

Association Between Burnout and Insomnia in U.S. Air Force Pararescue Personnel:

A Cross-Sectional Study

by

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## ABSTRACT

Recently, a growing number of studies have examined burnout and its impact on health. In particular, burnout has been shown to have an influence on sleep, which has clinical and organizational implications. Surprisingly, no published studies have examined the relationship between burnout and insomnia in a military sample. The United States Air Force (USAF) Pararescue personnel are an elite combat force who are specially trained to conduct both first-line combat and full spectrum personnel recovery. Thus, these individuals are at high risk of exposure to psychological stressors and trauma, as well as burnout and insomnia. We examined the association between burnout and insomnia in this population, as well as moderators of this association. A cross-sectional survey was administered to 203 Pararescue personnel (Mean Age=32.1 years; 100% Male; 90.1% Caucasian) recruited from six bases in the US. The survey included demographics questions, the Maslach Burnout Inventory (MBI), Insomnia Severity Index (ISI), Acceptance and Action Questionnaire – II (AAQ-II), and Deployment Risk and Resilience Inventory – Support (DRRI-S). The findings included the Emotional Exhaustion scale of the MBI was significantly associated with ISI with a moderate to large effect size even after controlling for rank and number of deployments. The Depersonalization scale of the MBI was also significantly associated with ISI, with some evidence that the association was moderated by AAQ-II scores such that the association between MBI Depersonalization scores and ISI became stronger in individuals with higher AAQ-II score (individuals who are more inflexible). In an incidental finding, enlisted members who were higher in rank reported higher burnout scores than lower-ranked enlisted members, whereas higher ranking officers had lower burnout scores than lower-ranked officers. These findings support continued efforts towards finding ways to weaken the deleterious influence of burnout and insomnia on selected service members.

## TABLE OF CONTENTS

LIST OF TABLES .....	7
LIST OF FIGURES .....	8
CHAPTER 1: INTRODUCTION .....	9
CHAPTER 2: SPECIFIC AIMS .....	19
STUDY RATIONALE .....	19
STUDY AIMS .....	19
CHAPTER 3: METHODS .....	21
Participants.....	21
Procedure .....	22
Measure.....	22
DATA ANALYSIS.....	26
CHAPTER 4: RESULTS .....	29
Specific Aim 1: .....	29
Specific Aim 2 .....	30
Specific Aim 3 .....	30
CHAPTER 5: DISCUSSION.....	33
STRENGTHS .....	38
LIMITATIONS.....	39
FUTURE DIRECTIONS .....	40
REFERENCES .....	49

## LIST OF TABLES

Table 1.	Demographics. ....	43
Table 2.	Zero-order Correlations and Distribution .....	44
Table 3.	Association Between Burnout and Insomnia .....	45
Table 4.	Association Moderated by Psychological Flexibility .....	46
Table 5.	Association Moderated by Social Support .....	47

## LIST OF FIGURES

Figure 1.	Conceptual Model.....	48
Figure 2.	Association between Rank and Emotional Exhaustion .....	49

## CHAPTER 1: INTRODUCTION

The 11<sup>th</sup> edition of the International Classification of Diseases (ICD-11) describes burnout as “a syndrome conceptualized as resulting from chronic workplace stress that has not been successfully managed” (WHO, 2019). Initially, burnout was studied in relation to client-centered professions. However, the focus of burnout research has, since, expanded into a wide variety of occupations (Metlaine et al., 2018). Although many definitions of burnout exist, emotional exhaustion, depersonalization, and personal achievement, are commonly used to describe dimensions of burnout (Maslach & Jackson, 1981). Emotional exhaustion refers to a person’s inability to give themselves to their job or others, due to a depletion of emotional energy. Depersonalization is characterized as feeling callous towards one’s work and others. Lastly, personal accomplishment refers to experiences of dissatisfaction in one’s job and one’s job performance. These dimensions originate from the Maslach Burnout Inventory (MBI), a prominent measure for burnout, which has been the most used in burnout research to date.

Conceptualization of burnout varies somewhat across burnout measurement scales. Another common burnout measure is the Shirom-Melamed Burnout Measure (SMBM). SMBM focuses burnout as experienced via energetic exhaustion in physical, emotional, and cognitive domains (Shirom and Melamed, 2006). While the MBI identifies its three different dimensions of burnout into separate, uncombined scales, the SMBM conceptualizes all three of the domains into a single burnout scale. Other burnout scales include the Copenhagen Burnout Inventory, Oldenburg Burnout Inventory, and the Pine Burnout Measure. The development of various burnout scales has, on one hand, contributed to more precise research into burnout, such as better understanding its difference to other overlapping conditions such as depression and job strain (Salvagioni et al., 2017; Metlaine et al., 2017; Armon, 2009). However, on the other hand, the

creation of various research scales with differing conceptualizations has also contributed to an imprecise overall framework of burnout and creates difficulties comparing across different studies.

### **Burnout and the Military**

The term “burnout” was originally coined in the 1970s and was used to describe exhaustion in civilian workers; however, burnout has been studied in the military context, with its first research dating back to World War II, though using different terms. In 1947, Major Raymond Sobel noted a syndrome called the “Old Sergeant Syndrome” (Sobel, 1947), which shared various overlapping features with burnout. Upon interviewing fifty World War II soldiers, Major Raymond Sobel, a then U.S. Army psychiatrist, and his colleagues, noticed that these soldiers displayed symptoms of feeling emotionally exhausted and experiencing a lessened level of personal accomplishment. In addition, these men reported wanting to transfer to jobs that would consist of less human interactions, such as truck driving. These desires are similar to the depersonalization dimension of burnout. In health care providers with burnout, individuals may show a more callous attitude towards their patients due to their repeated exposure and experience to patient deaths or poor recovery from a serious injury or illness despite great efforts (Melvin, 2015). The “old sergeants” of Sobel’s 1947 work may have also developed a similar coping mechanism to the death and trauma that they observed.

While the term “burnout” had not been classified at the time, the men Sobel interviewed described their symptoms as feeling: “burned out”, “worn out”, “beat up”, and “just had too much of it” (Sobel, 1947). These descriptions, along with the patterns of behaviors Sobel described, display many parallel to the modern concept of burnout. The findings of the “Old Sergeant Syndrome” by Sobel are limited to his two publications (available online). However,

current research on burnout in the military continues the spirit of this research. For instance, leadership qualities, individual characteristics, cohesion, lack of job control, and stressful interpersonal duties overlap with Sobel's conceptualizations (Wilcox, 1994). However, other factors that have been shown to be associated with burnout such as job overload, role ambiguity, role conflict, lack of job control, and lack of positive feedback speak to a new or differently nuanced understanding of factors contributing to burnout in the military (Wilcox, 1994).

Today, members in the military who play a similar role to Sobel's "old sergeants" may be senior enlisted individuals. Senior enlisted individuals are often seen as the experts in their trade and tasked with training incoming and junior enlisted and officers. However, this statement cannot be generalized without further research, as senior enlisted members (E7-E9) may find themselves in various roles, depending on their profession that they are in. Therefore, it is important to understand who, in which specific leadership role may be at a greater risk for burnout. Although research on burnout in military personnel is available, there is much to learn about this phenomenon (Etzion and Vestman, 1992; Wilcox, 2000; Adler et al., 2017; Keyser et al., 2021).

