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Main Sources of Occupational Stress and Symptoms of Burnout, Clinical Distress, and Post-Traumatic Stress Among Distributed Common Ground System Intelligence Exploitation Operators (2011 USAFSAM Survey Results)

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14. ABSTRACT

Significant efforts have been made to address combat stress among personnel deployed or returning from deployment, but far less attention has been given to the "deployed-in-garrison" work environment of distributed common ground system (DCGS) intelligence exploitation operators, who remotely monitor and report real-time, hostile, enemy contact and facilitate redirection of ground forces to engage enemy combatants. As the "eyes and ears" of the battlefield, these personnel vicariously experience the combat environment on a daily basis. This study investigated the impact of the deployed-in-garrison environment by surveying DCGS intelligence exploitation personnel, DCGS system sustainment personnel, and noncombatant support and logistics airmen from the same installations. The survey included a demographic questionnaire, items assessing sources of stress, as well as standardized instruments assessing occupational burnout, clinical distress, post-traumatic stress disorder, as well as vicarious exposure to combat. The results of the study suggest that the primary sources of occupational stress for the DCGS intelligence exploitation personnel are operational in nature (i.e., long hours, shift work, organizational and leadership difficulties, nature of work, additional workload, low manning and training challenges, and work-rest cycle management), and that these stressors contribute directly to high levels of emotional exhaustion and clinical distress. Additional research is required to more thoroughly understand the impact of the deployed-in-garrison, around-the-clock operations on the psychological health of DCGS intelligence exploitation operators.

15. SUBJECT TERMS
Occupational stress, deployed-in-garrison environment, post-traumatic stress disorder, clinical distress, emotional exhaustion

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1.0 EXECUTIVE SUMMARY

Over the past decade, U.S. armed forces have devoted more than 3,500,000 mission-hours collecting and analyzing intelligence to maximize battlefield awareness for commanders and troops operating in theater. Although such data are essential to successful battlefield operations, many of the personnel who exploit this real-time combat intelligence do not operate in theater. Based in the continental U.S., these professionals remotely monitor and report real-time, hostile, enemy contact and facilitate redirection of ground forces to engage enemy combatants. As the "eyes and ears" of the battlefield, these personnel vicariously experience the combat environment on a daily basis. While significant efforts have been made to address combat stress among personnel deployed or returning from deployment, far less attention has been given to the "deployed-in-garrison" work environment of the distributed common ground system (DCGS) intelligence exploitation operator.

This study investigated the impact of the deployed-in-garrison occupational environment by surveying DCGS intelligence exploitation personnel (n = 411), DCGS system sustainment personnel (n = 152), and noncombatant support and logistics airmen (n = 200) from the same installations. The survey included a demographic questionnaire, items assessing sources of stress, as well as standardized instruments assessing occupational burnout (Maslach Burnout Inventory), clinical distress (Outcome Questionnaire-45.2), post-traumatic stress disorder (PTSD) (PTSD Checklist- Military), and vicarious exposure to combat (Vicarious Combat Exposure Scale).

The results of the study suggest the primary sources of occupational stress for the DCGS intelligence exploitation personnel are operational in nature (i.e., long hours, shift work, organizational and leadership difficulties, nature of work, additional workload, low manning and training challenges, and work-rest cycle management), and these stressors contribute directly to high levels of measurable stress response. Compared to DCGS system sustainment personnel and logistics/support noncombatant airmen, DCGS intelligence exploitation personnel had substantially higher incidences of emotional exhaustion and clinical distress. However, there was no distinction between groups regarding scores on the measure evaluating PTSD-related symptoms. The study also reveals those with greater vicarious exposure to combat report higher scores for emotional exhaustion and distress. Additional research is required to more thoroughly understand the impact of the deployed-in-garrison, around-the-clock operations on the psychological health of DCGS intelligence exploitation operators.

2.0 INTRODUCTION

Due to advances in aerial, satellite, and computer-based technology, and the high rate of air operations to sustain persistent battlefield awareness in theaters of conflict, there are several units of distributed common ground system (DCGS) intelligence exploitation personnel whose jobs involve being physically removed from the combat environment yet still engaged in the analyses and dissemination of real-time data from operations in theater. Although such personnel operate within the confines and safety of military installations removed from the battlefield, they are required to adjust to a high operational tempo associated with sustaining around-the-clock, real-time digital intelligence operations critical to a wide range of military operations. The challenging nature of such operations may be accentuated by the deployed-in-garrison lifestyle that many DCGS intelligence exploitation personnel adopt as they

simultaneously balance the demands of their warfighter role with their personal lives and domestic roles.

Frequently, DCGS intelligence exploitation personnel expand upon the work of an ever-increasing fleet of remotely piloted aircraft, but there are other platforms that are sources of information also requiring their efforts. DCGS intelligence exploitation personnel augment remotely piloted aircraft and other intelligence, surveillance, and reconnaissance (ISR) platforms via the analyses and dissemination of real-time information to commanders for identifying fixed and moving targets, tracking enemy movements and assets, catching insurgents planting roadside bombs, locating and destroying weapons caches, directing and protecting ground forces, safeguarding convoys, tracking and/or eliminating enemy combatants, augmenting manned-strike missions, and surveying post-strike battle damage.

Regardless of the sources of data or the distance from the actual combat environment, DCGS intelligence exploitation personnel regularly experience combat in a sensory way (via exposure to digital-based visual and auditory forms of data) as part of their day-to-day lives (Ref 1). Although shielded from the challenges associated with the physical combat environment, it would be incorrect to conclude that such personnel do not face demanding occupational stressors (operational and combat related). Individuals operating in this arena have been quoted as saying "the stress lingers after the 12-hour shift is over" and that "one's brain often hurts at the end of the night, the way feet ache after a long march" (Ref 2). These anecdotal remarks combined with observations made by operational leaders have raised medical concerns, yet there are no published empirical studies to date identifying the sources of stress or assessing the consequences [prevalence of occupational burnout, clinical distress, or post-traumatic stress disorder (PTSD)] of these unique operations.

2.1 Occupational Stressors

There are wide ranges of occupationally oriented stressors DCGS intelligence exploitation personnel experience that may result in negative changes to their emotional well-being. These stressors can vary across duty positions, geographical location, unit mission, as well as status (i.e., active duty, civilian). An extensive list of such stressors is beyond the scope of this study. However, below is a list of perceived stressors, separated into the conceptual categories of operational, combat related, and career related, with which operators must frequently contend.

