ROLE OF COMBAT EXPOSURE AND INSOMNIA IN STUDENT VETERANS'
ADAPTATION TO COLLEGE

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Since 2002, the number of veterans enrolled in universities has nearly doubled, although 30-40% of veterans fail to complete their degree. While research efforts to understand the challenges veterans face transitioning from military life to college has increased in recent years, few studies have looked beyond the effects of post-traumatic stress disorder (PTSD). Insomnia is the most frequently reported symptom of combat veterans and can have serious implications for college students. The purpose of this study was to examine the role of insomnia and student veteran adaptation to college relative to civilian students. College students ($N = 588$) were administered a Background Information Questionnaire, the Insomnia Severity Index, the Deployment Risk and Resilience Inventory, and the Student Adaptation to College Questionnaire. Results revealed that students with insomnia reported significantly lower adaptation to college than students without insomnia. Student veterans reported better academic and personal-emotional adaptation to college than civilian students, while civilians reported better social adjustment than veterans. Although combat veterans without insomnia scored consistently higher academic adjustment than non-combat veterans and civilian students, when present insomnia seemed to have a greater negative effect on combat veterans' academic adjustment relative to civilian students. Furthermore, insomnia mediated the relationship between combat exposure and veteran's personal-emotional adjustment to college. Implications and future directions for research are discussed.

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By

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INTRODUCTION

The number of veterans enrolled in universities nearly doubled from 2002 to 2012 (Education Program Beneficiaries, 2014). However, 30-40% of veterans returning to college do not complete their degree (Cate, 2013). While unique military experiences, such as combat exposure, may make veterans' adaptation to college difficult, it is likely that present-day psychological or physical symptoms also negatively affect student veterans. For example, insomnia is not uncommon and potentially contributes to psychological distress among both veterans (McLay, Klam, & Volkert, 2010) and college students (Buboltz, Brown, & Soper, 2001; Taylor et al., 2011). Taylor et al. (2011) found that insomnia in a normative college sample was a major contributor to mental health symptoms, which in turn may affect students' functioning. To date, no research has examined these variables among military veterans attending college. The present study is designed to address that gap by exploring the effects of veteran status, combat exposure, and insomnia on adjustment to college.

From 2002 to 2014, over 1.7 million military members involved in Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) left active duty and received veteran benefit status through the Veterans Administration (VA; Veterans Administration Office of Public Health and Environmental Hazards, 2014). Historically, mental health issues are second behind general medical conditions for veterans receiving care at VA Medical Centers (VAMC), with over half (55.7%) of patients diagnosed with a mental disorder. Sleep difficulties are common among those suffering from psychological problems or chronic medical conditions, and have been linked to worsening symptoms (Ohayon, Caulet, & Lemoine, 1998; Roth & Ancoli-Israel, 1999; Tang, Wright, & Salkovskis, 2007; Taylor, Lichstein, Durrence, Reidel, & Bush, 2005). Insomnia is the most commonly reported symptom following

deployments and may exacerbate physical and psychological consequences of combat (McLay et al., 2010; Mysliqiec et al., 2013; Plumb, Peachey, & Zelman, 2013). With insomnia already a key concern for traditional college students (Buboltz et al., 2001; Taylor et al., 2011), a better understanding of the role insomnia plays in adjustment to college is needed for the roughly 1-million veterans utilizing educational benefits in American institutions (Education Program Beneficiaries, 2014).

Insomnia Overview

The *Diagnostic Statistical Manual for Mental Disorders-V* (DSM-5; American Psychiatric Association [APA], 2013) defines Insomnia Disorder as an individual's dissatisfaction with the amount and quality of sleep while experiencing difficulty initiating sleep, maintaining sleep, and/or waking up early and being unable to return to sleep. Sleep difficulties must also be associated with impairment in important areas of daytime functioning, including social and occupational domains. Further, the diagnosis of Insomnia Disorder requires individuals to have adequate opportunities for sleep, and it excludes sleep difficulties related to substance use. Insomnia rates vary for different age and sex groups, with more complaints among middle-aged to older adults and women. However, most experts assume the majority of individuals have experienced symptoms of insomnia at least once over the lifespan (Kleitman, 1963), with approximately 30% in the general population having difficulty initiating or maintaining sleep (Ohayon & Roth, 2001).

Insomnia can contribute to impairment in daily functioning, such as daytime sleepiness and fatigue, concentration difficulties, work absenteeism, and increased accidents (Ohayon, Caulet, Philip, Guilleminault, & Priest, 1997; Roth & Ancoli-Israel, 1999; Riedel & Lichstein, 2000). Research has also found support for insomnia as both a predictor and outcome of other

psychological disorders (Harvey, 2002; Ohayon et al., 1998; Taylor et al., 2005) and various medical conditions (Roth & Ancoli-Israel, 1999; Tang et al., 2007; Taylor et al., 2007). Similar to other studies that explored relationships between insomnia and mental health (Ohayon et al., 1998; Taylor, Lichstein, & Durrence, 2003; Weissman, Greenwald, Nino-Murcia, & Dement, 1997), in a community-based sample, Taylor et al. found that individuals with insomnia were almost 10 times as likely to report clinically significant depression and around 17 times more likely to report clinical levels of anxiety. Taylor et al. also found that participants with higher depression and anxiety reported more frequent insomnia symptoms.

Insomnia on College Campuses

Students in college experience similar rates of insomnia (9.5%) as the general adult population (9.1-9.3%; Lichstein, Durrence, Riedel, Taylor, & Bush., 2004; Ohayon & Roth, 2001; Taylor, Bramoweth, Grieser, Tatum, & Roane, 2013). In a study assessing the sleep quality of college students, Buboltz et al. (2001) found that only 11% of their sample reported “good” sleep quality, with 73% reporting occasional sleep problems and 15% indicating poor sleep quality. Over half the participants reported feeling tired when they woke in the morning. Further, an estimated 18 to 30% of the sample reported insomnia in the last 3 months. Buboltz et al. posited that the college environment and other stressors specific to student demands could have a negative effect on sleep habits, which may lead to further difficulties, possibly resulting in a self-perpetuating cycle causing more sleep problems.

Across two different college samples ($N = 548, 157$), Gellis, Park, Stotsky, and Taylor (2014) found that 12 to 13% of students reported clinically significant insomnia. Poor sleep hygiene practices such as engaging in inconsistent sleep-wake-schedules, uncomfortable sleeping environments, and arousal behaviors near bedtime were all associated with higher insomnia

severity. Furthermore, Taylor et al. (2011) found that 9.4% of their college sample ($n = 373$) reported insomnia. In addition to being more likely to have at least one medical disorder (57.1% versus 24.9%), students with insomnia reported more depression, anxiety, somatization, psychic distress, and obsessive-compulsive symptoms than individuals without insomnia. In a follow-up study that was one of the first to evaluate the updated DSM-5 criteria for chronic insomnia, Taylor et al. (2013) reported similar findings with 9.5% of their college sample meeting criteria for chronic insomnia. The chronic insomnia group reported more fatigue, lower quality of life, and increased psychological difficulties (depression, anxiety, and stress) than the normal sleep group. Additionally, 44.4% of those with chronic insomnia reported medical problems compared to 24.8% of “normal sleepers.”

Insomnia in Military Populations

Insomnia is the most commonly reported symptom of distress among military service members following deployment (McLay et al., 2010). Mustafa, Erokwu, Ebose, and Strohl (2005) found that 40% of their veteran sample reported insomnia symptoms, which is 10% higher than insomnia symptoms reported by the general population (Ohayon & Roth, 2001). In another study of 1887 service members, findings indicated that 41% of troops deployed to Iraq or Afghanistan reported sleep difficulties, which was significantly higher than the 25% prevalence among those deployed to other locations (McLay et al., 2010). Hermes and Rosenheck (2013) found that the best predictors of insomnia for veterans were depression and anxiety symptoms, and whether or not the service member had been deployed.

Around 75% of military personnel describe their sleep quality as significantly worse in a deployed environment (Peterson, Goodie, Satterfield, & Brim, 2008). Due to crowded sleeping conditions, noises and distractions while attempting to sleep, and long shifts resulting in irregular

sleep-wake cycles, it may be difficult for troops to maintain adequate sleep hygiene in deployed environments. Bramoweth and Germain (2013) postulated that deployment-related stressors (combat exposure, mild traumatic brain injury, poor sleep hygiene, and adjustment to returning home) could create an environment that may contribute to insomnia. Furthermore, in a large longitudinal cohort study of military personnel ($N = 41,225$), Seelig et al. (2010) found that troops who had deployed reported greater sleep difficulties than troops who had not deployed, with increased combat exposure and/or mental health symptoms associated with more sleep difficulties.

Mysliwiec et al. (2013) was interested in the comorbidity of sleep disorders with other psychological disorders in military personnel. Out of 110 participants, 88.2% met diagnosis for at least one sleep disorder with 63.6% meeting criteria for insomnia. Results revealed that personnel exposed to combat reported greater prevalence of insomnia, and those reporting sleep difficulties were more likely meet criteria for depression (71.4%). These results are consistent with the longitudinal findings of Plumb et al. (2013), who found that veterans with sleep difficulties were more likely to endorse greater exposure to combat as well as higher depression, anxiety, and other symptoms. Plumb et al. observed that insomnia was not only associated with depression and other psychological difficulties immediately following combat, but symptoms persisted at 6-month follow-up. These findings suggest insomnia can be found in veterans dealing with a variety of psychological symptoms, and is particularly problematic among military personnel exposed to combat.

