Ethnic and Racial Differences in Clinically Relevant Symptoms in Active Duty Military Personnel with Posttraumatic Stress Disorder

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Abstract

Previous research has shown racial/ethnic differences in Vietnam veterans on symptoms related to posttraumatic stress disorder (PTSD). The current study explored racial/ethnic differences in PTSD symptoms and clinically relevant symptoms. Resilience and social support were tested as potential moderators of racial/ethnic differences in symptoms. The sample included 303 active duty male service members seeking treatment for PTSD. After controlling for age, education, military grade, and combat exposure, Hispanic/Latino and African American service members reported greater PTSD symptoms compared to non-Hispanic White service members. Higher alcohol consumption was endorsed by Hispanic/Latino service members compared to non-Hispanic White or African American service members, even after controlling for PTSD symptom severity. No racial/ethnic differences were found with regard to other variables. These results suggest that care should be made to thoroughly assess PTSD patients, especially those belonging to minority groups, for concurrent substance use problems that may impede treatment utilization or adherence.

Keywords: race, ethnicity, PTSD, depression, alcohol, anger

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1. Introduction

Given the ongoing military conflicts in the Middle East, there has been increasing focus on ensuring adequate mental healthcare for post-9/11 service members. Specifically, a great deal of attention has been placed on the detection and effects of posttraumatic stress disorder (PTSD) following the high stress associated with serving in and around Iraq (Operation Iraqi Freedom; OIF) and Afghanistan (Operation Enduring Freedom; OEF; Shea, Reddy, Tyrka, & Sevin, 2013; Shea, Vujanovic, Mansfield, Sevin, & Liu, 2010). Lifetime prevalence estimates for PTSD in military samples (both OEF/OIF and Vietnam veterans) have ranged from 5-20% in non-treatment seeking populations and up to 50% in veterans seeking treatment (Dohrenwend et al., 2006; Ramchand et al., 2010). Healthcare burden from PTSD in military service members includes a higher number of missed days from work, a higher public health cost, poorer health functioning, and higher healthcare utilization across the medical system (Asnaani, Reddy, & Shea, 2014; Hoge, Terhakopian, Castro, Messner, & Engel, 2007; Tuerk, et al., 2013).

¹**Abbreviations:** AUDIT = Alcohol Use Disorders Identification Test; BAI = Beck Anxiety Inventory; BDI-II = Beck Depression Inventory-II; CAPS = Clinician-Administered PTSD Scale; CTS = Conflict Tactics Scale; DRRI = Deployment Risk and Resilience Inventory; *DSM-IV-TR* = *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision*; ISEL = Interpersonal Support Evaluation List; OIF/OEF/OND = Operation Iraqi Freedom/Operation Enduring Freedom/Operation New Dawn; PCL-S = PTSD Checklist-Stressor Specific Version; PE = Prolonged Exposure; PSS-I = PTSD Symptom Scale-Interview Version; PTSD = posttraumatic stress disorder; RCTS = Revised Conflict Tactics Scale; RSES = Response to Stressful Experiences Scale; STAXI = State-Trait Anger Expression Inventory; VA = Department of Veterans Affairs; WRAIR = Walter Reed Army Institute of Research Horizontal and Vertical Cohesion Scales.

Identifying racial/ethnic differences in PTSD and clinically relevant symptoms in military service members is important for understanding how these symptoms may present in different cultural groups. Such research can inform our understanding of disparities in mental health care utilization and can suggest factors to consider in diagnosis, prevention, and treatment. Thus far, research on racial/ethnic differences in PTSD symptoms has shown mixed results (Hall-Clark, Sawyer, Golik, & Asnaani, 2016). The National Vietnam Veterans Readjustment Study reported that Hispanic veterans are at higher risk of developing PTSD than non-Hispanic White veterans or African American veterans (Kulka, et al., 1990). In addition, Rosenheck and Fontana(1996) found more severe PTSD symptoms in Puerto Rican Vietnam veterans compared to non-Hispanic White veterans or African American veterans in a sample of treatment-seeking veterans with PTSD.

Ortega and Rosenheck (2000) found that Hispanic Vietnam veterans showed more severe PTSD symptoms and were more likely to have PTSD than non-Hispanic White veterans. However, the Hispanic group in this study was primarily Puerto Rican, consistent with the findings of Rosenheck and Fontana (1996). In addition, the Hispanic group did not show greater functional impairment than non-Hispanic White veterans, which the authors suggest may be due to differences in cultural expressiveness rather than illness severity (Ortega & Rosenheck, 2000). Others have also suggested that the previous finding of greater PTSD in Hispanic Vietnam veterans may be influenced by cultural differences in the style of responding (Ruef, Litz, & Schlenger, 2000). Conversely, others do not find racial/ethnic differences in PTSD symptoms. Studies comparing African American and non-Hispanic White treatment-seeking combat veterans with PTSD did not find significant group differences in terms of PTSD symptoms

(Frueh, Gold, de Arellano, & Brady, 1997; Monnier, Elhai, Frueh, Sauvageot, & Magruder, 2002; Trent, Rushlau, Munley, Bloem, & Driesenga, 2000).