2.1.1 Operational. Operational stressors are defined as those related to sustaining operations. These include issues such as available manpower, equipment, and general resources needed to accomplish occupational tasks and objectives. There are several important operational stressors to consider when assessing the impact on the health and well-being of DCGS intelligence exploitation personnel. For these operators, stressors include, but are not limited to, (a) long hours (e.g., 6 days on, 2 days off), (b) frequent shift work and shift changes, (c) inadequate manpower levels to sustain high operational tempo, (d) multi (and sometime conflicting) tasks with immediate suspenses, (e) nonstandardized work-rest cycle management, and (f) requirement to communicate and interact within teams. The long hours combined with rotating shift work can make it difficult to maintain healthy sleep patterns and domestic routines for many DCGS intelligence exploitation personnel. It stands to reason such stressors can lead to both physical and psychological fatigue when faced on a daily basis.

2.1.2 Combat Related. Combat stressors are defined as those that involve ISR and weapon-deployment missions that are in direct support of combat operations. For many DCGS personnel, combat-related stressors include (a) precisely targeting enemy combatants and assets, where mistakes may come at a high price (e.g., inadvertently killing friendly ground forces and civilians); (b) being exposed to hours of live video feed and images of destruction to ensure combatants have been effectively destroyed or neutralized; (c) making critical decisions regarding the identification of enemy combatants and providing effective force protection to ground troops to reduce casualties of friendly forces and civilian bystanders; and (d) the unique demand of simultaneously juggling one's warfighter role with sustainment of domestic roles and responsibilities. The demand of continuously balancing such roles may lead to increased interpersonal/social role distress. Although physically separated from the battlefield, it is reasonable to perceive the nature of their duties requiring them to confront the realities of the battlefield on a daily basis that may carry over into their personal life.

2.1.3 Career Related. Career-related stressors are those associated with the sustainment of occupational proficiency and accomplishment of key tasks to be competitive for promotion. DCGS intelligence exploitation personnel may face a number of career-related stressors that include, but are not limited to, (a) maintaining proficiency in core skill sets (even those not being used in their primary duties) that define their career field; (b) accomplishing standard professional military education whether by correspondence, in-residence, or both; (c) earning advanced degrees (primarily an officer requirement); (d) accomplishing training challenges (e.g., keeping up with advancements in strategies and military-specific readiness training requirements); and (e) holding organizational leadership positions. The operational tempo of DCGS intelligence operations may serve as an obstacle to meeting the necessary job- and non-job-specific (involvement in community work, volunteering for additional duties to demonstrate leadership capability) requirements for timely promotion and career progression.

2.2 Medical Concerns and Impact on Psychological Health

Emotional distress is a common phrase used to refer to an unpleasant state characterized by negative emotional (e.g., increasing feelings of anger, irritability, agitation, hopelessness, nervousness, sadness), behavioral (e.g., increasing arguments with others, trouble getting along with peers), physical (e.g., difficulty sleeping, fatigue, sensations of heart pounding, general muscle tension, headaches), and cognitive (e.g., difficulty concentrating, sustaining attention) changes in functioning. Given the sensitive, high-demand, high-precision nature of DCGS intelligence operations, it is critical military commanders gauge the levels of emotional distress experienced among such operators. If significant numbers of DCGS intelligence exploitation operators are found to be experiencing facets of occupational burnout and/or high levels of emotional distress, then commanders and medical providers may realize a need for intervention to preserve the performance and well-being of airmen under their command.

Furthermore, it is reasonable to perceive that continuous exposure to real-time, visual imagery of combat heightens the risk for PTSD. It is important to note that PTSD is more than stress in response to combat-related events. PTSD is a complex psychological condition developed after exposure to a traumatic event (e.g., witness or experience events that lead to actual or threatened death, injury to others), and the response involves intense feeling of fear, helplessness, or horror (Ref 3). The condition is characterized by a clustering of symptoms that

fall into the categories of: (a) sense of re-experiencing the event (e.g., recurrent and intrusive recollections of the event, distressing dreams of the event, acting or feeling as if the traumatic event were recurring, physiological reactivity to cues that resemble an aspect of the event); (b) persistent avoidance of stimuli associated with the event or numbing of general responsiveness (e.g., effort to avoid thought, feeling, or conversations associated with the event, avoidance of activities that arouse recollections of the event, feeling of detachment from others, restricted range of affect, sense of foreshortened future), as well as (c) increased arousal (e.g., difficulty falling or staying asleep, increase in irritability/outbursts of anger, difficulty concentrating, hypervigilance, exaggerated startle response). Two or three symptoms above may not be uncommon after exposure to combat operations. However, it is the clustering, severity, and persistence of such symptoms along with impaired social or occupational functioning that lead to the diagnosis of PTSD. It is standard practice to evaluate for PTSD among deployed military personnel supporting combat operations in theater. And it is reasonable to consider the same precautions for assessing DCGS intelligence exploitation operators in supporting real-time ISR and weapons-strike operations.

Although DCGS intelligence operators are not engaged in hand-to-hand combat, they are involved in operations where they witness the destruction of enemy combatants and assets. It stands to reason among line and medical leadership that repeated vicarious exposure and responsibility for deploying weapons in support of combat operations may place DCGS operators at elevated risk for clinical levels of emotional distress and/or PTSD. Regardless of one's opinion on the sources of stress (combat vs. operational or a combination thereof), it is reasonable to perceive that DCGS intelligence exploitation personnel are at increased risk for occupational stress.

2.3 Purpose of the Study

The purposes of this study are to: (a) determine the rates of clinically significant occupational burnout among DCGS exploitation personnel; (b) gain an understanding of the most common sources of occupational stress (e.g., operational and combat related) among DCGS operators; and (c) compare differences on measures of occupational burnout, clinical distress, and PTSD among DCGS intelligence exploitation operators, DCGS support (nonexploitation) personnel (who do not engage in combat information exploitation activities), and a noncombatant control group that provides support missions on DCGS installations.

3.0 METHODS

3.1 Participants

The purpose and methodology of the study were reviewed and granted exemption from the Wright-Patterson Air Force Base Institutional Review Board and assigned protocol number F-WR-2011-0068-E. The voluntary and fully informed consent of participants was obtained in accordance with 32 CFR 219 and Air Force Instruction 40-402.

