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Occupational Health Screenings of U.S. Air Force Remotely Piloted Aircraft (Drone) Operators

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14. ABSTRACT

Remotely piloted aircraft (RPA; also known as drone) operators have critical roles in the U.S. Air Force (USAF), ranging from intelligence, surveillance, and reconnaissance missions to delivering weapons on targets for close air support and precision strike operations. The health and wellness of RPA operators are critical to sustaining performance readiness. As a result, the USAF School of Aerospace Medicine was requested by USAF line operator and medical leadership to conduct a field survey to assess for general areas of health-related behaviors (i.e., sleep and exercise; alcohol, tobacco, and caffeine use; common reasons for seeking medical care and mental health support services; and reasons for increased prescription and over-the-counter medication usage). A total of 1,094 MQ-1 Predator/MQ-9 Reaper operators (pilots, sensor operators, and mission intelligence coordinators) from three USAF major commands completed the web-based survey, resulting in a 49% response rate. Statistical analyses were performed to assess for between-group major command differences to quantitative and qualitative items assessing (a) the amount of sleep obtained before work and the frequency of engaging in structured physical exercise throughout the week; (b) the amount, frequency**,** and increase in consumption of alcohol, tobacco, and caffeine and the reasons for increased consumption; (c) medical conditions worsened by current unit assignment and occupational stress; (d) changes in healthcare utilization since being assigned to Predator/Reaper operations and the reasons for these changes; and finally (e) increases in medication utilization since being assigned to Predator/Reaper operations and the reasons for such increases. A number of recommendations are provided for line and medical leadership for optimizing health for RPA operators. Such recommendations included optimizing work hours and shift work schedules, managing the ergonomic strains inherent in the Predator/Reaper workstations, maintaining sufficient manning for the mission, and embedding mental health providers within line intelligence units, to name a few.

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TABLE OF CONTENTS

Section		Page
LIST OF TABLES		iii
1.0	EXECUTIVE SUMMARY	1
2.0	INTRODUCTION	1
3.0	METHODS	3
	3.1 Participants	3
	3.2 Questionnaire	4
	3.3 Procedure	6
	3.4 Data Analysis	7
	3.4.1 Quantitative Analyses	7
	3.4.2 Qualitative Analyses	8
4.0	RESULTS	8
	4.1 Demographics	8
	4.2 Sleep and Physical Exercise Health Behaviors	10
	4.3 Poor Health Habits (Alcohol, Tobacco, Caffeine Use)	11
	4.3.1 Alcohol Use	11
	4.3.2 Tobacco Use	13
	4.3.3 Caffeine Stimulant Use	14
	4.4 Medical Conditions Created or Made Worse by Assignment	14
	4.5 Changes in Healthcare Utilization Since Current Unit Assignment	14
	4.5.1 Medical Services	14
	4.5.2 Mental Health Support Services	16
	4.5.3 Alternative Health Services	17
	4.6 Increases in Medication Utilization Since Current Unit Assignment	17
	4.6.1 Prescription Medication	17
	4.6.2 OTC Medication	18
5.0	DISCUSSION	18
	5.1 Current Health Behaviors	18
	5.2 Changes in Health Behaviors	20
	5.3 Changes in Medical Symptoms and Conditions	20
	5.4 Important Differences Across MAJCOMs	21
	5.4.1 Air Combat Command	21
	5.4.2 Air Force Special Operations Command	22
	5.4.3 Air National Guard	23

6.0 STUDY OUTCOME RECOMMENDATIONS 24

6.1 First Tier – Line Leadership 24
6.2 Second Tier – Medical Treatment Facilities 25
6.3 Areas of Future Study 25

7.0 STRENGTHS AND LIMITATIONS OF THE STUDY 26

8.0 CONCLUSION 26

9.0 REFERENCES 27

LIST OF ABBREVIATIONS AND ACRONYMS 30

LIST OF TABLES

Table		Page
1	Questions Assessing Health-Related Behaviors and Utilization of Medical Services	4
2	Demographics by MAJCOM and RPA Operators Overall, Proportion Comparisons	9
3	Logistic Regression Results for MAJCOM Demographics	10
4	Health Behaviors by MAJCOM and RPA Operators Overall, Proportion Comparison	11
5	Logistic Regression Results for MAJCOM Health Behaviors	11
6	Alcohol Use per Week and Occasion by RPA Operators Overall and by MAJCOM, Proportion Comparisons	12
7	Increased Alcohol Use and Elevated Use by RPA Operators Overall and by MAJCOM, Proportion Comparisons	12
8	Logistic Regression Results for MAJCOM Alcohol Use	13
9	Tobacco Use by MAJCOM and RPA Operators Overall, Proportion Comparisons	13
10	Logistic Regression Results for MAJCOM Tobacco Use	14
11	Most Frequently Cited Conditions Perceived to be Created or Worsened by Their Unit Assignment and Occupational Stress, Proportion Comparisons	15
12	Healthcare Utilization by MAJCOM and RPA Operators Overall, Proportion Comparisons	15
13	Logistic Regression Results for MAJCOM Healthcare Utilization	15
14	Most Frequently Self-Reported Reasons for Increased Mental Health Support Services, Proportion Comparisons	16
15	Medical Utilization by MAJCOM and RPA Operators Overall, Proportion Comparisons	17
16	Logistic Regression Results for MAJCOM Medication Utilization	17

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1.0 EXECUTIVE SUMMARY

Remotely piloted aircraft (RPA; also known as drones) operators have critical roles in the U.S. Air Force (USAF), ranging from intelligence, surveillance, and reconnaissance missions to delivering weapons on targets for close air support and precision strike operations. They sustain around-the-clock operations to meet the growing demand from military leadership requesting RPA operators to support a wide range of global missions. Although advancements in aviation, satellite, and computer-based technology have contributed greatly to RPA platforms and systems, the health and wellness of the airmen operating such aircraft are critical to sustaining performance and readiness. As a result, the USAF School of Aerospace Medicine was requested by USAF line operator and medical leadership to conduct a field survey to assess for general areas of health-related behaviors (i.e., sleep and exercise; alcohol, tobacco, and caffeine use; common reasons for seeking medical care and mental health support services; and reasons for increased prescription and over-the-counter medication usage).

Participation in this study was solicited via e-mail invitations sent out to USAF RPA operators. The survey was anonymous, voluntary, and self-report. A total of 1,094 MQ-1 Predator/MQ-9 Reaper drone operators (pilots, sensor operators, and mission intelligence coordinators) from three USAF major commands (Air Combat Command, Air Force Special Operations Command, and the Air National Guard) from within the continental united states (CONUS) completed the web-based survey, resulting in an estimated 49% response rate.

