. Dr. Beckham participated in the conceptualization and writing of the manuscript. Dr. Elbogen contributed to each aspect of this project from study design to edits of the manuscript. All authors have approved the final manuscript.

Conflict of Interest

My coauthors, Drs. Youssef, Beckham, and Elbogen and I do not have any interests that might be interpreted as influencing the research. APA ethical standards were followed in the conduct of this research.

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or decreased) were utilized as independent variables in separate models evaluating alcohol misuse at the one-year follow-up.

Results—Multiple linear regression analyses controlled for age, gender, level of educational attainment, combat exposure, PTSD symptom severity, and self-reported alcohol abuse. Accounting for these covariates, findings revealed that lower baseline resilience, younger age, male gender, and self-reported alcohol abuse were related to alcohol misuse at the one-year follow-up. A separate regression analysis, adjusting for the same covariates, revealed a relationship between change in resilience (from baseline to the one-year follow-up) and alcohol misuse at the one-year follow-up. The regression model evaluating these variables in a subset of the sample in which all the participants had been deployed to Iraq and/or Afghanistan was consistent with findings involving the overall era sample. Finally, logistic regression analyses of the one-year follow-up data yielded similar results to the baseline and resilience change models.

Conclusions—These findings suggest that increased psychological resilience is inversely related to alcohol misuse and is protective against alcohol misuse over time. Additionally, it supports the conceptualization of resilience as a process which evolves over time. Moreover, our results underscore the importance of assessing resilience as part of alcohol use screening for preventing alcohol misuse in Iraq and Afghanistan era military veterans.

Keywords

Substance Misuse; Resilience; Military Veterans

Introduction

Alcohol misuse in the U.S. military is widespread (Institute of Medicine, 2013; Ames & Cunradi, 2004). Current population estimates range from 22% to 40%, a considerable higher rate when compared to non-military populations (Eisen et al., 2012; Seal et al., 2011; Calhoun et al., 2008). Although previous studies have attempted to clarify the rates of alcohol misuse in military samples, less attention has been placed on identifying protective mechanisms that buffer against high risk drinking in this population (Scott et al., 2012). Longitudinal assessment using standardized measures in the same sample could lead to a more complete understanding of the course of alcohol misuse and potential protective factors among U.S. Iraq/Afghanistan era servicemembers.

Characterizing Alcohol Misuse

Alcohol misuse is a collective term for defining problems or conditions related to alcohol use. More specifically, it refers to any alcohol drinking behavior that increases an individual's risk for negative health and social consequences (U.S. Department of Health and Human Services, 2005). While repeated alcohol misuse has been linked to dependence, not all high-risk drinkers become dependent users (Babor et al., 2001) — suggestive of a protective mechanism at play. Further study of the mechanisms important for protection against alcohol misuse is needed for understanding the extent in which these mechanisms buffer against problem alcohol drinking in U.S. Iraq and Afghanistan Era Veterans.

Combat Exposure, PTSD, and Socio-demographic Variables: Documented Risks of Alcohol Misuse

Combat exposure is a risk factor for a number of psychological conditions including alcohol misuse (Hoge, Auchterlonie, & Milliken, 2006; Bray & Hourani, 2007; Schlenger et al., 2007; Kulka et al., 1990b; Marx et al., 2009; Seal et al., 2007; Goldberg, Eisen, True, & Henderson, 1990). In a large-scale prospective study of 48,481 combat exposed veterans, Jacobson and colleagues (2008) found that National Guard/Reserve and younger aged

servicemembers were at a greater risk for alcohol misuse—described as alcohol-related problems, new onset of heavy weekly drinking, and binge drinking (Jacobson et al., 2008). Likewise, researchers observed a two-fold increase in post-deployment alcohol-related behavioral problems in a retrospective study involving 1,080 U.S. soldiers returning from Iraq (Wilk et al., 2010). Moreover, in a representative, longitudinal study of 88,235 Operation Iraqi Freedom (OIF) veterans, Milliken and colleagues (2007) found that 12% of active duty and 15% of National Guard/Reserve troops reported alcohol-related consequences 3 to 6 months post-deployment (Milliken et al., 2007). As these studies demonstrate, exposure to combat may result in an increased risk in alcohol misuse.