### **Burnout in the USAF Pararescue Community**

The U.S. Air Force (USAF) Pararescue force has been the focus of little mental health research, to include burnout, despite their crucial role and high operations tempo and repeated exposure to trauma. Understanding burnout and their health outcomes in this population may have a particular relevance to conserving this community's unique capabilities. The USAF Pararescue professionals are the "only Department of Defense (DoD) elite combat forces specifically organized, trained, equipped, and postured to conduct full spectrum Personnel Recovery (PR) to include both conventional and unconventional combat rescue operations"

(United States Air Force, 2010). This population performs a uniquely high-stress function within the military with frequent combat deployment assignments and emergency paramedical care (United States Air Force, 2010). Pararescue personnel are experts qualified to engage in direct combat and conduct first-line emergency recovery medical procedures. These procedures are designed to save or prolong lives in a combat environment until the patient is transported to a higher level of medical care. Due to this reason, they are also uniquely exposed to environment that increases their vulnerability to both combat and medical trauma.

To date, only one study has examined burnout in USAF Pararescue personnel. Smith et al. (2015) found the overall mean scores of burnout in this sample were comparable to the levels found in nonmilitary surgeons and family physicians, with Pararescue personnel experiencing a relatively higher Depersonalization than nonmilitary surgeons and lower Emotional Exhaustion than family physicians (Smith et al., 2015; Sharma et al., 2008; Lee et al., 2008). These findings suggest that Pararescue men experience a similar level of overall burnout to health care providers, who have been at the center of burnout research for many decades.

The comparable levels of burnout experienced by Pararescue personnel raises the question of whether overall findings of burnout research in health care providers may be generalizable to this population. To this end, it is important to understand the overlapping and nonoverlapping aspects of these two professions. Some overlapping factors are first, Pararescue personnel conduct some form of medical care, often through a first-line emergency recovery procedure in combat and humanitarian missions (United States Air Force, 2010). Second, they experience a comparable level of interpersonal interaction as health care providers, although these interactions may look different. Given the nature of the team-oriented training the Pararescue personnel undergo, they often must interface with many different individuals.

Despite these similarities to health care providers, Pararescue personnel's roles are unique and different in that they are a specialized military unit and trained to function in both medical and combat capacities. Their experience of working on the front lines on deployments are different from that of health care providers, who are often placed in supporting roles. Therefore, Pararescue personnel's unique experiences may include aspects of burnout found in both health care providers and in the "old sergeants" who Sobel interviewed. These factors include repeated exposure and experience to deaths or poor recovery from a serious injury or illness despite great efforts that health care providers may experience, and job overload that senior enlisted members, who most accurately resemble the "old sergeants" than any other groups, may experience (Melvin, 2015; Wilcox, 2000).

### **Burnout and Insomnia**

A review article showed that burnout is associated with various health outcomes including sleep disorders, muscular or musculoskeletal pain, headaches or migraines, constant fatigue, gastrointestinal disorders, cardiovascular disorders, immunodeficiency with colds or constant gripes, disorders relating to skin, respiratory system disorders, sexual dysfunctions, and substance abuse (Constantino et al., 2014, p. 90). Biologically, Bayes et al (2021) found that burnout is associated with sustained activation of autonomic nervous system, dysfunction of the sympathetic adrenal medullary axis.

While many studies examined the relationship between burnout and health through cross-sectional research, some studies have suggested a causal relationship through epidemiological longitudinal methods. For example, burnout has been shown to predict decline of nurses' physical functioning after a 1-year follow-up, when their health was measured by the health-related quality of life (HRQOL) (Zhang et al., 2018). Additionally, Kim et al. (2011) found that

in a one-year follow-up, social workers with initial high levels of burnout experienced greater frequencies in headaches, gastrointestinal problems, and respiratory infections. Both of these studies utilized different measures for both health and burnout, which shows the heterogeneous nature of burnout research. While more studies show a significant relationship between burnout and health, this article will examine the relationship between burnout and insomnia.

Many studies show a significant relationship between burnout and sleep disturbances, namely insomnia (Armon et al., 2008; Armon, 2009; Gerber et al., 2018; Kousloglous et al., 2014; Metlaine et al., 2017; Metlaine et al., 2018; Toker et al., 2014; Wang et al., 2019; Wolkow et al., 2019; Vela-Bueno et al., 2008). Research investigating the directionality of the association between burnout and insomnia has been mixed. Armon et al. (2008) conducted a study which included an 18-month follow-up with time 1 burnout predicting an increase in time 2 insomnia. After controlling for confounders such as gender, Body Mass Index (BMI), depressive symptomatology, trait anxiety, and follow-up duration in months, they found a 1-unit increase (roughly 1.20 *SD*) in burnout at time 1 increases the odds of a new case of insomnia at follow-up by 93%. Armon (2009; same first author) longitudinally investigated whether the job demand control-support (JDC-S) model found an additive effect on burnout, and if its effect would have any subsequent impact on insomnia. The JDC-S model is a model that consists of constructs such as Job Control, Job Demands, Social Support, and Perceived Occupational Health (Karasek, 1979; Häusser, 2010). The model predicts that job control, job demands, and social support impact individuals' perceived health at their work environment. The analysis revealed a significant additive effect of the JDC-S variables in predicting insomnia, but burnout significantly predicted insomnia independent of the model. The authors of this study concluded that level of burnout predicts insomnia in workers across various job strains, and this relationship

is not just limited to individuals who experience a high job strain. Many other cross-sectional and longitudinal studies showed a significant association between burnout and insomnia (Kang, 2021).

Contrary to these findings, Jansson-Fröjmark and Lindblom (2010) reported a non-significant prospective association between burnout and new cases of insomnia. At 1-year follow-up, burnout assessed by the MBI did not predict new cases of insomnia. Similarly, insomnia did not predict new cases of burnout. Among participants experiencing emotional exhaustion at baseline, the study did report a marked association between insomnia and maintenance of emotional exhaustion, with insomnia increasing the odds of maintenance of emotional exhaustion about three times. This longitudinal association in the direction from insomnia to emotional exhaustion is consistent with previous research finding an association with the MBI Emotional Exhaustion subscale and insomnia (Wolkow et al., 2019; Metlaine et al., 2017; Kousloglou et al., 2014).

### **CATS and COR Theories**

A number of theories have been applied to try to explain the relationship between burnout and insomnia. Many individuals with burnout have a difficult time downregulating their psychophysiological arousal levels (Toker & Melamed, 2017). Given this idea, Metlaine et al., 2018 proposed that a hyper-aroused physiological state and impaired Sympathomedullary Pathway (SAM) and Hypothalamic Pituitary-Adrenal (HPA) may have the potential to induce insomnia similar to how individuals with chronic stress have a difficult time downregulating their psychophysiological arousal level (Toker & Melamed, 2017). The Cognitive Action Theory of Stress (CATS) framework has also been used to explain this psycho-physiological interaction (Ursin and Eriksen, 2004). CATS supports the idea that individuals with burnout will have a

harder time falling asleep due to physiological arousal levels caused by psychological stress (Vela-Bueno et al., 2008). In support of this theory's framework, Söderström et al. (2004) showed that working individuals with high levels of burnout were less likely to experience reduced sleepiness during their days off, even when they were given ample opportunity to sleep. These findings suggested that individuals who endorse a high level of burnout experience a lower quality of sleep because of their prolonged physiological arousal (Söderström et al. 2004).

In the opposite direction, studies have examined the association between insomnia and burnout through the lens of Conservation of Resources (COR) theory. COR theory postulates that evolutionarily, individuals strive to procure, retain, foster, and protect resources they value (Hobfoll et al., 2018). It suggests that an individual with disturbed sleep is more likely to experience burnout symptoms as the lack of sleep will result in poor mental and physical replenishment. Therefore, when an individual is faced with a stressful situation, they are more likely to have depleted mental and physical resources to adequately handle the situation (Armon et al., 2008). Conversely, an individual, who can sleep and replenish their body and mind, is more likely to have an intact mental and physical resources to overcome a stressful situation without leading to burnout symptoms. Therefore, COR suggests that energetic resources can have cross-domain effects. In addition to understanding this association, COR's framework helps to identify moderator variables thought to influence this relationship. Understanding significant moderator variables can help to identify individuals at a greatest risk for this association to occur, and highlight potential targets for interventions.