Statistical analyses were performed to assess for between-group major command differences to quantitative and qualitative items assessing (a) the amount of sleep obtained before work and the frequency of engaging in structured physical exercise throughout the week; (b) the amount, frequency, and increase regarding consumption of alcohol, tobacco, and caffeine (to include the use of traditional and designer energy drinks) and the reasons for increased consumption; (c) medical conditions worsened by current unit assignment and occupational stress; (d) changes in healthcare utilization (such as medical care, mental health, and alternative health provider services) since being assigned to Predator/Reaper drone operations and the reasons for these changes; and finally (e) increases in medication utilization (i.e., prescription and over-the-counter) since being assigned to Predator/Reaper operations and the reasons for such increases.

A number of recommendations are provided for line and medical leadership for optimizing health for RPA operators. Such recommendations included optimizing work hours and shift work schedules, managing the ergonomic strains inherent in the Predator/Reaper workstations, maintaining sufficient manning for the mission, and embedding mental health providers within line intelligence units, to name a few.

2.0 INTRODUCTION

Advances in aerial, satellite, and computer-based technology have thrust remotely piloted aircraft (RPA) into the center of U.S. military operations on the modern battlefield. Among the wide range of RPAs within the U.S. military, the MQ-1 Predator and the MQ-9 Reaper drones have emerged as uniquely critical assets to combat commanders. These drones perform a variety of combat-related functions, ranging from intelligence, surveillance and reconnaissance missions to delivering weapons on targets for close air support and precision strike operations [1]. Predator/Reaper missions provide real- time information to commanders to identify fixed and

moving targets, track enemy movements and assets, catch insurgents planting roadside bombs, locate and destroy weapons caches, direct and protect ground forces, safeguard convoys, track and/or eliminate enemy combatants, augment manned strike missions, and survey post-strike battle damage. These are just a few examples of their battlefield-essential capabilities. The growing appreciation for the strategic and tactical advantages such aircraft afford has led to a rapidly increasing demand for their use in regions of conflict across the globe [2,3]. Although Predator/Reaper operators engage the battlefield remotely (i.e., from the relative safety of the continental United States), their high operations tempo and "around-the-clock" operational environment presents unique threats to operators' health and well-being. Long work hours, rotating shift work schedules, ergonomically taxing workstations, geographically remote assignment locations, and exposure to real-time, graphic images of destruction and death characterize the Predator/Reaper drone work environment. Research has just begun to investigate and elucidate the impact these factors have on Predator/Reaper drone operators [4,5]. These reports found high levels of self-reported symptoms of emotional exhaustion, cynicism, psychological distress among such military personnel, and the primary factors leading to elevated levels of stress were operationally oriented (i.e., long work hours, rotating shift work, lack of an adequate number of personnel to carry out missions) and not related to participation in or exposure to the visual images of battle strikes. This initial research suggests that sustaining continuous operations with high workloads, long shifts, and limited manpower may be more detrimental to Predator/Reaper drone operators than their exposure to combat-related images and destruction [4].

Similar findings have been reported among USAF distributed common ground system (DCGS) intelligence exploitation operators who support Predator/Reaper operations and who also sustain around-the-clock operations [6]. The study conducted by Prince et al. assessed levels and sources of stress in these personnel [6]. Although these personnel are routinely exposed to visually imagery associated with combat related events around the world that involve human causalities, the results revealed that long hours, shift work, organizational and leadership difficulties, high workload, low manning, and training challenges are their most frequently reported sources of stress [6].

Although prior research has begun to document elevated stress levels among Predator/Reaper operators and the operational sources for this stress, little is known about how their occupational environment might impact health habits and healthcare utilization. Although not RPA specific, evidence exists in both military and civilian samples that some of the factors that characterize the RPA work environment can detrimentally affect workers' health, health behaviors, and healthcare utilization. For example, chronic job stress has been shown in civilian occupational samples to lead to high-risk health behaviors (e.g., increased alcohol and drug use [7,8]) and illnesses (e.g., back pain, eyestrain, gastrointestinal problems and headaches [9]). In addition, high demand work schedules (i.e., frequently rotating shift work), independent of self-reported occupational stress, can put workers at risk for problematic alcohol consumption (i.e., binge drinking [10]) and poor health outcomes [11]. Furthermore, symptoms of post-traumatic stress are highly associated with physical health problems, alcohol and substance abuse, as well as healthcare utilization [12-14].

Although operational sources of stress (shift work, high workload, long shifts, etc.) are nearly universal across all RPA platforms, Predator/Reaper operations are conducted within unique cultural contexts that must also be considered to understand all of the stresses and strains inherent in these duties. Predator/Reaper operations are spread across three separate U.S. Air

Force (USAF) major commands (MAJCOMs)—Air Combat Command (ACC), Air Force Special Operations Command (AFSOC), and the Air National Guard (ANG)—and each of these communities has distinct cultural, geographical, and organizational factors (e.g., mission personnel allocations and mission assignment durations) that directly impact the work environment of RPA personnel. Previous studies have compared ACC and ANG RPA operators and have found differences in levels of exhaustion and cynicism [5], which suggest that when investigating the work environment, it is important to consider not just the demands inherent in their specific RPA-platform but also the broader context (i.e., MAJCOM) in which these operations are being conducted.

There are a number of resources to assist RPA operators with identifying and improving occupational health. Such resources include routine periodic and annual health assessments (e.g., annual web-based health assessment screening), as well as routine and daily access to flight medicine providers, health and wellness resources (such as the base gym), and programs (e.g., tobacco cessation). Health promotion strategies may also vary by MAJCOM, such as weekly or monthly social morale events and regularly scheduled unit fitness exercise throughout the week. However, large-scale assessment of the general health habits (physical exercise, alcohol and caffeine use, utilization of medical care services) has yet to be investigated.

The purpose of this study is to identify self-reported differences between ACC, ANG, and AFSOC RPA operators on the following:

- The frequency of health behaviors regarding the amount of sleep obtained before work and the frequency of engaging in structured physical exercise throughout the week
- The amount, frequency, and increase in consumption of alcohol, tobacco, and caffeine (use of traditional and designer energy drinks) and the reasons for increased consumption
- Medical conditions worsened by current unit assignment and occupational stress
- Changes in healthcare utilization (such as medical care, mental health, and alternative health provider services) since being assigned to Predator/Reaper operations and the reasons for these changes
- Increases in medication utilization (i.e. prescription and over-the-counter) since being assigned to Predator/Reaper operations and the reasons for such increases

Investigating the health behaviors and healthcare utilization trends in the Predator/Reaper population will provide USAF line and medical leadership with an additional source of information and situational awareness needed to better understand the health-related consequences associated with Predator/Reaper operations. This information will aid in the development of strategies for optimizing health and performance and will assist in the development of policies that will maximize the capabilities of RPA operators across and within AF MAJCOMs.