Several units located within the continental United States responded to the survey; however, for security reasons, the number of units and locations are not disclosed. On average, units that participated in the study had a 30% response rate.

3.1.1 DCGS Intelligence Exploitation Personnel. A total of 411 DCGS intelligence exploitation personnel participated in the study. There were 277 males and 129 females; 5 participants did not identify their gender. Thirty-eight (9.24%) were between the ages of 18 to 21, 112 (27.25%) were 22 to 25, 129 (31.38%) were 26 to 30, 55 (13.38%) were 31 to 34, 37 (9.00%) were 35 to 39, 28 (6.81%) were 40 to 45, and 8 (1.95%) were 46 and above. Four participants did not report their age. There were 41 (9.97%) officers and 359 (87.34%) enlisted; 10 participants did not report their rank. In total, 124 (31.63%) were single and 238 (60.71%) were married; 30 (7.65%) were unmarried but in a significant relationship. A total of 187 (45.49%) reported having children living at home.

3.1.2 DCGS Support/System Sustainment (Nonexploitation) Personnel. A total of 152 DCGS support and system sustainment personnel (e.g., communications, engineering, system maintenance) participated in the study. Such operators are located within DCGS units but do not serve in an intelligence exploitation role. Rather, their duties are to serve as technicians to ensure digital and computer-based systems are functioning effectively to serve intelligence exploitation operations. There were 118 males and 34 females. Eight (5.26%) were between 18 to 21 years of age, 90 (27.63%) were 22 to 25, 41(26.97%) were 26 to 30, 21 (13.81%) were 31 to 34, 16 (10.52%) were 35 to 39, 10 (6.57%) were 40 to 45, and 11 (7.23%) were 46 and above. Three participants did not report their age. There were 6 (3.95%) officers and 132 (86.84%) enlisted. Twenty participants did not report their rank. In total, 52 (34.21%) were single and 85 (55.92%) were married; 9 (5.92%) were unmarried but in a significant relationship. Six participants did not report their relationship status. A total of 75 (49.34%) reported having children living at home.

3.1.3 Noncombatant Airmen Comparison Group. A total of 200 noncombatant airmen collocated with certain DCGS units participated (officer and enlisted support/logistics personnel). There were 153 males and 43 females; 4 participants did not identify their gender. Fifteen (7.5%) were between 18 to 21 years of age, 51 (25.5%) were 22 to 25, 41 (20.5%) were 26 to 30, 33 (16.5%) were 31 to 34, 36 (18.1%) were 35 to 39, 14 (7.0%) were 40 to 45, and 7 (3.5%) were 46 and above. One participant did not report his/her age. There were 8 (4.0%) officers and 189 (94.5%) enlisted; 2 did not report their rank. In total, 53 (26.7%) were single and 132 (66.6%) were married; 11 (5.56%) were unmarried but in a significant relationship. Two participants did not report their relationship status. A total of 97 (48.9%) reported having children living at home.

3.2 Measures

Participants completed a demographic questionnaire consisting of questions regarding their duty position, rank, gender, age range, marital status, children living at home, length of time serving in current duty position, average number of hours worked in a typical week, current work shift, and length of time since engaged in shift work. Space was provided for “write-in” comments regarding top sources of stress. The demographics section of the questionnaire was developed to sustain anonymity to support genuine self-disclosure in a community where there is a perceived strong cultural and community stigma regarding mental health problems.

3.2.1 Maslach Burnout Inventory-General Survey (MBI-GS). The MBI-GS is a 16-item self-report survey assessing facets of occupational burnout (Ref 4). The facets include emotional exhaustion (e.g., fatigue), cynicism (negative work attitude), and professional efficacy (e.g., sense of occupational accomplishment). The emotional exhaustion and cynicism subscales are composed of five items, and the professional efficacy subscale is composed of six items. Construct validity with the MBI-GS has been established via principal component analyses with other constructs for each of the scales (Ref 5). Stability coefficients range from 0.65 to 0.67 (Ref 4).

3.2.2 Outcome Questionnaire-45 (OQ-45.2). The OQ-45.2 is a 45-item survey assessing symptoms of emotional distress over the previous week including difficulties in interpersonal relationships, social roles, and general quality of life (Ref 6). Each item has a Likert response rating from "*Almost Always*" to "*Never*." The responses are numerically coded on a scale of 0 to 4 based upon the direction of endorsement. The items are summed to yield a total emotional distress score. Several items are reverse-scored to reduce random responding. The 45-item questionnaire has a score range of 0 to 180. A total score cut-off of 63 or more indicates high levels of emotional distress (Ref 6). Concurrent validity estimates for the total score range from .64 to .88. Test-retest reliability and internal consistency values for the OQ-45.2 total score range from .84 to .93. The OQ-45.2 is commonly used at mental health clinics on U.S. Air Force installations to assess distress and track progress among Air Force personnel seeking mental health care.

3.2.3 PTSD Checklist for Military (PCL-M). The PCL is a 17-item self-report questionnaire that measures the 17 symptoms of PTSD over the last month as outlined in the Diagnostic and Statistical Manual of Mental Disorders (Ref 3,7). The PCL-M addresses symptoms that arise in response to "stressful military experiences." It is often used with active service members and veterans. The PCL-M has a variety of purposes, including (1) screening individuals endorsing symptoms associated with PTSD, (2) diagnosing PTSD in conjunction with a clinical interview, and (3) monitoring symptom change during and after psychological treatment. A total symptom severity score (range = 17-85) can be obtained by summing the scores from each of the 17 items. A total cut-off score of 50 or more indicates a high level of PTSD symptomology. The PCL-M is commonly used by the Department of Defense and the Department of Veterans Affairs to screen and diagnose PTSD.

3.2.4 Vicarious Combat Exposure Scale (VCES) – *Experimental*. Although several combat exposure measures exist to address direct combat exposure, none are easily applicable to technology-based, vicarious combat exposure. The VCES was developed in an effort to fill this gap (Ref 1). The VCES is a 14-item questionnaire that assesses the frequency and nature of exposure (auditory, visual, or both) to various types of combat events. The responses are numerically coded on a 0-to-4, 1-to-5, or 0-to-8 scale, based upon the weight of the question and direction of the endorsement. The items are summed to yield a total combat exposure score. VCES scoring ranges from 0 to 101. A preliminary, total score cut-off of 68 or more indicates a high level of vicarious combat exposure (Ref 1). While still experimental, the VCES manifests construct and content validity, accounting for the primary array of combat events likely to be observed via vicarious means. However, this measure is relatively new and additional testing is necessary to verify validity and reliability.