### **Moderator Variables**

Determining moderator variables of the association between burnout and insomnia can help to identify subgroups of individuals for which the association between burnout and

insomnia is particularly strong. Psychological flexibility is defined as “being able to contact the moment as a conscious human being, more fully as it is, not as what it says it is, and based on what the situation affords, persisting or changing in behavior in the service of chosen values” (Hayes et al., 2013). Psychological flexibility allows individuals to face difficult problems more effectively and adapt to different situations, which reduces rumination and worry (Ong et al., 2012). Psychological flexibility may also help individuals generate and consider more options to resolve an issue, whereas low psychological flexibility generally inhibits this.

Recall that the general hypothesis is that individuals with lower levels of burnout are less at risk for insomnia. Therefore, when compared to individuals with lower levels of burnout, individuals with higher levels of burnout and lower psychological flexibility may find that their problem-solving skills have failed, and may be at higher risk of excessive worries and rumination, which may lead to insomnia. In contrast, individuals with higher levels of burnout and higher levels of psychological flexibility may be better able to resolve an issue, and be at lower risk of excessive worries and rumination, and insomnia. Therefore, as levels of psychological flexibility decrease (or, equivalently, as levels of psychological inflexibility increase), the association between burnout and insomnia should become stronger. Individuals with high levels of burnout and low levels of psychological flexibility (equivalently, high levels of psychological inflexibility) would be expected to report the highest levels of insomnia.

Another possible moderator variable for the association between burnout and insomnia is social support. Social support provides an avenue for individuals to share their struggles with others, allowing them to better cope with their emotions (Hobfoll et al., 1990). Individuals with social support may also have more opportunities to experience positive emotions through their social interactions (Hobfoll et al., 1990). Therefore, compared to individuals with lower levels of

burnout, when individuals with higher levels of burnout and lower social support are unable to share their experiences and/or experience positive emotions through social support, they may be at higher risk of negative emotions, worries, and rumination which may lead to insomnia (Baglioni et al., 2010). In contrast, individuals with higher levels of burnout and higher levels of social support may be better able to cope with events and experience positive emotions, and therefore at lower risk of negative emotions, worries, rumination, and insomnia as they were able to use social support in diffusing the tension of stress. Therefore, the association between burnout and insomnia should be stronger in individuals with lower levels of social support.

## CHAPTER 2: SPECIFIC AIMS

### STUDY RATIONALE

Burnout has been commonly found in individuals in healthcare professions (Reith, 2018). In the past decade, more studies have been conducted to understand burnout as it relates to military healthcare providers. USAF Pararescue personnel are uniquely trained to conduct full spectrum personnel recovery, to include providing first-line emergency medical care and being exposed to first-hand combat and represent a group of military emergency medical providers with several other high level of additional stressors, who may be at higher risk for burnout. Understanding burnout in the USAF Pararescue personnel may lead to a better understanding of burnout in this unique community, and other similar communities such as special operations or medical units and may better inform treatment modalities for different individuals.

A cross-sectional study (Smith et al., 2015) examined the level of burnout in Pararescue personnel as assessed by the Maslach Burnout Inventory (MBI), which included three subscales: Emotional Exhaustion, Depersonalization, and Personal Accomplishment (Maslach and Jackson, 2007). The current study, using the same dataset, proposes to extend this research by 1) examining the associations between burnout and insomnia, to include each of the subscales of MBI, and 2) examining moderators of the relationship between burnout and insomnia. The conceptual model for this study is shown in Figure 1.

**Specific Aim 1:** To examine whether burnout, assessed by MBI, is cross-sectionally associated with insomnia symptoms, as assessed by the Insomnia Severity Index (ISI; Morin, Belleville, Belanger & Ivers, 2011).

Hypothesis 1.1: Increased emotional exhaustion will be related to increased insomnia symptoms.

Hypothesis 1.2: Increased depersonalization will be related to increased insomnia symptoms.

Hypothesis 1.3: Decreased personal accomplishment will be related to increased insomnia symptoms.

**Specific Aim 2:** To examine whether the relationship between burnout (MBI) and insomnia (ISI) is moderated by psychological flexibility, as assessed by the Acceptance and Action Questionnaire II (AAQ-II; Bond et al., 2011). Note that higher scores on the AAQ-II indicate lower psychological flexibility, or, equivalently, higher psychological inflexibility.

Hypothesis 2.1: There will be a stronger relationship between emotional exhaustion and insomnia for those who score higher (vs. lower) on AAQ-II scores.

Hypothesis 2.2: There will be a stronger relationship between depersonalization and insomnia for those who score higher (vs. lower) on AAQ-II scores.

Hypothesis 2.3: There will be a stronger relationship between (the lack of) personal accomplishment and insomnia for those who score higher (vs. lower) on AAQ-II scores.

**Specific Aim 3:** To determine whether the relationship between burnout (MBI) and insomnia (ISI) is moderated by social support, as assessed by the Post-Deployment Social Support Scale (PSSS) of the Deployment Risk and Resiliency Inventory (DRRI)-Support (King, King, Vogt, Knight, & Samper, 2006). Note that higher scores on the PSSS indicate higher levels of social support.

Hypothesis 3.1: There will be a stronger relationship between emotional exhaustion and insomnia for those who score lower (vs higher) on the PSSS.

Hypothesis 3.2: There will be a stronger relationship between depersonalization and insomnia for those who score lower (vs higher) on the PSSS.

Hypothesis 3.3: There will be a stronger relationship between (the lack of) personal accomplishment and insomnia for those who score lower (vs higher) on on the PSSS

## CHAPTER 3: METHODS

This study is a secondary data analysis of a previously collected cross-sectional survey data on various psychological distress of Air Force Pararescue personnel. The parent study, conducted by Smith et al. (2015), examined factors associated with burnout in comparing active-duty personnel group and national guard and reserve group of Pararescue personnel. Approval for the parent study was obtained from the Institutional Review Board at Wilford Hall Ambulatory Surgical Center at Lackland Air Force Base, Texas, under a Department of the Air Force grant (#FA8650-12-2-6277). Approval for the current study was obtained from the Institutional Review Board at the Uniformed Services University (R0721122620).

### Participants

Participants were 203 Pararescue personnel who completed the survey and who provided data on the dependent variable (ISI). The surveys were completed by Pararescue personnel between 2013 and 2014. Not all individuals provided demographic information, therefore, sample sizes for demographic information ranged from 155-182 participants, depending on the variable of interest (Table 1).

At the time the data were collected, there were no female Pararescue personnel as these positions were not legally open to females in 2015. The sample consisted of 100% male participants, and their age ranged from 23 to 50 ( $M=32.06$ ,  $SD= 5.86$ ). Racial distribution of the participants was 163 (90.1%) Caucasian, 4 (1.9%) African American, 3 (1.7%) American Indian/Alaskan Native, 4 (1.9%) Asian American, 3 (1.7%) Native Hawaiian or Other Pacific Islander, and 5 (2.4%) other, with 11 (6%) identifying as Hispanic ethnicity. All participants completed a high school diploma, or a higher degree (associates, undergraduate, and graduate). Participants' years of service in the military ranged from 1 to 26 years ( $M=8.90$ ,  $SD=5.95$ ). Rank

distribution included 140 (76.2%) enlisted members and 42 (23.1%) officers. Military status included 133 (73.9%) active duty and 47 (26.1%) national guard or reserves personnel. The number of deployments ranged from 0 times (no previous deployments) to 7 times ( $M=2.82$ ,  $SD=1.70$ ).