3.0 METHODS

3.1 Participants

A total of 1,094 MQ-1 Predator/MQ-9 Reaper operators (pilots, sensor operators, and mission intelligence coordinators) participated in the study. In total, 731 (66.82%) were from ACC units, 221 (20.20%) were from ANG units, and 142 (12.98%) were assigned to AFSOC

units. The overall response rate was 49%. The total number of airmen assigned to each unit within AFSOC, ANG, and ACC MAJCOMs was obtained from AF operational leadership. This number was then compared with the number of airmen that participated in the study to obtain an overall response rate.

3.2 Questionnaire

The first part of the survey was composed of demographic items that assessed respondents' unit of assignment, duty position, rank range, gender, age range, marital status, and number of child dependents living at home. This section also contained operational items that assessed length of time serving as a Predator/Reaper operator, average number of hours worked in a typical week, and current work schedule. This section of the questionnaire was designed so that no identifiable personal information was obtained with the goal of maintaining anonymity for respondents. This was done to encourage genuine self-disclosure in a community where there may be strong cultural stigmas (and concerns for negative career implications) regarding mental health problems.

The second part of the survey consisted of questions designed to assess sleep and physical exercise health behaviors; alcohol, tobacco, and caffeinated beverage use; medical conditions created or made worse by current unit assignment; medical, mental support, and alternative healthcare utilization; and prescription and over-the-counter (OTC) medication utilization (Table 1).

Table 1. Questions Assessing Health-Related Behaviors and Utilization of Medical Services

Question	Response
Sleep	
On average, how many hours of sleep do you obtain each night or day prior to starting work?	4 or less 5-6 7-8 9-10 11 hours or more
Physical Exercise	
How often do you engage in physical exercise/training each week?	None 1-2 times per week 3-4 times per week 5 times per week Daily
Alcohol Use	
On average, how many times per week do you consume alcohol?	N/A (do not drink) 1-2 3-4 5 or more times a week
On average, how many alcoholic beverages do you have on one occasion (1 drink = 12 ounces of beer, 5 ounces of wine, or 1.5 ounces of liquor)?	N/A (do not drink) 1-2 3-4 5 or more drinks
Since your assignment to this unit, has your use of alcohol changed?	Yes No N/A (do not drink)
If yes, how has it changed?	Do not drink alcohol anymore Alcohol use has decreased Alcohol use has increased
If your alcohol use changed, what do you attribute the change to?	*Open response*

Table 1. Questions Assessing Health-Related Behaviors and Utilization of Medical Services (continued)

Question	Response
Tobacco Use	
How much tobacco have you used on average over the past month?	None No more than ½ pack of cigarettes or ½ can of dip per day 1 pack of cigarettes or 1 can of dip per day More than 1 pack of cigarettes or 1 can of dip per day
Since your assignment to this unit, has your use of tobacco changed?	Yes No N/A (do not use tobacco)
If yes, how has it changed?	Do not use tobacco anymore Tobacco use has decreased Tobacco use has increased
If your tobacco use changed, what do you attribute the change to?	*Open response*
Caffeinated Beverage Use	
On average, how often do you use stimulants (i.e., caffeinated/energy drinks, pills, gum, etc.)?	N/A (do not consume caffeine) 1-2 3-4 5 or more drinks/stimulants a day
Since your assignment to this unit, has your use of caffeinated/energy drinks or stimulants changed?	Yes, it has increased Yes, it has decreased No, it has not changed N/A
If your caffeinated/energy drink/stimulant use has changed, what do you attribute the change to?	*Open response*
Medical Conditions Created or Made Worse by Current Unit Assignment	
Please list any medical conditions you have that you believe have been created by or made worse by your current unit assignment Please list any medical conditions you have that you believe have been created by or made worse by occupational stress	Examples provided to respondents for both items: Back pain, chest pain, neck pain, heart palpitations, heart burn, nausea, diarrhea, constipation, sleep problems, depression, anxiety
Medical Services Utilization	
In general, since your current assignment, has your use of medical services changed (e.g., visits for healthcare, consultation with physician)?	Yes No
If yes, how has it changed?	Do not use medical services Use of medical services has decreased Use of medical services has increased
If your use of medical support services has changed, what do you attribute the change to?	*Open response*
Mental Healthcare Services Utilization	
In general, since your current assignment, has your use of mental health support services changed (e.g., mental health counselor, military and family life consultant)?	Yes No N/A (have never used mental health support services)
If yes, how has it changed?	Use of support services has decreased Use of support services has increased
If your use of mental health support services has changed what do you attribute the change to?	*Open response*

Table 1. Questions Assessing Health-Related Behaviors and Utilization of Medical Services (concluded)

Question	Response
Alternative Health Services Utilization	
Have you sought treatment from an alternative health provider (e.g., chiropractor, massage therapist, acupuncturist) for the medical condition(s) listed [in previous responses] while in your current assignment?	Yes No
If yes, has the frequency of treatment changed since your current unit assignment?	It has increased It has decreased
To what do you attribute the change?	*Open response*
Prescription Medication Utilization	
Has your usage of prescription medication(s) changed since arrival at your current assignment?	Yes No
If yes, how has it changed?	It has increased It has decreased
To what do you attribute the change?	*Open response*
OTC Medication Utilization	
Has your usage of OTC medication changed since arrival at your current unit?	Yes No
If yes, how has it changed?	Use has increased Use has decreased
To what do you attribute the change?	*Open response*

3.3 Procedure

Participation was advocated by line leadership (group, squadron, and flight commanders from USAF active duty, National Guard, and Reserve units) across MAJCOMs via e-mail to RPA operators through their USAF e-mail accounts. The mass e-mail invitation to participate informed airmen that participation was voluntary and anonymous. Line leadership invitations to participate included the statements that clarified the purpose of the survey was to gain a better understanding of the health habits and behaviors of RPA operators to identify areas for change to improve health and morale.

The group e-mail invitation to participate had an internet link to the USAF School of Aerospace Medicine web-based survey, which contained an opening page with an introductory script further explaining the study was conducted by independent researchers and participation was voluntary and anonymous. It also explained to potential participants the nature, purpose, and instructions of the study and informed them that operational leadership would not have access to individual responses, results would be presented in a summarized format at the squadron level, and they could withdraw at any time without negative repercussions. The web page also had a list of flight medicine physician and aeromedical psychologist points of contact for each MAJCOM if an operator had questions or concerns related to his or her health and well-being. Participants were encouraged to contact the point of contact at their respective MAJCOM if they were interested in discussing their health, especially any items on the survey that raised personal concerns.

Before participants could begin the electronic survey, they were asked if they understood the nature, purpose, and instructions of the survey and were voluntarily consenting to participate. Those who endorsed “yes” were then allowed to proceed and take the survey. Those who

endorsed “no” were not given the survey and were redirected to another web page that instructed them how to contact the independent researchers of the study for additional information.