Most previous research on racial/ethnic differences in PTSD has been limited to veterans. Since veterans have served, but are not currently serving, they experience variable amounts of time since the traumatic event occurred. During that time, cultural influences (differences in re-assimilation, cultural barriers to treatment, etc.) could impact the presentation of PTSD symptoms in different racial/ethnic groups. Active duty military service members, on the other hand, may be more homogeneous in terms of their current military experiences, which could provide a clearer picture of racial/ethnic differences in PTSD symptoms, if any, prior to re-assimilation into the community. Therefore, the first aim of the current study was to examine racial/ethnic differences in PTSD symptoms in a sample of active duty military service members with PTSD.

In addition, racial/ethnic differences may be found in other symptoms that are clinically relevant to PTSD. Veterans with PTSD often experience comorbid depression, general anxiety, alcohol problems, and anger (Yarvis & Schiess, 2008) highlighting the need to better understand which populations might be at risk for such symptoms. Research on racial/ethnic differences in military samples shows that African American veterans with PTSD report equivalent rates of depression and general anxiety symptoms compared to non-Hispanic White veterans (Frueh et al., 1997; Monnier et al., 2002; Trent et al., 2000). However, these previous studies did not examine differences in depression and general anxiety in Hispanic/Latino individuals. Furthermore, these prior studies were conducted with veterans with PTSD, not with active duty service members. Therefore, it would be informative to examine racial/ethnic differences in depression and general anxiety in a sample of active duty service members with PTSD.

In terms of substance use, the most recently published Health Related Behaviors Survey of Active Duty Military Personnel (Department of Defense, 2013) found non-Hispanic White service members endorsed the greatest amount of moderate alcohol use, followed by Hispanic service members, and then African American service members. Non-Hispanic White, Hispanic, and African American service members did not differ significantly in terms of heavy alcohol use. Another study found that African American active duty service members were more likely to endorse alcohol problems compared to non-Hispanic White and Hispanic service members (Bell, Harford, Fuchs, McCarroll, & Schwartz, 2006). However, the same study also found that non-Hispanic White service members were more likely to endorse heavier alcohol use than African American or Hispanic service members (Bell et al., 2006). Although both Bell et al. (2006) and the Department of Defense survey (2013) used active duty service members, these studies did not take into account whether service members had PTSD or not, making it difficult to generalize these results to PTSD samples.

Regarding alcohol use and aggression, Bell et al. (2006) found that heavy alcohol use was a significant risk factor for engaging in spousal abuse among non-Hispanic White and Hispanic service members but not African American service members. Additionally, C'de Baca, Castillo, and Qualls (2012) found non-Hispanic White female veterans had higher scores on a scale of antisocial behaviors than Hispanic female veterans. In contrast, African American female veterans endorsed greater levels of assault than non-Hispanic White female veterans (C'de Baca et al., 2012). Taken together, the literature reveals a mixed picture regarding the degree to which race and ethnicity impact other symptoms associated with PTSD. Therefore, the second aim of the current study was to explore racial/ethnic differences in clinically relevant symptoms related

to PTSD (depression, general anxiety, substance use/abuse, and anger/aggression) in a large sample of active duty military service members with PTSD.

While identifying racial/ethnic differences is of interest, it is also important to understand what factors may be influencing these differences. For example, it is possible that any observed racial/ethnic differences in PTSD and other clinically relevant symptoms may depend on other factors such as the individual's level of social support or resilience. Protective factors such as support and resilience are thought to ameliorate the development and exacerbation of PTSD and its related dysfunction (Green, Calhoun, Dennis, & Beckham, 2010). Resilience is conceptualized as a trait-like ability to effectively cope with stress and thrive despite hardship (Connor & Davidson, 2003). Research shows that those with higher resilience experienced lower levels of PTSD symptoms. For example, in a sample of veterans, Green et al. (2010) found that resilience was a particularly strong buffer against PTSD symptoms for those with the highest levels of combat exposure. Furthermore, several studies have found that lower levels of unit support and postdeployment social support were associated with higher PTSD symptoms (Pietrzak et al., 2010; Wright, Kelsall, Sim, Clarke, & Creamer, 2013). Thus, the third aim of the current study was to test whether resilience and social support moderated racial/ethnic differences found in PTSD and clinically relevant symptoms.

To help bridge the current gaps in knowledge about differences among demographic groups in terms of PTSD and clinically relevant symptoms, the current study examined racial/ethnic differences in a number of symptom domains in a sample of active duty U.S. service members seeking treatment for PTSD. Racial/ethnic differences among those identifying as non-Hispanic White, African American, and Hispanic/Latino were explored for PTSD, depression, general anxiety, substance use/abuse, and anger/aggression. We predicted that the

Hispanic/Latino service members would endorse greater PTSD symptoms than the non-Hispanic White or African American service members. Alcohol consumption was predicted to be higher in the non-Hispanic White and Hispanic/Latino service members compared to African American service members, but with equivalent levels of dependence among all groups. In terms of anger/aggression, we predicted greater psychological aggression in non-Hispanic White service members and greater physical aggression in African American service members compared to the Hispanic/Latino service members. Lastly, resilience and interpersonal support were predicted to be moderators of any racial/ethnic differences in PTSD or clinically relevant symptoms, with higher levels of resilience and social support being associated with lower PTSD and clinically relevant symptoms across racial/ethnic groups.