## **Procedure**

Data were collected from Pararescue participants stationed at six different military bases around the US. All data were collected within the two months period before or after a squadron deployment. All participants received informed consent procedures at scheduled visits and agreed to voluntarily answer survey packet of questions. No leadership was present during these procedures to minimize any possibility of coercion or unintended effects in respect to participation. Once completed, participants returned the survey packet to the researchers, who secured them in a safe location. Once all survey packets were received, data were securely transferred to the University of Utah, where they were manually entered into a database by trained research assistants. The dataset were then securely transferred to the Uniformed Services University of the Health Sciences for a secondary analyses.

## **Measures**

### *Burnout*

The Maslach Burnout Inventory (MBI) is one of the most commonly used validated measure for assessing burnout (Maslach & Jackson, 1981). This 22-item self-report questionnaire survey measures three aspects of burnout through its subscales: Emotional Exhaustion, Depersonalization, and Personal Accomplishment. Each subscale is scored by calculating a sum of the items within each subscale. Emotional Exhaustion, which consists of nine items, is defined as a feeling of emotional extension, resulting in reduced work engagement

and ability to emotionally give themselves to others (Maslach, Jackson, and Leiter, 1986). Higher scores on Emotional Exhaustion indicate higher levels of Emotional Exhaustion. Depersonalization, which consists of five items, describes the negative, cynical, and callous attitude an individual may feel towards their work and others. Higher scores on Depersonalization indicate higher levels of Depersonalization. Lastly, Personal Accomplishment, which consists of eight items, assesses the tendency to evaluate job performance positively, to include feelings of competence and successfulness in their work. Higher scores on Personal Accomplishment indicate higher levels of Personal Accomplishment.

Note that for emotional exhaustion and depersonalization, higher scores correspond to higher levels of burnout. The opposite is true for personal accomplishment, where a lower score corresponds to higher levels of burnout. The possible range of scores in each subscale are: 9-63 for Emotional Exhaustion, 5-35 for Depersonalization, and 8-56 for Personal Accomplishment.

In previous research, this measure has demonstrated adequate internal consistency, with internal consistency of the emotional exhaustion subscale being reported as  $\alpha = .89$ , personal accomplishment subscale as  $\alpha = .82$ , and depersonalization subscale as  $\alpha = .74$  (Maslach and Jackson, 1981). Convergent and discriminant validity have also been demonstrated (Maslach and Jackson, 1981). Convergent validity was demonstrated by correlations between an individual's MBI scores, and behavioral ratings made by others who knew the individual well (e.g., spouse or coworker), by correlations with the presence of certain job characteristics expected to contribute to burnout, and by correlations with measures of various outcomes hypothesized to be related to burnout (Maslach and Jackson, 1981). Furthermore, discriminant validity was also demonstrated by distinguishing MBI from other measures such as the Job-Demand Stress model and Crowne-Marlowe Social Desirability Scale.

In the current study, the Cronbach's alpha for Emotional Exhaustion, Depersonalization, and Personal Accomplishment were .90, .77, and .84, respectively.

### *Insomnia*

The Insomnia Severity Index (ISI) is a validated measure that captures the diagnostic criteria for insomnia outlined in the Diagnostic and Statistical Manual of Mental Disorders (DSM-V) (Bastien, Vallieres, and Morin, 2001). This brief 7-item scale measures subjective reporting of sleep onset latency (SOL), wake after sleep onset (WASO), and early morning awakening (EMA), as well as subjective distress due to these sleep problems, sleep dissatisfaction, interference of sleep difficulties with daytime functioning, and noticeability of sleep problems by others (Morin et al. 2011). The participants were asked to recall their symptoms in the "last week" using a 5-point Likert scale.

The total ISI score is calculated by adding all items together, yielding a range of 0 to 28. The interpretation of the total score is as follows: 0-7 points represent absence of insomnia; 8-14 represent sub-threshold insomnia, 15-21 represent moderate insomnia, and 22-28 represent severe insomnia (Morin et al., 2011). The scale has been shown to have high internal consistency from two independent community (alpha = 0.90) and clinical samples (alpha = 0.91). Correlations between individual items and total ISI scores ranged from 0.55 to 0.81 (mean  $r = 0.71$ ) for the community sample and from 0.55 to 0.85 (mean  $r = 0.73$ ) for the clinical sample, which showed that all items significantly contributed to the total score (Morin et al., 2011). Convergent validity was demonstrated by correlations between the total ISI scores with subjective sleep estimates and Pittsburg Sleep Quality Index (PSQI) total scores. The ISI has also demonstrated adequate concurrent validity (Bastien et al., 2001).

In the current study, the Cronbach's alpha for the total ISI score was .90.

### *Psychological Flexibility*

The Acceptance and Action Questionnaire-II is a widely used measure of psychological flexibility or psychological inflexibility, which is commonly also referred to as experiential avoidance (Bond et al., 2011). Higher scores on the AAQ-II reflect higher levels of psychological inflexibility (or, equivalently, lower levels of psychological flexibility). This 7-item self-report questionnaire has demonstrated satisfactory reliability with a mean alpha coefficient of .84 (.78-.88), and 3- and 12-month test-retest reliability of .81 and .79 (Bond et al., 2011). The preliminary psychometric analysis of the measure was shown to have appropriate discriminant, factorial, and construct validity. However, a different study (Tyndall et al., 2019) has questioned the discriminant validity of the measure as the researchers found the measure to be significantly correlated with measures of neuroticism and negative affect (.59-.71). This suggests the AAQ-II may contain an excess inclusion of neuroticism and negative affect concepts within the measure. In addition, the authors of this study noted a low convergent validity between the AAQ-II and the Multidimensional Experiential Avoidance Questionnaire (MEAQ), which is another scale that measures psychological flexibility. Other studies have questioned the face, construct, and discriminant validity of this measure (Wolgast, 2014; Tyndall et al., 2019). More research is needed to better understand the validity of AAQ-II, and interpretation of data in the current study was conducted with caution.

In the current study, the Cronbach's alpha for the total AAQ-II score was .84.

### *Social Support*

The Deployment Risk and Resilience Inventory (DRRI) is a compilation of fourteen comprehensive scales that assess pre-deployment, deployment, and post-deployment factors in service members (King et al., 2006). One of the post-deployment scales is the Post-Deployment

Social Support Scale (PSSS), which was utilized to measure social support. Initial psychometrics of the inventory consisting of Gulf War veterans showed adequate internal reliability across all scales. Specifically, the Post-Deployment Social Support demonstrated an internal reliability of  $\alpha = .84$  in a study using telephone survey, and  $\alpha = .87$  in a study using a mail survey. A later psychometric study using samples of Operations Iraqi Freedom (OIF) veterans was consistent with these results, showing an alpha of .88 (Vogt et al., 2008). The inventory demonstrated modest to moderate validity in both Gulf War and OIF veterans' samples. Study observing the former sample showed criterion validity of  $r = -.41$ ,  $-.47$ , and  $-.39$ , when comparing the scale to measures of PTSD, depression, and anxiety (King et al., 2006). Using the sample of OIF veterans, validity was more modest, but consistent with Gulf War veterans' sample, showing an adequate criterion validity of  $-.32$ , and  $-.40$ , when compared to measures of PTSD and depression (Vogt et al., 2008). The PSSS positively correlated with measures of physical, mental, and cognitive functioning. There was no significant difference in results between men and women, or combat-arms/combat-support and service-support groups, demonstrating Cohen's *ds* of .03 and .01, respectfully (King et al., 2006).