Previous studies have explored the role of insomnia in mediating the relationship between combat exposure and psychological symptoms. Picchioni et al. (2010) observed a 65% decrease in the correlation between combat exposure and psychological symptoms when insomnia was

entered into their model, indicating partial mediation. Similarly, Borders, Rothman, and McAndrew (2014) found that insomnia partially mediated the relationship between rumination and psychological symptoms. The results of these studies suggest insomnia may be one mechanism by which the effects of exposure to combat influence and maintain psychological symptoms in veterans.

Student Veteran Adaptation to College

Most of the early research on veterans transitioning to college focused on school performance and GPA (Osborne et al., 1950; Joanning, 1975) or financial adjustment (Atkinson, 1950). However, O'Neill and Fontaine (1973) found that 60% of the 347 Vietnam-era student veterans reported difficulties adjusting to civilian life, and 47% endorsed insomnia, nightmares and/or impulsive behaviors. Other adjustment issues included academic uncertainty regarding their field of study, unawareness of veteran benefits, difficulty making friends and relating to peers, and struggling to adapt to the faster pace of civilian life. More recently, common complaints of today's OEF/OIF/OND student veterans include frustrations while navigating the VA bureaucratic system, absence of campus resources for veterans, lack of understanding regarding the benefits they are eligible to receive, and a sense that they do not fit in with their college peers (Ackerman, DiRamio, & Garza Mitchell, 2009; Rumann & Hamrick, 2010). Some student veterans may also have difficulty leaving the structured environment of military life and adapting to a more "loosely configured" campus setting with no direct chain-of-command to turn to for support and guidance (Ackerman et al., 2009). Additionally, while attempting to acculturate to their new role as students, some veterans could still be suffering from mental and physical wounds of service (Glasser, Powers, & Zywiak, 2009).

Considering that veterans may be at greater risk of having mental health concerns due to their military experiences, it is important to consider how these issues impact student veterans' transition to college. In a study of 199 student veterans and 181 of their civilian student peers, Whiteman, Barry, Mroczek, and MacDermid Wadsworth (2013) reported that both groups demonstrated a similar increase in emotional support over the course of 1 year, and less emotional support from peers was related to poorer academic functioning and more psychological symptoms. However, student veterans generally reported less peer emotional support than their civilian counterparts and the negative correlation between veterans' emotional support and psychological issues was significantly weaker than non-veteran students. In a similar college study, 78 combat veterans were compared alongside 53 non-combat veterans, 38 Reserve Officers' Training Corps (ROTC) students, and 79 civilian students (Barry, Whiteman, MacDermid Wadsworth, 2012). Relative to the other groups, combat veterans reported more psychological symptoms which were associated with more drinking problems and consequences, lower GPA, decreased academic motivation, and diminished likelihood to stay enrolled at their university.

In another study of student veterans, Ingala, Softas-Nall, and Peters (2013) examined the role of combat experiences, mental health, and social support in veterans' adaptation to college. Findings suggested that veterans who reported more psychological symptoms experienced greater difficulty adapting to college, but more exposure to combat did not significantly influence college adjustment. In addition, veterans who reported higher levels of unit support while deployed and social support after deployments indicated better adaptation to college. These findings highlight the need for campus officials and mental health practitioners to be aware of student veterans' military-related experiences and their continuing consequences.

Current Study

With the increase in university enrollment by military personnel upon separation from service, research focused on veterans' transition to college has grown in recent years (Barnard-Brak, Bagby, Jones, and Sulak., 2011; Whiteman et al., 2013). Although studies have documented the role of general psychological distress in student veterans' academic adaptation and functioning (Barry et al., 2012; Rudd, Goulding, & Bryan, 2011), few studies have examined sleep disturbances, which are the most reported symptom of combat veterans (McLay et al., 2010) and linked to worsened mental and physical health (Ohayon et al., 1998; Roth & Ancoli-Israel, 1999; Tang et al., 2007; Taylor et al., 2005; Taylor et al., 2007). Given further evidence that insomnia can have serious negative effects for college students (Buboltz et al., 2001; Taylor et al., 2011; Taylor et al., 2013), there is a clear need to investigate insomnia among college veterans.

The current study examined the role of insomnia and combat experiences in student veterans' adaptation to college. We hypothesized a moderating effect for insomnia such that combat veterans with insomnia would report lower college adaptation (i.e., academic adjustment, personal-emotional adjustment, social adjustment, goal commitment/institution affiliation) relative to combat veterans without insomnia, as well as non-combat veterans and civilian students with or without insomnia. Drawing upon research suggesting a mediating role for insomnia in associations between combat exposure and psychological symptoms (Borders et al., 2014; Picchioni et al., 2010), we also hypothesized that insomnia mediates the relationship between combat exposure and student veterans' college adaptation.

METHOD

Participants

The present study is part of a larger project examining the psychological, relational, and academic functioning of college student veterans. Participants were 588 college students enrolled in a public or private university and included 154 undergraduate or graduate student veterans who have been in college for an average of 19.34 months ($SD = 15.00$, Range = 1 – 120). In the overall sample, mean age was 23.77 years ($SD = 6.9$, Range = 18 – 62), with females ($n = 351$) representing 60.1% of the sample. In terms of race/ethnicity, 350 were Caucasian (59.8%), 90 were Hispanic (15.4%), 62 were African American (10.6%), 44 were Asian/Pacific Islander (7.5%), and 35 identified as bi-racial/multi-racial or other (6%). With regard to marital status, 85 reported being married (14.5%), 313 were single (never married) (53.2%), 132 were in a committed relationship of 6 or more months (22.4%), 23 were divorced or separated (3.9%), 29 were cohabitating (4.9%), and 6 did not respond (1%).

Service members in the subsample of student veterans averaged 10.82 months deployed. Around 68% of veterans reported at least one deployment, and about 61% reported combat exposure. Each military branch was represented, with 59 having served in the Army (38.6%), 34 represented the Navy (22.2%), 34 Marines (22.2%), and 26 Air Force (17%). Additionally, Reserve ($n = 29$) and National Guard ($n = 12$) veterans represented 19.4% and 7.9% of the sample respectively. In terms of rank, 127 were non-commissioned officers (E4-E6) (82.5%), 10 were junior enlisted (E1-E3) (6.4%), 8 were senior non-commissioned officers (E7-E9) (5.2%), and 9 were commissioned officers during their service (5.8%).

Instruments

The Insomnia Severity Index (ISI). On the *Insomnia Severity Index* (Bastien, Vallieres, & Morin, 2001; Morin, 1993) participants rate their perceived sleep difficulties on seven items using a Likert-type scale from 1 to 4, with higher scores indicating greater endorsement of insomnia severity. Items assess difficulty falling or staying asleep, problems waking up too early, as well as to what extent participants are satisfied with their sleep, how much their sleep problems interfere with daily functioning, how noticeable their problems are to others, and how worried they are about their sleep difficulties. For community samples, Morin, Belleville, Bélanger, and Ivers (2011) suggested using an ISI cutoff score of 10 to determine whether participants meet criteria for insomnia. The ISI has demonstrated adequate internal consistency, with a Cronbach's alpha ranging from .61-.88 (Bastien et al., 2001). In this study, Cronbach's alpha for the ISI was .89.

The Deployment Risk and Resilience Inventory (DRRI). The *Deployment Risk and Resilience Inventory* (King et al., 2003) examines the effect of military deployments on veterans' health across 14 factors, including two pre-deployment, ten during-deployment, and two post-deployment scales. The present study used the "Combat Experiences" factor scale, which examines direct exposure to wartime events. Participants respond either "yes" or "no" to questions like "While deployed, I went on combat patrols or missions" (King, et al., 2003). Vogt, Proctor, King, King, & Vasterling (2008) reported Cronbach's alpha of .85 across two samples. In this study, Cronbach's alpha for the "Combat Experiences" scale was .91.

The Student Adaptation to College Questionnaire (SACQ). The *Student Adaptation to College Questionnaire* (Baker & Siryk, 1984; 1999) is a 67-item self-report questionnaire designed to assess student functioning across four specific domains: Academic Adjustment,

Personal-Emotional Adjustment, Social Adjustment, and Goal Commitment/Institutional Attachment. The Academic Adjustment subscale addresses “educational demands characteristic of the college experience,” the Social Adjustment subscale refers to “interpersonal-societal demands,” the Personal-Emotional Adjustment subscale explores “psychological distress and/or somatic complaints,” and the Goal Commitment/Institutional Attachment subscale examines feelings toward “college, in general, and the college s/he is attending, in particular” (Baker & Siryk, 1999 p.1). Students rate all items on a 9-point scale from “Applies very closely to me” to “Doesn’t apply to me at all.” The sum of item scores for each subscale indicates level of functioning with higher scores indicating better adaptation to college. Cronbach’s alpha for the SACQ ranges from .77 - .91 (Baker & Siryk, 1999). In this study, Cronbach’s alpha for the Full Scale was .96 and Cronbach’s alphas for the subscales ranged from .87 to .92.