2. Methods

2.1. Participants

Participants included 366 male military personnel between 18 and 65 years of age seeking treatment through a randomized controlled trial investigating the efficacy of massed (10 sessions in 2 weeks) vs. spaced (one session per week over 10 weeks) prolonged exposure (PE) therapy sessions. Participants were either active duty, activated Reservist, or activated National Guard military personnel who had previously deployed in support of Operations Iraqi Freedom (OIF), Enduring Freedom (OEF), or New Dawn (OND). Participants were included in the research trial if (1) they experienced a Criterion A traumatic event related to combat or other traumatic military experience that occurred during an OIF-, OEF-, or OND-related deployment, and (2) they met the criteria for PTSD outlined in the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed., text rev.; DSM-IV-TR; American Psychiatric Association, 2000) as measured by the PTSD Symptom Scale-Interview Version (PSS-I; Foa, Riggs, Dancu,

& Rothbaum, 1993). Exclusion criteria for the research trial consisted of current bipolar disorder, current psychotic disorder, current alcohol dependence as measured by the Alcohol Use Disorders Identification Test (Babor, Higgins-Biddle, Saunders, & Monteiro, 2001), moderate to severe brain injury that would preclude them from understanding the questionnaires, current acute suicidal risk warranting immediate crisis intervention, or a primary psychiatric diagnosis other than PTSD.

The current study measured race (non-Hispanic White, African American, American Indian/Alaskan Native, Asian, Native Hawaiian or Other Pacific Islander, or other) and ethnicity (Hispanic or non-Hispanic) as two separate questions. To be consistent with the literature on racial/ethnic differences, endorsement of Hispanic ethnicity preempted any racial designation. Racial/ethnic categories included in analyses were non-Hispanic White, African American, and Hispanic/Latino. Due to small sample sizes, individuals who identified themselves as American Indian/Alaskan Native ($n = 5$), Asian ($n = 3$), Native Hawaiian or Other Pacific Islander ($n = 3$), or other ($n = 4$) were excluded from this study. Females ($n = 44$) were also excluded due to the small sample size of this population relative to male participants ($n = 322$). Cases with missing data were deleted listwise, leaving 303 participants: 183 non-Hispanic White (60.4%), 57 African American (18.8%), and 63 Hispanic/Latino (20.8%). For demographics for each racial/ethnic group, see Table 1.

2.2. Procedures

Regulatory approvals for the treatment-outcome study were obtained from the Institutional Review Boards at Brooke Army Medical Center, the University of Texas Health Science Center at San Antonio, and the University of Pennsylvania. The study was also reviewed and approved by the U.S. Army Medical Research and Materiel Command Office of Research

Protections, HumanResearch Protection Office. The treatment-outcome study is being conducted as part of the South Texas Research Organizational Network Guiding Studies on Trauma and Resilience (STRONG STAR), a research consortium funded by the U.S. Department of Defense. Potential participants were consented into the study before completing the baseline assessment, where they were evaluated by a masked independent evaluator and completed a battery of measures. Then they were evaluated for eligibility for the study. Those who met criteria for this study were randomized to one of four conditions: (1) 10 sessions of PE over 8 weeks (spaced PE); (2) 10 sessions of PE over 2 weeks (massed PE); (3) 10 sessions of present-centered therapy over 8 weeks; or (4) a minimal contact condition consisting of brief weekly phone check-ups without trauma treatment. This study examined baseline data only, due to current ongoing collection of treatment outcomes; therefore, treatment outcome data will not be reported. Demographic information collected included age, race/ethnicity, education, military grade, and combat exposure.

2.3. PTSD measures

2.3.1 PTSD Symptom Scale-Interview Version (PSS-I)

PTSD was diagnosed by a master's- or doctoral-level independent evaluator using the *DSM-IV-TR* criteria (American Psychiatric Association, 2000) and the PSS-I (Foa et al., 1993). The PSS-I is a 17-item clinical interview that evaluates *DSM-IV* PTSD symptoms on a frequency/severity scale. The PSS-I is comparable to the gold standard employed in studies of veterans (the Clinician Administered PTSD Scale; CAPS) yet takes considerably less time to administer (Foa & Tolin, 2000; Kaloupek et al., 2010).

2.3.2. PTSD Checklist-Stressor Specific Version (PCL-S)

The PCL-S is a 17-item self-report questionnaire measuring *DSM-IV-TR* criterion symptoms of PTSD that have been experienced over the past month (Weathers, Litz, Herman, Huska, & Keane, 1993). The PCL-S provides a measure of the three symptom clusters of reexperiencing, avoidance/emotional numbing, and hyperarousal. This measure shows excellent internal consistency (alpha of .85-.96), adequate test-retest reliability (.96 over 2-3 days, .68 over 12-14 days), and good convergent validity with a variety of PTSD and depression-related measures including the Clinician-Administered PTSD Scale (CAPS; Keen, Kutter, Niles & Krinsley, 2008). The PCL-S was originally normed using predominantly non-HispanicWhite male service members (Keen et al., 2008; Weathers et al., 1993); however, the civilian version has been used in prior studies of racial/ethnic differences (Marshall, Schell, & Miles, 2009).