In the current study, the Cronbach's alpha for the PSSS score was .84.

## **DATA ANALYSIS**

Primary analyses were conducted using SPSS Version 27. Participants are nested within squadrons (6 locations in the United States), suggesting that a multilevel analysis could be appropriate. However, there was no evidence for differences in ISI scores by squadrons (intraclass correlation coefficient was close to zero) in the current sample, and so a single-level analysis was performed, using multiple linear regression.

For all analyses, Rank (a categorical variable with 5 levels; E1-E4; E5-E6; E7-E9; O1-O3; O4-O9) was coded as 4 dummy variables (reference category E7-E9). A multiple linear regression tested Specific Aim 1, the association between each MBI subscale and insomnia, controlling for covariates which included rank and number of deployments. For Specific Aim 2 and 3, for each moderator variable (Moderator) (psychological flexibility assessed by AAQ-II and social support assessed by PSSS), a variable was created corresponding to the Moderator x Predictor interaction, where the Predictor variable was one of the MBI subscales. A multiple linear regression tested the association between each interaction term and ISI scores (controlling for covariates).

Rank and number of deployments were selected as covariates based on bivariate correlations between each covariate and the predictor variables (e.g., subscales of the MBI), the dependent variable (ISI score), and past research using this dataset (e.g., Smith et al., 2015). Specifically, Rank and number of deployments were significantly associated with both the ISI score and at least one MBI scale. In the current study, no significant differences in the dependent variable (ISI score) were observed between pre-deployment and post-deployment groups, therefore, the timing of assessment as related to deployment was not examined further. Beta coefficients and squared semipartial correlations were used for effect sizes.

### **Power**

Power was estimated a priori using G\*Power 3.1 (Faul, Erdfelder, Lang, & Buchner, 2007), and 2-tailed tests ( $\alpha = .05$ ), and using an a priori estimate of the sample size for each analysis (rather than the actual sample size). For Specific Aim 1, for each subscale of the MBI, the true effect size of the population for the association between Burnout and Insomnia would need to be (partial)  $r = .20$  (corresponding to a partial  $R^2$  of .040, a small to moderate effect size)

to achieve power = .79 to reject the null hypothesis, assuming  $N=194$  (and controlling for 5 covariates, which corresponds to 1 covariate for number of deployments, and 4 covariates for coding of Rank). For Specific Aims 2 and 3, the true effect size for the Burnout x Moderator interaction in the population would need to be Cohen's  $f^2 = .04$  (corresponding to a partial  $R^2$  of .039, a small to moderate effect size) to achieve power = .79 to reject the null hypothesis, assuming  $N=194$ , and 7 covariates (including the two main effects corresponding to Burnout and the Moderator). This was the case for each interaction tested (for Specific Aims 2 and 3).

## CHAPTER 4: RESULTS

### Descriptive Statistics

On the MBI, participants observed emotional exhaustion scores ranged from 9 to 59, with a *Mean* score of 18.84 and *SD* of 9.71. The coefficient of variation (*CV*) (defined as  $SD/Mean$ , a measure of dispersion of scores that takes into account the magnitude of scores) of emotional exhaustion was 0.52. The observed scores for depersonalization ranged from 5-30, with a *Mean* of 11.91 and *SD* of 5.94 ( $CV = 0.50$ ). The observed scores for personal accomplishment ranged from 8-56, with a *Mean* of 39.27 and *SD* of 8.26 ( $CV = 0.21$ ). Emotional exhaustion scores were positively correlated with depersonalization scores,  $r = .38, p < .001$ , emotional exhaustion scores were negatively correlated with personal accomplishment scores,  $r = -.21, p < .01$ , and depersonalization scores were negatively correlated with personal accomplishment scores,  $r = -.16, p < .05$ .

For the ISI, participants' observed scores ranged from 0-28, with the *Mean* value of 5.07 and *SD* of 5.12. When using the recommended cut-offs (Morin et al., 2011), 151 individuals reported an absence of insomnia; 41 individuals reported sub-threshold insomnia, and 11 individuals reported clinical insomnia.

On the AAQ-II, participants' scores ranged from 7-37, with the *Mean* value of 11.18 and *SD* of 5.00. On the PSSS participants' scores ranged from 15-65, with the *Mean* value of 53.20 and *SD* of 6.90.

Table 2 reports zero-order correlations between study variables.

### Specific Aim 1: Association between Burnout and Insomnia

Specific Aim 1 examined whether burnout, assessed by MBI subscales, is cross sectionally associated with insomnia symptoms as assessed by ISI. There was a significant

association between emotional exhaustion and ISI scores (Table 3). A one standard deviation increase in emotional exhaustion scores was associated with an increase of 0.361 standard deviation in predicted ISI scores, when controlling for covariates. In addition, there was a significant association between depersonalization and insomnia (Table 3). A one standard deviation increase in depersonalization scores was associated with an increase of 0.218 standard deviations in predicted ISI scores, when controlling for covariates. Personal accomplishment was not significantly associated with ISI scores (Table 3).

### **Specific Aim 2: Moderation by Psychological Flexibility**

Specific Aim 2 examined whether the association between burnout and insomnia was moderated by psychological flexibility. Data analysis revealed that there was a trend towards psychological flexibility moderating the association between depersonalization and ISI scores, but this analysis did not meet statistical significance. As shown in Table 4, the interaction term between psychological flexibility and depersonalization was not significant, with  $p=.054$ . As predicted, as AAQ-II scores increase (i.e., as inflexibility increases) the association between depersonalization and ISI scores increases in magnitude, but, as noted above, the interaction did not reach statistical significance.

There was no evidence that psychological flexibility moderated the association between emotional exhaustion and ISI scores, or between personal accomplishment and ISI scores (Table 4).

### **Specific Aim 3: Moderation by Social Support**

Specific Aim 3 examined whether the association between Burnout and Insomnia were moderated by Social Support. Data analysis revealed that there was no evidence that Social

Support, assessed using the PSSS, moderated the association between Burnout and Insomnia (Table 5).

### Exploratory Analyses

In the analyses for Specific Aim 1 reported above, the MBI subscales were tested in separate models. If all MBI subscales were entered together in the single model (along with the covariates), emotional exhaustion was still significantly associated with ISI scores ( $B = 0.165$ ,  $SE = 0.041$ ,  $Beta = 0.323$ ,  $p < .001$ ). In this model, depersonalization and personal accomplishment were not significantly associated with ISI scores ( $ps > .25$ ).

To explore if there was any evidence that senior enlisted personnel experienced higher levels of burnout, as anticipated by “Old Sergeant Syndrome”, the association between Rank and MBI scores, specifically emotional exhaustion, was examined further. Emotional exhaustion was examined due to its strong association with insomnia in all the models tested. For enlisted Pararescue personnel, emotional exhaustion significantly increased with Rank, where E1-E4 had a mean score of 14.6 ( $SD=12.71$ ), E5-E6 had a mean score of 18.68 ( $SD=9.08$ ), and E7-E9 had a mean score of 23.88 ( $SD=12.66$ ) (Figure 2). Conversely, individuals who identified as an officer showed a trend of decreasing scores with higher rank as O1-O3 scored a mean of 20.23 ( $SD=8.65$ ), and O4-O9 personnel scored a mean of 16.81 ( $SD=7.01$ ). A 1-factor ANOVA using Rank as a multinomial variable with 5 levels (E1-E4; E5-E6; E7-E9; O1-O3; O4-O9) revealed a significant effect of Rank,  $F(4, 172) = 5.07$ ,  $p < .001$ . The association remained significant when including number of deployments as a covariate in a 1-factor ANCOVA,  $F(4, 171) = 2.43$ ,  $p < .05$ . Comparisons between unadjusted means ( $alpha = .05$  for each comparison) revealed that emotional exhaustion scores for E7-E9 were significantly higher than emotional exhaustion

scores for E5-E6, E1-E4, and O4-O9, but not significantly higher than emotional exhaustion scores for O1-O3. The difference between O1-O3 and O4-O9 was also not significant.