The Background Information Questionnaire-Student Veteran Version. *The Background Information Questionnaire-Student Veteran Version* (Riggs & Campbell, 2013) obtained participants’ demographic data (e.g. age, gender, race/ethnicity, education, relationship status, etc.) and mental health history. The researchers modified an earlier version of the Background Information Questionnaire (Riggs, 2003) to include military specific demographic information (e.g. branch, rank, deployment history, length of service, etc.).

Procedure

The university’s Institutional Review Board reviewed and approved the procedures for online data collection and recruitment strategies for both veteran and non-veteran subsamples. To ensure adequate representation of our population of interest, recruitment of student veterans targeted three universities in the southwest U.S. A designated employee at each university was responsible for identifying student veterans and distributing recruitment materials, which

included an email invitation to participate and flyers describing the study to post on campus or deliver to campus officials. Veterans interested in participating contacted the lab and, if eligible, received an access code for the online survey, which was estimated to require 45-60 minutes. An informed consent notice including study description, PI contact information, and potential risks and benefits appeared on the first page of the survey and participants indicated consent by clicking an “I agree” button. After completing a battery of standard questionnaires with programmed skip-logic for non-deployed and single veterans (i.e. participants were not administered non-applicable measures), participants were provided with a list of university counseling centers, community mental health clinics, and VA medical centers in their area. To increase participation during the later stage of data collection, veteran participants at the PI’s institution were offered a \$10 incentive to complete the online survey as part of a screening for a separate study.

For the comparison group, non-veteran students were recruited at the PI’s institution and received extra credit in their psychology courses for participating. After registering for the study, participants received an access code to complete the survey, which contained the same questionnaires with an additional skip-logic for non-veteran status. All other procedures were identical to those described for the veteran sample. All data were downloaded and transferred to SPSS for cleaning and analysis.

RESULTS

Preliminary Analyses

Means, standard deviations, and correlations were computed for each scale of interest. The ISI produced a mean of 9.65 ($SD = 6.04$), and 49.14% of the total sample met the community sample screening cut-off for insomnia (Morin et al., 2011). Correlations between ISI

and all SACQ variables were significant at the $p < .001$ level. In addition, the DRRRI Combat Experiences subscale was significantly associated with the ISI and SACQ Personal-Emotional Adjustment subscale, $p = .031$.

Chi-square, ANOVA, and MANOVA procedures compared combat veterans ($n = 95$), non-combat veterans ($n = 59$), and civilian students ($n = 434$) on a number of demographic factors. Relative to civilian students, both combat and non-combat veterans tended to be older, $F(2, 559) = 249.86, p < .001$, male, $\chi^2 = 117.37, p < .001$, and married $\chi^2 = 178.16, p < .001$. Despite being younger, civilians were more likely to have been enrolled in college longer than combat veterans, $F(2, 585), p = .024$, but not non-combat veterans. Chi-square analyses for race/ethnicity, $\chi^2 = 26.42, p = .001$, and income, $\chi^2 = 144.85, p < .001$, were significant. While 55.3% of the civilian subsample reported being White/European American, 78.5% of combat and 63.8% of non-combat veterans endorsed White/European American ethnicity. The majority (82.3%) of civilian students reported an income below \$15,000, compared to 29.8% of combat and 34.5% of non-combat veteran students. Both combat and non-combat veterans were most likely to report incomes between \$15,000-30,000 (both 36.2%).

One-way ANOVAs and Pearson correlations were conducted to determine whether demographic differences existed for the main variables of interest (i.e., college adjustment, insomnia, and combat exposure). One-way ANOVA results revealed that African American students reported lower Academic Adjustment scores than White/European American students, $F(4, 580) = 2.74, p = .028$. Females reported significantly lower Personal-Emotional Adjustment than males, $F(1, 582) = 6.82, p = .009$. Pearson correlations indicated that age was significantly and positively correlated with Academic Adjustment ($r = .21, p < .001$) and Personal-Emotional Adjustment ($r = .18, p < .001$), but negatively correlated with Social Adjustment ($r = -.13, p =$

.003). The total months the students had been enrolled at their university was positively correlated with three of the four SACQ subscales (Academic Adjustment [$p = .023$], Social Adjustment [$p = .002$], and Goal Commitment/ Institutional Attachment [$p = .041$]). Because demographic variables were also related to Combat Status, they were not controlled for in analyses to avoid violating homogeneity of regression slopes assumptions (Tabachnick & Fidell, 2007). No other significant differences or correlations were observed.

Primary Analyses

To test the first hypothesis, we conducted a 3 (Combat Veterans/Non-Combat Veterans/Civilians) x 2 (Insomnia/No-Insomnia) MANCOVA using the four SACQ subscales as dependent variables controlling for months enrolled in college (see Table 1). Based on the suggested ISI cutoff score of 10 for community samples (Morin et al., 2011), we assigned participants into Insomnia and No-Insomnia groups. The MANCOVA was significant for veteran status (Wilks' $\lambda = 11.09$, $p < .001$, partial $\eta^2 = .07$), insomnia (Wilks' $\lambda = 19.78$, $p < .001$, partial $\eta^2 = .12$), and the interaction between veteran status and insomnia (Wilks' $\lambda = 2.19$, $p = .026$, partial $\eta^2 = .02$). Follow-up ANOVAs produced significant main effects for Veteran Status on Academic, Social, and Personal-Emotional Adjustment, and significant main effects for Insomnia on all four SACQ subscales. Post-hoc comparisons revealed that both Combat ($p = .002$) and Non-Combat Veterans ($p = .021$) reported lower Social Adjustment relative to Civilian Students. Contrary to predictions however, Combat Veterans and Non-Combat Veterans reported better Academic Adjustment ($p < .001$; $p = .015$, respectively) and Personal-Emotional Adjustment ($p < .001$; $p = .002$, respectively) than Non-Veteran Students.

A univariate interaction effect was significant for Academic Adjustment. As shown in Figure 1, combat veterans without Insomnia ($M = 163.98$, $SD = 4.01$) endorsed better academic

adjustment than all other groups, but when insomnia was present combat veterans showed the steepest decline in adjustment ($M = 138.58$, $SD = 3.88$). Non-combat veterans with ($M = 146.70$, $SD = 4.80$) or without ($M = 147.59$, $SD = 5.22$) insomnia had similar academic adjustment scores, only slightly higher than civilians without insomnia ($M = 144.65$, $SD = 1.81$). Civilian students with insomnia ($M = 130.53$, $SD = 1.88$) had consistently lower Academic Adjustment scores than the other groups.

To test the hypothesis that insomnia mediates the relationship between combat exposure and student veterans' adjustment to college, we used the test of mediation proposed by Baron and Kenny (1986). Using only veterans, initial regressions with Combat Experiences (CE) predicting each SACQ subscale (Academic Adjustment, Personal-Emotional Adjustment, Social Adjustment, and Goal Commitment/ Institutional Attachment) produced only one significant association with Personal-Emotional Adjustment, standardized $\beta = -.224$, $t(92) = -2.188$, $p = .031$. Next the regression of CE on the mediator (insomnia) was also significant, standardized $\beta = .209$, $t(92) = 2.063$, $p = .045$. Step 3 of the mediation process including all predictors showed that insomnia was significant in predicting Personal-Emotional Adjustment, standardized $\beta = -.602$, $t(92) = -7.199$, $p < .001$. The unstandardized coefficient of CE diminished and became a non-significant predictor of Personal-Emotional Adjustment when insomnia was included in the model (see Figure 2). Results from the Sobel test (Sobel, 1982), $z' = -1.965$, $p = .049$, indicate that insomnia significantly mediates the relationship between combat exposure and Personal-Emotional Adjustment to college in this sample. The mediation analysis had 88% power to detect an effect, and CE and insomnia accounted for approximately 39.7% of the variance in Personal-Emotional adjustment.

DISCUSSION

The present study examined the role of insomnia in adaptation to college among combat veterans, non-combat veterans, and civilian students. Findings provided mixed support for hypotheses. Differences between veterans' and civilians' academic, social, and personal-emotional adjustment were observed regardless of insomnia status. While both groups of veterans reported lower social adjustment than civilian students, contrary to predictions the two veteran groups endorsed better academic and personal-emotional adjustment. In addition, insomnia more negatively affected combat veterans' academic adjustment relative to non-combat veterans and civilian students. Furthermore, results indicated that insomnia was a mediator in the relationship between combat exposure and academic adjustment, but not other domains of adaptation to college. Findings and implications are discussed below.

Consistent with previous studies documenting that insomnia is particularly detrimental for college students (Buboltz et al., 2001; Gellis et al., 2014; Taylor et al., 2011; Taylor et al., 2013), the students who met the clinical cutoff for insomnia reported more difficulties adapting to college than students without insomnia across all college adaptation variables (Academic, Social, Personal-Emotional, and Goal Commitment/Institutional Attachment). Findings also revealed that veteran status was significantly associated with academic, social, and personal-emotional adjustment. Both combat and non-combat veterans reported lower social adjustment compared to civilian students. This is consistent with previous studies suggesting veterans may have difficulties connecting with peers and faculty (Ackerman et al., 2009; Rumann & Hamrick, 2010) and experience lower peer emotional support than civilian students (Whiteman et al., 2013). Elliot, Gonzalez, and Larsen (2011) found that veterans in college felt alienated from other students and faculty when they heard negative statements regarding service or were singled

out in class. Faculty training may help instructors provide a more supportive campus environment for student veterans, as studies have found that increased social support is related to academic success in veterans (Ingala et al., 2013; Whiteman et al., 2013).