There is considerable evidence for the link between PTSD and alcohol misuse among military veterans (King, King, Fairbank, Keane, & Adams, 1998; Jakupcak et al., 2010; Shipherd, Stafford & Tanner, 2005). Research indicates that Iraq and Afghanistan veterans with PTSD have alcohol abuse rates that are twice as high as those found among non-military young males (Institute of Medicine, 2013). Additionally, a recent report which examined several factors related to post-deployment alcohol misuse in a sample of National Guardsmen (n=348) cited combat related PTSD as a significant factor in the onset of alcohol use disorders (Kelhe et al., 2012). PTSD is a psychiatric condition characterized by reexperiencing (e.g., acting or feeling as if the traumatic event were recurring), avoidant and/or numbing (e.g., feelings of detachment or estrangement from others), and hyperarousal symptoms (e.g., irritability or outbursts of anger; APA, 2000). Hypothesized explanations for the relationship between PTSD and alcohol misuse vary widely and include the use of alcohol to reduce symptom distress (e.g., self-medication; Khantzian, 1985), which subsequently, is reinforced through symptom alleviation (Jacobsen et al., 2001). Another theory points to a genetic and environmental vulnerability that increases the likelihood of developing both PTSD and alcohol use problems following a traumatic event (McLeod et al., 2001; Scherrer et al., 2008; Xian et al., 2000). Moreover, evidence has cited alcohol's role in the increase of endorphin levels as a possible reason for the co-morbidity between PTSD and alcohol misuse (Volpicelli et al., 1999).

Socio-demographic factors such as younger age (Ferrier-Auerbach et al., 2009; Stahre, et al., 2009; Bray et al., 2003), White race (Nolen-Hoeksema, 2004; Naimi et al., 2003), male gender (Nolen-Hoeksema, 2004; Naimi et al., 2003), single marital status (Ferrier-Auerbach et al., 2009; Fertig & Allen, 1996), and lower levels of educational attainment (Ames & Cunradi, 2004; Bray et al., 2003) are well documented risk factors for alcohol misuse among military servicemembers. A cross-sectional study of 514 National Guardmembers found that younger age predicted higher quantity of drinking prior to deployment (Ferrier-Auerbach et al., 2009). In the same study, single marital status was found to predict greater total drinking and higher frequency of heavy drinking (Ferrier-Auerbach et al., 2009). Together, these results suggest that certain socio-demographic variables contribute to an increased risk for high risk alcohol drinking.

Resilience

A recent report has suggested that a key factor playing a protective role against alcohol misuse among U.S. military combat troops is resilience (Green et al., 2010). Resilience is universally described as an individual's ability to thrive despite adversity (Connor & Davidson, 2003; Luthar, Cicchetti, & Becker, 2000; Rutter, 1987; Masten, 1994, p.3). Additionally, resilience has been thought of as a dynamic, multidimensional construct (Luthar, Cicchetti, & Becker, 2000; Zimmerman & Arunkumar, 1994), largely comprised of protective processes (biological, cognitive, and spiritual), which aids in finding positive meaning in stressful situations (Richardson, 2002). While early scholars posited resilience as a biological (Rutter, 2008) or behavioral trait (Wagnild & Young, 1993; Masten, 1994), modern theories generally consider resilience as a state of functionality consisting of

personal characteristics and protective factors that foster adaptation to stress (Luthar, Cicchetti, & Becker, 2000; Zautra, Hall, & Murray, 2010).

Validation studies of resilience (as measured by the Connor Davidson Resilience Scale (CD-RISC) in diverse samples have provided preliminary support for the inverse relationship between resilience and psychological trauma (Campbell-Sills & Stein, 2007; Wang, Shi, Zhang, & Zhang, 2010; Burns & Antsey, 2010; Notario-Pacheco et al., 2011). Furthermore, the relation between resilience and adverse physical and mental health outcomes has been documented among various samples including community (Connor, Davidson, & Lee, 2003), elderly (Wagnild & Young, 2007), and military populations (Youssef et al., 2013; Youssef et al., 2013; Green et al., 2010). The core characteristic of resilience (as measured by the 10-item version of the CD-RISC) encompasses the strengthening effect of stress, positive acceptance of and successful adaptation to change, and self-efficacy (Connor & Davidson, 2003; Campbell-Sills & Stein, 2007). Resilience characteristics have been shown to provide protection against alcohol misuse (Lerner & Vicary, 1984) as well as aid in the recovery from substance misuse (Benda et al., 2002). Additionally, improvement in resilience over time among individuals with PTSD has been documented in a pharmaceutical trial of venlafaxine (Davidson et al., 2008), providing initial evidence that resilience can be bolstered in trauma exposed populations.

