AFRL-SA-WP-TR-2011-0003

FACETS OF OCCUPATIONAL BURNOUT AMONG U.S. AIR FORCE ACTIVE DUTY AND NATIONAL GUARD/RESERVE MQ-1 PREDATOR AND MQ-9 REAPER OPERATORS

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June 2011

Final Report
for July 2010 to June 2011

Distribution Statement A: Approved for public release; distribution is unlimited. Case Number: 88ABW-2011-4485, 15 Aug 2011

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NOTICE AND SIGNATURE PAGE

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REPORT DOCUMENTATION PAGE			*Form Approved OMB No. 0704-0188*

1. REPORT DATE *(DD-MM-YYYY)*	**2. REPORT TYPE**	**3. DATES COVERED *(From – To)***
30-06-2011	Final Technical Report	July 2010 – June 2011

4. TITLE AND SUBTITLE	**5a. CONTRACT NUMBER**
Facets of Occupational Burnout Among U.S. Air Force Active Duty and National Guard/Reserve MQ-1 Predator and MQ-9 Reaper Operators	**5b. GRANT NUMBER**
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	**5d. PROJECT NUMBER**
Joseph A. Ouma, Wayne L. Chappelle, Amber Salinas	**5e. TASK NUMBER**
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USAF School of Aerospace Medicine Aerospace Medicine Education 2510 Fifth St. Wright-Patterson AFB, OH 45433-7913	**8. PERFORMING ORGANIZATION REPORT NUMBER** AFRL-SA-WP-TR-2011-0003
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)	**10. SPONSORING/MONITOR'S ACRONYM(S)**
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT

Distribution Statement A: Approved for public release; distribution is unlimited. Case Number: 88ABW-2011-4485, 15 Aug 2011

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The increasing operational demand for MQ-1 Predator and MQ-9 Reaper remotely piloted aircraft (RPA) in support of intelligence, surveillance, and reconnaissance missions as well as precision-strike operations in theaters of conflict has led to a substantial rise in operational hours, shift work, and exposure to combat-related events (e.g., destruction of enemy assets and combatants) for operators. As a result of the continual need to sustain a high operational tempo, there are concerns among line commanders and aeromedical leadership regarding the prevalence of occupational burnout. There is also concern that there are differences across units for risk of occupational burnout and that active duty crew members are at higher risk when compared with National Guard/Reserve operators. This study surveyed 426 officer and enlisted operators (pilots and sensor operators). Although a wide range of stressors may contribute to elevated levels of burnout, the majority of occupational stress was reported to stem from operational stress and not exposure to combat (e.g., live video feed regarding the destruction or death of enemy combatants and ground forces). In general, the results revealed that active duty operators are more than twice as likely to suffer from the facets of occupational burnout involving emotional exhaustion and cynicism. Active duty as well as National Guard/Reserve operators attributed shift work, shift changes, hours worked, and simultaneously serving as a warfighter in theater while returning home and managing domestic roles and responsibilities at home to their burnout levels. Aeromedical recommendations include reducing operational hours, reducing frequency of shift changes, reducing the length of assignments, providing clear guidance and opportunities for competitive career-progression, improving human-machine interfacing within the ground control station, marital and family enrichment opportunities, as well as periodic psychological health assessments to mitigate the risk of burnout among RPA operators.

15. SUBJECT TERMS

Remotely piloted aircraft, pilots, sensor operators, operational stressors, combat stressors

16. SECURITY CLASSIFICATION OF:			**17. LIMITATION OF ABSTRACT**	**18. NUMBER OF PAGES**	**19a. NAME OF RESPONSIBLE PERSON** Wayne L. Chappelle
a. REPORT	**b. ABSTRACT**	**c. THIS PAGE**			**19b. TELEPHONE NUMBER *(include area code)***
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Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18

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1.0 EXECUTIVE SUMMARY

The increasing operational demand for MQ-1 Predator and MQ-9 Reaper remotely piloted aircraft (RPA) in support of intelligence, surveillance, and reconnaissance missions as well as precision-strike operations in theaters of conflict has led to a substantial rise in operational hours, shift work, and exposure to combat-related events (e.g., destruction of enemy assets and combatants) for operators. As a result of the continual need to sustain a high operational tempo, there are concerns among line commanders and aeromedical leadership regarding the prevalence of occupational burnout. There is also concern that there are differences across units for risk of occupational burnout and that active duty crew members are at higher risk when compared with National Guard/Reserve operators. This study surveyed 426 officer and enlisted operators (pilots and sensor operators). The survey consisted of items assessing demographics and occupational work-related conditions (e.g., shift work, hours worked per week, geographic location), as well as a nationally standardized instrument assessing facets of occupational burnout that include emotional exhaustion, cynicism, and professional efficacy. The survey was anonymous to maximize self-disclosure from participants and was completed within the operational installation in which participants were assigned. The results of the study revealed that 78 (26.35%) active duty and 18 (13.85%) National Guard/Reserve operators reported experiencing high levels of emotional exhaustion and 48 (16.22%) active duty and 9 (6.92%) National Guard/Reserve members reported experiencing high levels of cynicism. The results of the study also revealed active duty members were more than twice as likely to report high levels of work-related emotional exhaustion and cynicism. However, there were no group differences in professional efficacy. Both groups were consistent and shared positive perception regarding the impact and contributions of their work. Although a wide range of stressors may contribute to elevated levels of burnout, the majority of occupational stress was reported to stem from operational stress and not exposure to combat (e.g., live video feed regarding the destruction or death of enemy combatants and ground forces). For instance, 157 (53.40%) active duty and 65 (52.00%) National Guard/Reserve operators attributed a moderate to large amount of their occupational stress to shift work. In general, the results revealed that active duty operators are more than twice as likely to suffer from the facets of occupational burnout involving emotional exhaustion and cynicism. Active duty as well as National Guard/Reserve operators attributed shift work, shift changes, hours worked, and simultaneously serving as a warfighter in theater while returning home and managing domestic roles and responsibilities at home to their burnout levels. However, active duty operators were more likely to report working longer hours and additional stressors associated with geographical location of assignment, concerns regarding career-progression, and an uncertain future regarding assignment opportunities. Aeromedical recommendations include reducing operational hours, reducing frequency of shift changes, reducing the length of assignments, providing clear guidance and opportunities for competitive career-progression, improving human-machine interfacing within the ground control station, marital and family enrichment opportunities, as well as periodic psychological health assessments to mitigate the risk of burnout among RPA operators.