2.4. Clinically relevant symptom measures

2.4.1. Beck Depression Inventory-II (BDI-II)

The BDI-II is a 21-item self-report measure of depressive symptoms (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). This measure provides a total severity score that can be categorized into minimal (0-13), mild (14-19), moderate (20-28), or major (29-63) depressive symptoms. This measure has excellent internal consistency (.91) and is highly correlated with other depression measures (Beck, Steer, & Brown, 1996). A study using item response theory to compare the way individuals from different racial/ethnic groups respond to the BDI-II found comparable response patterns between African Americans and non-HispanicWhite participants (Hambrick et al., 2010).

2.4.2. Beck Anxiety Inventory (BAI)

The BAI is a 21-item self-report scale measuring physical and psychological dimensions of anxiety that have occurred within the past week (Beck, Epstein, Brown, & Steer, 1988). The

items are summed to obtain a total severity score rating: minimal (0-7), mild (8-15), moderate (16-25), or severe (26-63). The BAI has shown good internal consistency (alpha of .92) and adequate test-retest reliability. Furthermore, this measure reliably distinguishes between those with and without anxiety diagnoses (Beck et al., 1988). Using confirmatory factor analysis, a study found that a 2-factor model showed adequate fit for both the non-HispanicWhite and African American groups (Chapman, Williams, Mast, & Woodruff-Borden, 2009).

2.4.3. Alcohol Use Disorders Identification Test (AUDIT): Interview Version

The AUDIT is a 10-item interviewer-administered scale that screens for excessive alcohol consumption, symptoms of alcohol dependence, and alcohol-related problems (Babor et al., 2001). Alcohol consumption is calculated as the sum of AUDIT items 1-3, alcohol dependence is the sum of items 4-6, and alcohol-related problems are the sum of items 7-10. This measure was developed by the World Health Organization and has a total possible score of 40. The AUDIT shows adequate internal consistency (alpha of .80-.93) and good sensitivity/specificity (Saunders, Aasland, Babor, De La Fuente, & Grant, 1993). An analysis of the AUDIT in a multi-ethnic sample did not find evidence of racial/ethnic bias using Receiver Operating Characteristic Curve analysis (Volk, Steinbauer, Cantor, & Holzer, 1997).

2.4.4. State-Trait Anger Expression Inventory (STAXI)

The STAXI is a 44-item questionnaire that assesses anger symptoms (Spielberger, 1988). Only the state anger scale was collected in this study. This scale measures the intensity of anger at the time the questionnaire is completed (e.g., how much anger you feel right now). Internal consistency for this measure is very good (alpha of .90), and the state anger measure was found to have excellent convergent validity with measures of hostility (Spielberger, 1988). Although the newest version of the STAXI (the STAXI-II) was obtained after the study was initiated, the

results of the STAXI-II are not reported in this paper due to large amounts of missing data. The STAXI was originally normed in a predominantly non-HispanicWhite sample (Spielberger, 1988); however, it has been translated and normed in Hispanic/Latino populations as well (Moscoso & Spielberger, 1999).

2.4.5. Revised Conflict Tactics Scale (RCTS)

The Conflict Tactics Scale (CTS) was originally developed to measure reasoning, verbal aggression, and violence in the family (Straus, 1979). The most recent version of this scale, the CTS2, evaluates a variety of tactics used when there is conflict in a relationship. The CTS2 shows adequate internal reliability (alpha of .79-.95) and discriminant validity (Straus, Hamby, Boney-McCoy, & Sugarman, 1996). Only the Physical Assault and Psychological Aggression subscales were collected as part of this study; hence, the measure is referred to as the Revised-CTS or RCTS. The Physical Assault subscale measures the frequency of engaging in physically aggressive behavior such as shoving, kicking, or punching another person. The Psychological Aggression subscale measures how often individuals use nonphysical aggression such as shouting, using insults, or verbally threatening another person. Although psychometric data on racial/ethnic norms/validation could not be found for this measure, the CTS has been used in prior studies of racial/ethnic differences (Ingram, 2007).

2.5. Potential moderators

2.5.1. Response to Stressful Experiences Scale (RSES)

The RSES is a 22-item measure that assesses cognitive, emotional, and behavioral resilience following stressful events (Johnson et al., 2011). Responses are measured on a 5-point scale (0=“not at all like me” to 4=“exactly like me”). This measure shows adequate internal consistency (alpha of .91-.93), test-retest reliability (.87 over 7 days), and convergent validity

with the Connor-Davidson Resilience Scale (.61-.81) as well as with measures of cohesion and support (Johnson et al., 2011). The RSES was validated in a predominantly non-Hispanic White sample of military service members (Johnson et al., 2011).