### **Sensitivity Analyses**

Using the Bootstrapping function in SPSS Version 27, 95% bias-corrected accelerated (BCa) Confidence Intervals and  $p$  values were computed using 5000 samples. None of the significant results presented above became non-significant when using this procedure, and none of the non-significant results became significant. Therefore, results were robust when using a method that requires fewer assumptions for  $p$  values to be valid.

As noted above, analyses were conducted using Rank and Number of Deployments as covariates. Results were examined using additional covariates, including age, marital history (ever vs. never married), marital status (married vs. not married), BMI, education status, time of assessment (pre- vs post- deployment), years of service, and military status (Active Duty vs. National Guard/Reserves). Inclusion of additional covariates did not change the results reported earlier.

## CHAPTER 5: DISCUSSION

In sum, the main results of the study were as follows. First, there was evidence that burnout was significantly associated with insomnia, particularly for the emotional exhaustion subscale. Second, there was only marginal evidence that psychological flexibility moderated the association between depersonalization and insomnia, and no evidence that psychological flexibility moderated the association between emotional exhaustion and insomnia, or the (non-significant) association between personal accomplishment and insomnia. Last, there was no evidence that social support moderated the association between burnout and insomnia.

The significant association between emotional exhaustion and insomnia is consistent with the literature. In a case-control study conducted by Metlaine et al. (2018), all three subscales of the MBI were associated with insomnia levels as measured in French financial workers; however, the emotional exhaustion subscale had the largest association with insomnia. In addition, Jansson-Fröjmark and Lindblom (2010) reported that only the emotional exhaustion subscale was associated with insomnia in a sample of general Swedish employees. Other studies support a significant relationship between burnout and insomnia with emotional exhaustion yielding the largest association in samples of employees working in clinical and management roles in hospitals and North American fire-fighters, respectively (Wang et al., 2019; Wolkow et al., 2018). Note, however, that while previous research can speak to the directionality of burnout and insomnia, the current study had a cross-sectional design which limits ability to draw inferences regarding directionality.

The association between emotional exhaustion and insomnia may be due to the impact of increased levels of burnout on the individual's ability to emotionally regulate, as shown in a recent systematic review (Jackson-Koku and Grime, 2019). The inability to regulate emotions

may lead to a chronic presence of stress, which can lead to a psychophysiological arousal, as described by the CATS theory. In reverse, research has shown that disruption of sleep results in maladaptive changes in individuals' emotion and emotional regulation processes, which may contribute to further burnout symptoms as individuals are not able to effectively deal with stressors that are emotional in nature (Palmer & Alfano, 2017).

The significant association between depersonalization and insomnia is also consistent with the literature (McCracken et al., 2021; Puolakanaho et al., 2020). However, there has been less extensive discussion about this association in previous studies compared to the association between emotional exhaustion and insomnia. A possible explanation could be that the depersonalization subscale focuses on individuals' attitude towards others at work or their jobs (Maslach & Leiter, 2016), whereas emotional exhaustion focuses on both intrapersonal and interpersonal exhaustive state, which may be more debilitating to the individual's mental state even when they are no longer at work. Therefore, it is possible for emotional exhaustion to have a persevering impact on individuals' internal state when they are alone, such as when they are trying to sleep, compared to depersonalization, which may have a greater impact on individuals' interactions with others and less on their internal state when they are alone. This may lead to a decreased impact of depersonalization when they are trying to go to sleep compared to emotional exhaustion.

Lastly, personal accomplishment was not significantly associated with insomnia. Previous research on the association between personal accomplishment and insomnia has been mixed, with some studies reporting a significant association between personal accomplishment and insomnia (Wang et al., 2019; Wolkow et al., 2019; Kousloglou et al., 2014), and others reporting a non-significant association (Jansson-Fröjmark and Lindblom, 2010; Metlaine et al.,

2017). The null association in the current study may be explained in part by the fact that a large portion of the participants reported a high level of personal accomplishment. This may be because the Pararescue career field has a highly selective process, where individuals must display high levels of qualification and/or performance in physical and psychological capabilities. Therefore, individuals who can make it through the selection process and the training pipeline to officially become a member of the Pararescue unit may have a high level of accomplishment and correctly feel a sense of pride in being able to be a part of a career field that is highly selective. In addition, the variability (as assessed by the coefficient of variation) was lower with the personal accomplishment subscale than the other two subscales, which may have made it more difficult to detect an association in this particular sample. In sum, due to the relatively low numbers of subjects who reported low levels of personal accomplishment (resulting in low variability), detecting an association between personal accomplishment and insomnia may have been more difficult in this population.

Analyses regarding moderating variables can potentially help to identify individuals most at risk of burnout and therefore most in need of an intervention. There was a non-significant trend for psychological flexibility to moderate the relationship between depersonalization and insomnia, with individuals who had high scores on depersonalization and low psychological flexibility having the highest insomnia scores. Therefore, it is possible that psychological flexibility can work as providing some buffer in the depersonalization-insomnia linkage, by helping to alter individuals' attitudes toward the people they interact with at their job. This would be consistent with the COR theory, in that psychological flexibility provides more cognitive resources for individuals who may have a heightened level of depersonalization that leads to insomnia. However, this may not be the case for personal accomplishment, because individuals

who experience a lack of personal accomplishment in their job may experience a heightened level of personal accomplishment more strongly through concrete evidence, rather than altering their perspectives.

In interpreting the results, one should note that participants generally had low levels of AAQ-II (*Mean* = 11.18), indicating generally low levels of psychological inflexibility (and therefore high levels of psychological flexibility). The high levels of overall psychological flexibility in paramedic personnel may have made it more difficult to detect an interaction than would be the case if there had been a wider distribution of AAQ-II scores. Additionally, and as previously noted, weaknesses pertaining to the validity of the AAQ-II may have contributed to the findings.

To examine AAQ-II scores more closely, AAQ-II scores of paramedic personnel were compared to AAQ-II scores from other groups. First, paramedic personnel's reported AAQ-II scores revealed greater psychological flexibility (i.e., lower AAQ-II scores) when compared to undergraduate/graduate students from diverse ethnic backgrounds with a range of mean age from 22.94 to 26.70 (Aciksari and Karatepe, 2020). The mean scores of White, Black, Latinx, Asian, and Middle Eastern participants' AAQ-II scores ranged from 19.32 to 21.98 (vs 11.18 for paramedic personnel).

Second, paramedic personnel's mean AAQ-II score was compared to the scores of internal medicine (IM) and emergency medicine (EM) specialists and residents in a different study (Borgogna et al., 2020). The mean AAQ-II score of EM specialists was 12.4, which was significantly lower than IM specialists' (*Mean* = 17.4). IM residents and EM residents' mean AAQ-II scores were 20.5 and 19.4, respectively. The EM specialists and paramedic personnel

showed comparable mean AAQ-II scores, 12.4 and 11.18, respectively. This is an interesting comparison, given the two populations' overlapping roles as emergency medical providers.