2.0 INTRODUCTION

The U.S. Air Force (USAF) MQ-1 Predator and MQ-9 Reaper have emerged as dominant intelligence, surveillance, reconnaissance (ISR) and weapon-bearing, precision-strike remotely piloted aircraft (RPA). As a result of their effectiveness, such aircraft are increasingly relied upon in a wide range of military operations worldwide. The increasing demand for such aircraft has created the need for RPA operators (pilots, sensor operators, and mission intelligence coordinators) to sustain multiple, 24-h ("round-the-clock") combat air patrols. This has led to a dramatic increase in operational hours, shift work, and exposure to combat-related events (e.g., destruction of enemy assets and combatants). As a result of the continual need to sustain a high operational tempo, there are concerns among aeromedical leadership regarding the prevalence of occupational burnout among Predator/Reaper operators. Although RPA aircraft may shield operators from the traditional threats to physical safety while in combat, the high operational tempo and unique stressors of the RPA environment may elevate the risk for occupational burnout.

The level of risk may not be the same between active duty and National Guard/Reserve operators. Anecdotal evidence based upon discussions with line commanders and flight medicine physicians suggests that occupational burnout is perceived by line commanders to be higher among active duty units. Although all operators must contend with having to simultaneously manage a high operational tempo while juggling their role as warfighters with their domestic duties, there is concern that active duty operators work longer hours, have more frequent shift changes, and struggle with more career-oriented stressors than National Guard/Reserve units. However, there is only a limited amount of objective information regarding the impact of such operations on the psychological well-being of RPA operators in general. Moreover, there are no published studies to date assessing for differences in the facets of occupational burnout between active duty and National Guard/Reserve MQ-1 Predator and MQ-9 Reaper units.

2.1 Purpose

The purpose of this study is to assess for the top sources of occupational stress perceived by active duty and National Guard/Reserve operators and the differences between active duty and National Guard/Reserve operators on facets of occupational burnout regarding the prevalence of emotional exhaustion (e.g, the depletion of emotional energy and reserves), cynicism (e.g, declining sense of enthusiasm and increasing complacency to work), and professional efficacy (i.e., sense of self-competency and effectiveness at work). To fully understand the concern for occupational burnout among such operators, the following sections describe the Predator/ Reaper aircraft; operator (i.e., pilot and sensor operator) duties; and the various operational, combat-related, and career-oriented stressors common to RPA operations.

2.2 Description of MQ-1 Predator and MQ-9 Reaper

The Department of Defense (DoD) defines RPAs as powered, aerial vehicles that do not carry a human operator, use aerodynamic forces to provide lift, fly autonomously and/or piloted remotely, are expendable or recoverable, and can carry a lethal or nonlethal payload. It is important to note that ballistic or semi-ballistic vehicles, cruise missiles, and artillery projectiles are not considered unmanned aerial vehicles (Ref 1). The Army, Navy, and USAF operate a wide range of RPAs that involve low-, medium-, and high-altitude as well as long- and short-range mission capabilities. Among the many RPAs within the DoD arsenal, the USAF MQ-1 Predator and MQ-9 Reaper have emerged as critical and dominant aerial assets to joint ISR and precision-strike operations in theaters of conflict.

The MQ-1 Predator is a medium-altitude, long-endurance RPA originally developed to meet demands for a quiet, versatile, unmanned reconnaissance aircraft. The aircraft is roughly the length of a Cessna 172 civilian aircraft (27 ft long, 6.9 ft tall) with a wingspan of slightly longer than an F-15E fighter aircraft. Remotely piloted from a ground control station (GCS), the aircraft is equipped with multiple full-motion video cameras for day and night operations as well as variable weather conditions. It is also fitted with an advanced targeting system of electrooptical, infrared, laser designation, and laser illumination capabilities and is configured to carry two laser-guided AGM-114 Hellfire anti-tank missiles (Ref 2). The MQ-1 Predator travels at high speeds that vary according to weather and wind conditions, loiters over a target for up to 24 h, and has an operational ceiling of 25,000 ft. The roles of this aircraft, from an ISR to a weapon-deploying asset, quickly elevated USAF capabilities for supporting ground forces and attacking enemy combatants.