The survey was distributed electronically via a Department of Defense-approved electronic survey tool. Respondents completed the survey online at their work site. In general, it took respondents 25 to 30 minutes to complete the survey. After completing the survey, respondents were instructed how to obtain the general results of the study and when such information would be available. It is unknown how many operators declined participation after reading the informed consent section of the introductory web page for the survey.

3.4 Data Analysis

3.4.1 Quantitative Analyses. Group frequencies and proportions were calculated for items assessing the following:

1. Demographics (gender, age range, marital status, and children dependents at home)
2. Occupational variables (rank range, time on station, shift schedule, shift rotation frequency, and hours worked per week)
3. Health behaviors (average number of hours of sleep before work and average number of days engaged in moderate physical exercise per week)
4. Poor health habits (alcohol use; elevated alcohol use linked to health risks, i.e., drinking five or more drinks per occasion or drinking three or more drinks per occasion three or more times per week; any tobacco use; and stimulant or caffeine use) and increases in poor health habits
5. Availability of medical care at work and increased healthcare utilization (medical, mental, and alternative health services)
6. Increased medication utilization (prescription and OTC)

The frequencies for each category of stimulant and caffeine use were too low to be included in data analyses assessing for between-group differences. Percentages for increased poor health habits, increased and decreased healthcare utilization, and increased medication utilization were computed using the overall group sample size for each MAJCOM.

Independent proportion comparisons were run on all variables listed above for frequency analyses to test for significant differences. These comparisons were run between ACC and ANG, AFSOC and ANG, as well as AFSOC and ACC, but could not be computed in instances where n was less than five. Three sets of binary logistic regressions were run for each variable. One analysis compared ACC to ANG and predicted for ACC group membership. The next analysis compared AFSOC to ANG and predicted for AFSOC group membership. The last analysis compared AFSOC to ACC and predicted for AFSOC group membership. Logistic regressions were not run for number of days of alcohol consumed per week or average number of alcohol beverages consumed per occasion. Rather, the analysis was run on two “elevated alcohol use” variables that were created based upon the consumption of (1) five or more alcoholic beverages in one occasion and (2) alcohol three or more days a week and consuming at least three or more alcoholic beverages on each occasion. Logistic regressions were not run in instances where sample size assumptions were not met for the outcome variable. The MAJCOM groups were required to have n equal to or greater than 30, and the individual categories for each predictor

required n equal to or greater than five to be included in the logistic regression analysis (i.e., 9 or more hours of sleep). A statistical significance level of $p < .05$ was established a priori.

The comparison category is indicated for each categorical predictor by "a" in each of the tables. Comparison categories were chosen based upon a series of factors. For demographic variables, some comparison categories were established based upon the largest proportion (e.g., being male, enlisted, working 50 or less hours per week), whereas other demographic comparison categories were based on the category of interest (e.g., being in the age range of 18-25, single, having dependents at home, and spending more than 24 months on current station). For health behaviors, comparison categories were chosen based on healthy levels recommended by literature (e.g., 7-8 hours of sleep per night, 3-4 days of moderate exercise per week). For all other variables included in logistic regression analyses, the comparison category was chosen based upon the baseline category response (e.g., no increase in alcohol use, no tobacco use, etc.).

3.4.2 Qualitative Analyses. Two behavioral science researchers performed qualitative analyses on textual responses to the open-ended, write-in response items in Table 1. The semantics of participants' textual responses were independently analyzed and coded into a list of categories by each researcher. The list of coded categories from each researcher for each item was then compared for inter-rater reliability. Categories for medical conditions included Back or Neck Pain, Sleep Problems, Depression or Anxiety, Other Musculoskeletal Pain (Hip, Wrist, Chest Pain), Gastrointestinal Problems, Vision Problems, etc. For example, responses such as *little to no sleep, sleep problems,* and *insomnia* were grouped together in the category Sleep Problems. Similar qualitative analyses were performed for each item where respondents listed attributions for increases in poor health habits, increases and decreases in healthcare utilization, and increases in medication utilization. Categories varied per item, but common categories were Ergonomic Strain, Back or Neck Pain, Stress, Family or Relationship Issues, Depression or Anxiety, and Sleep Problems. The frequency of coded responses for each semantic category was computed and the top responses are reported. The top three medical conditions and the top three to five attributions for increases in alcohol and tobacco use, increases and decreases in healthcare utilization, and increases in medication utilization are reported.

4.0 RESULTS

4.1 Demographics

In total, there were 731 ACC, 221 ANG, and 142 AFSOC respondents. Demographics for overall respondents, as well as for ACC, ANG, and AFSOC separately, are shown in Table 2. Significant and insignificant differences in group proportion comparisons for each category are also shown in Table 2.

A larger proportion of ACC respondents (compared to ANG) were age 18-25, age 26-30, officers, single, no dependents at home, 24 months or less in current unit, work shift work, rotate shifts every 60 days, and work over 50 hours per week. A larger proportion of AFSOC respondents (compared to ANG) were age 26-30, officers, no dependents at home, 24 months or less in current unit, work shift work, rotate shifts every 30 days, and work over 50 hours per week. A larger proportion of AFSOC respondents (compared to ACC) were age 35-39, 25 months or more in current unit, rotate shifts every 30 days, and work over 50 hours per week. A larger proportion of ANG respondents (compared to ACC) were age 35+, enlisted, married, have

dependents at home, 25 months or more in current unit, work standard days, rotate shifts every 30 or 90 days or do not rotate shifts, and work 30-50 hours per week. A larger proportion of ANG respondents (compared to AFSOC) were age 40+, enlisted, have dependents at home, 25 months or more in current unit, work standard days, rotate shifts every 60 days or do not rotate shifts, and work 30-50 hours per week. A larger proportion of ACC respondents (compared to AFSOC) were age 18-25, 24 months or less in current unit, rotate shifts every 60 days or do not rotate shifts, and work 30-50 hours per week.