Although they reported lower social adjustment in college, both combat and non-combat veterans reported better personal-emotional adjustment than civilian students. This finding was unexpected considering and in contrast to previous research indicating elevated risk for psychological problems among student veterans in a national sample (Rudd et al., 2011). In addition, contrary to hypotheses, current findings indicated that both combat and non-combat veterans reported better academic adjustment than civilian students. These findings suggest that student veterans may be better able to handle academic and personal-emotional adaptations to college relative to traditional students. Rumann and Hamrick (2010) reported student veterans believed their maturity and deployment experiences gave them confidence to overcome the stress of transitioning to college. For example, these veterans indicated that their perspective following deployments changed such that they are now better able to prioritize what they believe is important. This is consistent with the findings of Ackerman et al. (2009) who reported that student veterans believed they were better students after serving in the military because they understood how to focus on their studies much like they focused on their mission while in the armed services.

Findings supported the hypothesis that insomnia would have a moderating effect. Specifically, results indicated that academic adjustment for combat veterans and civilians depended on whether they had insomnia. While combat veterans without insomnia reported higher academic adjustment scores than non-combat veterans and civilian students without insomnia, the academic adjustment of combat veteran and civilian groups declined significantly

when insomnia was present. Interestingly, non-combat veterans with and without insomnia reported levels of academic adjustment similar to civilian students without insomnia. These findings suggest that when combat veterans functioning is not impaired by insomnia, they demonstrate substantial resilience in the academic domain, which is consistent with previous studies reporting posttraumatic growth following combat (Feder et al., 2008; Maguen, Vogt, King, King, & Litz, 2006; Solomon and Dekel, 2007). The difference between the combat and non-combat veterans might be explained by the difference in nature of their insomnia symptoms. Non-combat veterans' insomnia may be influenced by the same issues civilian students face, whereas combat veterans' insomnia may be the result of nightmares associated with traumatic re-experiencing that make the effects of insomnia harder to overcome (Inman, Silver, & Doghramji, 1990). The ability to overcome insomnia's negative effect on academic adjustment in non-combat veterans may also be due to qualities acquired through their service such as maturity, professionalism, and ability to cope with stressors (Hourani et al., 2012; Pietrzak, Johnson, Goldstein, Malley, & Southwick, 2009), whereas civilian students might not have developed those same attributes yet.

In separate regressions for veterans, as predicted, insomnia mediated the relationship between combat exposure and student veterans' personal-emotional adjustment to college. This finding lends support to previous findings indicating that insomnia mediates the association between combat and psychological symptoms in veterans (Borders et al., 2014; Picchioni et al., 2010). Efficacy studies for Cognitive-Behavioral Therapy for Insomnia show that targeting insomnia symptoms and nightmares in veterans experiencing mental health difficulties improves both their quality of sleep and psychological symptoms (Margolies, Rybarczyk, Vrana, Leszczyszyn, & Lynch, 2013; Talbot et al., 2013; Trockel, Karlin, Taylor, & Manber, 2014). In

combination with findings that traumatized individuals receiving treatment targeting other psychological symptoms often have residual insomnia even after other symptoms have reduced (DeViva, Zayfert, Pigeon, & Mellman, 2005; Zayfert & DeViva, 2004), these results suggest that a treatment focus on improving insomnia symptoms in combat veterans may contribute to improvements in other areas of psychological functioning.

The current study is limited by a cross-sectional design, which cannot identify directionality of the relationships nor provide causal conclusions. Furthermore, the use of self-report measures introduces the possibility of biased reporting and the results may not generalize to other students across the country as participants were restricted to colleges located in Texas. Future research using longitudinal designs, more objective measures, and less geographical restrictions could address some of these issues.

This study extended previous research on insomnia and combat exposure from general veteran populations to a sample of student veterans. The study also compared veterans in college of their non-veteran peers, demonstrating significant differences in their adaptation to college. The current study highlights the need to view student veterans as a unique subpopulation that faces different challenges and offers different strengths than civilian students. Research should continue to explore the experiences of veterans transitioning to college. Current literature concerning student veterans mostly centers on the difficulties veterans face transitioning to college; future research should investigate areas of strengths including resilience and post-traumatic growth.

Findings from the current study underscore the need for college administrators and health providers to increase awareness of and improve services for the unique subpopulation of student veterans. Programs designed to increase campus faculty and staff knowledge of military culture

and the issues student veterans face may enhance the college experience for ex-military scholars. In particular, health provider interventions targeting insomnia in combat veterans may help alleviate other psychological symptoms (Margolies et al, 2013; Talbot et al., 2013; Trockel et al, 2014). Previous studies have indicated that veterans may be reluctant to report mental health symptomatology (Hoge et al., 2004), but seeking help for sleep difficulties could be perceived as more socially acceptable. Despite studies finding insomnia to be one of the most reported symptoms of veterans, very few veterans seeking treatment receive insomnia specific care (Hermes & Rosenheck, 2013). Additionally, these results support previous studies that have found insomnia to be a major problem on college campuses, and increased sleep hygiene education programs might help all students struggling with insomnia.

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TABLES AND FIGURES

Table 1

MANCOVA Examining Adaptation to College in Relation to Veteran Status, Insomnia, and Their Interaction

Scale Sets	Veteran Status N = 588			<i>F</i>	Insomnia N = 588		<i>F</i>	Vet Status X Insomnia Interaction <i>F</i>
	Combat Vets <i>M (SD)</i> <i>n</i> = 95	Non- Combat <i>M (SD)</i> <i>n</i> = 59	Civilians <i>M (SD)</i> <i>n</i> = 434		Insomnia <i>M (SD)</i> <i>n</i> = 289	No Insomnia <i>M (SD)</i> <i>n</i> = 299		
MANOVA				11.09***			19.78***	2.19*
Academic Adjustment	150.14(31.87) _a	146.95(28.53) _a	138.07(27.47) _b	11.61***	133.49(25.24)	148.08(30.01)	18.55***	3.76*
Social Adjustment	101.29(29.31) _a	101.66(24.86) _a	110.79(26.03) _b	5.58**	102.91(24.92)	113.59(27.43)	19.37***	1.67
Personal-Emotional Adjustment	86.57(25.87) _a	86.02(22.50) _a	78.38(22.47) _b	11.58***	69.48(17.54)	91.10(21.75)	75.36***	2.45
Goal Commitment/ Institutional Attachment	94.03(19.39)	92.12(18.38)	92.84(19.57)	.42	89.25(18.47)	96.54(19.63)	11.99***	.29

Note. For veteran status, means with different subscripts differ significantly at $p < .05$ or greater.

* $p < .05$, ** $p < .01$, *** $p < .00$

Figure 1

Interaction Effect of Veteran Status and Insomnia on Academic Adjustment

Figure 2. Standardized regression coefficients for the relationship between Combat Exposure and Personal-Emotional Adjustment as mediated by Insomnia. The standardized regression coefficient between Combat Exposure and Personal-Emotional Adjustment, controlling for Insomnia, is in parentheses.

$*p < .05$; $*** p < .001$

APPENDIX A.

Extended Literature Review

EXTENDED LITERATURE REVIEW

Introduction

The number of veterans enrolled in universities nearly doubled from 2002 to 2012 (Education Program Beneficiaries, 2014). However, 30-40% of veterans returning to college do not complete their degree (Cate, 2013). While unique military experiences, such as combat exposure, may make veterans' adaptation to college difficult, it is likely that present-day psychological or physical symptoms also negatively affect student veterans. For example, insomnia is not uncommon and potentially contributes to psychological distress among both veterans (McLay, Klam, & Volkert, 2010) and college students (Buboltz, Brown, & Soper, 2001; Taylor et al., 2011). Taylor et al. (2011) found insomnia in a normative college sample was a major contributor to mental health symptoms, which in turn can affect students' functioning. To date, no research has explored the relationship of these variables in veteran specific college samples. The present study is designed to address that gap by examining the effects of combat exposure and insomnia on adjustment to college among student veterans.

From 2002 to 2014, over 1.7 million military members involved in Operation Enduring Freedom (OEF), Operation Iraqi Freedom (OIF), and Operation New Dawn (OND) have left active duty and received veteran status through the Veterans Administration (VA; Veterans Administration Office of Public Health and Environmental Hazards, 2014). Historically, mental health issues are second behind general medical conditions for veterans receiving care at VA Medical Centers (VAMC), with over half (55.7%) of patients diagnosed with a mental disorder. Sleep difficulties are common among those suffering from psychological problems or chronic medical conditions, and have been linked to worsening symptoms (Ohayon, Caulet, & Lemoine, 1998; Roth & Ancoli-Israel, 1999; Tang, Wright, & Salkovskis, 2007; Taylor, Lichstein,

Durrence, Reidel, & Bush, 2005). Not surprisingly, insomnia is the most commonly reported symptom following deployments and may exacerbate physical and psychological consequences of combat (McLay et al., 2010; Mysliqiec et al., 2013; Plumb, Peachey, & Zelman, 2013). With insomnia already a key concern for traditional college students (Buboltz et al., 2001; Taylor et al., 2011), a better understanding of the role insomnia plays in academic performance is needed for the roughly 1-million veterans utilizing educational benefits in American institutions (Education Program Beneficiaries, 2014).