The fact that social support did not significantly moderate the association between burnout and insomnia is interesting, and is contrary to the predictions of the COR theory. If the findings were consistent with the COR theory, an increase in social support should have a buffering effect on the association, as they would theoretically have an increased level of emotional resources through the support and positive interactions from their support systems. Due to the cross-domain effects that resources can have on each other as posited by the COR theory, social support should moderate the association. One possibility is that the scale used in the study, which specifically utilized a social support scale that is embedded in the context of post-deployment, may have affected the results. It is also possible that a different scale measuring for social support independent of post-deployment status, may yield a different result. The DRRI-S consists of questions that aim to gather information about individuals' sense of social support after a deployment such as, "there are people to whom I can talk about my deployment experiences" and "I have problems that I can't discuss with family or friends". Additionally, the questions focus mostly on social support outside of the work environment, such as friends and family members. Therefore, questions that specifically discusses everyday work-life or the individual's perceived social support from colleagues, the results may have been different. Alternatively, the prediction of COR theory may not be correct, and social support may not be a moderator of the association.

The incidental findings on the levels of burnout in different groups may provide a more nuanced understanding of burnout in Pararescue personnel. The fact that levels of emotional exhaustion were highest in senior enlisted members is consistent with Old Sergeant Syndrome,

described in the introduction. Additionally, the individuals in the Old Sergeant Syndrome study may be very similar to today's E7 to E9 ranked enlisted personnel, as they are still often seen as the known experts in their trade. This describes one of the defining roles that the "old sergeants" had and why they were often seen as the "old reliables" (Sobel, 1947). While this may be an interesting connection, more research is necessary to understand whether burnout is in fact, more likely in senior enlisted members in the general military population to affirm this incidental finding. Interestingly, senior enlisted did not have higher levels of emotional exhaustion than junior officers. If these are robust findings, it is possible that senior enlisted and junior officers may have more responsibilities associated with the dangers/stressors of each specific mission, which accounts for elevated levels of burnout in those groups. In contrast, senior officers may have different, more administrative, responsibilities, and it is possible that senior officers have greater financial resources, which may buffer the effects of stress.

### **Strengths**

A strength of this study is that it added to the scarce literature on the psychological health of USAF Pararescue personnel. It is difficult to gain access to this population for research purposes due to the classified nature of their job, which partially accounts for the relative dearth of available research. A second strength of the study was the comprehensive assessment battery that permitted an examination of the association between burnout and insomnia, as well as moderators of this association. Given this community's exposure to combat and medical trauma - as well as other stressors such as frequent deployments to austere locations and training environments - it is important to better understand the psychological processes that underlie burnout in this population so that more effective interventions may be developed to care for this population. In addition, this study is the first to document an association between burnout and

insomnia in a military population. Last, there are only approximately 900 Active Duty Pararescue personnel in the Air Force. The study's sample size (133 Active Duty) was about a sixth of this population, which improves the chances that the results generalize to the broader Pararescue community.

### **Limitations**

There are some limitations to this study. First, the current study used self-report measures, which may have suffered from self-report biases. It is possible that the USAF Pararescue units may endorse a culture of promoting toughness and grit, as suggested by the authors of the parent study, Smith et al. (2015). This culture may have led to participants' underreporting of symptoms. In addition, due to the sample being a highly specialized military unit, it is possible that the findings from this study may not generalize to the rest of the military population, let alone the rest of the population at large. This is an especially visible limitation given that the entire population was male, and there were no female participants. While this is the case because there were no female Pararescue personnel in the career field at the time the data was gathered, there have been a small number of females admitted to this career field, which is likely to increase with time. Therefore, it is possible that these results may not generalize well to future female Pararescue personnel. Last, the cross-sectional study design limits the ability to make causal inferences regarding the relationship between burnout and insomnia. For example, burnout may cause insomnia, insomnia may cause burnout, and/or one or more third variables, measured or unmeasured, may underlie the association. The current study is unable to differentiate between these models.

### **Future Directions**

Regarding the association between burnout and insomnia across civilian and military population, it would be useful to conduct a formal systematic review to determine if emotional exhaustion is more strongly related to insomnia than the depersonalization or personal accomplishment, in both univariable and multivariable models.

Regarding the Pararescue population, for causal inferences to be made, future research should utilize longitudinal or ecological momentary assessment (EMA) study designs to further examine the causal relationships between burnout and insomnia. If further research supports a causal relationship between emotional exhaustion and insomnia, interventions that reduce the emotional exhaustion component of burnout may be useful for prevention and/or treatment of insomnia.

Moreover, future research using longitudinal designs should examine the mediating mechanisms linking burnout and insomnia. For example, research could examine whether the effect of depersonalization on insomnia may be partly explained by emotional exhaustion. Additionally, research could examine whether the effect of burnout on insomnia may be partly accounted by isolating-behaviors. For example, experiencing depersonalization may lead to self-isolating behaviors, which may lead to insomnia. Studies examining mediators may also suggest potential targets for interventions.

In addition, more research is needed to understand other potential moderating variables of this association. In the current study, there was no evidence that psychological flexibility or social support significantly moderated the relationship. It is important for future research to explore other potential moderator variables, such as Military Status (Active Duty vs. Reserves/National Guard) or Rank, to identify individuals most at risk of insomnia and other

adverse outcomes, and to identify individuals who would benefit most from interventions for prevention and treatment of insomnia.

**Table 1: Demographics**

<b>Characteristic ↓</b>	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>	<i>N</i>	<i>%</i>
<b>Demographics</b>						
Age	32.06	5.86	23	50	171	100
18-34					125	73.1%
35-49					45	26.3%
>50					1	0.7%
Race						
Caucasian					163	90.1%
African American					4	1.9%
Native American/Alaskan Native					3	1.7%
Asian American					4	1.9%
Native Hawaiian or Other PI					3	1.7%
Other					5	2.4%
Ethnicity						
Hispanic					11	6%
Non-Hispanic					171	94%
Education					182	100%
Some High School					0	0%
GED					0	0%
High School Diploma					13	7.1%
Some College					65	35.7%
Associates Degree					32	17.6%
4-year College Degree					57	31.3%
Master's Degree					14	7.7%
Doctoral Degree					1	.5%
<b>Military Variables</b>						
Years of Service	8.90	5.95	1	26	182	100%
Rank						
E1-E4					49	26.92%
E5-E6					66	36.26%
E7-E9					25	13.74%
O1-O3					31	17.03%
O4-O9					11	6.04%
Military Status						
Active Duty					133	73.9%
National Guard/Reserves					47	22.7%
Number of Deployments	2.40	1.86	0	7	182	100%
0					27	14.8%
1					38	20.9%
2					46	25.3%
3					25	13.7%
4					20	11.0%
>5					26	14.3%

Table Note: Sample size varies across variables due to missing data. PI = Pacific Islander

**Table 2: Zero-order Correlations and Distribution of Measures**

	<b>MBI-EA</b>	<b>MBI-DP</b>	<b>MBI-PA</b>	<b>ISI</b>	<b>AAQ</b>	<b>PSSS</b>
<b>MBI-EA</b>	1					
<b>MBI-DP</b>	.38	1				
<b>MBI-PA</b>	-.21	-.15	1			
<b>ISI</b>	.44	.15	-.17	1		
<b>AAQ</b>	.37	.36	-.21	.36	1	
<b>PSSS</b>	-.36	-.21	.40	-.33	-.34	1
<i>Mean</i>	18.84	11.89	39.32	5.07	11.13	53.20
<i>SD</i>	9.73	5.94	8.23	5.12	5.00	6.92
<i>Range</i>	9-59	5-30	8-56	0-28	7-37	15-65

Table Note: Table reports zero-order correlations between study variables for participants with ISI data. EE=Emotional Exhaustion, DP=Depersonalization, PA=Personal Accomplishment.