Studies examining the longitudinal effects of resilience on alcohol misuse in Iraq and Afghanistan era samples are lacking. Given the magnitude of alcohol misuse in the military and the serious financial, psychological, and physical consequences associated with its use (Rhem, 2000), research on the mechanisms that may buffer against alcohol misuse is vital. Further evaluation of resilience in alcohol misuse populations could assist in understanding risk and protective factors associated with substance abuse.

In a previous retrospective study of U.S. Iraq and Afghanistan combat exposed veterans ($n=497$), we found that higher levels of resilience were related to lower problem alcohol drinking rates. This relationship remained even after adjusting for the influence of combat-related PTSD (Green et al., 2010). Data have also shown that resilience is inversely related to substance misuse and is protective overtime (Smith et al., 1995). Following the results of the aforementioned studies, the present study sought to investigate the longitudinal effects of a theorized protective factor, resilience, against alcohol misuse adjusting for socio-demographic factors, trauma-related variables, and self-reported history of alcohol abuse. We hypothesized that: (1) lower baseline resilience will be related to higher levels of alcohol misuse at one-year follow-up; (2) demographic variables, particularly younger age, White race, male gender, single marital status, and lower educational attainment will be associated with higher severity of alcohol misuse; (3) change in baseline resilience will be negatively related to severity of alcohol misuse; and (4) Combat exposure, probable PTSD, and demographic variables (younger age, White race, single marital status, lower educational attainment) will be related to alcohol misuse at one-year follow-up in persons who deployed to Iraq and Afghanistan.

Methodology

Participants and Procedures

The sample was drawn from the National Post-Deployment Adjustment Study (NPDAS) survey—a prospective study of mental and physical health symptoms in U.S. military veterans who served on or after September 11, 2001 and were separated from active duty or served in the National Guard or Reserves (Elbogen et al., 2013). A randomized list of prospective subjects ($n=3000$) was provided by the U.S. Department of Veterans Affairs Environmental Epidemiological Service (EES). Established selection parameters for the

study sample included an oversampling for women and stratification by gender. The study sample appeared representative of separated veterans with respect to geography (representation of 50 states, Washington D.C. and 4 territories), race/ethnicity (72.65% White and 27.35% Black or African American, Hispanic or other) and military service branch (Center for Health Promotion and Prevention Medicine, 2010). Data collection took place between August 2009 and December 2011.

Institutional Review Board (IRB) approval for the research study was obtained at the Department of Veterans Affairs Medical Center in Durham, North Carolina and the University of North Carolina, Chapel Hill, North Carolina. Informed consent involved an acknowledgement of study procedures. Study participants were recruited at baseline and one-year follow-up through the use of Dillman's Tailored Design Method (TDM; Dillman, 2007; Dillman, 1978). The Dillman approach to survey sampling is generally considered the standard for telephone or mailed surveys and involves a systematic tailoring of interval mailings thereby encouraging high response rates (Dillman, 1978).

At the start of the study, prospective subjects were mailed a personalized, introductory letter describing the purpose of the study and details of an upcoming web-based survey opportunity. After four days, an invitation letter containing the survey instructions, a commemorative postage stamp booklet (valued at \$4.40), and a password for completing the web-based survey was mailed. Non-responders were followed up sixteen days after the invitation mail-out with a reminder postcard and were subsequently mailed a paper version of the web-based survey with a pre-paid postage return envelope. A final letter of invitation was sent approximately two months later to encourage participation and provide information relating to the end of the survey the following week.

Surveys were mailed to 3,000 potential subjects. Five hundred and one (n=501) were excluded from the study sample due to incomplete addresses/death (n=63) and erroneous addresses (n=438). An additional subset of potential subjects considered as non-responders (n=1111) were removed resulting in a final baseline sample of n=1388. The cumulative participant response rate was 56%, a comparably high percentage when compared to recent national surveys conducted in similar military samples (Riddle et al., 2008; Beckham et al., 2008). The follow-up (n=1090) study sample exhibited a retention rate of 79% from baseline to one-year follow-up.