Gerdes and Mallinckrodt (1994) observed that students tend to overestimate their ability to adjust to college. In a longitudinal study, Gerdes and Mallinckrodt collected responses from 209 students during their first semester of college using the Student Adaptation to College Questionnaire (SACQ; Baker & Siryk, 1984; 1999) and compared them with transcript data retrieved 6-years later. They found items that indicated better social and personal/emotional adjustment to college were associated with less attrition. In another study using the SACQ to measure adjustment to college, Ramos-Sánchez and Nichols (2011) found that undergraduate students ($N = 192$) with high self-efficacy reported better adaptation to college. Additionally, non-first generational students reported significantly higher self-efficacy than first generation students. Considering the majority of veterans enrolled in universities are first generation students (66%; National Survey of Student Engagement, 2010), these results have implications for the adjustment of military members to college. Furthermore, students who have a difficult time acknowledging their emotions report lower SACQ scores (Kerr, Johnson, Gans, & Krumrine, 2004), which could complicate the transition to college for veterans, as research has observed that military members are reluctant to discuss distressing emotions (Hoge et al., 2004). In one of the few studies to examine veteran adjustments to college using the SACQ, Ingala,

Softas-Nall, and Peters (2013) found that higher PTSD symptoms predicted lower adjustment to college. However, there is a dearth of information surrounding the difficulties student veterans face when transitioning to college and how they compare to their civilian peers.

As part of a larger study designed to assess student veterans' functioning in personal, academic, and relational domains, the present study's goal is to examine the links between insomnia and student veterans' academic adaptation to college in three distinct areas: academic adjustment, personal/emotional adjustment, and social adaptation. Additionally, the study will explore the relationship between combat exposure, insomnia, and personal/emotional adjustment to college, and also compare combat veterans' severity of insomnia and academic adaptation to non-combat veterans and non-veteran college students. Findings will inform assessment, treatment, and education efforts targeting insomnia on college campuses, and contribute new knowledge regarding the increasing number of student veterans and how they may differ from their non-veteran classmates.

Insomnia Overview

Approximately 30% of Americans report difficulties related to sleep (Ancoli-Israel & Roth, 1999). Most individuals experience sleep difficulties at some point in their life, with 40% of Americans receiving less than 7 hours of sleep per night on average (Jones, 2013). Although 8 hours has typically been the societal benchmark of sleep for one night, individuals vary in depth and duration of their sleep, which makes establishing an objective criterion difficult (Kleitman, 1963). For example, an individual who sleeps for 8 hours per night may complain about receiving too little sleep, while another who regularly obtains 5 hours of sleep per night may feel it is sufficient. Although insomnia is commonly misunderstood as a lack of sleep, the criteria for insomnia related sleep disorders are more complex. The *Diagnostic Statistical Manual for*

Mental Disorders-V (DSM-5; American Psychiatric Association [APA], 2013) defines Insomnia Disorder as an individual's dissatisfaction with the amount and quality of sleep while experiencing difficulty initiating sleep, maintaining sleep, and/or waking up early and being unable to return to sleep. Sleep difficulties must also be attributable to impairment in important areas of daytime functioning, including social and occupational domains. Further, the diagnosis of Insomnia Disorder requires individuals to have adequate opportunities for sleep, and it excludes sleep difficulties related to substance use.

Classification types of insomnia traditionally fall into two categories: exogenous and endogenous insomnias (Kleitman, 1963). Exogenous insomnias involve environmental factors such as work schedules, poor hygiene, lifestyle, climate, etc. Endogenous insomnias involve biological factors and are typically broken down further into two separate groups. The primary or essential group refers to a hereditary predisposition or temperament for insomnia. There are various subdivisions of the secondary or symptomatic group, which involve mostly psychological and/or physiological functions. Other differentiating factors include whether the insomnia is situational, recurrent, or persistent (APA, 2013). Situational insomnia typically occurs during major life events or changes and usually lasts between a few days to a few weeks. Sometimes situational insomnia can become recurrent insomnia, which may involve a triggering event in which the insomnia response has been conditioned. Persistent or chronic insomnia is when nightly sleep pattern variability exists with mostly poor sleep accompanied by occasional nights of restful sleep. Chronic insomnia is one of the most reported psychological symptoms, affecting around 16% of the adult population (Lichstein, Durrence, Riedel, Taylor, & Bush, 2004).

Insomnia rates vary for different age and sex groups, with more complaints among

middle-aged to older adults and women (APA, 2013). However, most experts assume the majority of individuals have experienced symptoms of insomnia at least once over the lifespan (Kleitman, 1963). Although insomnia affects aspects of daily functioning such as daytime sleepiness and fatigue, concentration difficulties, work absenteeism, and increased accidents (Ohayon, Caulet, Philip, Guilleminault, & Priest, 1997; Roth & Ancoli-Israel, 1999; Riedel & Lichstein, 2000; Wilkerson, Boals, & Taylor, 2011), insomnia has also been identified as both a predictor and outcome of other psychological disorders (Harvey, 2002; Ohayon et al., 1998; Taylor et al., 2005) and various medical conditions (Roth & Ancoli-Israel, 1999; Tang et al., 2007; Taylor et al., 2007).

In a large study ($N = 4056$) with a sizeable age range (15 – 100), Ohayon et al. (1997) explored a variety of impairments related to daytime sleepiness, which can be a consequence of insomnia. Individuals with severe daytime sleepiness were more likely to be diagnosed with depressive disorder (17.4%) or anxiety disorder (19.4%) when compared to those with moderate (8.7 – 9.6%) to no (3.3 – 4.2%) daytime sleepiness. Further, severe to moderate daytime sleepiness sufferers reported higher rates of bipolar disorders (6% and 3.9%, respectively) than those with no daytime sleepiness (1.5%). The researchers also found that daytime sleepiness may affect multiple aspects of daily functioning. Around 60% of the sample reported they frequently operated machinery or vehicles, and the proportion of operators did not differ between those with severe, moderate, or no daytime sleepiness. However, those with severe daytime sleepiness reported an accident (9.3%) or one or more traffic violations/tickets in the past 12 months (6.9%) twice as often as those with no daytime sleepiness (4.7% and 3.4%, respectively). Other consequences of daytime sleepiness included falling asleep during activities, increased caffeine intake, muscle stiffness, and excessive limb movements while sleeping. These findings suggest

insomnia sufferers experience difficulties beyond simply the inability to fall asleep.

Though it is often associated with insomnia, Riedel and Lichstein (2000) argued that daytime sleepiness is not necessarily a consequence of insomnia. Riedel and Lichstein suggested that early insomnia researchers assumed people with insomnia experienced daytime sleepiness, though more recent research evidence contradicts conventional wisdom. For example, several studies did not find a difference in sleepiness between people with insomnia and people without insomnia (Bonnet & Arand, 1995; Chambers & Keller, 1993; Edinger et al., 1997; Riedel, Lichstein, & Dwyer, 1995; Zammit, Weiner, Damato, Sillup, & McMillan, 1999). However, people with insomnia reported significantly more fatigue than people without insomnia (Fitch et al., 1995; Lichstein, Means, Noe, & Aguillard, 1997). Fatigue is often synonymous with sleepiness, although those with insomnia frequently complain about feeling physically and mentally exhausted but have no problem staying awake (Riedel & Lichstein, 2000). Furthermore, psychological symptoms stemming from insomnia (depression and anxiety) may contribute to an overestimation of daytime functioning ability in people with insomnia, which can make it difficult for researchers to objectively determine insomnia sufferers' actual daytime impairment (Riedel & Lichstein, 2000).

Despite the difficulties associated with objectively assessing daytime functioning, Roth and Ancoli-Israel (1999) described some issues people with insomnia may face in their daily lives. In their sample of 1000 adults, 700 participants reported current sleep problems. Individuals with chronic or occasional insomnia reported lower quality of life and decreased ability to accomplish tasks and enjoy relationships than adults without insomnia. Additionally, those with chronic insomnia were more likely to have been involved in an automobile accident due to sleepiness than those with occasional or no insomnia. An increase in accidents could be

attributed to insomnia sufferers' diminished ability to focus on tasks, with 32% of those with chronic insomnia reporting impaired concentration, and over half (53%) indicating they often have difficulty with memory. Deficits in cognitive functioning as a result of sleep difficulties can have serious implications. In a sample of 941 college students, Wilkerson et al. (2012) found that insomnia predicted diminished memory, and increased distractibility and motor function difficulties. Further, insomnia partially mediated the relationship between cognitive failures and depression, negative affect, and trait anxiety. These findings support the notion that sleep plays a crucial role in the process of memory and performance of other everyday tasks.