The strategic role of the MQ-1 Predator in ISR and precision-strike missions fostered demand for a more versatile and lethal "hunter-killer" aircraft with enhanced capabilities for identifying, targeting, and destroying enemy combatants and assets considered time-sensitive targets. The MQ-9 Reaper is a high-altitude, long-endurance airframe that is roughly the size of an F-16 fighter with a length of 40 ft and a height of 16 ft. It flies higher (up to 50,000 ft) and faster and is more heavily armed. The MQ-9 Reaper features the same types of cameras as its predecessor as well as synthetic aperture radar (SAR) that allows observation and targeting of points of interest on the ground when poor weather conditions create visual difficulties. The MQ-9 Reaper weapons payload may be configured with up to eight AGM-114 Hellfire missiles, four 500-lb GBU-12 Paveway II laser-guided bombs, or two GBU-38/B joint direct attack munition bombs, as well as other weapons such as AGM-65 Maverick air-to-surface missiles, AIM-9 Sidewinder air-to-air missiles, and AIM-120 Advanced air-to-air missiles. The versatility in weapons configurations provides flexibility to air combatant commanders and ground units requesting assistance. The aircraft may also be equipped with a variety of sensors and cameras, dependent upon the needs of the mission.

Both the MQ-1 Predator and MQ-9 Reaper represent significant advancements in the areas of aviation, human-machine computer and satellite-based engineering, visual imagery surveillance technology, as well as weapons targeting and configurations. As a result, such aircraft have significantly expanded both the breadth and depth of USAF air power across the globe.

2.3 Operational Demand for the Predator/Reaper Aircraft

As mentioned previously, the MQ-1 Predator and MQ-9 Reaper serve several functions in the collection of still and live imagery and streaming video to support ISR and close air support operations. They provide critical, real-time information to combatant commanders for identifying fixed and moving enemy assets and combatants, tracking and eliminating enemy combatants, locating and destroying weapons caches, directing and protecting ground forces, safeguarding convoys, augmenting manned-strike missions, and surveying post-strike battle damage (Ref 3). Such aircraft provide significant strategic advantages to battlefield commanders while shielding RPA crew members from traditional threats to safety (Ref 4). As a result of their strategic advantages, the demand for Predator/Reaper operations has grown substantially (Ref 5). The increased acquisitions budget and devotion to further development of such RPA aircraft reflect the vision of USAF leadership that RPA operations (such as the Predator and Reaper) will dominate aerial battlefield operations throughout the 21st century (Ref 5-7). The increasing demand for such RPA operations throughout a wide range of ISR and precision-strike missions has resulted in the need to increase the number of RPA operators across USAF active duty and National Guard/Reserve units and to develop specific enlisted and officer operator career fields specifically devoted to such operations.

2.4 MQ-1 Predator/MQ-9 Reaper Operators

To fully understand the potential for occupational burnout, it is important to understand the role and duties of RPA operators. The Predator/Reaper aviation-related crew is composed of a pilot (i.e., a commissioned officer) and sensor operator (SO) (an enlisted member). These crew members participate in tip-of-the spear ISR and weapon-deployment operations on a daily basis. They sit side-by-side in a GCS working together in a seamless fashion to carry out a wide range of aviation-related tasks.

2.4.1 Pilot Role and Duties. USAF MQ-1 Predator and MQ-9 Reaper pilots perform a wide range of manual and computer-based tasks to actively and passively control and maneuver the aircraft (Nagy JE, Kalita SW, Eaton G, *U.S. Air Force Unmanned Aircraft Systems Performance Analyses*, *Predator Pilot Front End Analysis (FEA Report)*, SURVIAC-TR-06-203, Feb 2006; available through the Defense Technical Information Center to U.S. Government agencies and their contractors only). As reported by Chappelle et al. (Ref 8), the duties of the predator and reaper pilots include, but are not limited to: (a) performing preflight and in-flight mission planning activities in accordance with unified combatant command and theater rules of engagement (ROE); (b) understanding tactics, techniques, and procedures (TTPs) for friendly and enemy air order of battle (AOB) assets; (c) receiving, interpreting, extracting, and disseminating relevant air tasking orders (ATOs), airspace control orders (ACOs), and special instructions (SPINS) information; (d) ensuring airframe and supporting GCS systems for controlling the aircraft are operating efficiently and effectively; (e) performing checklists and monitoring system controls during aircraft launch/recovery; (f) flying the aircraft en route to airspace of national interest while coordinating with air traffic control, ground forces, and other aircrew; (g) strategically maneuvering the aircraft to gather surveillance and reconnaissance data over targets and areas of interest; (h) maneuvering the aircraft into strategic positions for the deployment of weapons; (i) assisting in air navigation, AOB integration, fire control planning, and determining effective weapons control and delivery tactics to achieve mission objectives; (j) receiving target briefs for weapons delivery and conducting battle damage assessments (BDAs); as well as (k) assembling target information, locating forces, and determining hostile intentions and possible tactics.

An additional challenge related to piloting the aircraft is the demand to attend to and interpret visual and auditory data from several sources to sustain situational and spatial awareness. Specifically, pilots are required to multitask and sustain vigilance to multiple forms of input from the aircraft, other aircrew, and military personnel (e.g., ground forces). These multiple tasks include translating two-dimensional imagery into mental representations while performing numerical calculations for maneuvering the aircraft (see Nagy, Kalita, & Eaton, p. 4). It is important to note, as reported by Chappelle et al. (Ref 8), that despite the automated nature of the MQ-1 Predator and MQ-9 Reaper during certain phases of flight, the pilot must manually maneuver the aircraft for deployment of weapons, BDA, strategic positioning for surveillance and reconnaissance, avoiding bad weather, and controlling the aircraft during equipment or system failures. For effective and efficient operations, the pilot also works closely with the SO, mission intelligence coordinator, and other military personnel on the ground and in the air for identification and discrimination of targets and deployment of weapons. As can be surmised from above, the pilot must draw from an inherent set of cognitive aptitudes and personality traits to successfully master a wide knowledge and skill set. Nagy, Kalita, and Eaton (see citation, p. 4) offer a more in-depth view of the specific job tasks and duties of RPA pilots.