Study Measures

Demographic Information—Demographic data collected as part of this study included age, gender, race, marital status (unmarried, married, married- but separated), education level (junior high school, middle school, partial high school, high school graduate (G.E.D.), partial college, associate's degree, bachelor's degree, graduate degree), working status (full-time, part-time, retired, unemployed, full-time student, part-time student, stay-at-home caretaker, on disability, or have filed for disability, other), military service status (on active duty, in the ready reserves, in the individualized ready reserve, in the national guard, in the inactive national guard, discharge from the military), and deployment history (number of deployments to either Afghanistan or Iraq).

Resilience—The Connor-Davidson Resilience Scale (CD-RISC-10) is a brief, validated instrument for evaluating resilience (Campbell-Sills & Stein, 2007). Preliminary evidence has shown the CD-RISC-10 to be a more psychometrically sound measure of resiliency in Iraq and Afghanistan Era military populations when compared to the 25-item version. The CD-RISC-10 consists of items 1, 4, 6, 7, 8, 11, 14, 16, 17, and 19 from the full measure with each item rated on a 5-point Likert scale (0 "not true at all" to 4 "true nearly all of the time"). Items comprised in the CD-RISC-10 are considered to be reflective of both

adaptability and commitment (e.g., “I can deal with whatever comes my way”, “I am not easily discouraged by failure.”). The total score ranges from (0–40), with higher scores indicating a greater degree of resiliency. Additionally, the CD-RISC-10 has demonstrated excellent psychometric properties among differing samples including college students, trauma-exposed adult women, and non-Western populations (Gucciardi, Jackson, Coulter, & Mallett, 2011; Wang, Shi, Zhang, & Zhang, 2010; Scali et al., 2012; Campbell-Sills & Stein, 2007). The estimates of reliability for the CD-RISC-10 were sufficient in both the initial validation study (Cronbach $\alpha = .89$; Campbell-Sills & Stein, 2007) and current sample (Cronbach $\alpha = 0.93$). A change in resilience from baseline to one-year follow-up could denote an increase in resilience (positive value) or a decrease in resilience (negative value).

Combat Exposure—Combat exposure was measured using the Combat Experiences Scale (CES) from the Deployment Risk and Resilience Inventory (DRRI; King et al., 2003). Comprised of 15 items in total, the CES assesses exposure to combat or war related situations, such as firing a weapon, being fired on or receiving friendly fire, and witnessing an attack, injury, or death (King et al., 2003; Vogt et al., 2008). Response items are rated on a 6-point Likert type scale (1 = Never; 6 = Daily or almost daily), with higher scores representing greater levels of combat exposure. The CES has demonstrated good reliability when tested in an Operation Iraqi Freedom (OIF) veteran population (Vogt et al., 2008).

Probable Posttraumatic Stress Disorder (PTSD)—PTSD severity was assessed with the Davidson Trauma Scale (DTS), a brief global assessment scale for posttraumatic stress disorder (PTSD; Davidson et al., 1997). The DTS includes 17 items that correspond to each of the 17 DSM-IV symptoms of PTSD. Respondents rate each of the 17 items on both frequency and severity. A cut-off value of 48 or more on the DTS is believed to reflect the presence of PTSD. Additionally, the DTS has demonstrated reliability and validity in OEF/OIF veterans as evident by sensitivity of 0.82, a specificity of 0.94, and a diagnostic efficiency of .87 using the Structured Clinical Interview for DSM-IV-TR Axis I disorders (McDonald, Beckham, Morey, & Calhoun, 2009).

Alcohol Misuse—To measure current level of alcohol use, we employed the Alcohol Use Disorders Identification Test (AUDIT) (Saunders, Aasland, Babor, de la Puente, & Grant, 1993), which is a 10-item self-report instrument used for assessing alcohol misuse. Responses range from 0 to 40. A total score of 8 or more in men (or 7 or more in women) indicates a strong likelihood of hazardous and harmful alcohol use, as well as possible alcohol dependence (Babor et al., 2001). The AUDIT demonstrated adequate internal consistency when tested in a similar military cohort ($\alpha = .85$) and was estimated at $\alpha = .85$ in the present sample (Crawford et al., in press).

Moreover, history of alcohol abuse was assessed during the baseline survey. Participants were asked to indicate whether the statement, “I abused alcohol” was applicable before, during, between, and/or after their military deployment.

Statistical Analyses

Women constituted 33% of the current sample but represent an estimated 15.6% of the military, based on September 2009 Defense Manpower Data Center figures (Center for Health Promotion and Prevention Medicine, 2010); data in the current study were weighted to reflect the latter proportion, which adjusted the total sample to a weight-adjusted follow-up sample of $n=866$.