In an attempt to help solidify the understanding about the effect of sleep on cognitive processes, Harvey (2002) developed a cognitive model of insomnia, which postulates that cognitive resources become allocated to unwanted thoughts about sleep difficulties and their consequences. The model asserts that individuals with insomnia can experience excessive worry and intrusive thoughts throughout the day that intensify during the pre-sleep period. The excessive negative cognitions may result in emotional distress and autonomic arousal of the sympathetic nervous system (fight or flight response). The resulting anxious state promotes attention narrowing that allocates cognitive resources to recognizing internal and external threats to sleep (i.e. body sensations and the environment), and can occur at both a conscious and unconscious levels. Detection of threats can perpetuate increased worry and concern, possibly resulting in a distorted perceptual exaggeration of sleep deficit and diminished daytime functioning. In other words, the individual may experience reality distortion and could overestimate the amount of actual sleep lost and/or the severity of decline in daytime performance. This can result in individuals engaging in "safety behaviors" to cope with the increased cognitions, including suppression of thoughts and/or imagery, emotional inhibition,

and excessive time spent awake in bed. Harvey (2002) posits the eventual culmination of actual deficits may be a result of the cycle of cognitive processes and not necessarily the sleep/wake cycle itself. According to this model, treatment should avoid attempts to increase sleep time, and instead focus on correcting the distorted beliefs that maintain the maladaptive cognitive processes.

To investigate the theory that misperceptions of sleep deficits exacerbate insomnia severity, Tang and Harvey (2004) recruited 48 adult sufferers of insomnia to participate in a research experiment. Participants were divided into a behavioral experiment group ($n = 24$) who underwent a therapeutic intervention to reconcile their misperceptions, and a verbal feedback group ($n = 24$) who were simply told about the discrepancy between their thoughts of sleep deficit and their actual sleep patterns. The researchers hypothesized that individuals in the behavioral experiment group would estimate their sleep more accurately and experience more positive thoughts and feelings toward their sleep. They found that participants benefitted from the behavioral experiment, showing greater decrease in anxiety and preoccupation with sleep, insomnia symptom severity and frequency, and sleep-distress ratings (Cohen effect sizes: 0.79 – 1.25) when compared to the verbal feedback group (effect sizes: -.06 - .31). However, both groups improved their sleep estimate accuracy, for which Tang and Harvey (2004) offered three possible explanations: low sleep deficit at baseline resulting in a floor effect, possible delay in effect of treatment, or the findings reflected reality and both groups benefitted from their interventions.

With Harvey's (2002) cognitive model of insomnia in mind, it is not surprising insomnia has been found to be comorbid with other psychological difficulties (Ohayon et al., 1998; Taylor et al., 2005). In one of the first epidemiological studies on comorbidity of mental and insomnia

disorders, Ohayon et al. (1998) were interested in the presence of anxiety and depression among adults dissatisfied with the quality and quantity of their sleep and how they differed from adults who only suffered from insomnia symptoms without depression and/or anxiety. Overall, 18.6% of the participants met diagnostic criteria for insomnia, while 17.7% endorsed both insomnia and psychiatric disorder symptoms. They found participants who were depressed reported more severe insomnia symptoms. Further, individuals experiencing insomnia reported depression more frequently than anxiety, and approximately 90% of depressed participants complained of insomnia symptoms (i.e., waking up frequently during sleep, early-morning awakenings). Individuals with depression also reported longer duration of insomnia symptoms (median, 120 months) than those without depression (median, 46 and 48 months). The researchers posited that depressed individuals with insomnia are more likely to seek general medical treatment for their sleep problems, which creates the possibility of depressive symptoms remaining undetected and untreated. These findings highlighted the importance of assessing mental health symptomatology of individuals suffering from insomnia.

In another epidemiological study investigating the effects of insomnia on depression and anxiety, Taylor et al. (2005) attempted to control for possible confounding variables (e.g., organic sleep disorders, medical conditions, demographic characteristics) to capture an unbiased sample. Their findings were similar to other studies that explored relationships between insomnia and mental health (Ohayon et al., 1998; Taylor, Lichstein, & Durrence, 2003; Weissman, Greenwald, Nino-Murcia, & Dement, 1997). Specifically, individuals with insomnia were almost 10 times as likely to report clinically significant depression and around 17 times more likely to report clinical levels of anxiety. Taylor et al. (2005) also found that participants with higher depression and anxiety reported more frequent insomnia symptoms. While this study controlled

for confounding medical conditions, it is important to recognize that, like mental health problems, medical issues can be both a predictor and outcome of insomnia.

In their national study of the daytime consequences of insomnia, Roth and Ancoli-Israel (1999) found only about half (53%) of participants with chronic insomnia reported feeling good physically, compared to 86% of individuals with no insomnia. Evidence suggests that individuals suffering from chronic pain may be more likely to also suffer from insomnia when compared to pain-free individuals (Tang et al., 2007; Taylor et al., 2007). Furthermore, Taylor et al. (2007) found that individuals with elevated blood pressure, breathing difficulties, urinary problems, and gastrointestinal issues could have greater insomnia severity than individuals without these medical conditions.

Insomnia on College Campuses

Research has demonstrated that most college students experience sleep difficulties (Buboltz et al., 2001). In a study assessing the sleep quality of college students, Buboltz et al. (2001) found that only 11% of their sample reported “good” sleep quality, with 73% reporting occasional sleep problems and 15% indicating poor sleep quality. Over half the participants reported feeling tired when they woke in the morning. Further, an estimated 18 to 30% of the sample reported insomnia in the last 3 months. Overall, Buboltz et al. (2001) found that students indicated diminished sleep quality greater than average adult populations. Consistent with the cognitive model of insomnia (Harvey, 2002), there was a significant difference in students’ estimates of sleep versus their actual hours slept. The researchers posited that the college environment and other stressors specific to student demands could have a negative effect on sleep habits, which may lead to further difficulties, possibly resulting in a self-perpetuating cycle causing more sleep problems. Buboltz et al. (2001) suggested that universities address sleep

hygiene with their students and consider educational programs to explain how sleep is related to college adjustment and performance.

Gellis, Park, Stotsky, and Taylor (2014) found college students report worse sleep than the general population. Across two different college samples ($N = 548, 157$), 12 to 13% of students reported clinically significant insomnia. Poor sleep hygiene practices such as engaging in inconsistent sleep-wake-schedules, uncomfortable sleeping environments, and arousal behaviors near bedtime were all associated with higher insomnia severity. However, after controlling for well-known insomnia risk factors such as depression, anxiety, and gender, the only significant predictor of insomnia severity remaining was improper sleep scheduling. Furthermore, at 2-month follow-up poor sleep scheduling predicted insomnia severity after controlling for baseline insomnia severity and other known risk factors. These findings suggest college students in general may practice poor sleep hygiene which can exacerbate insomnia.

Researchers have asserted that sleep problems, specifically insomnia, need to be assessed in university settings because they can pose a significant problem for college students. Taylor et al. (2011) found that 9.4% of their college sample ($n = 373$) reported insomnia. In addition to being more likely to have at least one medical disorder (57.1% versus 24.9%), students with insomnia reported more depression, anxiety, somatization, psychic distress, and obsessive-compulsive symptoms than individuals without insomnia. In a follow-up study that was one of the first to evaluate the updated DSM-5 criteria for chronic insomnia, Taylor, Bramoweth, Grieser, Tatum, and Roane (2013) found that 9.5% of their college sample met criteria for chronic insomnia. The chronic insomnia group reported worse fatigue, lower quality of life, and increased psychological difficulties (depression, anxiety, and stress) than the normal sleep group. Additionally, 44.4% of those with chronic insomnia reported medical problems compared to

24.8% of “normal sleepers.” Similar to the results of Buboltz et al. (2001), these findings indicated that those with chronic insomnia tended to be less accurate than “normal sleepers” when estimating their amount of sleep. However, no differences were observed in academic performance between those with insomnia and those without.

Although studies have found that sleep difficulties may contribute to poor academic performance (Becker, Adams, Orr, & Quilter, 2008; Trockel, Barnes, & Egget, 2000), research is scarce when it comes to specifically linking insomnia to academic performance. This is surprising considering the studies finding associations between insomnia, depression, and anxiety (Roth & Ancoli-Israel, 1999; Taylor et al., 2005; Wilkerson et al., 2011), and research concerning depression, anxiety, and poor academic performance (Andrews & Wilding, 2004; Brackney & Karabenick, 1995). However, Vincent, Oakley, Pohl, and Walker (2000) suggest that people with insomnia tend to be more perfectionistic, which may cause students with insomnia to work more carefully to overcome some of the negative effects their condition might have on academic performance. Additionally, Schmidt, Richter, Gendolla, and Van der Linden (2010) found that young adults suffering from insomnia may exert extra effort to compensate for sleep problems. College students ($N = 77$) were given a memory task while cardiovascular data were collected. Participants with greater insomnia severity had higher systolic blood pressure, suggesting that students suffering from insomnia may cope with cognitive challenges by recruiting extra resources.