Table 2. Demographics by MAJCOM and RPA Operators Overall, Proportion Comparisons

Demographics	Total		ACC		ANG		AFSOC		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%	n	%			
Gender											
Male	965	88.53	653	89.57	192	87.27	120	85.11	.34	.56	.12
Female	125	11.47	76	10.43	28	12.73	21	14.89	.34	.56	.12
Age Range											
18-25	222	20.33	181	24.83	24	10.86	17	11.97	<.01	.74	<.01
26-30	367	33.61	267	36.63	40	18.10	60	42.25	<.01	<.01	.21
31-34	184	16.85	128	17.56	28	12.67	28	19.72	.09	.07	.54
35-39	151	13.83	79	10.84	47	21.27	25	17.61	<.01	.39	<.05
40+	168	15.38	74	10.15	82	37.10	12	8.45	<.01	<.01	.53
Rank Range											
Enlisted	562	51.80	347	47.73	143	65.60	72	51.43	<.01	<.01	.42
Officer	523	48.20	380	52.27	75	34.40	68	48.57	<.01	<.01	.42
Marital Status											
Single	398	36.51	285	39.09	63	28.51	50	35.71	<.01	.15	.45
Married	692	63.49	444	60.91	158	71.49	90	64.29	<.01	.15	.45
Dependents at Home											
Yes	459	42.11	277	38.00	126	57.27	56	39.72	<.01	<.01	.70
No	631	57.89	452	62.00	94	42.73	85	60.28	<.01	<.01	.70
Time on Station (mo)											
≤24	637	58.28	517	70.82	53	23.98	67	47.18	<.01	<.01	<.01
>24	456	41.72	213	29.18	168	76.02	75	52.82	<.01	<.01	<.01
Shift Schedule											
Standard Day	195	17.92	122	16.76	58	26.36	15	10.71	<.01	<.01	.07
Shift Work	893	82.08	606	83.24	162	73.64	125	89.29	<.01	<.01	.07
Shift Rotation Frequency (days)											
Every 30	389	41.34	192	30.82	91	50.28	106	77.37	<.01	<.01	<.01
Every 60	302	32.09	278	44.62	19	10.50	5	3.65	<.01	<.05	<.01
Every 90	46	4.89	23	3.69	14	7.73	9	6.57	<.05	.69	.13
N/A[a]	204	21.68	130	20.87	57	31.49	17	12.41	<.01	<.01	<.05
Hours Worked per Week											
30-50	668	61.12	445	60.96	172	77.83	51	35.92	<.01	<.01	<.01
51+	425	38.88	285	39.04	49	22.17	91	64.08	<.01	<.01	<.01

[a]N/A = does not rotate shift.

Results for logistic regressions predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 3. Note that in instances where the variable has only two categories, proportion comparisons and logistic regressions will yield the same *p*-value.

Table 3. Logistic Regression Results for MAJCOM Demographics

Demographic	ACC/ANG			AFSOC/ANG			AFSOC/ACC		
	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*
Gender									
Male[a]		0.89(1)	.35		0.34(1)	.56		2.22(1)	.14
Female	0.80 [0.50, 1.27]			1.20 [0.65, 2.21]			1.50 [0.89, 2.53]		
Age Range									
18-25[a]		115.87(4)	<.01		53.24(4)	<.01		15.85(4)	<.01
26-30	0.89 [0.52, 1.52]			2.12* [1.01, 4.43]			2.39* [1.35, 4.23]		
31-34	0.61 [0.34, 1.09]			1.41 [0.63, 3.18]			2.33* [1.22, 4.43]		
35-39	0.22*[b] [0.13, 0.39]			0.75 [0.34, 1.65]			3.37* [1.72, 6.59]		
40+	0.12*[c] [0.07, 0.20]			0.21*[d] [0.09, 0.49]			1.73 [0.79, 3.79]		
Rank Range									
Enlisted[a]		21.77(1)	<.01		7.10(1)	<.01		0.64(1)	.42
Officer	2.09* [1.52, 2.86]			1.80* [1.17, 2.78]			0.86 [0.60, 1.24]		
Marital Status									
Single[a]		8.41(1)	<.01		2.05(1)	.15		0.57(1)	.45
Married	0.62*[e] [0.45, 0.86]			0.72 [0.46, 1.13]			1.16 [0.79, 1.68]		
Dependents at Home									
Yes[a]		25.46(1)	<.01		10.65(1)	<.01		0.15(1)	.70
No	2.19* [1.61, 2.97]			2.03* [1.32, 3.13]			0.93 [0.64, 1.35]		
Time on Station (mo)									
≤24	7.69* [5.43, 10.89]			2.83* [1.80, 4.45]			0.37*[f] [0.26, 0.53]		
>24[a]		155.61(1)	<.01		20.82(1)	<.01		28.49(1)	<.01
Shift Schedule									
Standard Day[a]		9.57(1)	<.01		13.90(1)	<.01		3.50(1)	.06
Shift Work	1.78* [1.24, 2.54]			2.98* [1.61, 5.51]			1.68 [0.95, 2.97]		
Shift Rotation Frequency (days)									
Every 30	0.93 [0.62, 1.38]			3.91* [2.12, 7.19]			4.22* [2.42, 7.38]		
Every 60	6.42* [3.67, 11.22]			0.88 [0.29, 2.72]			0.14*[g] [0.05, 0.38]		
Every 90	0.72 [0.35, 1.50]			2.16 [0.80, 5.84]			2.99* [1.19, 7.52]		
N/A[a]		81.83(3)	<.01		27.66(3)	<.01		135.59(3)	<.01
Hours Worked per Week									
30-50[a]		22.37(1)	<.01		64.79(1)	<.01		30.21(1)	<.01
51+	2.25* [1.58, 3.19]			6.26* [3.93, 9.99]			2.79* [1.92, 4.05]		

OR = odds ratio; CI = confidence interval.
*Significant chi square (p <.05) and odds ratio.
[a]Comparison category for predictor.
[b]Inverse OR = 4.49, 95% CI [2.57, 7.84].
[c]Inverse OR = 8.36, 95% CI [4.92, 14.19].
[d]Inverse OR = 4.84, 95% CI [2.03, 11.53].
[e]Inverse OR = 1.61, 95% CI [1.16, 2.23].
[f]Inverse OR = 2.72, 95% CI [1.88, 3.92].
[g]Inverse OR = 7.27, 95% CI [2.63, 20.14].

4.2 Sleep and Physical Exercise Health Behaviors

Comparisons of group proportions for each response category are shown in Table 4. One significant comparison was found. A larger proportion of ANG respondents reported sleeping 5-6 hours before work when compared to ACC. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 5. No logistic regression results were statistically significant.

Table 4. Health Behaviors by MAJCOM and RPA Operators Overall, Proportion Comparisons

Health Behaviors	Total		ACC		ANG		AFSOC		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%	n	%			
Hours of Sleep before Work											
4 or less	44	4.02	33	4.51	6	2.71	5	3.52	.24	.66	.60
5-6	617	56.4	396	54.17	138	62.44	83	58.45	<.05	.45	.35
7-8	426	38.94	296	40.49	76	34.39	54	38.03	.10	.48	.58
9 or more	7	<1.00	6	<1.00	1	<1.00	0	0.00	N/A[a]	N/A[a]	N/A[a]
Exercise per Week											
None	50	4.58	32	4.38	10	4.55	8	5.63	.92	.64	.51
1-2 times	323	29.58	212	29.04	68	30.91	43	30.28	.59	.90	.77
3-4 times	496	45.42	330	45.21	102	46.36	64	45.07	.76	.81	.98
5-6 times	154	14.10	107	14.66	30	13.64	17	11.97	.71	.65	.40
Daily	69	6.32	49	6.71	10	4.55	10	7.04	.24	.31	.89

N/A = not applicable.
[a]Sample size assumption (n ≥ 5) was not met for proportions analysis.