Descriptive statistics for the demographics and clinical characteristics, outcome variables, and potential predictors were calculated including the mean, standard deviations, counts, and

frequencies for continuous and categorical variables respectively. Bivariate correlations between independent variables and alcohol misuse (AUDIT total score) at follow-up were computed using Pearson product-moment and point-biserial correlation coefficient procedures.

Multiple linear regression analyses were utilized to examine predictors of alcohol misuse (AUDIT total score) at one-year follow-up. Socio-demographic and trauma-related variables such as age (Ferrier-Auerbach et al., 2009; Stahre, et al., 2009; Bray et al., 2003), gender (Nolen-Hoeksema, 2004; Naimi et al., 2003), White race (Nolen-Hoeksema, 2004; Naimi et al., 2003), being married (Ferrier-Auerbach et al., 2009; Fertig & Allen, 1996), post-secondary education, combat exposure (Hoge, Auchterlonie, & Milliken, 2006; Bray & Hourani, 2007; Schlenger et al., 2007; Kulka et al., 1990b; Marx et al., 2009; Seal et al., 2007; Goldberg, Eisen, True, & Henderson, 1990), and PTSD (using a total DTS cut-off score of ≥ 48 ; King, King, Fairbank, Keane, & Adams, 1998; Jakupcak et al., 2010; Shipherd, Stafford & Tanner, 2005) were considered for analyses due to the literature evidence. Additionally, all statistical models controlled for self-reported history of alcohol abuse. Presence of multicollinearity among predictor variables in the regression models was assessed using a variance inflation factor. Adjusted R^2 values and probability values were also calculated. Statistical significance was determined at $p < .05$. A separate multiple linear regression analysis was also conducted to evaluate whether the change in resilience from baseline to the one-year follow-up predicted alcohol misuse (AUDIT total score) at follow-up.

Finally, a multiple logistic regression analysis was conducted to evaluate the association between baseline resilience and alcohol misuse (measured dichotomously using an AUDIT cutoff score of ≥ 7 and ≥ 8 for women and men respectively) at one-year follow-up, after adjusting for a range of important socio-demographic factors (e.g. age, gender, race, level of education attainment, marital status), trauma-related variables (combat exposure, probable PTSD) and self-reported history of alcohol misuse. All statistical analyses were performed using SAS, version 9.1 (SAS Institute, Cary, N.C.).

Results

Sample Characteristics

Participants reported a mean age of 37 years ($SD=9.57$), and 84% were male. The study group was comprised primarily of Whites (78%), with other racial groups representing 22% of the remaining sample (13% Black and the remaining 3% Asian, 0.92% Native American/Alaskan Native, 0.74% Native Hawaiian or Other Pacific Islander, 3% more than one race, and 1.5% other). Sixty-four percent of participants were married, 81% were employed, and 82% reported having education beyond high school. Fifty-two percent of participants endorsed serving in the reserve component of the Armed Forces (i.e., National Guard and/or Reserves) and the remainder were active duty. The majority of the sample (82%) had been deployed to Iraq or Afghanistan and the remaining (18%) served during the era (military service during the time period) but not in theater (i.e., military service outside of the officially designated combat zone areas in Iraq and/or Afghanistan). Nearly half (48%) of the sample endorsed combat exposure based on the CES.

Prevalence of Alcohol Misuse, Probable PTSD, and Resilience

The mean AUDIT score at baseline and the one-year follow-up for the study sample was 5.54 ($SD=6.63$) and 5.27 ($SD= 4.98$) respectively. The percent of females with an AUDIT score ≥ 7 was 17% and the percent of males with a score ≥ 8 was 26%. Based on a single survey item (not as part of the AUDIT), 23% reported alcohol abuse prior to the baseline

interview. Rates of probable PTSD (as defined by a DTS cut-off score of 48) were estimated at 18%. The mean score for the CD-RISC was 30.5 ($SD=6.63$). The mean change in resilience for the sample was 0.33 ($SD = 5.38$), suggesting very little change for the overall sample in resilience. However, examination with in participants did show change in resilience, with a range from -32 to 40 , reflecting that resilience decreased for some participants (39%), remained the same (12%) and improved for others (49%).