2.5.2. Interpersonal Support Evaluation List (ISEL-12)

The ISEL-12 is a 12-item short version of the ISEL that assesses perceived social support and interactions with other people in the participant's life (Cohen & Hoberman, 1983). This measure includes three subscales of support: Appraisal, Belonging, and Tangible. ISEL Appraisal measures the perceived availability of people with whom the person can discuss personal issues. ISEL Belonging measures the perceived availability of people to interact with socially. ISEL Tangible measures the perceived availability of people to aid or help the person. Higher scores indicate greater perceived social support. The ISEL has shown good internal consistency (alpha of .88-.90) in the general population (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). Although psychometric data on racial/ethnic norms/validation could not be found for this measure, the ISEL has been used in prior studies investigating racial/ethnic differences (Fogel, Albert, Schnabel, Ditkoff, & Neugut, 2003).

2.5.3. Walter Reed Army Institute of Research (WRAIR) Horizontal and Vertical Cohesion Scales

The WRAIR cohesion scales evaluate attitudes about perceived peer support (horizontal cohesion) and leader support (vertical cohesion) in service members (Bliese & Halverson, 1996). Individuals are instructed to respond to the items based on their currently assigned unit, and questions assess the degree to which others are seen as cooperative and dependable. The vertical cohesion items were chosen based on high inter-item correlations with each other. The horizontal cohesion subscale has shown a Chronbach's alpha of .86-.88 (Podsakoff & MacKenzie, 1994). No research on racial ethnic norms/validation could be found for this measure.

2.6. Covariate measures

2.6.1. Deployment Risk and Resilience Inventory (DRRI)

The DRRI assesses high- and low-intensity stress related to deployment experiences (King, King, Vogt, Knight, & Samper, 2006). The DRRI-Combat Experiences subscale consists of 23 items assessing the frequency of combat-related experiences on a scale from 1 (never) to 5 (daily or almost daily). The DRRI has shown excellent internal consistency and construct validity (Vogt, Proctor, King, King, & Vasterling, 2008). The DRRI has been validated in a large population of demographically diverse military service members (Vogt et al., 2008).

2.7. Data analysis

Hierarchical multivariate regression was used to test for racial/ethnic differences in PTSD, depression, general anxiety, substance use/abuse, and anger/aggression. Two models were tested: one to control for possible covariates that may impact the results and the second to further control for PTSD symptom severity, which may drive racial/ethnic differences if the groups differ in their PTSD symptoms (e.g., a racial/ethnic group may show greater levels of depression simply because they also have greater levels of PTSD, since PTSD and depression are highly related). Specifically, the first model controlled for age, military grade status, education, and combat exposure while analyzing racial/ethnic differences. The second model added the PCL-S as an additional covariate in order to test racial/ethnic differences in the clinically relevant symptoms beyond the effects of PTSD severity, which is highly related to these variables. Multivariate hierarchical regression models included all dependent variables to control for multiple comparisons in our analysis. An overall significant multivariate test was followed by interpretation of the hierarchical linear regression analyses for each dependent variable.

Hierarchical analyses involved entering age, education, military grade, and combat exposure in block 1 (controlling for these covariates), entering PTSD symptom severity in block 2 (to further control for PTSD symptom severity), and finally, entering race/ethnicity in block 3 (to examine group differences). Lastly, we tested whether resilience and social support (interpersonal social support and unit cohesion) moderated the relationship between race/ethnicity and symptom presentation. As suggested by Goodman and Berlin (1994), confidence intervals are provided for *p* values that do not reach significance (*p* values between .50 and .10) for primary outcomes of interest. Wilks's lambda is reported for the multivariate test. Effects sizes for significant group comparisons are provided using Cohen's *d*.

3. Results

3.1. Sample characteristics and relationship between variables of interest and PTSD

The means and standard deviations for each variable by racial/ethnic group are listed in Table 1. First, we explored the relationship between the variables of interest and PTSD symptoms as measured by the PCL-S to determine whether these variables were related to PTSD in the expected directions. After controlling for all covariates including race, those with higher PCL-S scores reported greater depressive symptoms as measured by the BDI-II ($\beta = .50$, $SE = .05$, $t(295) = 9.37$, $p < .001$) and greater general anxiety symptoms as measured by the BAI ($\beta = .54$, $SE = .06$, $t(295) = 10.46$, $p < .001$). Those with higher PCL-S scores also reported greater state anger symptoms as measured by the STAXI ($\beta = .42$, $SE = .04$, $t(295) = 7.51$, $p < .001$) and more psychological aggression ($\beta = .18$, $SE = .16$, $t(295) = 3.13$, $p = .002$). Higher PCL-S scores were associated with lower levels of ISEL Appraisal (the perceived availability of people with whom the patient can discuss personal issues; $\beta = -.19$, $SE = .02$, $t(295) = -3.23$, $p = .001$), lower ISEL Belonging (perceived availability of people with whom the patient can interact

socially; $\beta = -.16$, $SE = .02$, $t(295) = -2.67$, $p = .008$), and lower ISEL Tangible (perceived availability of people to aid or help the patient; $\beta = -.15$, $SE = .02$, $t(295) = -2.43$, $p = .016$).