Table 5. Logistic Regression Results for MAJCOM Health Behaviors

Health Behavior	ACC/ANG			AFSOC/ANG			AFSOC/ACC		
	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*
Hours of Sleep before Work									
4 or less	1.41 [0.57, 3.49]			1.17 [0.34, 4.04]			0.83 [0.31, 2.22]		
5-6	0.74 [0.54, 1.01]			0.85 [0.54, 1.32]			1.15 [0.79, 1.67]		
7-8[a]		5.15(2)	.08		0.73(2)	.70		0.85(2)	.65
9 or more[b]									
Exercise per Week									
None	0.99 [0.47, 2.08]			1.27 [0.48, 3.40]			1.29 [0.57, 2.93]		
1-2 times	0.96 [0.68, 1.37]			1.01 [0.62, 1.65]			1.05 [0.68, 1.60]		
3-4 times[a]		1.75(4)	.78		1.38(4)	.85		1.10(4)	.90
5-6 times	1.10 [0.69, 1.75]			0.90 [0.46, 1.77]			0.82 [0.46, 1.46]		
Daily	1.51 [0.74, 3.10]			1.59 [0.63, 4.04]			1.05 [0.51, 2.19]		

Note: No analyses were significant at $p < .05$.
[a]Comparison category for predictor.
[b]Respondents who endorsed 9 or more hours of sleep were excluded from analyses because of the low n for ANG and AFSOC.

4.3 Poor Health Habits (Alcohol, Tobacco, Caffeine Use)

4.3.1 Alcohol Use. Comparisons in group proportions for each response category for average frequency of alcohol consumption per week and number of drinks per occasion for males and females are shown in Table 6. One comparison was significant. A larger proportion of males in ACC reported they do not drink alcohol compared to males in ANG.

Two elevated use variables were computed. The variables were defined as “elevated alcohol use linked to health risks - quantity” (five or more drinks per occasion; based upon the National Institute on Alcohol Abuse and Alcoholism [15] definition of binge drinking) and “elevated alcohol use linked to health risks - frequency and quantity” (three or more drinks per occasion and three or more occasions per week). Significant and insignificant differences in group proportions for each response category for alcohol increase and elevated use variables are shown in Table 7. A larger proportion of AFSOC reported an increase in alcohol use since being assigned to RPA duties when compared to ACC. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 8.

Table 6. Alcohol Use per Week and Occasion by RPA Operators Overall and by MAJCOM, Proportion Comparisons

Alcohol Use	Total				ACC				ANG				AFSOC				% ACC/ANG *p*		% AFSOC/ANG *p*		% AFSOC/ACC *p*	
	Males (n=965)		Females (n=125)		Males (n=653)		Females (n=76)		Males (n=192)		Females (n=28)		Males (n=120)		Females (n=21)		Males	Females	Males	Females	Males	Females
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%						
Times per Week																						
N/A	243	25.23	47	38.21	181	27.76	31	41.33	35	18.23	9	33.33	27	22.69	7	33.33	<.01	.47	.34	1.00	.25	.51
1-2	560	58.15	64	52.03	375	57.52	35	46.67	118	61.46	16	59.26	67	56.30	13	61.90	.33	.26	.37	.85	.81	.22
3-4	123	12.77	12	9.76	74	11.35	9	12.00	31	16.15	2	7.41	18	15.13	1	4.76	.08	N/A[a]	.81	N/A[a]	.24	N/A[a]
5+	37	3.84	0	0.00	22	3.37	0	0.00	8	4.17	0	0.00	7	5.88	0	0.00	.60	N/A[a]	.49	N/A[a]	.19	N/A[a]
Drinks per Occasion																						
N/A	204	21.21	37	29.60	152	23.31	25	32.89	30	15.63	7	25.00	22	18.64	5	23.81	<.05	.44	.49	.92	.26	.43
1-2	606	62.99	83	66.40	402	61.66	47	61.84	130	67.71	21	75.00	74	62.71	15	71.43	.13	.21	.37	.78	.83	.42
3-4	133	13.83	4	3.20	88	13.50	4	5.26	27	14.06	0	0.00	18	15.25	0	0.00	.84	N/A[a]	.77	N/A[a]	.61	N/A[a]
5+	19	1.98	1	<1.00	10	1.53	0	0.00	5	2.60	0	0.00	4	3.39	1	4.76	.32	N/A[a]	N/A[a]	N/A[a]	N/A[a]	N/A[a]

N/A = not applicable.
[a]Sample size assumption (n ≥ 5) was not met for proportions analysis.

Table 7. Increased Alcohol Use and Elevated Use by RPA Operators Overall and by MAJCOM, Proportion Comparisons

Alcohol Use	Total		ACC		ANG		AFSOC		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%	n	%			
Alcohol Increase[a]											
Yes	148	13.53	86	11.76	32	14.48	30	21.13	.28	.10	<.01
No	946	86.47	645	88.24	189	85.52	112	78.87	.28	.10	<.01
Elevated Use - Quantity											
Above	20	1.83	10	1.37	5	2.26	5	3.57	.35	.46	.07
Below	1,071	98.17	720	98.63	216	97.74	135	96.43	.35	.46	.07
Elevated Use - Frequency & Quantity											
Above	53	4.87	30	4.12	13	5.91	10	7.14	.26	.64	.12
Below	1,036	95.13	699	95.88	207	94.09	130	92.86	.26	.64	.12

Note: Elevated Use - Quantity is defined as five or more drinks per occasion. Elevated Use - Frequency & Quantity is defined as three or more drinks per occasion, three or more times per week.
[a]Variable n is based on group n: ACC n = 731, ANG n = 221, AFSOC n = 142.

Table 8. Logistic Regression Results for MAJCOM Alcohol Use

Alcohol Use	Logistic Regressions								
	ACC/ANG			AFSOC/ANG			AFSOC/ACC		
	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*
Alcohol Increase									
Yes	0.79 [0.51, 1.22]			1.58 [0.91, 2.74]			2.01* [1.27, 3.19]		
No[a]		1.12(1)	.29		2.65(1)	.10		8.12(1)	<.01
Elevated Use – Quantity									
Above	0.60 [0.20, 1.77]			1.60 [0.45, 5.63]			2.67 [0.90, 7.92]		
Below[a]		0.80(1)	.37		0.53(1)	.47		2.74(1)	.10
Elevated Use – Frequency & Quantity									
Above	0.68 [0.35, 1.33]			1.22 [0.52, 2.87]			1.79 [0.86, 3.76]		
Below[a]		1.18(1)	.28		0.22(1)	.64		2.18(1)	.14

Note: Elevated Use – Quantity is defined as five or more drinks per occasion. Elevated Use – Frequency & Quantity is defined as three or more drinks per occasion, three or more times per week.
*Significant chi square ($p < .05$) and odds ratio.
[a]Comparison category for predictor.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited self-reported reasons for an increase in alcohol use included *social climate and squadron events promoting alcohol usage*, *occupational and personal stress*, and *shift work* across the three MAJCOMS.