2.4.2 Sensor Operator Role and Duties. In general, RPA SOs employ airborne sensors in manual or computer-assisted modes to actively and/or passively acquire, track, and monitor airborne, maritime, and ground objects, as well as enemy combatants and assets. They conduct operations and procedures in accordance with SPINS, ATOs, and ROE. As reported by Chappelle et al. (Ref 9), specific SO duties include (a) conducting reconnaissance and surveillance of potential targets and areas of interest; (b) detecting, analyzing and discriminating between valid and invalid targets using SAR, electrooptical, low-light, and infrared full-motion video imagery, and other active or passive tracking systems; (c) assisting in air navigation, AOB integration, fire control planning, and determining effective weapons control and delivery tactics to achieve overall mission objectives; (d) receiving target briefs (9-liners) for weapons delivery and conducting immediate first phase BDAs for up-channel coordination and potential re-attack; (e) utilizing laser target marking systems to provide target identification and illumination for onboard weapons delivery and being responsible for terminal weapons guidance; (f) performing preflight and in-flight mission planning activities in accordance with unified combatant command and theater ROE; (g) understanding TTPs for friendly and enemy AOB assets; (h) operating mission planning ancillary equipment to initialize information for download to airborne mission systems; (i) receiving, interpreting, extracting, and disseminating relevant ATO, ACO, and SPINS information; (j) researching and studying target imagery, friendly and enemy orders of battle, and offensive and defensive capabilities from various sources; and, lastly (k) assembling target information, locating forces, and determining hostile intentions and possible tactics.

As can be surmised from above, this enlisted aircrew position requires a person to visually discriminate and synthesize various images and complex data on several electronic screens while maintaining heightened vigilance to numerous sources of visual and auditory information necessary for sustaining situational and spatial awareness. For example, the SO must effectively attend to the electronic video to calibrate instruments and distances of specific ground objects while maintaining vigilance to visual and auditory input from aircrew and command. The SO must also effectively communicate with aircrew to report the identification and discrimination of targets and to assist in the deployment of weapons. The SO must also sustain visual targeting during and following the employment of weapons to ensure accuracy and damage assessment. This task includes visually observing the destruction of fixed and moving objects (such as buildings and cars), as well as the wounding and death of human combatants. Morever, the SO must be attentive to several procedural checklists and processes with advanced computer systems while simultaneously translating two-dimensional information from video screens into four-dimensional mental imagery and spatial analyses. As mentioned above, SOs must carry out their duties in a confined environment with specific ROE, tactics, and techniques. Nagy, Muse, and Eaton (Nagy J, Muse K, Eaton G, *U.S. Air Force Unmanned Aircraft Systems Performance Analyses: Predator Sensor Operator Front End Analysis (FEA) Report*, SURVIAC-TR-10-043, 18 Aug 2006; available through the Defense Technical Information Center to U.S. Government agencies and their contractors only) offer a more in-depth view of the specific job tasks and duties of SOs.

2.5 Aeromedical Concerns Regarding Occupational Burnout

According to USAF aeromedical policy, performing and operating in a high-demand, high-operational, and high-precision aviation-related position requires an optimal level of physical and psychological functioning (Ref 10,11). Although operators may be perceived to be generally healthy, if they suffer from a physical or psychological condition that has the potential to lead to degradation in the performance of their duties, then they are disqualified from such aviation-related operations. A general reason for holding operators to such high aeromedical standards is due to the perceived risk that subtle decrements in health can have on elevating the risk for an aviation mishap in which the threat to human life, national security, foreign relations, military operations, and loss of a multimillion dollar aircraft is often high. Although occupational burnout is not a categorical psychiatric diagnosis, it stands to reason that such a condition leads to performance degradation and, if untreated, may lead to significant emotional difficulties (e.g., anxiety and depression).

Occupational burnout has been studied in depth and defined by Maslach, Jackson, and Leiter (Ref 12) as containing three aspects: emotional exhaustion (i.e., depletion of emotional energy and reserves due to work-related stress), cynicism (a sense of indifference or a distant attitude toward work, as well as declining sense of enthusiasm for work), and personal efficacy (i.e., a sense of satisfaction with accomplishments and efficacy at work). Occupational burnout is composed of high levels of emotional exhaustion and cynicism, combined with low levels of personal efficacy. Consequently, the negative effects of occupational burnout can be wide ranging, from impaired ability to complete tasks to difficulty relating to people.

As mentioned previously, the sources of occupational burnout can be wide ranging. An important aspect of assessing the facets of burnout is to understand the RPA operator's occupational environment as a whole. This understanding includes considering the variety of operational stressors (e.g., workload, work hours, shift work, career progression) as well as combat-related stressors (e.g., exposure to live imagery of battle damage, destruction of enemy forces, and duty to protect ground forces) that may impact an operator's psychological health. Although occupational stressors may differ across occupational positions (e.g., supervisory vs. nonsupervisory, enlisted vs. officer), an important aspect of this study is to address common sources of stress.