3.3 Procedure

Participation in the survey was solicited through 480th ISR Wing leadership channels (wing, group, and squadron commanders), via e-mail and in-person group meetings. Commanders informed potential participants that survey participation was completely voluntary and that responses to the questionnaires would remain anonymous. Additionally, leadership stated that the results of the survey would help them better understand the main sources of occupational stress and current levels of distress in their units as well as identify areas for change that could lead to improvements in health and morale.

The survey was distributed electronically via a Department of Defense approved electronic survey tool and was re-advertised to the survey audience periodically during the survey period to maximize the response rate. In general, it took participants 20-25 minutes to complete all the items on the survey. Participants who completed the survey were instructed on how to obtain the general results of the study and when such information would be available.

4.0 RESULTS

4.1 Self-Reported Sources of Stress

Participants' qualitative responses to the item asking them to write-in and describe their top three stressors associated with occupational stress were analyzed. Three behavioral science researchers performed a qualitative analysis on the content of participant responses. The transcripts and notes from each research team member were consolidated into a list of stressors affecting distress levels and morale among the groups. Responses that appeared to label the same or similar stressors were consolidated under a single category attribute. For example, terms such as "rotating shift schedule every 30 days" and "switching from day to swing shift" were categorized under the main stressors of shift work.

Aside from marital and family stressors that were common across all groups, the primary sources of occupational stress for DCGS intelligence exploitation personnel, DCGS sustainment (nonexploitation) personnel, and noncombatant airmen are shown below, with the most frequently reported stressors listed first. Each of these categories represents no less than 6% and up to 15% of the combined sources of stress, as reported by each sample group.

- **DCGS Intelligence Exploitation Personnel (n = 411)**
  - Long hours/low manning (e.g., working 50+ hours per week to sustain time suspense missions)
  - Leadership/management (e.g., extra duties, line of sight taskings, inadequate training)
  - Deployed-in-garrison status (e.g., daily balance of warfighter role with domestic life, access to base resources, juggling family/personal relationships)

- **DCGS Support/System Sustainment Personnel (n = 152)**
  - Long hours/low manning (e.g., working 50+ hours per week to sustain time suspense missions)
  - Leadership/management (e.g., extra duties, line of sight taskings, inadequate training)
  - Organizational communication (e.g., leaders not communicating goals/objectives/plans; lack of communication across work centers)

- **Air Force Noncombatant Control Group (n = 200)**
  - Leadership/management (e.g., challenges regarding juggling leadership roles with career duties)
  - Financial concerns (e.g., access to training and organizational activities leading to on-time promotion)
  - Organization communication (e.g., lack of communication across work centers)

4.2 Facets of Occupational Burnout

4.2.1 Emotional Exhaustion-Fatigue. The mean emotional exhaustion scale score was 13.35 (standard deviation (SD) = 8.12) for DCGS intelligence exploitation personnel, 8.72 (SD = 7.45) for DCGS support/system sustainment (nonexploitation) personnel, and 8.99 (SD = 7.03) for noncombatant airmen from co-located support/logistic units. An analysis of variance assessing between group differences was significant ($F_2 = 28.67$, $p<0.01$). Subsequent mean comparisons using t-tests for equal variance (Bonferroni t) were significant when comparing mean scores between DCGS intelligence exploitation personnel and DCGS system/sustainment personnel ($t = 4.62$, $p<0.01$) and between DCGS intelligence exploitation personnel and noncombatant airmen ($t = 4.36$, $p<0.01$).

The number and percentage of those who had a score of 20 or higher, indicative of emotional exhaustion, were 97 (26.58%) for DCGS intelligence exploitation personnel, 15 (11.19%) for DCGS support/system sustainment personnel, and 14 (7.57%) for noncombatant airmen. A chi-square test for differences was significant between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel ($\chi^2 = 13.32$, $p < 0.01$) and between DCGS intelligence exploitation personnel and noncombatant airmen ($\chi^2 = 27.54$, $p < 0.01$). There was no significant difference between DCGS support/system sustaining personnel and noncombatant airmen.

4.2.2 Cynicism. The mean occupational cynicism scale score was 11.43 (SD = 8.34) for DCGS intelligence exploitation personnel, 8.11 (SD = 7.79) for DCGS support/system sustainment personnel, and 8.11 (SD = 6.90) for noncombatant airmen. An analysis of variance assessing between group differences was significant ($F_2 = 15.057$, $p < .01$). Subsequent mean comparisons using t-tests for equal variance (Bonferroni t) were significant when comparing mean scores between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel ($t = 3.33$, $p<0.01$) and between DCGS intelligence exploitation personnel and noncombatant airmen ($t = 3.32$, $p<0.01$).

The number and percentage of those who had a score of 20 or higher, indicative of elevated, occupational cynicism, were 75 (20.83%) for DCGS intelligence exploitation personnel, 16 (12.03%) for DCGS support/system sustainment personnel, and 18 (9.68%) for noncombatant airmen. A chi-square test for differences was significant between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel ($\chi^2= 5.0$, $p < 0.05$) and between DCGS intelligence exploitation personnel and noncombatant airmen ($\chi^2= 10.80$, $p < 0.01$). There was no significant difference between DCGS support/system sustainment personnel and noncombatant airmen.

4.2.3 Professional Efficacy. Overall, the mean professional efficacy scale score was 24.43 (SD = 7.92) for DCGS intelligence exploitation personnel, 25.64 (SD = 8.03) for DCGS support/system sustainment personnel, and 24.60 (SD = 8.62) for co-located noncombatant airmen. An analysis of variance assessing between group differences was not significant (F_2 = 1.087, p = .338).

The number and percentage of those who had low levels of professional efficacy were 21 (5.87%) for DCGS intelligence exploitation personnel, 8 (6.06%) for DCGS system/support sustainment personnel, and 13 (7.18%) for noncombatant airmen. A chi-square test for differences showed no significance between any of the groups.