Finally, those with higher PCL-S scores reported lower levels of horizontal (peer) cohesion as measured by the WRAIR ($\beta = -.15$, $SE = .02$, $t(295) = -2.48$, $p = .014$). No other significant differences were found for the PCL-S.

Table 1

Means and Standard Deviations of Symptom Measures by Racial/Ethnic Group

Measure	Non-Hispanic White (<i>n</i> = 183)		African American (<i>n</i> = 57)		Hispanic/Latino (<i>n</i> = 63)	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Age (years)	31.32	6.67	37.23	7.11	33.86	7.06
Education	3.72	1.05	4.21	1.18	4.05	0.87
Rank	2.17	0.59	2.61	0.73	2.22	0.42
DRRI Combat	51.64	13.43	50.25	16.95	51.30	16.50
PCL-S	53.13	9.43	58.86	10.31	58.24	11.70
BDI-II	27.64	9.48	27.79	8.92	29.11	11.05
BAI	22.47	11.12	25.53	12.97	25.44	12.06
AUDIT Consumption	3.16	3.01	2.60	3.09	4.14	3.21
AUDIT Dependence	0.17	0.67	0.23	0.96	0.40	1.16
AUDIT Alc Problems	1.62	2.25	1.49	2.60	1.79	2.57
STAXI State Anger	17.76	7.00	17.75	7.03	19.17	7.45
RCTS Psych Aggress	32.20	28.45	29.60	28.76	36.19	32.11
RCTS Phys Assault	2.84	8.12	1.77	6.41	2.65	6.28
RSES	49.48	14.93	53.96	16.89	53.16	18.93
ISEL Appraisal	11.14	3.11	10.67	2.95	11.41	3.32
ISEL Belonging	11.45	2.89	11.14	3.25	11.94	2.97
ISEL Tangible	11.68	2.84	11.75	2.80	11.76	2.58
WRAIR Total	44.13	12.82	45.30	10.78	44.71	13.75
WRAIR Horizontal	7.88	3.11	8.18	2.68	8.08	3.15
WRAIR Vertical	36.25	10.58	37.12	8.90	36.63	11.64

Note. Education = scale from 1 (some high school) to 8 (doctoral degree); Rank = scale from 1 (E1-E3) to 5 (Officer); DRRI = Deployment Risk and Resilience Inventory; PCL-S = PTSD Checklist-Stressor Specific Version; BDI-II = Beck Depression Inventory-II; BAI = Beck Anxiety Inventory; AUDIT = Alcohol Use Disorders Identification Test; Alc = alcohol; STAXI

= State-Trait Anger Expression Inventory; RCTS = Revised Conflict Tactics Scale; RSES = Response to Stressful Experiences Scale; ISEL = Interpersonal Support Evaluation List; WRAIR = Walter Reed Army Institute of Research Horizontal and Vertical Cohesion Scales.

3.2. Model 1: Racial/ethnic differences after controlling for covariates

The first hierarchical regression model used for exploring racial/ethnic differences controlled for age, education, military grade, and combat exposure. This model included all dependent variables to control for multiple comparisons. This model revealed differences in several of the predictors as a function of age, education level, military grade, or combat exposure while controlling for the other variables in the model including race. Although secondary to the main hypotheses of this study, these results suggest the importance of including these variables as covariates in the model. This model showed a significant overall multivariate test (Wilks's $\Lambda = .49$, $F(102, 1603.3) = 2.12$, $p < .001$).

After controlling for covariates, racial/ethnic differences were found for the PCL-S with both Hispanic/Latino and African American participants reporting greater PTSD symptoms compared to non-Hispanic White individuals (Hispanic/Latino > non-Hispanic White, $\beta = .20$, $SE = 1.49$, $t(296) = 3.36$, $p = .001$, $d = .39$; African American > non-Hispanic White, $\beta = .22$, $SE = 1.62$, $t(296) = 3.53$, $p = .001$, $d = .41$). Hispanic/Latino service members did not differ significantly from African American service members on the PCL-S. There was a trend towards greater general anxiety symptoms as measured by the BAI in the African American service members compared to the non-Hispanic White service members ($\beta = .12$, $SE = 1.88$, $t(296) = 1.95$, $p = .052$; 95% CI [-.04, 7.36]). There were no significant group differences for depressive symptoms measured by the BDI-II.

Hispanic/Latino participants endorsed greater alcohol consumption compared to both African American ($\beta = .19$, $SE = .56$, $t(296) = 2.52$, $p = .012$; $d = .29$) and non-Hispanic White subjects ($\beta = .18$, $SE = .44$, $t(296) = 3.02$, $p = .003$; $d = .35$). The Hispanic/Latino group also showed greater alcohol dependence than non-Hispanic White participants ($\beta = .13$, $SE = .13$, $t(296) = 2.25$, $p = .025$; $d = .26$). No significant group differences were found for alcohol-related problems. The racial/ethnic groups did not differ on anger symptoms as measured by the STAXI. No group differences were found for psychological aggression or physical assault from the RCTS either.