Bivariate Correlations

Pearson product-moment and point-biserial correlations were used to assess the relationship between independent variables and alcohol misuse (AUDIT total score) at one-year follow-up. Age ($r(1074) = -.20, p < .0001$), gender ($r_{pb}(1074) = .11, p < .001$), marital status ($r_{pb}(1074) = -.12, p < .0001$), post-secondary education ($r_{pb}(1074) = .13, p < .0001$), self-reported history of alcohol misuse ($r_{pb}(1074) = .41, p < .0001$), probable PTSD ($r_{pb}(1074) = .18, p < .0001$), combat exposure ($r_{pb}(1074) = .17, p < .0001$), and baseline resilience ($r(1059) = -.24, p < .0001$) were consistently related in the expected direction to alcohol misuse at one-year follow-up. Race ($r(1071) = .04, p = .18$) failed to be related to alcohol misuse at one-year follow-up.

Association of Baseline Resilience, Change in Resilience, Sociodemographic Factors, Trauma Variables, and Alcohol Misuse

Three separate regression analyses were conducted for evaluating alcohol misuse (AUDIT total score) at one-year follow-up. Covariates for the statistical models included age, gender, race, being married, post-secondary education, probable PTSD, combat exposure, and self-reported history of alcohol abuse. In the first statistical model, baseline resilience was utilized as the predictor variable. In the second statistical model, change in resilience from baseline to one-year follow-up served as the predictor variable. In the third statistical model, the dependent variable (alcohol misuse at one-year follow-up) was dichotomized (alcohol misuse or not). Results for Models 1 and 2 are summarized in Table 1 and results for Model 3 are displayed in Table 2.

In Model 1, as predicted, lower baseline resilience, was associated with alcohol misuse at follow-up even after accounting for the presence of combat exposure, PTSD symptom severity, and a self-reported history of alcohol abuse. Younger age and male gender were associated with higher alcohol use. The overall model was statistically significant, and accounted for 21% of the variability in alcohol misuse at follow-up.

In Model 2, the same covariates as in Model 1 were related in the expected direction. In addition, change in resilience was also related to alcohol misuse at one-year follow-up. The overall model was significant and accounted for 23% of the variability in alcohol misuse at follow-up.

In Model 3, a logistic regression was conducted to examine the relationship between baseline resilience and alcohol misuse (defined by an AUDIT score of ≥ 8 in men or ≥ 7 for women) at one-year follow-up. Table 2 provides a summary of the analysis results. Main effects were noted for age, combat exposure, self-reported history of alcohol abuse, and baseline resilience.

Discussion

To our knowledge this is the first study to examine the longitudinal effects of psychological resilience on alcohol misuse in a nationally representative U.S. military sample. As hypothesized, lower resilience at baseline was predictive of alcohol misuse at one-year

follow-up, even after accounting for trauma related variables (e.g., combat exposure, probable PTSD) and self-reported history of alcohol abuse. The present study extends previous knowledge related to the resilience and substance use literature in military samples by demonstrating the protective nature of resilience against alcohol misuse over time in an Iraq and Afghanistan era sample (Green et al., 2010; Bartone et al., 2012; King et al., 1998).

The association between younger age and alcohol misuse has been repeatedly shown in empirical studies of alcohol misuse (Mattiko et al., 2011; Naimi et al., 2003; Filmore et al., 1991; Richards, Goldberg, Rodin & Anderson, 1989). This relationship was observed in the current study as well as in studies involving other military cohorts (Jakupcak et al., 2010; Bray et al., 2004; Ames & Cunradi, 2004). Consistent with the literature on risks for alcohol misuse, male gender and White race was associated with alcohol misuse (Nolen-Hoeksema, 2004; Naimi et al., 2003). While numerous studies have reported an association between combat exposure and alcohol misuse (Hoge, Auchterlonie, & Milliken, 2006; Bray & Hourani, 2007; Schlenger et al., 2007; Kulka et al., 1990; Marx et al., 2009; Seal et al., 2007; Goldberg, Eisen, True, & Henderson, 1990), this relationship was only supported in the logistic regression model. Hence, future studies should explore this relationship in greater detail to extrapolate the contribution of combat exposure in alcohol misuse taking into account prior history of alcohol abuse.

Another important finding from this study was an inverse relationship between change in resilience and severity of alcohol misuse. This finding highlights the view of resilience as a dynamic process, which varies over time (Flach, 1980; Rutter, 1985; Flach, 1988; Luthar, 2000). Interestingly, the addition of change of resilience to the regression analyses increased the explanatory power of the overall statistical model (R^2 value of .21 to .23).