2.5.1 Operational Stressors. Operational stressors are defined as those related to sustaining operations. These operational stressors include issues such as available manpower, equipment, and general resources needed. There are several important operational stressors to consider when assessing the risk of occupational burnout among Predator/Reaper operators. As originally reported by Chappelle et al. (Ref 8), such stressors include, but are not limited to, (a) long hours (e.g., working 51 or more hours a week, working 6 days on, 2 days off); (b) frequent shift work and shift changes (e.g, every 3 wk), making it difficult to maintain domestic life routines (Ref 13); (c) geographically undesirable locations (e.g., long commute times, limited base and community resources in highly rural settings); (d) restricted or highly limited opportunities to fly manned airframes to maintain flight hours necessary for flight pay or promotion for those who cross-trained from a manned airframe; (e) restricted working environment (i.e., small GCS with limited freedom for mobility); (f) poor ergonomics of seating and poor temperature control of work stations; (g) sustaining vigilance to a high monitoring visual and auditory workload (Ref 14) and multitasking with time limited suspense (see Nagy, Kalita, & Eaton, p. 4; see Nagy, Eaton, & Muse, p. 6). It stands to reason such stressors can lead to both physical and psychological distress when faced on a daily basis. The long hours combined with rotating shift work can reasonably elevate the risk of fatigue (Ref 14), increase difficulty with maintaining a routine domestic life, as well as elevate the potential for a mishap (Ref 15).

2.5.2 Combat Stressors. Combat stressors are defined as those directly involved in the ISR and weapon-deployment missions that involve direct support to combat-related operations. As originally reported by Chappelle et al. (Ref 8), combat-related stressors that may lead to occupational burnout among Predator/Reaper operators include, but are not limited to, (a) precision targeting and destroying enemy combatants and assets in which mistakes may come at a high price (e.g., inadvertently killing friendly ground forces and civilians), (b) exposure to 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, lastly, (d) the unique demand for RPA operators to simultaneously juggle their warfighter role while having to sustain their domestic roles and responsibilities. Because of the advancements in aviation and computer-based and satellite communication technology, Predator/Reaper operations provide the ability to conduct ISR and precision-strike capabilities from within national borders. However, this capability creates a unique requirement on Predator/Reaper operators to compartmentalize their warfighter role from their domestic role and responsibilities on a daily basis. It stands to reason that engagement in ISR and precision-strike missions critical to theater operations may elevate the risk of occupational burnout among Predator/Reaper operators who must also simultaneously manage their domestic responsibilities.

RPA operators must also contend with a number of career-oriented stressors (Ref 8,16). First, the Predator/Reaper career field is relatively new in contrast to aviation-related career fields for manned airframes. As a result, aspects regarding competitive career progression and promotion in unmanned aviation remain uncertain. Second, many Predator/Reaper operators within active duty units cross-trained from a manned airframe under the assumption they would be able to return to their original career field following completion of a 3- to 4-yr assignment. Furthermore, many active duty operators were involuntarily assigned to Predator/Reaper units following successful completion of training in manned airframes. Whether the assignment was voluntary or involuntary, returning to their original career field in flying manned aircraft is limited or restricted. The restriction is due, in large part, to the continual surge in Predator/Reaper operations that require experienced operators. This increased demand in Predator/Reaper operations has left many active duty members with the perception they are in a career field and assignment they do not perceive as inherently rewarding. The lack of control over their assignment process and uncertain future are stressors to which many active duty operators must adapt, which may subsequently elevate their risk for occupational stress and burnout.

Based upon conversations with line commanders and flight medicine physicians at multiple USAF RPA installations, it is largely perceived that when the various stressors above are combined on a daily basis, there is a negative effect on psychological health. However, it is unknown whether or not there are differences in the rates of occupational burnout between active duty and National Guard/Reserve operators. Many line commanders and physicians suggest that RPA operators are at higher risk of burnout. This perceived increased risk of burnout occurs because of the operational stressors to which operators are exposed, such as working longer hours, a larger percentage having to work swing and night shifts to sustain "around-the-clock" operations, and undesirable geographical locations. Some commanders and physicians have suggested that uncertain career prospects regarding promotion and the involuntary nature of Reaper/Predator assignments for many active duty operators further increase the risk of burnout. Regardless of one's opinion on the sources of stress (combat vs. operational or a combination), there is a general consensus that active duty Predator/Reaper operators may be at higher risk of experiencing burnout.

3.0 METHODS

3.1 Participants

3.1.1 Active Duty Operators. There were 296 active duty participants from 8 RPA operational squadrons, with 145 pilots (48.99%) and 151 (51.01%) SOs in the study. Among the participants, there were 266 males (90.78%) and 27 females (9.22%). There were 178 (29.96%) between the ages of 18-30, 35 (19.86%) between the ages of 41-40, and 56 (8.90%) over the age of 40. The sample was composed of 65 (22.34%) airmen (E1-E3), 66 (22.68%) noncommissioned officers (E4-E5), 17 (5.84%) senior noncommissioned officers (E6-E8), 103 (35.34%) company grade officers (O1-O3), and 40 (13.75%) field grade officers (O4-O6). Four active duty participants did not report their age and rank, and one participant did not report age. A total of 113 (38.70%) reported being single and 179 (61.30%) reported being married. Four participants did not report their marital status. A total of 186 (62.84%) of the participants reported having children living at home, and 110 (37.16%) denied having children living at home.