4.3 Clinical Distress

4.3.1 OQ-45.2 – Total Score. Overall, the mean OQ-45.2 total score was 41.05 (SD = 21.8) for DCGS intelligence exploitation personnel, 31.64 (SD = 20.92) for DCGS support/system sustainment personnel, and 30.70 (SD = 17.25) for noncombatant airmen from co-located support/logistic units. An analysis of variance assessing between group differences was significant (F_2 = 18.698, p < .01). Subsequent mean comparisons using t-tests for equal variance (Bonferroni t) were significant when comparing mean scores between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel (t = 9.41, p<0.01) and between DCGS intelligence exploitation personnel and noncombatant airmen (t = 10.35, p<0.01).

The number and percentage of those who scored in the "clinical distress" range (i.e., ≥ 63) were 58 (16.11%) for DCGS intelligence exploitation personnel, 10 (7.58%) for DCGS support/system sustainment personnel, and 5 for (3.16%) of noncombatant airmen. A chi-square test for differences was significant between DCGS intelligence exploitation personnel and DCGS system/support personnel (χ^2= 5.91, p < 0.03) and between DCGS intelligence exploitation personnel and noncombatant airmen (χ^2= 17.23, p < 0.01). There was no significant difference between DCGS support/system sustainment personnel and noncombatant airmen.

4.3.2 Symptom Distress OQ-45.2 Subscale. Overall, the mean symptom distress subscale score was 21.17 (SD = 12.78) for DCGS intelligence exploitation personnel, 15.85 (SD = 12.17) for DCGS support/system sustainment personnel, and 15.38 (SD = 10.29) for noncombatant airmen from co-located support/logistic units. An analysis of variance assessing between group differences was significant (F_2 = 17.636, p < .01). Subsequent mean comparisons using t-tests for equal variance (Bonferroni t) were significant when comparing mean scores between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel (t = 5.32, p<0.01) and between DCGS intelligence exploitation personnel and noncombatant airmen (t = 5.79, p<0.01).

The number and percentage of those who had a score of 36 or higher, indicative of emotional exhaustion, were 51 (14.17%) for DCGS intelligence exploitation personnel, 7 (5.30%) for DCGS support/system sustainment personnel, and 5 (2.94%) for noncombatant airmen. A chi-square test for differences was significant between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel (χ^2= 7.30, p < 0.01) and between DCGS intelligence exploitation personnel and noncombatant airmen (χ^2= 15.40, p < 0.01). There was no significant difference between DCGS support/system sustainment personnel and noncombatant airmen.

4.3.3 Interpersonal Relationships OQ-45.2 Subscale. Overall, the mean interpersonal relationships scale score was 9.91 (SD = 7.02) for DCGS intelligence exploitation personnel, 7.80 (SD = 6.61) for DCGS system/support sustainment personnel, and 7.22 (SD = 5.48) for noncombatant airmen from co-located support/logistic units. An analysis of variance assessing between group differences was significant ($F_2 = 11.791$, $p < .01$). Subsequent mean comparisons using t-tests for equal variance (Bonferroni t) were significant when comparing mean scores between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel ($t = 2.11$, $p<0.01$) and between DCGS intelligence exploitation personnel and noncombatant airmen ($t = 2.69$, $p<0.01$).

The number and percentage of those who had a score of 15 or higher, indicative of negative impact on interpersonal relationships, were 85 (23.61%) for DCGS intelligence exploitation personnel, 23 (17.42%) for DCGS support/system sustainment personnel, and 24 (13.64%) for noncombatant airmen. A chi-square test for differences was not significant between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel or between DCGS support/system sustainment personnel and noncombatant airmen. However, there was a significant difference between DCGS intelligence exploitation personnel and noncombatant airmen ($\chi^2 = 7.26$, $p < 0.01$).

4.3.4 Social Role OQ-45.2 Subscale. Overall, the mean social role scale score was 9.98 (SD = 4.46) for DCGS intelligence exploitation personnel, 7.99 (SD = 4.35) for DCGS support/system sustainment personnel, and 8.48 (SD = 4.17) for noncombatant airmen from co-located support/logistic units. An analysis of variance assessing between group differences was significant ($F_2 = 13.152$, $p < .01$). Subsequent mean comparisons using t-tests for equal variance (Bonferroni t) were significant when comparing mean scores between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel ($t = 1.98$, $p<0.01$) and between DCGS intelligence exploitation personnel and noncombatant airmen ($t = 1.49$, $p<0.01$).

The number and percentage of those who had a score of 12 or higher, indicative of negative impact on social role, were 125 (34.72%) for DCGS intelligence exploitation personnel, 26 (19.70%) for DCGS support/system sustainment personnel, and 38 (21.47%) for noncombatant airmen. A chi-square test for differences was significant between DCGS intelligence exploitation personnel and DCGS support/system sustainment personnel ($\chi^2 = 10.25$, $p < 0.01$) and between DCGS intelligence exploitation personnel and noncombatant airmen ($\chi^2 = 9.86$, $p < 0.01$). There was no significant difference between DCGS support/system sustainment personnel and noncombatant airmen.

4.4 Vicarious Exposure to Combat and Post-Traumatic Stress

4.4.1 VCES. Overall, the mean VCES score was 42.75 (SD = 24.64) for DCGS intelligence exploitation personnel and 23.89 (SD = 17.24) for DCGS support/system sustainment, personnel. Noncombatant airmen from co-located support/logistic units were not assessed for in-garrison combat exposure. Since DCGS intelligence exploitation and DCGS support/system sustainment personnel work in the same organizational environment, but execute different functions, an analysis of variance assessing between group differences was conducted. The difference between groups was found to be significant ($F_2 = 14.573$, $p < .01$).

A summary of VCES scoring ranges by category (low, moderate, high) for DCGS intelligence exploitation personnel revealed 120 (48.19%) experienced low combat exposure, 97 (38.96%) experienced moderate combat exposure, and 32 (12.85%) experienced high combat exposure. A summary of responses from DCGS support/system sustainment personnel revealed 35 (77.78%) experienced low combat exposure, 9 (20.0%) experienced moderate combat exposure, and 1 (2.22%) experienced high combat exposure.