The significant relationship found between level of education attainment and alcohol misuse at one-year follow-up in the regression model for deployed veterans can be partly explained by characteristics of the study sample. A little over half of respondents who reported being deployed to Iraq and Afghanistan were comprised of junior enlisted personnel (51%, E1–E5). Generally, individuals at these service rank levels are less likely to have attained a college degree because they often enlist in the military before pursuing higher education (Ames & Cunradi, 2004; Watkins & Sherk, 2008).

This is the first longitudinal investigation of resilience and alcohol misuse in an U.S. Iraq and Afghanistan era military sample. Given that several hardiness themed concepts are encompassed in the CD-RISC, an understanding of the protective effect of resilience over time can be drawn from the hardiness literature. As described by Bartone and colleagues (2012), hardiness is a “resilience resource” comprised of a triad of personality traits (commitment, control, and challenge) which function to facilitate both survival and life enhancement through the positive appraisal of stressful situations (Kobasa et al., 1981; Kobasa, 1979). Studies of hardiness in military populations have demonstrated its importance for resilience outcomes. For example, findings from the National Vietnam Veterans’ Readjustment Study (NVVRS) found that hardiness was important in maintaining resilience and recovery processes after the Vietnam War (King, King, Fairbank, Keane, & Adams, 1998). Along similar lines, Bartone and colleagues (2012) observed an increased risk for alcohol abuse among individuals with low levels of hardiness and high levels of avoidance coping in a Norwegian military combat sample ($n=1402$; Bartone et al., 2012). Unlike the present study, researchers did not take into account the contribution of prior alcohol misuse, a documented predictor of future misuse. Although these studies examined a resilience related concept (e.g., hardiness), findings highlight the protective contributions of resilience processes overtime against negative function.

Although the statistical models for alcohol misuse were significant in this study, it is clear that there are additional variables important for alcohol misuse; for example, genetic factors, family history, age at onset of drinking, and childhood maltreatment (Marcos et al., 2011; Ducci & Goldman, 2008; Young, Hansen, Gibson & Ryan, 2006; Hingson, Heeren, & Winter, 2006; McCarty et al., 2004; Hingson et al., 2003; Carbbe, 2002; Kendler, 2001; DeWit, Adlaf, Offord, & Ogborne, 2000; Long et al., 1998; Beirut et al., 1998; Clapper et al., 1995). Future research should examine the interrelationships between these factors and alcohol misuse to further clarify the protective role resilience plays, in civilian and veteran populations alike.

Limitations of the current study include the use of self-report instruments. Evidence has shown that self-report data are often susceptible to social desirability and response bias (Mensch & Kandel, 1988). Another limitation concerns the use of one measure of resilience. While the 10-item CDRISC is a reliable measure of resilience, other constructs (e.g. social support, religiosity) important for protection against alcohol misuse are not assessed in this abbreviated version. For example, multiple studies have demonstrated that religious beliefs/involvement buffer the uptake of alcohol by non-drinkers as well as heavy use in current drinkers (Miller, 2002; Amey, Albrecht, & Miller, 1996; Heath & Martin, 1988; Heath et al., 1999; Maes et al., 1999; Midanik & Clark, 1994). The use of a single item for self-reported history of alcohol abuse and a lack of an operational definition of alcohol abuse provided to participants can also be cited as a limitation. Consideration of these factors in future studies will increase the predictability of alcohol misuse in this population.

In conclusion, results of the present study demonstrated a protective effect of resilience against alcohol misuse overtime in a U.S. Iraq/Afghanistan era military sample. Alcohol misuse is a preventable public health problem. Its consequences in the military may adversely affect areas related to organizational readiness and physical or psychological fitness (Jolee, 2007). Given alcohol's reported involvement in the surge of suicidal deaths in returning troops (LeardMann et al., 2013; Chiarelli, 2010), it is vital that efforts are placed on identifying reliable mechanisms and programs that bolster protection against high risk drinking. One such effort designed to enhance the resilience capacity in troops is the U.S. Army's Master Resilience Training Course (MRTC)— a curriculum of the Comprehensive Soldier Fitness program designed solely for teaching resilience-based skills (Lester, Harms, Herian, Krasikova, & Beal, 2011). While the MRTC has received considerable criticism for its lack of scientific support, initial findings have reported positive effects (Lester et al., 2011). Additionally, resilience based interventions within positive psychology are currently being tested for their capacity to reduce the occurrence of alcohol misuse (Seligman & Csikszentmihalyi, 2000). While it is encouraging that the military has implemented several initiatives aimed at bolstering resilience and reducing the prevalence of alcohol misuse among troops, further research is needed to determine the effectiveness of these interventions over time (Foran, 2012; Fava & Tomba, 2009).