3.1.2 National Guard/Reserve Operators. There were 130 USAF National Guard and Reserve participants from 4 separate RPA operational squadrons, with 71 pilots (54.62%) and 59 (45.38%) SOs. Among the participants, there were 123 males (94.62%) and 7 females (5.38%); 27 (20.77%) were between the ages of 18-30, 35 (26.92%) between the ages of 41-40, and 66 (51.56%) over the age of 40. There were 10 (5.05%) airmen (E1-E3), 30 (23.44%) noncommissioned officers (E4-E5), 18 (9.09%) senior noncommissioned officers (E6-E8), 13 (6.57%) company grade officers (O1-O3), and 57 (28.79%) field grade officers (O4-O6). Among the participants, two did not report their age and rank. A total of 32 (25.20%) reported being single, and 95 (74.8%) reported being married. Three participants did not report their marital status. A total of 49 (37.69%) reported having children living at home, and 81 (62.31%) denied having children living at home.

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-2009-0063-E. The voluntary and fully informed consent of participants was obtained.

3.2 Measures

Participants were given a questionnaire composed of items that asked about rank range, gender, age range, marital status, length of time serving as a Predator/Reaper operator, average number of hours worked in a typical week, current work shift, and sources of occupational stress. The demographics questionnaire was developed to allow participants to remain anonymous to increase self-disclosure in a community in which there is strong cultural stigma regarding physical and emotional difficulties.

The Maslach Burnout Inventory-General Schedule (MBI-GS) is a leading measure of occupational burnout. The measurement is a 16-item self-report questionnaire assessing occupational burnout (Ref 12). Aspects of occupational burnout measured by the questionnaire include emotional exhaustion, cynicism, and professional efficacy. The emotional exhaustion and cynicism subscales are each composed of five items, and the professional efficacy subscale is composed of six items. The subscale of emotional exhaustion is a subjective measure regarding the depletion of emotional energy and reserves due to work-related stress. High scores on emotional exhaustion are likely signs of distress in response to emotionally demanding work. The subscale of cynicism is a subjective measure regarding the sense of indifference or a distant attitude toward work (e.g., a declining sense of enthusiasm for work). The items refer to work itself and not to personal relationships at work. High levels of cynicism may reflect an attempt by respondents to distance themselves from their work as a way of coping with exhausting demands. The subscale of professional efficacy assesses satisfaction with past and present accomplishments in one's occupation, as well as expectations of continued effectiveness at work. Construct validity of the MBI-GS has been established via principal component analyses with other constructs for each of the scales. Stability coefficients range from .65 to .67 (Ref 12).

3.3 Procedure

The participation from volunteers was requested by line leadership (group, squadron, and flight commanders from active duty and National Guard/Reserve units) via e-mail and in-person group meetings. Line leadership stated participation was voluntary and responses to the questionnaire would remain anonymous to support honest disclosure. Line leadership encouraged participation to understand the main sources of stress and levels of stress of those within their chain-of-command so they would be better equipped to initiate changes that would lead to improvements in health and morale. The demographics questionnaire and MBI-GS were handed out to participants in group settings at the work site of each participant by USAF flight medicine physicians, psychologists, or mental health technicians from the medical clinic following a brief description and purpose for participation. In general, it took participants 15 to 20 min to complete all the items on the survey.

4.0 RESULTS

Item responses were summed to obtain total scores for each of the subscale measures. A number of t-tests were conducted to assess for differences between groups. A difference between group mean scores was considered operationally relevant if (a) the difference was statistically significant at the .05 level and (b) the magnitude of the difference was moderate to large as indicated by a Cohen's *d* effect size of .50. Furthermore, clinical levels of occupational burnout were identified by summing scores on the three scales. Clinical cut-off scores were set at 20 or more on both the emotional exhaustion and cynicism scales and 12 or below on the professional efficacy scale. See Figure 1 for the percentage of operators meeting or exceeding discretionary cut-off scores.

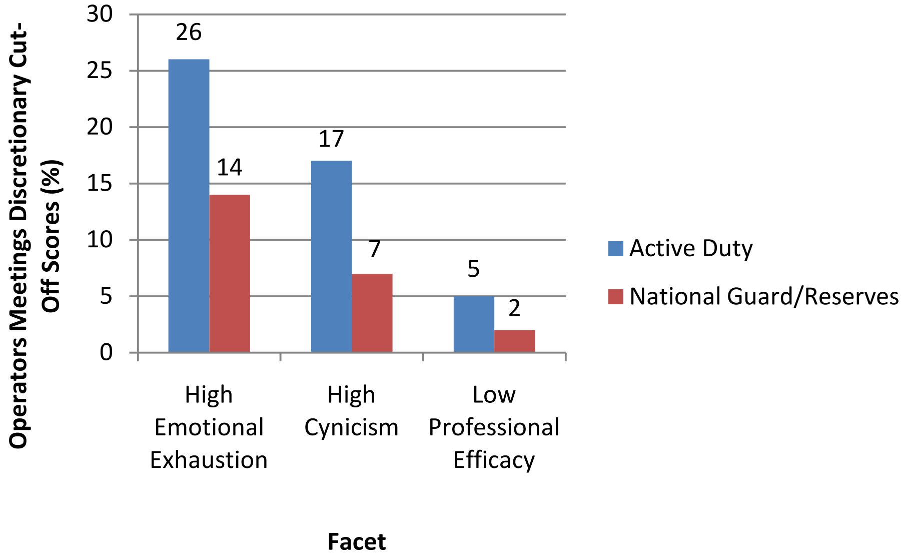

Figure 1. Percentage of Operators within Each Group Who Meet the Discretionary Cut-Off Scores for Each Facet of Occupational Burnout

4.1 Shift Work, Hours Worked, and Attribution to Occupational Stress

A summary of responses from active duty operators revealed that 149 (52.46%) worked the day shift, 70 (24.65%) worked the mid shift, and 61 (21.28%) worked the night shift. A total of four (1.41%) operators reported working multiple shifts over the past month. A total of 157 (53.40%) attributed a moderate to large amount of their occupational stress to shift work. In regards to number of hours a week operating RPAs, 32 (10.92%) reported 30-40 h a week, 120 (40.96%) reported 41-50 h a week, and 167 (56.99%) reported ≥51 h a week.