3.3. Model 2: Race differences after controlling for covariates and PTSD symptom severity

After finding that PTSD symptoms as measured by the PCL-S were associated with many of the predictors in the model and following the finding that PTSD symptoms significantly differed between the racial/ethnic groups, we decided to add the PCL-S as a covariate to the model. This allows us to examine racial/ethnic differences in the clinically relevant symptoms while controlling for PTSD severity as a possible confound. The overall multivariate test remained significant in the model that included the PCL-S as an additional covariate (Wilks's $\Lambda = .32$, $F(112, 1819.9) = 3.17$, $p < .001$).

African American service members showed *fewer* depressive symptoms on the BDI-II than non-Hispanic White service members after controlling for PTSD severity ($\beta = -.13$, $SE = 1.41$, $t(295) = -2.21$, $p = .028$, $d = -.26$). No group differences were found for general anxiety (BAI). After adding the PCL-S as an additional covariate, racial/ethnic differences in alcohol consumption continued to be significantly higher in Hispanic/Latino participants compared to both non-Hispanic White individuals ($\beta = .17$, $SE = .45$, $t(295) = 2.88$, $p = .004$, $d = .34$) and African American participants ($\beta = .19$, $SE = .56$, $t(295) = 2.53$, $p = .012$, $d = .30$). However, the

previous finding of greater alcohol dependence in the Hispanic/Latino compared to the non-Hispanic White participants no longer reached significance after controlling for PTSD severity ($\beta = .12$, $SE = .13$, $t(295) = 1.92$, $p = .056$; 95% CI [-.01, .50]). No other significant racial/ethnic group differences were found for the other measures in Table 1.

3.4. Resilience and social support as potential moderators of racial/ethnic differences

Lastly, we tested whether resilience or social support (interpersonal support or unit cohesion) moderated the racial/ethnic differences in PTSD or alcohol consumption. Neither resilience nor social support significantly moderated the relationship between race/ethnicity and PTSD symptoms (p -values $\geq .123$) or alcohol consumption (p -values $\geq .213$).

4. Discussion

The results of this study demonstrated interesting findings regarding racial and ethnic similarities and differences in clinically relevant measures associated with PTSD after controlling for age, education, military grade, and combat exposure. First, we found racial/ethnic differences in PTSD symptoms, with Hispanic/Latino and African American service members reporting greater PTSD symptoms compared to non-Hispanic White service members. However, it remains unclear whether this reflects a true difference in PTSD symptom severity or whether it is an artifact of cultural differences in emotional/symptom expression. For example, previous work showed that Hispanic/Latino individuals reported more PTSD symptoms despite similar resulting clinical severity, possibly due to differences in cultural expressiveness (Ortega & Rosenheck, 2000; Ruef, Litz, & Schlenger, 2000). Additionally, Alcántara, Casement, and Lewis-Fernández, (2013) found that racial/ethnic differences in risk for PTSD were no longer statistically significant when using clinician-administered diagnostic interviews as opposed to self-report measures, suggesting differences between clinical judgment and self-report.

Stronger endorsement of PTSD symptoms in the Hispanic/Latino group is possibly related to cultural influences, but we do not have a way to test this in the current sample. Furthermore, racial/ethnic differences in PTSD symptoms were not restricted to the Hispanic/Latino service members, as they were found in the African American service members as well. It is also important to consider that the PTSD measure used in the current study was originally normed using predominantly non-Hispanic White male service members (Keen et al., 2008; Weathers et al., 1993), which may bring into question the cultural sensitivity of this measure.

Racial/ethnic differences emerged in substance use, with Hispanic/Latino participants reporting higher alcohol consumption compared to both non-Hispanic White and African American individuals, even after controlling for PTSD symptom severity. These results are consistent with previous research showing that Latino individuals endorse heavier alcohol consumption than non-Hispanic White individuals (De La Rosa et al., 2005; Galvan & Caetano, 2003). Heavier alcohol use among Hispanic/Latinos may be due to a variety of factors such as immigration experiences, racial/ethnic discrimination, economic disadvantage, and/or genetic factors (Chartier & Caetano, 2010). However, the finding that alcohol consumption was highest in the Hispanic/Latino service members in the current study is in contrast to another study on military service members, which found that non-Hispanic White service members showed the highest alcohol use, followed by Hispanic/Latino service members, and lastly by African American service members (Department of Defense, 2013). However, the Department of Defense study did not take into account whether or not participants met criteria for PTSD. The Hispanic/Latino service members in the current study may have consumed more alcohol on average than the non-Hispanic White service members prior to the development of PTSD. Since

pretrauma levels of alcohol consumption were not assessed, it remains unclear whether increased alcohol use in the Hispanic/Latino service members represents a pre-existing condition or a consequence of trauma.