Further analyses of the DCGS intelligence exploitation subgroup comparing low VCES scorers to high VCES scorers revealed significant associations with facets of occupational burnout subcategories and clinical distress (and subcategories as measured by the OQ-45.2). Chi-square analysis showed that scoring high on the VCES is significantly associated with scoring 20 or higher for emotional exhaustion ($\chi^2 = 6.72$, $p < 0.01$) and cynicism ($\chi^2 = 4.2$, $p < 04$). High VCES scores were also significantly associated with being at or above threshold for symptom distress (OQ-45.2 ≥ 64; $\chi^2 = 7.55$, $p < 0.018$) and distress in the area of social role ($\chi^2 = 9.18$, $p < 0.002$).

4.4.2 PCL-M. The mean PCL-M score was was 23.37 (SD = 8.23) for DCGS intelligence exploitation personnel, 21.51 (SD = 8.29) for DCGS support/system sustainment personnel, and 22.33 (SD = 8.73) for noncombatant airmen from co-located support/logistic units. An analysis of variance assessing between group differences was not significant ($F_2 = 2.746$, $p = .065$). The number and percentage of those who had a score of 50 or higher (at increased risk of PTSD) were 6 (1.62%) for DCGS intelligence exploitation personnel, 4 (2.90%) for DCGS support/system sustainment personnel, and 4 (2.34%) for noncombatant airmen. A chi-square test for differences showed no significance between any of the subject groups.

4.5 Overall Comparisons and Odds Ratios

Across the board, group mean scores and the relative incidence of stress response were significantly higher for DCGS intelligence exploitation personnel when compared to DCGS support/system sustainment personnel and noncombatant airmen. Table 1 illustrates the rates of reaching or exceeding threshold on the primary stress indices employed in the study.

Table 1. Percentages in Each Group at or Above the Discretionary Thresholds for Identifying High Levels Regarding Facets of Burnout, Clinical Distress, Vicarious Combat Exposure, and PTSD

Stress Measure	DCGS Intelligence Exploitation Personnel (%)	DCGS Support/System Sustainment Personnel (%)	Noncombatant Airmen (%)
Facets of Burnout			
Emotional Exhaustion	24	10	8
High Cynicism	27	11	10
Low Professional Efficacy	6	6	7
High Clinical Distress			
Overall Distress	16	8	7
Symptom Distress	14	5	3
Interpersonal Relationship	24	17	14
Social Role	35	20	21
High Level of Vicarious Exposure to Combat and PTSD-Related Symptoms			
Vicarious Combat Exposure	13	2	N/A
PTSD-Related Symptoms	2	3	2

[a]

A subsequent series of odds ratios was performed to assess the relationship between demographic variables (i.e., age, rank, gender, group, shift work, hours worked, length of assignment) and the likelihood of DCGS intelligence exploitation personnel reporting high levels of emotional exhaustion/fatigue and cynicism. When comparing respondents reporting high emotional exhaustion to those reporting low to moderate emotional exhaustion, the results of the analyses revealed the following:

1. Those who reported working a swing or night shift schedule (particularly midnight shift) were 2 times more likely to report high emotional exhaustion (95% confidence interval (CI): 1.22-3.53) than those who strictly worked a day schedule. Additionally, night shift workers were 3.2 times at risk of high cynicism (95% CI: 1.82-5.65).
2. Those who reported working chronically long work hours (50 hours or more per week) were 2 times more likely to report high emotional exhaustion (95% CI: 1.2-3.15) than those who worked less than 50 hours per week.
3. Those who reported sleeping on average 4 hours or less prior to work were 5.48 times more likely to report high emotional exhaustion (95% CI: 2.15-10.73) than those reporting 5 or more hours of sleep prior to work.
4. Those who reported experiencing high vicarious combat exposure were 3.9 times more likely to report high emotional exhaustion (95% CI: 1.3-6.4) than those reporting low vicarious combat exposure.

When comparing respondents who met or exceeded threshold for clinical distress to those below threshold (OQ-45.2 $\geq$ 63):

1. Those who reported working on a swing or night shift schedule (particularly midnight shift) were 3 times more likely to report overall clinical distress (95% CI: 1.6-5.64) than those on a day shift schedule.
2. Those who reported working chronically long work hours (50 hours or more per week) were 2.4 times more likely to report social role stress (95% CI: 1.5-3.8) than those who worked less than 50 hours per week.
3. Those who reported sleeping on average 4 hours or less prior to work were 4.2 times at risk for clinical distress (95% CI: 1.83-9.57) than those reporting 5 or more hours of sleep prior to work. There was particular concern in the areas of symptom distress (5 times the risk, 95% CI: 2.18-11.62) and social role stress (4 times the risk, CI: 1.8-9.7).
4. Those who reported being single were 2.9 times more likely to experience overall clinical distress (95% CI: 1.5-5.5), and 3.6 times more likely to experience distress in the area of interpersonal relationships, than those who reported being married.
5. Those who reported experiencing high vicarious combat exposure were 3.5 times more likely to report clinical symptom distress (95% CI: 1.4-8.8) than those reporting low vicarious combat exposure.

5.0 DISCUSSION

The combination of quantitative and qualitative analysis presents a compelling picture of occupational stress among DCGS intelligence exploitation personnel supporting around-the-clock real-time operations. Although subjective feedback from survey respondents points to occupational factors as the primary sources of stress, combat exposure appears to compound this stress,

manifesting in increased rates of emotional exhaustion and clinical distress. When considering the defined goals for the study, much was learned about the relative rates of stress response between groups and the various sources of stress contributing to these negative emotional impacts.

5.1 Main Sources of Occupational Stress Between DCGS Intelligence Exploitation Personnel and Comparison Groups

A qualitative analysis of survey responses revealed the most commonly cited stressors associated with occupational stress among DCGS intelligence exploitation personnel included (1) shift work and long hours (50+ hours a week); (2) difficulties with leadership/management and organizational problems; and (3) nature of the work – continual heightened vigilance to multiple visual/auditory sources of combat information and high precision nature of operations. These findings point to operational stressors as the most prevalent causes of occupational stress among DCGS intelligence exploitation operators.