Moreover, the results of this study suggest that it would be beneficial for clinicians to evaluate resilience (as measured by the CD-RISC) as part of alcohol misuse assessment (Campbell-Sills & Stein, 2007; Connor & Davison, 2003) as such assessment could provide relevant information for treatment planning. It may also be useful to include resilience enhancement treatment components (as they are empirically identified) in treating alcohol misuse. Although there has yet to be an identified efficacious resilience enhancement treatment, components of cognitive behavioral approaches such as coping strategies and mindfulness (Segal, Williams, & Teasdale, 2002) may serve to enhance resilience (Davidson et al., 2005); however, this remains an empirical question. The evaluation of protective, as well as risk factors in alcohol misuse may contribute to a more comprehensive assessment and treatment of alcohol misuse.

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Highlights

- Models controlled for history of alcohol abuse and demographic and trauma-related variables.
- Baseline resilience, age, and history of alcohol abuse were related to alcohol misuse at follow-up.
- Change in resilience and gender was related to alcohol misuse at follow-up.
- Age, combat, self-reported history of alcohol abuse, and baseline resilience was related alcohol misuse at follow-up.
- Resilience is an important factor for protection against alcohol misuse overtime.

Table 1
Multivariate Prediction of Alcohol Misuse (Model 1: baseline resilience; Model 2: change in resilience) at One-Year Follow-up

Variable	Model 1			Model 2		
	B	SE	P	β	SE	P
Age	-0.06	0.02	0.0002	-0.06	0.02	0.0002
Male Gender	1.56	0.44	0.0004	1.60	0.44	0.0003
White Race	0.51	0.35	0.14	0.65	0.35	0.06
Married	-0.58	0.33	0.08	-0.57	0.33	0.08
Post-secondary Education	-0.78	0.41	0.06	-0.73	0.41	0.08
Probable PTSD ^a	0.27	0.45	0.55	-0.00	0.45	1.00
Combat Exposure ^b	0.49	0.33	0.14	0.45	0.33	0.16
Self-reported History of ETOH Abuse	4.29	0.39	<0.0001	4.15	0.39	<0.0001
Baseline Resilience ^c	-0.10	0.02	<0.0001	-0.15	0.02	<0.0001
Δ Resilience ^c	N/A	N/A	N/A	-0.14	0.03	<0.0001
R ²				0.21		0.23

Note. $N=1074$. ETOH= alcohol; PTSD=Posttraumatic Stress Disorder; The analysis for Model 1 was repeated using a sample of deployed only veterans; and the results were found to be essentially the same.

^a As measured by the Davidson Trauma Scale;

^b As measured by the Combat Experiences Scale;

^c As measured by the 10-item Connor Davidson Resilience Scale.

Table 2

Logistic Regression Results Examining the Association between Combat Exposure, PTSD, Baseline Resilience, and the Dichotomous AUDIT cut-off score for Alcohol Misuse

Variable	β	SE	Wald χ^2	OR	95% CI
Age	-0.03	0.01	11.80	0.97***	0.95-0.99
Male Gender	0.31	0.19	2.61	1.37	0.94-2.00
White Race	-0.05	0.18	0.09	0.95	0.66-1.35
Married	-0.19	0.17	1.20	0.83	0.59-1.16
Education	-0.16	0.22	0.64	0.94	0.55-1.29
Probable PTSD ^a	-0.06	0.21	0.08	0.94	0.62-1.43
Combat Exposure ^b	0.39	0.18	4.92	1.48*	1.04-2.08
Self-Reported History of ETOH Abuse	1.67	0.18	88.63	5.31***	3.75-7.52
Baseline Resilience ^c	-0.03	0.01	7.36	0.970**	0.95-0.99

Note. N= 1074. AUDIT= Alcohol Use Identification Test; ETOH= alcohol; PTSD=Posttraumatic Stress Disorder.

^a As measured by the Davidson Trauma Scale;

^b As measured by the Combat Experiences Scale;

^c As measured by the 10-item Connor Davidson Resilience Scale.