4.3.2 Tobacco Use. Unlike alcohol, there is no known "safe" amount of tobacco use – regardless of gender [16]. As a result, the tobacco use data collected in this survey are not examined by gender. Significant and insignificant differences in group proportions for each response category are shown in Table 9. One significant proportion comparison was found. A larger proportion of AFSOC reported an increase in tobacco use when compared to ANG. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 10.

Table 9. Tobacco Use by MAJCOM and RPA Operators Overall, Proportion Comparisons

Tobacco Use	Total		ACC		ANG		AFSOC		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%	n	%			
Use in Past Month											
Yes	205	18.77	142	19.45	37	16.74	26	18.44	.37	.68	.78
No	887	81.23	588	80.55	184	83.26	115	81.56	.37	.68	.78
Daily Use in Past Month											
None	887	81.23	588	80.55	184	83.26	115	81.56	.37	.68	.78
≤1/2 can/pack[a]	156	14.29	104	14.25	31	14.03	21	14.89	.94	.82	.84
1 can/pack[a]	44	4.03	36	4.93	5	2.26	3	2.13	.09	N/A[b]	N/A[b]
>1 can/pack[a]	5	0.46	2	0.27	1	0.45	2	1.42	N/A[b]	N/A[b]	N/A[b]
Tobacco Increase[c]											
Yes	90	8.23	61	8.34	11	4.98	18	12.68	.10	<.01	.10
No	1,004	91.77	670	91.66	210	95.02	124	87.32	.10	<.01	.10

N/A = not applicable.
[a]Pack of cigarettes or can of dip.
[b]Sample size assumption ($n \geq 5$) was not met for proportions analysis.
[c]Variable n is based on group n: ACC n = 731, ANG n = 221, AFSOC n = 142.

Table 10. Logistic Regression Results for MAJCOM Tobacco Use

Tobacco Use	Logistic Regressions								
	ACC/ANG			AFSOC/ANG			AFSOC/ACC		
	OR [95% CI]	Omnibus χ^2(df)	*p*	OR [95% CI]	Omnibus χ^2(df)	*p*	OR [95% CI]	Omnibus χ^2(df)	*p*
Use in Past Month									
Yes	1.20 [0.81, 1.79]			1.12 [0.65, 1.95]			0.94 [0.59, 1.49]		
No[a]		0.83(1)	.36		0.17(1)	.68		0.08(1)	.78
Daily Use in Past Month									
None[a]		3.55(3)	.32		1.02(3)	.80		4.98(3)	.17
≤1/2 can/pack[b]	1.05 [0.68, 1.62]			1.08 [0.60, 1.98]			1.03 [0.62, 1.72]		
1 can/pack[b]	2.25 [0.87, 5.83]			0.96 [0.23, 4.09]			0.43 [0.13, 1.41]		
>1 can/pack[b]	0.63 [0.06, 6.94]			3.20 [0.29, 35.69]			5.11 [0.71, 36.67]		
Tobacco Increase									
Yes	1.74 [0.90, 3.36]			2.77* [1.27, 6.06]			1.59 [0.91, 2.79]		
No[a]		3.00(1)	.08		6.77(1)	<.01		2.49(1)	.11

*Significant chi square ($p < .05$) and odds ratio.
[a]Comparison category for predictor.
[b]Pack of cigarettes or can of dip.

Across all three MAJCOMS, the results of qualitative analyses of participants' responses to the open-ended, write-in response item revealed the most frequently cited self-reported reasons for increasing tobacco use were *occupational and personal stress, maintaining alertness at work,* and *shift work.*

4.3.3 Caffeine Stimulant Use. Stimulant and caffeine use was addressed in the survey as one item combined, but 966/1,094 (88.30%) respondents did not answer the question. Due to the low response rate, this survey item was removed from the analyses.

4.4 Medical Conditions Created or Made Worse by Assignment

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited medical symptoms created or made worse by their occupational assignment were similar across MAJCOMS. However, a larger proportion of ANG, when compared with ACC, reported medical conditions to have been created or made worse by their occupational environment. No differences were found between ANG and AFSOC or ACC and AFSOC. For all three MAJCOM groups, the most frequently cited self-reported medical conditions or symptoms perceived to be caused or made worse by current assignment were *back/neck pain, sleep problems*, and *depression/anxiety* (see Table 11).

Furthermore, the most frequently cited self-reported medical symptoms or conditions believed to have been caused or made worse by occupational stress were similar to the previous item, with *sleep problems, back/neck pain,* and *depression/anxiety* reported for all three MAJCOM groups (see Table 11).

4.5 Changes in Healthcare Utilization Since Current Unit Assignment

4.5.1 Medical Services. Comparisons in group proportions reporting an increase in medical care since being assigned to their current unit are shown in Table 12. One comparison was significant. A larger proportion of ANG reported an increase in medical health services when compared to ACC. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 13.

Table 11. Most Frequency Cited Conditions Perceived to be Created or Worsened by Their Unit Assignment and Occupational Stress, Proportion Comparisons

Medical Condition	ACC[a]		ANG[b]		AFSOC[c]		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%			
By Unit Assignment									
Musculoskeletal injury/pain (e.g., back, neck, joint pain)	41	5.61	23	10.41	8	5.63	<.05	.11	.99
Sleep Problems (e.g., insufficient sleep)	38	5.20	26	11.76	11	7.75	<.01	.22	.23
Emotional Distress (e.g., anxiety, depression)	28	3.83	11	4.98	4	2.82	.45	N/A[d]	N/A[d]
By Occupational Stress									
Musculoskeletal injury/pain (e.g., back, neck, joint pain)	35	4.79	15	6.79	9	6.34	.24	.87	.44
Sleep Problems (e.g., insufficient sleep)	29	3.97	18	8.14	5	3.52	<.05	.08	.80
Emotional Distress (e.g., anxiety, depression)	22	3.01	4	1.81	4	2.82	N/A[d]	N/A[d]	N/A[d]

N/A = not applicable.
[a]Denominator n = 731.
[b]Denominator n = 221.
[c]Denominator n = 142.
[d]Sample size assumption (n ≥ 5) was not met for proportions analysis.