The difference found between Hispanic/Latino service members and non-Hispanic White service members in the current study was restricted to alcohol consumption and was not found for alcohol dependence after controlling for PTSD. One possibility for this finding is that PTSD symptom severity could be driving racial/ethnic differences in alcohol dependence. The clinical implications of this suggest that racial/ethnic differences in alcohol dependence may be reduced once the symptoms of PTSD are treated; however, this hypothesis has not been tested. Conversely, the small effect size for the alcohol dependence results suggests that the racial/ethnic difference found in alcohol dependence is not particularly robust. Of note, current alcohol dependence was part of the exclusion criteria in the current study. Therefore, the absence of differences in alcohol dependence after controlling for PTSD is not unexpected and may be due to a restricted range of alcohol dependence symptoms in the current sample.

The results of the first model which controlled for age, education, military grade, and combat exposure found no differences among the groups with regard to depression and general anxiety, which is consistent with other research showing no differences in depression or anxiety between minorities and non-Hispanic White service members with PTSD (C'de Baca et al., 2012; Frueh et al., 1997; Monnier et al., 2002). After controlling for PTSD symptom severity, African American service members showed fewer depressive symptoms than non-Hispanic White service members; however, this effect was small. Overall, there appears to be few racial/ethnic differences in secondary depressive and general anxiety symptoms in this treatment-seeking sample of service members with PTSD.

In terms of anger and aggression, this study did not find significant differences between Hispanic/Latino, African American, or non-Hispanic White service members in state anger symptoms. This is in contrast with previous research, which found racial/ethnic differences in anger or hostility in female service members seeking treatment for PTSD (C'de Baca et al., 2012). Of note, the state anger measure is limited in its focus to the individual's immediate state (how angry one feels right now). It would be beneficial to replicate these findings using trait anger (how angry one feels in general) as well. Furthermore, the current study used a treatment-seeking sample of PTSD patients and it is unclear whether treatment-seeking and nontreatment-seeking PTSD populations may differ in anger and aggression symptoms.

Lastly, we tested whether racial/ethnic differences in PTSD and alcohol consumption were moderated by resilience or social support (interpersonal social support and unit cohesion). The results of this study did not find that resilience or social support moderated racial/ethnic differences in PTSD and alcohol consumption, suggesting that racial/ethnic differences cannot be explained by variable levels of resilience or social support. Importantly, the current study was limited to treatment-seeking service members with PTSD; therefore, it is possible that this sample had a limited range of resilience, since it focused on individuals with PTSD (who may have developed this disorder, in part, due to low resilience). It may be more informative to test the moderating effects of resilience and social support in both PTSD patients and in trauma-exposed individuals who do not develop PTSD (presumably because of high resilience). As we continue to optimize our treatments for military service members suffering from PTSD, resilience remains an important domain to continue assessing in order to examine a broader array of potential factors that could be targeted to reduce the risk for and improve the course of PTSD. Indeed, within the context of the findings of the current study, which found that both

Hispanic/Latino and African American treatment-seeking individuals reported greater PTSD symptom severity in relation to non-Hispanic White individuals (which is consistent with previous research; Pole, Gone, & Kulkarni, 2008), the exploration of protective factors and how they differ by race could be a fruitful avenue for future research.

The current study recruited active-duty, male military personnel from a single military post with primarily combat-related trauma, which could limit the generalizability of these results. The participants in this study were also treatment-seeking PTSD patients which may not be representative of an epidemiological sample. These results need to be replicated in PTSD patients with diverse trauma experiences and in a sample of non-treatment seeking service members with PTSD. Additionally, the use of primarily self-report measures may be susceptible to racial/ethnic differences in symptom reporting. It has been shown that Hispanic/Latino and African American individuals show greater emotional expression, which may be reflected in their self-report measures (Alcántara et al., 2013). Furthermore, this study did not include a pretrauma measure of alcohol use, which would be useful in interpreting the finding of greater posttrauma alcohol use in the Hispanic/Latino group. Finally, the current sample did not allow for similar investigation into a more expansive range of racial and ethnic groups serving in the military (e.g. Asian Americans, Native Americans/American Indians, etc.), which would be important to explore further.

5. Conclusions

This study provides valuable insight into the possible impacts of race on PTSD in the military by providing a comprehensive examination into racial/ethnic differences in a range of clinically relevant domains related to PTSD in a large sample of active duty servicemen. The main racial/ethnic difference finding of greater alcohol consumption in Hispanic/Latino service

members after controlling for age, education, military grade, combat exposure, and PTSD symptom severity has important implications for treatment. Regardless of whether or not this effect was due to pretrauma or posttrauma levels of alcohol use, research has shown that those with PTSD and concurrent substance use are at increased risk for substance-use relapse (Glasner-Edwards, Mooney, Ang, Hillhouse, & Rawson, 2013) and treatment dropout (van Minnen, Arntz, & Keijsers, 2002). Furthermore, research has shown that minority veterans are less likely than non-Hispanic White veterans to use non-VA mental health services (Rosenheck&Fontana, 1996). The results of the current study suggest that care should be made to thoroughly assess PTSD patients, especially those belonging to minority groups, for concurrent substance use problems that may impede treatment utilization or adherence. Future research would benefit from additional studies aimed at gaining a better understanding of racial/ethnic differences in other risk factors related to the development of PTSD. The current findings provide a foundational place from which to examine the relationship between PTSD, clinically relevant symptoms, and race/ethnicity more closely in future studies.

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