**Table 3: Specific Aim 1 – Association between Burnout and Insomnia**

<b>DV →</b>	<b>ISI</b>						
<b>IV ↓</b>	<i>df</i>	<i>B</i>	<i>SE</i>	<i>Beta</i>	<i>t</i>	<i>P</i>	<i>Squared Semipartial Correlation</i>
MBI Subscales							
<i>Emotional Exhaustion</i>	169	0.185	0.038	.361	4.847	.000	0.114
<i>Depersonalization</i>	168	0.179	0.060	.218	2.958	.004	0.045
<i>Personal Accomplishment</i>	168	-0.059	0.044	-.099	-1.308	.189	0.009

Table Note: Each MBI Subscale was tested in a separate model. All models include Number of Deployments and Rank (dummy coded) included as covariates (regression coefficient for covariates not shown in table).

**Table 4: Specific Aim 2 – Moderation by Psychological Flexibility (AAQ-II)**

DV →			<i>ISI</i>						
IV ↓	Model	Moderator ↓	<i>df</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>		<i>Squared Semipartial Correlation</i>
Interaction Term									
<i>AAQ-II x EE</i>	1	AAQ-II	165	-0.006	0.006	-1.094	.276		0.005
<i>AAQ-II x DP</i>	2	AAQ-II	164	0.019	0.010	1.941	.054		0.018
<i>AAQ-II x PA</i>	3	AAQ-II	164	0.011	0.009	1.157	.249		0.006

Table Note: Table reports interaction terms tested in separate models. Model 1 tests the *AAQ-II x Emotional Exhaustion* interaction term. In Model 1, AAQ-II and the Emotional Exhaustion are included as covariates (regression coefficients not shown in table). Model 2 tests the *AAQ-II x Personal Accomplishment* interaction term. In Model 2, AAQ-II and the Personal Accomplishment are included as covariates (regression coefficients not shown in table). Model 3 tests the *AAQ-II x Depersonalization* interaction term. In Model 3, AAQ-II and the Depersonalization are included as covariates (regression coefficients not shown in table). Models 1, 2, and 3 include Number of Deployments and Rank included as covariates (regression coefficient for Number of Deployments and Rank not shown in table). EE=Emotional Exhaustion, DP=Depersonalization, PA=Personal Accomplishment,

**Table 5: Specific Aim 3 – Moderation by Social Support (PSSS)**

DV →			<i>ISI</i>					
IV ↓	Model	Moderator ↓	<i>df</i>	<i>B</i>	<i>SE</i>	<i>t</i>	<i>p</i>	<i>Squared Semipartial Correlation</i>
Interaction Term								
<i>PSSS x EE</i>	1	PSSS	155	0.000	0.005	0.054	.957	0.000
<i>PSSS x DP</i>	2	PSSS	154	-0.010	0.010	-1.076	.284	0.006
<i>PSSS x PA</i>	3	PSSS	154	-0.001	0.006	-1.112	.911	0.000

Table Note: Table reports interaction terms tested in separate models. Model 1 tests the *PSSS x Emotional Exhaustion* interaction term. In Model 1, PSSS and the Emotional Exhaustion are included as covariates (regression coefficients not shown in table). Model 2 tests the *PSSS x Personal Accomplishment* interaction term. In Model 2, PSSS and the Personal Accomplishment are included as covariates (regression coefficients not shown in table). Model 3 tests the *PSSS x Depersonalization* interaction term. In Model 3, PSSS and the Depersonalization are included as covariates (regression coefficients not shown in table). Models 1, 2, and 3 include Number of Deployments and Rank included as covariates (regression coefficient for Number of Deployments and Rank not shown in table). EE=Emotional Exhaustion, DP=Depersonalization, PA=Personal Accomplishment.

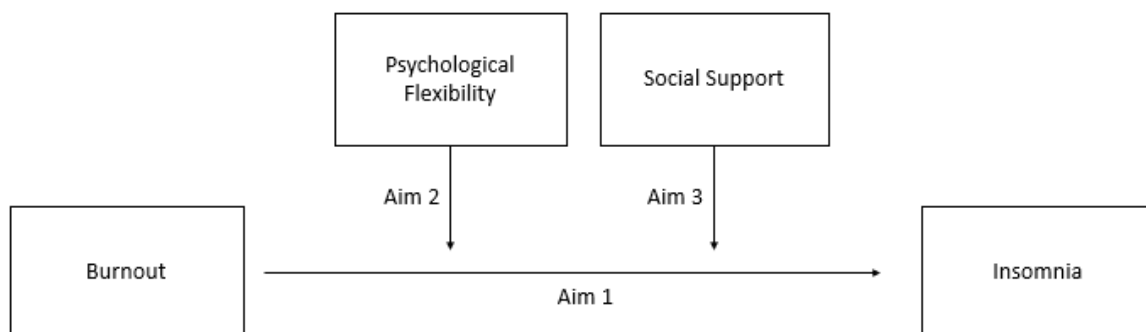
**Figure 1: Conceptual Model**

Figure Note: Conceptual Model for the study. Specific Aim 1 examines the association between Burnout and Insomnia, treating Burnout as the IV and Insomnia as the DV. Specific Aim 2 examines whether Psychological Flexibility moderates the association between Burnout and Insomnia. Specific Aim 3 examines whether Social Support moderates the association between Burnout and Insomnia. See text for details.

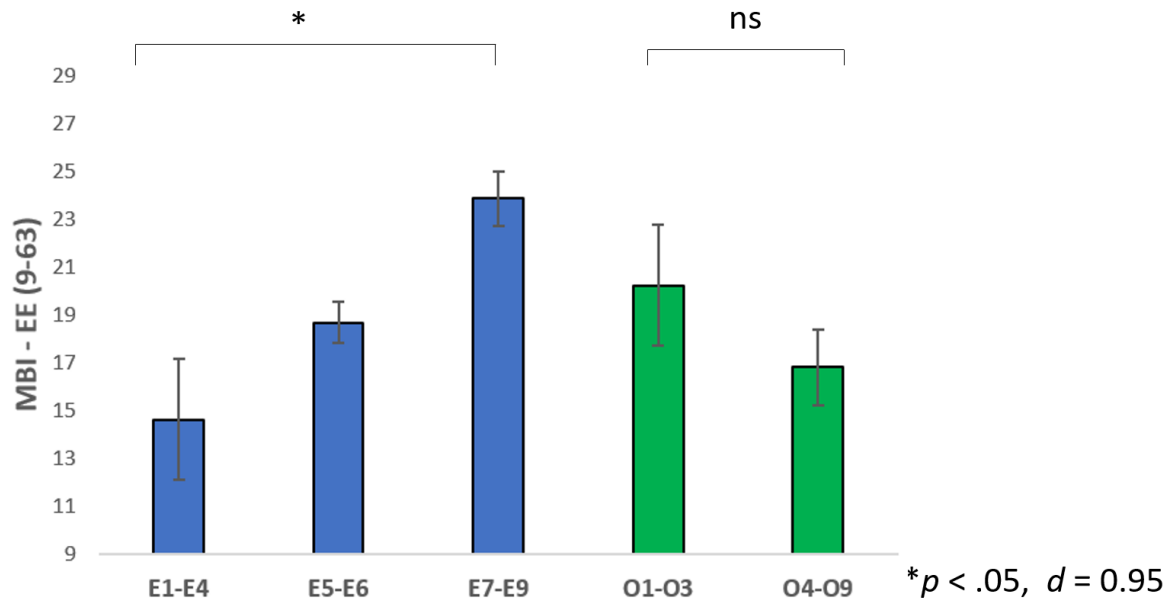
**Figure 2: Association between Rank and Emotional Exhaustion**

Figure Note: Association between Rank and Emotional Exhaustion.

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