Although research has not found insomnia to be related to academic performance, the college years are an important developmental period for young adults. Studies have found that insomnia in college-aged adults can predict consequences in middle adulthood (ages 40-65). In a longitudinal study of 101 medical students, Chang et al. (1997) found that those who reported

insomnia at baseline were at greater risk for developing clinical depression and other psychological distress after 30-year follow-up. Additionally, insomnia in college students has been shown to predict suicidal ideation (Nadorff, Nazeem, & Fisk, 2011). In particular, Nadorff et al. (2011) found that nightmares, a common symptom of trauma, predicted suicidal ideation. It is possible that traumatic experiences (e.g., combat exposure) resulting in nightmares could exacerbate insomnia severity.

Research has also linked nightmares as a result of bereavement to insomnia. Around 22-30% of college students may have lost a close family member or friend within the past year, and 35 to 48% may have been in bereavement for at two years (Balk, 2001). Hardison, Neimeyer, and Lichstein (2005) found 49% of their sample of college students ($N = 815$) was within 2 years of a significant loss. Bereaved students reported experiencing awakenings from nightmares and met diagnostic criteria for insomnia more frequently than their non-bereaved classmates. Students whose loved one was involved in a violent death were even more prone to report insomnia and complicated grief symptomatology than students whose loved ones died from natural causes. Furthermore, insomnia was associated with students using medication and alcohol to induce sleep, rumination, and dreams about the lost loved one.

Insomnia in Military Populations

Insomnia is the most commonly reported symptom of military service members following deployment (McLay, Klam, & Volkert, 2010). In one of the first studies of sleep difficulties in a veteran population, Mustafa, Erokwu, Ebose, and Strohl (2005) found that 40% of their sample reported insomnia symptoms, which is higher than general population prevalence of approximately 30% (Ohayon & Roth, 2001). In another study of 1887 service members, McLay et al. (2010)'s findings indicated that 41% of troops deployed to Iraq or Afghanistan

reported sleep difficulties, which was significantly higher than those deployed to other locations (25%). Previous studies have indicated that veterans may be reluctant to report mental health symptomatology (Hoge et al., 2004), and reporting sleep difficulties could be perceived as more socially acceptable, thus resulting in higher prevalence of reported insomnia symptoms. Other possible explanations could involve service members having greater self-awareness regarding sleep habits than other psychological symptoms. However, it is possible that sleep difficulties may be a common response to stress, even in the absence of mental health symptoms (Stein, 2007). Despite studies finding insomnia to be one of the most reported symptoms of veterans, Hermes and Rosenheck (2013) found that only 3.4% of patients receiving care from Veterans Health Administration (VHA) services ($N = 5,531,379$) were diagnosed with insomnia. Additionally, Hermes and Rosenheck indicated that the best predictors of insomnia were depression and anxiety symptoms, and whether or not the service member had been deployed.

Around 75% of military personnel describe their sleep quality as significantly worse in a deployed environment (Peterson, Goodie, Satterfield, & Brim, 2008). Due to crowded sleeping conditions, noises and distractions while attempting to sleep, and long shifts resulting in irregular sleep-wake cycles, it may be difficult for troops to maintain adequate sleep hygiene in deployed environments. Bramoweth and Germain (2013) postulate that deployment-related stressors (combat exposure, mild traumatic brain injury, poor sleep hygiene, and adjustment to returning home) could create an environment that might contribute to insomnia. On the other hand, troops already experiencing insomnia prior to deployment may be at greater risk of traumatic stress reactions (PTSD, depression, and suicide). Wallace et al. (2011) discovered that veterans with insomnia reported poor sleep hygiene. For instance, veterans who reported insomnia engaged in excessive caffeine intake, daytime napping, and oversleeping on weekends. Considering these

findings, it is not surprising that studies revealed that around 40% of deployed personnel reported chronic insomnia (Peterson et al., 2008). Furthermore, in a large longitudinal cohort study of military personnel ($N = 41,225$), Seelig et al. (2010) found that troops who had been deployed reported greater sleep difficulties than troops who had not deployed. They also discovered increased combat exposure and/or mental health symptoms was associated with more sleep difficulties.

Mysliwiec et al. (2013) was interested in sleep disorders' comorbidity with other psychological disorders in military personnel. Out of 110 participants, 88.2% met diagnosis for at least one sleep disorder with 63.6% meeting criteria for insomnia. Results revealed that personnel exposed to combat reported greater prevalence of insomnia, and those reporting sleep difficulties were more likely meet criteria for depression (71.4%). These results are consistent with the longitudinal findings of Plumb et al. (2013), who found that veterans who reported sleep difficulties were more likely to indicate greater exposure to combat as well as higher depression, anxiety, and other symptoms. Plumb et al. observed that insomnia was not only associated with depression and other psychological difficulties immediately following combat, but symptoms persisted at 6-month follow-up. These findings suggest insomnia can be found in veterans dealing with a variety of psychological distress, and seems to be consistently observed in military personnel exposed to combat.

Studies have supported a relationship between insomnia and psychological disorders in combat veterans, but it is difficult to determine whether insomnia is a consequence of poor mental health or an antecedent to symptoms. Wright et al. (2011) evaluated insomnia as a predictor versus outcome of depression and other symptomatology in combat veterans. Participants ($N = 659$) were assessed at 4-months and again at 8-months following a yearlong

deployment to Iraq. Insomnia was associated with psychological symptomatology at both collection periods, and initial insomnia severity predicted increases in depression and PTSD at 12-month follow-up. In another study of military personnel ($N = 522$) assessed prior to and after deployment, Wright, Britt, Bliese, and Adler (2010) found that insomnia may moderate the relationship between combat exposure and psychological symptoms, where greater insomnia severity resulted in a stronger relationship between combat and symptom severity.

While studies have looked at insomnia as a consequence, predictor, and moderator of psychological distress following combat deployments, others have explored insomnia as a mediator. Picchioni et al. (2010) hypothesized that insomnia would mediate the relationship between combat stressors and subsequent psychological symptoms in 576 Iraq War veterans. They observed a 65% decrease in the correlation between combat exposure and psychological symptoms when insomnia was entered into their model, indicating partial mediation. Previous studies have observed rumination to be associated with worse psychological symptoms in recently deployed veterans (Nolen-Hoeksema, Wisco, & Lyubomirsky, 2008). Borders, Rothman, and McAndrew (2014) hypothesized insomnia may be a rumination mechanism that perpetuates symptom severity. Consistent with Piccioni et al. (2010), Borders et al. discovered the strength of the relationship between rumination and psychological symptoms decreased when insomnia was included in their model, indicating partial mediation. The results of these studies suggest insomnia may be a catalyst by which the effects of exposure to combat influences and maintains psychological symptoms in veterans.

Insomnia can have severe consequences for veterans. Chakravorty et al. (2014) found an association between insomnia and suicidal ideation in veterans. In a study of 311 military personnel, Ribeiro et al. (2011) found that insomnia predicted suicidal ideation and attempts in

both cross-sectional and longitudinal analyses after controlling for depression, hopelessness, and baseline suicidal ideation. Pigeon, Britton, Ilgen, Chapman, and Conner (2012) reviewed medical records of 423 patients who received VHA services, and after adjusting for mental health symptoms, substance abuse, and age, their results suggested that patients with sleep disturbances committed suicide sooner after their last visit than those without sleep disturbances. These findings suggest suicidality is important to assess in veterans experiencing insomnia and other sleep difficulties.

Student Veteran Adaptation to College

Approximately 31% of military members make at least one visit to an outpatient mental health facility within one year after returning from deployment, and those who have positive screens for psychological issues are significantly more likely to separate from the military during that same time period (Hoge, Auchterlonie, & Milliken, 2006). It is likely many service members separating after deployment are utilizing educational benefits, with the latest estimate of veterans returning to college approaching one-million (Education Program Beneficiaries, 2014). Not surprisingly, veterans face challenges returning to college beyond traditional academic demands.

Most of the early research on veterans transitioning to college focused on school performance and GPA (Osborne et al., 1950; Joanning, 1975) or financial adjustment (Atkinson, 1950). In one of the first studies to examine veteran's social adjustments to college, O'Neill and Fontaine (1973) found that 60% of the 347 Vietnam-era student veterans reported difficulties adjusting to civilian life, and 47% indicated they were likely to experience insomnia, nightmares and/or act impulsively. Other adjustment issues included academic uncertainty regarding their field of study, unawareness of benefits, difficulty making friends and relating to peers, and struggling to adapt to the faster pace of civilian life. These difficulties are similar to those

reported by today's OEF/OIF/OND student veterans. Some common complaints of current student veterans include frustrations while navigating the VA bureaucratic system, absence of campus resources for veterans, lack of understanding regarding the benefits they are eligible to receive, and a sense that they do not fit in with their peers at their university (Ackerman, DiRamio, & Garza Mitchell, 2009; Rumann & Hamrick, 2010). Another difficulty for some student veterans is leaving the strictly structured environment of military life and adapting to a more "loosely configured" campus setting with no direct chain-of-command to turn to for support and guidance (Ackerman et al., 2009). Additionally, while veterans may attempt to acculturate to their new role as students, some could still be suffering from mental and physical wounds of service (Glasser, Powers, & Zywiak, 2009).