For the most part, the top reported stressors were similar between DCGS intelligence exploitation and DCGS support/system sustainment personnel. Although exploitation personnel did not report exposure to combat as the main stressor, they reported the deployed-in-garrison nature of their duties as one of the more occupationally difficult aspects of their duty position. This may be influenced, in part, by the other stressors (shift work, long hours) and management issues (additional duty taskings, inadequate time for training) associated with sustaining 24/7 operations. The reported deployed-in-garrison nature of exploitation duties stands as one of the main occupational stressors that are distinct from the stressors reported by the comparison groups.

5.2 Levels and High Incidences of Facets of Occupational Burnout

As mentioned previously, the subscale of emotional exhaustion is a subjective measure regarding the depletion of emotional energy due to work-related stress. High scores on emotional exhaustion are likely signs of distress in response to emotionally demanding work. According to the results of the study, approximately one out of every four active duty DCGS intelligence exploitation personnel reported experiencing high levels of emotional exhaustion. Furthermore, odds ratios revealed that such personnel were at higher risk of emotional exhaustion when compared with DCGS support/system sustainment personnel and noncombatant airmen. Such prevalence of emotional exhaustion raises medical concerns regarding the impact of the occupational environment on the health and well-being of operators, as well as the elevated risk for performance-related problems.

As mentioned previously, the subscale of cynicism is a subjective measure regarding the sense of indifference or a distant attitude towards work (e.g., a declining sense of enthusiasm for work). According to the results of this study, there is a significant difference in the levels of cynicism reported between active duty DCGS intelligence exploitation personnel and comparison groups. Approximately 1 out of every 4 DCGS intelligence exploitation operators reported high levels of cynicism compared to approximately 1 out of 10 in the comparison groups. This is a particularly salient finding for line leadership tasked with sustaining morale. Furthermore, it is reasonable to perceive high levels of cynicism leading to additional performance and/or retention-related difficulties.

Despite the higher levels of emotional exhaustion and cynicism, there was no difference in professional efficacy among participants. Airmen in all three groups participating in this study reported similar levels in their sense of accomplishment and effectiveness at work. The incidence of low professional efficacy was below 10% in each group. The results of the study indicate that higher

levels of cynicism and emotional exhaustion are not necessarily associated with a decline in the perception of value and contribution of one's role at work. The results of the study suggest that airmen sustain the perception they are making a difference on the job.

5.3 Levels and Incidence of Clinically Meaningful Emotional Distress and Corresponding Subscales

As mentioned previously, emotional distress is a commonly used phrase to refer to an unpleasant emotional state characterized by negative emotional, behavioral, physical, and cognitive changes in functioning. Given the sensitive nature of DCGS intelligence exploitation operations, it is critical to military commanders to gauge the levels of emotional distress experienced among such airmen directly engaged in such operations.

The results of this study suggest that DCGS intelligence exploitation personnel experience higher levels of distress (to include symptom distress, interpersonal relationship distress, and social role/conflict) in contrast to the DCGS support/system sustainment personnel and noncombatant airmen comparison groups. The results of this study found that DCGS intelligence exploitation personnel had twice the rate of overall clinical distress than the comparison groups (16% vs. 8% and 7%, respectively). Additionally, it is important to note that one out of every three to four DCGS intelligence exploitation personnel reported distress in the area of interpersonal relationships and social role stress functioning. This is particularly salient to leadership given the interpersonal requirements to function effectively within a DCGS exploitation environment. Airmen with notable difficulties interacting with others may also be experiencing high levels of emotional distress and may benefit from mentorship and leadership intervention.

5.4 Level of Vicarious Exposure to Combat-Related Events and Level of PTSD-Related Symptoms

The results of this study revealed DCGS intelligence exploitation personnel experience substantially higher levels of vicarious exposure to combat-related events when compared with DCGS support/system sustainment personnel. This finding is consistent with the differing nature of tasks and duties between the two groups. Although co-located in the same setting, DCGS intelligence exploitation personnel focus exclusively on the various forms (auditory, visual, and fused) of intelligence gathered from the battlefield, whereas support/sustainment personnel carry out tasks that do not include such exposure. However, contrary to commonly held perceptions, higher levels of vicarious exposure to combat did not lead to higher levels of endorsement for PTSD-related symptoms. The results of the study did not substantiate the perception of higher levels of PTSD among those with high levels of vicarious exposure to combat.

As mentioned previously, PTSD is a complex psychological condition characterized by frequency and severity of specific (i.e., re-experiencing, hyperarousal, avoidance) symptoms in response to exposure to a traumatic event (e.g., witness or experience events that lead to actual or threatened death, injury to others). Furthermore, the response to the event must involve intense feeling of fear, helplessness, or horror. While respondents did not subjectively endorse combat exposure as a top source of occupational stress or higher levels of PTSD, quantitative analysis regarding the frequency of vicarious exposure to combat cannot rule it out as a contributing factor to the elevated levels of stress among DCGS intelligence exploitation personnel. It is

also important to note that the VCES measure is still be developed and additional studies are needed to confirm reliability and validity.

Cumulative findings suggest that, as a group, DCGS intelligence exploitation personnel experience more than twice the combat exposure of that experienced by their sustainment counterparts, despite working in the same mission environment. More importantly, they also experience twice the rate of emotional exhaustion, cynicism, and clinical distress. Overall, the results of this study indicate higher levels of vicarious exposure to combat lead to higher levels of emotional exhaustion and symptoms of clinical distress, but not PTSD.

5.5 Line and Medical Management Recommendations

5.5.1 Line Management. The findings in this study suggest that many of the symptoms of burnout and distress reported by DCGS intelligence exploitation personnel are of an operational nature and can be addressed by leadership through altering organizational factors and scheduling. Among these factors are the following:

- Optimizing work/rest cycles to reduce incidence of fatigue
- Implementing more stable shift rotation schedules to minimize disruptions to circadian rhythm adjustment and capability of meeting social role requirements in one's domestic life
- Addressing existing manning shortages before expanding operations to reduce or mitigate the need for operators to work 50+ hours a week
- Allowing operators adequate opportunity during duty hours to complete duty and nonduty specific training to reduce stress associated with sustaining required skills sets and proficiencies
- Having a methodical strategy for delegation of taskings and monitoring of workload associated with additional taskings to mitigate the risk for exhaustion and cynicism
- Scheduling training regularly for officer and enlisted leadership on recognizing the signs of exhaustion and distress and ways to interact with operators to elicit genuine self-disclosure
- Monitoring the level of vicarious exposure to combat and the emotional responsiveness of operators

Although the results of this study did not find a higher incidence of PTSD, vicarious exposure to combat was associated with an elevation in exhaustion and clinical distress. A coordinated line leadership and mental health provider post-combat mission debriefing with operators may help mitigate emotional difficulties stemming from participation in such events. It is also highly recommended leadership provide an atmosphere that promotes genuine self-disclosure to identify and ultimately help those who are at high risk for emotional difficulties.