A summary of responses from National Guard/Reserve operators revealed 69 (46.83%) worked the day shift, 24 (19.05%) worked the mid shift, and 29 (23.02%) worked the night shift. A total of 14 (11.11%) operators reported working multiple shifts over the past month. A total of 65 (52.00%) attributed a moderate to large amount of their occupational stress to shift work. In regards to number of hours a week operating RPAs, 27 (21.26%) reported 30-40 h a week, 74 (58.27%) reported 41-50 h a week, and 26 (20.47%) reported ≥51 h a week.

4.2 Emotional Exhaustion

The average emotional exhaustion score was 13.58 (standard deviation (SD) = 8.10) for active duty operators and 10.50 (SD=6.63) for National Guard/Reserve operators. A t-test assessing for mean differences between groups based upon unequal variances (Satterthwaite test) was significant, t=-4.16, p<.01. A Cohen's *d* effect size assessing the magnitude of the difference was .42. Chi-square analyses conducted on the frequency of 78 (26.35%) active duty and 18 (13.85%) National Guard/Reserve operators experiencing high levels of emotional exhaustion (a score of 20 or more on this scale) were significant, x^2=8.09, p<.01. An odds ratio revealed active duty operators are 2.2 times more likely to report high levels of emotional exhaustion when compared with National Guard/Reserve operators.

4.3 Cynicism

The average cynicism score was 10.56 (SD=8.33) for active duty operators and 7.87 (SD=6.26) for National Guard/Reserve operators. A t-test assessing for mean differences between groups based upon unequal variances (Satterthwaite test) was significant, t=-3.72, p<.01. A Cohen's *d* effect size assessing the magnitude of the difference was .37. Chi-square analyses conducted on the frequency of 48 (16.22%) active duty and 9 (6.92%) National Guard/Reserve members experiencing high levels of cynicism (a score of 20 or more on this scale) were significant, x^2=6.73, p<.01. An odds ratio revealed that active duty operators are 2.62 times more likely to report high levels of cynicism when compared with National Guard/Reserve operators.

4.4 Professional Efficacy

The average professional efficacy score was 26.36 (SD=6.57) for active duty operators and 27.00 (SD=5.73) for National Guard/Reserve operators. A t-test assessing for mean differences between groups based upon unequal variances (Satterthwaite test) was not significant, t=-.98, p>.10. There was no significant difference between groups in mean professional efficacy scores. Chi-square analyses conducted on the frequency of 15 (5.07%) active duty and 3 (2.31%) National Guard/Reserve operators who reported experiencing low levels of professional efficacy (a score of 12 or less on this scale) were not significant. An odds ratio revealed that active duty operators are not more likely to report low levels of professional efficacy when compared with National Guard/Reserve operators.

5.0 DISCUSSION

5.1 Sources of Occupational Stress

The first objective of this study was to assess for the sources of occupational stress and for differences in the sources of stress between active duty and National Guard/Reserve units.

Consistent with the results of the study by Chappelle et al. (Ref 8), the most commonly cited stressors accentuating occupational stress for RPA operators included long hours (50+ h a week), shift work, human-machine interface difficulties (ergonomic design of equipment and GCS), inefficiencies in computer-based input and command procedures, and difficulty juggling the demands of personal and domestic life with military operations. These were commonly cited by both active duty and National Guard/Reserve operators. Important to note is that over half of the participants in this study reported a moderate to large amount of their occupational stress was attributed to shift work. Although there were between-group similarities regarding the number of participants engaged in day, swing, and night shift work, approximately 57% of active duty versus 20% of National Guard/Reserve participants reported operating RPAs on average 51 or more hours a week. This result suggests that active duty operators who participated in the study have a much higher operational tempo.

Combat-related stressors were not rated as within the top sources of stress among participants. Such a finding is helpful for line commanders and medical personnel in understanding occupational stress. However, Chappelle et al. (Ref 8) proposed that such a finding should also be interpreted cautiously when considering individual operators. It is likely that there are Predator/Reaper operators who perceive the deployment of weapons and exposure to live video feed of combat (i.e., destruction/death of enemy combatants and ground forces) as highly stressful even though it is not reported as the main source of occupational stress.

A qualitative analysis also revealed that active duty operators were more likely to report stressors regarding career progression (e.g., undefined promotional path, unclear career incentives, unclear status regarding return to original career field), geographical location (e.g., undesirable environmental location and/or long commute times equal to or longer than 1 hour), and assignment concerns (e.g., the perceived involuntary nature of assignments for many RPA operators, unclear or inconsistent reports regarding assignment opportunities in the future). The stressors of career progression, geographical location, and the perceived involuntary nature of assignments are organizational leadership decisions. Consequently, most of the stressors were operational in nature and/or based upon leadership decisions and policies rather than combat related. The findings of this research suggest active duty operators who participated in this study were experiencing a greater breadth and depth of occupational stressors than National Guard/Reserve operators.