Furthermore, faculty attitudes and perceptions toward student veterans can impact this difficult transition (Barnard-Brak, Bagby, Jones, & Sulak, 2011). In an attempt to understand some of the issues facing student veterans, Barnard-Brak et al. (2011) surveyed 596 faculty members about their perceptions of military members who served in the Iraq and Afghanistan wars. They found that the more negatively the faculty members reported they felt about the wars, the more difficult it may be for them to put their personal feelings aside and respect student veterans' service. Conversely, the more the faculty indicated they could lay their personal biases aside, the more self-efficacious the faculty members felt in their ability to meet the needs of student veterans. In other words, the ability of faculty to put aside their personal emotions regarding the war efforts served as a moderator between their prevailing negative attitudes toward war and the confidence in their ability to work with war veterans, specifically those suffering from psychological symptoms. This is an important finding because student veterans

have expressed concern for how their service will be perceived by faculty members and their peers (Ackerman et al., 2009).

While faculty perceptions toward the military may influence their ability to work with veterans, support of peers is another area of concern for transitioning troops. In a study of 199 student veterans and 181 of their civilian student peers, Whiteman et al. (2013) were interested in the development of peer emotional support and its implications for veterans. Though both groups indicated similar increase in emotional support over time, student veterans generally reported less peer emotional support than their civilian counterparts. The findings also revealed that stronger emotional support was related to greater academic success. However, the negative relationship between emotional support and psychological issues was significantly stronger for non-veteran students. In a similar study, 78 combat veterans were compared alongside 53 non-combat veterans, 38 Reserve Officers' Training Corps (ROTC) students, and 79 civilian students (Barry, Whiteman, MacDermid Wadsworth, 2012). The researchers were interested in whether psychological symptoms was related to alcohol use problems, academic performance, academic self-efficacy, academic motivation, and likelihood to remain enrolled in school. Not surprisingly, the combat veterans reported greater number of symptoms than the other groups. Increased symptoms were associated with more drinking problems and consequences, lower GPA, decreased academic motivation, and diminished likelihood to stay enrolled at their university. These findings highlight the importance of awareness of student veterans' unique military-related experiences and their consequences for campus officials and mental health practitioners.

Previous research suggests that military members may be reluctant to seek help for their service related mental health issues (Hoge et al., 2004). In a national survey of student veterans ($N = 628$), Rudd, Goulding, and Bryan (2011) examined psychological symptoms and risk for

suicide. Almost half of the sample (46%) reported significant PTSD symptoms, while 35% and 24% experienced severe anxiety and depression, respectively. They also found that 46% of their sample reported thoughts of suicide, 20% had a plan to take their life, and 7.7% had attempted to commit suicide. Of those who attempted suicide, 82% reported PTSD symptoms. Rudd et al. (2011) noted that their findings were alarming when compared to studies of suicidality in “normal” college populations as well as VA clinical populations (Jakupcak et al., 2010; Pietrzak et al., 2010). Although PTSD appears to be more prevalent in veterans who have been exposed to combat and are subsequently at higher risk for suicide, Grasso et al. (2012) found that college students with trauma histories absent of PTSD had higher levels of perceived social support and used less avoidance coping than students with PTSD and students with no history of trauma. In other words, student veterans who have been exposed to combat but do not experience PTSD symptoms may be more resilient than other students.

Considering that veterans are at greater risk of having mental health concerns due to their military experiences, it is important to consider how these issues impact student veterans’ transition to college. Ingala et al. (2013) examined the role of combat experiences, mental health, and social support in 128 student veterans’ adaptation to college. Student veterans enrolled in 2- and 4-year institutions indicated the amount exposure to combat using the Combat Experiences subscale on the Deployment Risk and Resilience Inventory (DRRI; King, King, & Vogt, 2003) and rated their adjustment to college using the Student Adaptation to College Questionnaire (Baker & Siryk, 1984; 1999). Ingala et al. (2013) found that veterans who reported more psychological symptoms indicated lower SACQ total scores, suggesting greater difficulty adapting to college. However, results revealed that exposure to more combat did not significantly influence college adjustment. Ingala et al. (2013) also observed that veterans who reported

higher levels of unit support while deployed and social support after deployments indicated better adaptation to college. Although this study is one of the few to investigate how student veterans' psychological symptoms and military experiences directly influence their adaptation to college, little is known regarding how they compare to non-veteran students.

APPENDIX B.
Additional Results

To further explore the moderation finding without dichotomizing the ISI, we conducted a multiple hierarchical regression to see if combat status moderates the relationship between insomnia and academic adjustment. Before conducting analyses, the categorical Combat Status variable was dummy coded, the ISI was centered to minimize multicollinearity, and interaction terms between combat status and ISI were computed. Relative to civilian students' Academic Adjustment, the main effects of being a combat veteran and non-combat veteran were significant, supporting the MANOVA results that veterans report better Academic Adjustment than civilian students. Additionally, higher levels of insomnia significantly predicted worse Academic Adjustment. Including the interaction terms resulted in a significant R^2 change, $F(2, 582) = 3.99, p = 0.02$, adjusted $R^2 = .11$. The interaction effect for combat veterans and insomnia relative to civilians' Academic Adjustment was significant, demonstrating that the effect of insomnia on Academic Adjustment was worse for combat veterans than civilian students. The interaction effect for non-combat veterans and insomnia relative to civilians' Academic Adjustment was not significant.

As expected, the follow-up regression revealed slightly different results by keeping ISI as a continuous variable and not using cut-offs to designate insomnia groups. Consistent with the MANOVA results, combat and non-combat veterans reported higher academic adjustment scores than civilian students. Including insomnia in the model revealed a significant interaction effect for combat veterans and insomnia relative to civilian students' academic adjustment, indicating the influence of insomnia on academic adjustment was worse for combat veterans than civilian students. As previously mentioned, this could be due to the nature of the combat veterans' insomnia as a result of traumatic experiences of war, nightmares, and rumination (Inman et al., 1990).

Table 2
Demographics of Veteran and Non-Veteran Subsamples

	Student Veterans (<i>n</i> = 142)		Non-Veteran Students (<i>n</i> = 441)		
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>F</i>
Age (in years)	31.63 ^a	7.37	20.92 ^b	3.87	496.77***
Months enrolled in college	16.79	16.50	20.24	14.34	6.09*
<hr/>					
	<i>n</i>	%	<i>n</i>	%	χ^2
Sex					109.71***
Male	114	76.0	119	27.4	
Female	36	23.4	315	72.6	
No Response	4	2.6	0	0.0	
Race/Ethnicity					20.53***
White	110	71.4	240	55.3	
Hispanic/Latino/Mexican American	13	8.4	77	17.7	
African-American	9	5.8	53	12.2	
Asian/Pacific Islander	6	3.9	38	8.8	
Bi- or Multi-Racial/ Other	13	8.2	26	6.0	
No Response	3	1.9	0	0.0	
Education					74.72***
High School Degree	4	2.6	60	13.8	
Some College	81	52.6	302	69.6	
Technical/2-Year-Degree	32	20.8	48	11.1	
Bachelor's Degree	24	15.6	22	5.1	
Graduate Degree	13	8.4	1	0.2	
No Response	0	0.0	1	0.2	
Relationship Status					220.06***
Single (never married)	43	27.9	270	62.2	
Single/Divorced	15	9.7	5	1.2	
Committed Relationship (6+ months)	15	9.7	117	27.0	
Cohabiting	7	4.5	22	5.1	
Married	72	46.8	13	3.0	
No Response	0	0.0	6	1.4	

^aRange 20.0 – 53.0 years

^bRange 18.0 – 62.0 years

****p* < .001

Table 3

Correlations, Means, and Standard Deviations for Full Sample (N = 588)

Variables	1	2	3	4	5
1. Insomnia	1				
2. Academic Adjustment	-.27***	1			
3. Social Adjustment	-.22***	.51***	1		
4. Personal-Emotional Adjustment	-.50***	.64***	.45***	1	
5. Goal Commitment/ Institutional Attachment	-.19***	.67***	.80***	.51***	1
M	9.65	140.91	108.34	80.47	92.96
SD	6.04	28.69	26.75	23.28	19.40

*** $p < .001$

Table 4

Correlations, Means, and Standard Deviations for Combat Veterans (N = 93)

Variables	1	2	3	4	5	6
1. Insomnia	1					
2. Combat Experiences	.21*	1				
3. Academic Adjustment	-.45***	-.02	1			
4. Social Adjustment	-.40***	-.15	.69***	1		
5. Personal-Emotional Adjustment	-.62***	-.22*	.68***	.74***	1	
6. Goal Commitment/ Institutional Attachment	-.33**	-.12	.74***	.88***	.69***	1
M	14.22	6.19	151.47	101.13	86.51	94.20
SD	6.36	4.71	31.29	29.41	26.04	19.52

* $p < .05$, ** $p < .01$, *** $p < .001$

Table 5

Regression for Insomnia Moderating Veteran Status and Academic Adaptation

Step/Predictors	df	Adj R ²	F	β
1. Insomnia	3, 584	.10	23.34***	-.27***
Combat Vets				.18***
Non-Combat Vets				.10*
2. Combat X Insomnia	2, 582	.11	3.99*	-.09*
Non-Combat X Insomnia				.07

* $p < .05$, ** $p < .01$, *** $p < .001$

APPENDIX C.

Extended References

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