It is also important for line leadership to recognize those at greatest risk for emotional exhaustion, cynicism, and clinical distress. As revealed in the results section, DCGS intelligence exploitation personnel who work swing or night shift, work chronically long hours (50+ hours a week), obtain less than 5 hours a sleep prior to work, and are single appear to be at greater risk for emotional difficulties than others. Although medical interventions may help improve the overall emotional health of DCGS intelligence exploitation personnel, it is ill-advised to rely solely on medical personnel to manage this issue. In the absence of operational leadership engagement, medical and psychological treatments will merely be treating the symptoms and not addressing salient causes of organizational stress.

5.5.2 Medical Prevention. Although operational interventions can make great strides in reducing the number of contributors to elevated distress and burnout, there are still elements of the exploitation mission that will require medical support from mental health (MH) providers. Implementing strategies to strengthen the relationship between the medical/MH organizations and the DCGS exploitation arena is critical to optimizing use of the medical/MH interventions available. The core element to strengthening this relationship would be the appointment of dedicated and experienced medical/MH providers (similar to flight surgeon model of care) to specific units to provide care, as well as to educate leaders and operators on operational stress and interventions.

An MH provider or technician with top secret clearance dedicated to specific DCGS intelligence units will also help strengthen the understanding of organizational and occupational-specific stressors affecting emotional health. Co-locating MH providers within a medical treatment arena may help increase access to MH care. The increased understanding and relationship building will improve the capability of MH providers to make effective discretionary judgments regarding how levels of clinical distress may affect performance and sustainment of around-the-clock intelligence exploitation operations.

Furthermore, when appropriate, the provision of occupationally tailored mental health debriefings to exploitation personnel regarding strategies to mitigate the impact of mission-specific operational stressors may help optimize performance. Systematic implementation of a standardized screener assessing for occupational burnout may be helpful to medical providers treating DCGS intelligence exploitation personnel.

In addition to considering the strategic methods required to address the needs of the DCGS intelligence exploitation community, it is equally important to consider the nature of interventions that may be required. Subjective remarks provided by survey participants point to specific areas of concern. Among these were coping strategies that involve somewhat elevated rates of self-medication (alcohol, tobacco, and over-the-counter medicine) as well as prescribed medicine and increased need for medical care to assist in sleep issues, stress, pain management, and mental health concerns.

It may also be beneficial to standardize occupational health "best practices and process improvement strategies." It is likely that a list of such practices across the local clinics may reveal specific areas of opportunity for improving the quality and access to mental health care. This is particularly important given the projected expansion and further dependence on such operators for conducting critical ISR around-the-clock operations in the future.

5.6 Assumptions and Limitations of the Study

5.6.1 Assumptions. Since combat exposure is an inherent part of the participants' occupations, for the purposes of this study it is an element of occupational "work" stress and is accounted as such among those who specify work as a source of their individual stress. This study also assumes that since the survey device is anonymous and nonattributional in nature, all respondents are answering truthfully, with no hidden agendas. It is also assumed that the sample group is sufficient to represent the target audience, and nonrespondents would answer no differently than those who volunteered to do so. Finally, the study assumes that there are no unwarranted assumptions in the survey instrument itself.

5.6.2 Limitations. The intent of this study is to not diagnose mental illness, but to screen for indicators and determine any demographic or combat-exposure-related trends. This study is also not able to account for preexisting conditions, whether physical or psychological, unless self-reported within the survey. Despite preliminary validation, the VCES is still at an experimental stage, and its sensitivity in measuring combat exposure may require further refinement. Finally, this study cannot account for any shifts in operations tempo (up or down) that may have occurred during the period of survey data collection that lead to transient, situationally induced increases in emotional exhaustion or distress.

The epidemiological nature of this study raises the concern for external validity (i.e., the generalizability of the results to all DCGS intelligence exploitation personnel). The foundation of generalizability of results is dependent upon the sample representing the general population. This study relies upon a convenience sample of personnel who were available to complete the survey during specific time periods, and it is recognized this convenience sample may not adequately represent the general population of DCGS intelligence exploitation personnel.

An issue affecting internal validity is the degree to which the screening method employed in this study warrants definitive judgments about the psychological disposition and service needs of DCGS intelligence exploitation personnel. In the descriptive and epidemiologic context, evaluation of functional impact is particularly important. The results of this study did not fully address the functional impairment of emotional exhaustion or clinical distress. The implicit assumption of epidemiologic studies, such as this one, is that airmen reporting high levels of emotional exhaustion or clinical distress are in need of care. However, simultaneous assessment of functional impairment is needed to support the validity of this assumption, and a prospective study would be necessary to validate a higher rate of personnel in need of medical care. It is possible that many DCGS intelligence exploitation personnel who endorse symptoms of distress remain functionally resilient and fit for duty.

6.0 CONCLUSIONS

The results of this study indicate that combined operational stressors (e.g., long hours, shift work, manning ratios, and challenges to sleep hygiene) constitute the preponderance of stress within the DCGS intelligence exploitation community. However, preliminary analysis of combat exposure suggests that combat as an element of the work experience does contribute and may exacerbate the stress reaction among DCGS intelligence exploitation personnel. Since combat, sustained vigilance, and 24/7 operations are all inherently stressful, eliminating all of the occupational stress associated with real-time exploitation is an impossible goal. With the medical resources available to advise commanders and assist individuals, policy and leadership decisions can significantly influence the factors that induce occupational stress.

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LIST OF ABBREVIATIONS AND ACRONYMS

CI	confidence interval
DCGS	distributed common ground system
ISR	intelligence, surveillance, reconnaissance
MBI-GS	Maslach Burnout Inventory-General Survey
MH	mental health
OQ-45.2	Outcome Questionnaire-45
PCL-M	PTSD Checklist for Military
PTSD	post-traumatic stress disorder
SD	standard deviation
VCES	Vicarious Combat Exposure Scale