5.2 Facets of Occupational Burnout (Active Duty vs. National Guard/Reserve Units)

The second objective of this study was to assess for differences between active duty and National Guard/Reserve units regarding the prevalence of high emotional exhaustion and cynicism and low professional sence of efficacy.

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 five active duty operators reported experiencing high levels of emotional exhaustion. Furthermore, odds ratios revealed that active duty operators were twice as likely to report high levels of high emotional exhaustion when compared with National Guard/Reserve operators. Although a previous study by Chappelle et al. (Ref 8) reported a considerable number of Predator/Reaper operators were at risk for emotional exhaustion, there is a clear difference between active duty and National Guard/Reserve operators. Such prevalence of emotional exhaustion raises aeromedical concerns regarding the impact of such RPA operations on the health and well-being of operators, as well as the elevated risk for a mishap and mission failure (Ref 17,18).

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 and National Guard/Reserve operators. Only 7% of National Guard/Reserve operators reported high levels of cynicism as opposed to 17% reported by active duty operators. Note that active duty operators were twice as likely to report high levels of cynicism. There is plausible evidence to suggest that such high levels of cynicism may lead to performance-related difficulties as well as contribute to a high attrition rate. Although the sources of cynicism among active duty operators remain unclear, the higher level of cynicism is, in part, due to reported concern regarding career progression, geographical location, involuntary nature of assignments, and uncertainty regarding future assignments for those who cross-trained with hopes of returning to their original career field.

Despite the higher levels of emotional exhaustion and cynicism, there was no difference in professional efficacy among active duty and National Guard/Reserve operators. Both groups of operators participating in this study are consistent in their sense of accomplishments and effectiveness at work. The higher levels of cynicism and emotional exhaustion are not necessarily associated with a decline in the perception of value on the role of RPA operators and their contribution to critical ISR and precision-strike operations in theater.

6.0 STUDY LIMITATIONS AND RECOMMENDATIONS

The temporal nature and survey methodology of this study raise the concern for sampling error affecting generalizability and external validity of the results. Therefore, generalizability of the results may not be applicable to all USAF Predator/Reaper units, and the causes or influences of occupational burnout may change over time. All Predator/Reaper units will be surveyed again at a later date to confirm study findings and to assess for changes in the prevalence of occupational burnout following implementation of remedial and preventative initiatives.

Another important issue affecting the internal validity is the degree to which the survey methodology allows for definitive judgments about the psychological disposition and service needs of Predator/Reaper operators. As was the case with the study by Chappelle et al. (Ref 8), the survey did not fully address functional impairment of emotional exhaustion and cynicism. Many Predator/Reaper operators who endorse symptoms of emotional exhaustion and cynicism may be functionally resilient and remain aeromedically fit for duty. Nevertheless, the implicit assumption of those endorsing high levels of emotional exhaustion and cynicism is that they need mental health care or medical intervention to mitigate such an unpleasant condition. Further studies to address functional impairment to assess the validity of this implicit assumption are highly recommended.

Regardless of the limitations to external or internal validity of the study due to its operational nature, a significant percentage of Predator/Reaper operators reporting high levels of emotional exhaustion and cynicism within active duty units is likely to benefit from increased access to mental health care. Although the stigma of mental health care is a barrier for many operators, allocating mental health and flight medicine providers within the operational unit of RPA operators may help them overcome such a barrier. Chappelle and McDonald (Ref 16) reported that Predator/Reaper operators experiencing clinical distress were also highly likely to report high levels of emotional exhaustion. Yet, such operators were also highly unlikely to seek mental health care because of concerns that such care would negatively impact their careers.

Assigning a military psychologist with aviation training and a skill set to an RPA unit to interact with operators may help increase access and utilization for mental health care.

Another recommendation is to review active duty units and assess for utilization of appropriate scheduling and fatigue management tools to ensure aircrew are adhering to effective techniques for sustaining "around-the-clock" operations without burning out their most valuable resource (i.e., the human operator). Furthermore, innovations in human-machine technology to reduce cognitive demands and increase efficiency of initiating command and control procedures as well as comfort level will likely help to mitigate risks for occupational burnout.

7.0 CONCLUSION

USAF Predator/Reaper operations have emerged as critical assets to ISR and precision-strike operations. These aircraft are relied upon for a wide range of missions throughout the globe. Advances in aviation, computer-based technology, and satellite communication has catapulted USAF remotely piloted aircraft into the center of many operational missions. Although Predator/Reaper aircraft are managed via impressive advances in technology, the most critical component may be the human operator. Safe and effective operations are essential, and line leadership and flight medicine providers should remain vigilant to the impact that technology and operational tempo may have on the psychological health of the human operator.

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LIST OF ACRONYMS

ACO	airspace control orders
AOB	air order of battle
ATO	air tasking order
BDA	battle damage assessment
DoD	Department of Defense
GCS	ground control station
ISR	intelligence, surveillance, reconnaissance
MBI-GS	Maslach Burnout Inventory- General Schedule
ROE	rules of engagement
RPA	remotely piloted aircraft
SAR	synthetic aperture radar
SD	standard deviation
SO	sensor operator
SPINS	special instructions
TTPs	tactics, techniques, and procedures
USAF	U.S. Air Force