Table 12. Healthcare Utilization by MAJCOM and RPA Operators Overall, Proportion Comparisons

Healthcare Utilization	Total		ACC		ANG		AFSOC		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%	n	%			
Medical Care Increase[a]											
Yes	163	14.90	92	12.59	48	21.72	23	16.20	<.01	.20	.24
No	931	85.10	639	87.41	173	78.28	119	83.80	<.01	.20	.24
Mental Health Support Increase[a]											
Yes	78	7.13	40	5.47	22	9.95	16	11.27	<.05	.69	<.01
No	1,016	92.87	691	94.53	199	90.05	126	88.73	<.05	.69	<.01
Alternative Health Provider Increase[a]											
Yes	166	15.17	89	12.18	54	24.43	23	16.20	<.01	.06	.19
No	928	84.83	642	87.82	167	75.57	119	83.80	<.01	.06	.19

[a]Variable n is based on group n: ACC n = 731, ANG n = 221, AFSOC n = 142.

Table 13. Logistic Regression Results for MAJCOM Healthcare Utilization

Healthcare Utilization	Logistic Regressions								
	ACC/ANG			AFSOC/ANG			AFSOC/ACC		
	OR [95% CI]	Omnibus $x^2(df)$	*p*	OR [95% CI]	Omnibus $x^2(df)$	*p*	OR [95% CI]	Omnibus $x^2(df)$	*p*
Medical Care Increase									
Yes	0.52*[b] [0.35, 0.76]			0.70 [0.40, 1.21]			1.34 [0.82, 2.21]		
No[a]		10.48(1)	<.01		1.71(1)	.19		1.29(1)	.26
Mental Health Support Increase									
Yes	0.52*[c] [0.30, 0.90]			1.15 [0.58, 2.27]			2.19* [1.19, 4.04]		
No[a]		5.11(1)	<.05		0.16(1)	.69		5.74(1)	<.05
Alternative Health Provider Increase									
Yes	0.43*[d] [0.29, 0.63]			0.60 [0.35, 1.03]			1.39 [0.85, 2.30]		
No[a]		18.24(1)	<.01		3.60(1)	.06		1.63(1)	.20

*Significant chi square ($p < .05$) and odds ratio.
[a]Comparison category for predictor.
[b]Inverse OR = 1.93, 95% CI [1.31, 2.84].
[c]Inverse OR = 1.91, 95% CI [1.11, 3.29].
[d]Inverse OR = 2.33, 95% CI [1.60, 3.41].

Across the MAJCOMs, the results of qualitative analyses of participants' responses to the open-ended, write-in response item revealed the most frequently cited self-reported reasons for an increase in medical care utilization included *shift work*, *occupational stress* (e.g., stress due to long hours, shift work, coworker/supervisor conflict), *job requirements*, *ergonomic strain* (e.g., poor ergonomic design of work stations), and *declining health associated with increasing age*.

Written responses describing reasons for decreases in medical care utilization revealed several factors. The most frequently cited reasons for a decrease in medical care utilization included *distance to services* (e.g., having to drive 45+ miles for medical services), *shift work schedule*, and *manning demands* (e.g., feeling the need to avoid duty not involving flying status and lost work time) across MAJCOMs. AFSOC respondents unanimously attributed the decrease to *shift work schedule*, stating that daytime appointments are difficult to make when working shift work.

4.5.2 Mental Health Support Services. Comparisons in group proportions reporting an increase in mental healthcare since being assigned to their current unit are shown in Table 12. A larger proportion of ANG reported an increase in mental health services when compared to ACC and a larger proportion of AFSOC reported an increase in mental health services when compared to ACC. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 13.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited self-reported reasons for an increase in mental healthcare included *occupational stress* (e.g., long hours, high workload, relational conflict with co-workers/supervisor), *marital/family related problems*, and *shift work* across the three MAJCOMs. Additionally, ACC respondents also listed *increased awareness and accessibility* as a reason for increased utilization (see Table 14).

Table 14. Most Frequently Cited Self-Reported Reasons for Increased Mental Health Support Services, Proportion Comparisons

Self-Reported Reasons (per coded category)	ACC[a]		ANG[b]		AFSOC[c]		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%			
Occupational stress (e.g., long hours, shift work, relational conflict with co-worker/supervisor)	9	1.23	10	4.52	9	6.34	<.01	.44	<.01
Marital/family problems (e.g., partner-relational difficulties, workload and duties affecting family relationship)	9	1.23	5	2.26	6	4.23	.26	.29	<.01
Shift work	4	0.55	2	0.90	2	1.41	N/A[d]	N/A[d]	N/A[d]
Increased awareness/accessibility	4	0.55	0	0.00	0	0.00	N/A[d]	N/A[d]	N/A[d]

N/A = not applicable.
[a]Denominator n = 731.
[b]Denominator n = 221.
[c]Denominator n = 142.
[d]Sample size assumption (n ≥ 5) was not met for proportions analysis.

4.5.3 Alternative Health Services. Comparisons in group proportions reporting an increase in alternative health services since being assigned to their current unit are shown in Table 12. One significant difference in proportions was found. A larger proportion of ANG reported an increase in alternative health services when compared to ACC. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 13.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for increasing alternative healthcare utilization included two categories: *musculoskeletal injury/pain* (e.g., seeking chiropractic care, acupuncture, massage therapy for back, neck pain) and *occupational stress* (e.g., seeking massage therapy to reduce muscle tension from work) across MAJCOMs.

Written responses describing reasons for decreasing utilization revealed several factors including *lack of time or availability*, *scheduling issues*, and *services not being covered by TRICARE*.

4.6 Increases in Medication Utilization Since Current Unit Assignment

4.6.1 Prescription Medication. Comparisons in group proportions reporting an increase in prescription medication since being assigned to their current unit are shown in Table 15. One comparison was significant. A larger proportion of ANG reported an increase in their prescription medication use compared to ACC. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 16.

Table 15. Medication Utilization by MAJCOM and RPA Operators Overall, Proportion Comparisons

Medication Utilization	Total		ACC		ANG		AFSOC		% ACC/ANG *p*	% AFSOC/ANG *p*	% AFSOC/ACC *p*
	n	%	n	%	n	%	n	%			
Prescription Increase[a]											
Yes	102	9.32	58	7.93	29	13.12	15	10.56	<.05	.47	.30
No	992	90.68	673	92.07	192	86.88	127	89.44	<.05	.47	.30
OTC Increase[a]											
Yes	131	11.97	82	11.22	27	12.22	22	15.49	.68	.37	.15
No	963	88.03	649	88.78	194	87.78	120	84.51	.68	.37	.15

[a]Variable n is based on group n: ACC n = 731, ANG n = 221, AFSOC n = 142.

Table 16. Logistic Regression Results for MAJCOM Medication Utilization

Medication Utilization	Logistic Regressions								
	ACC/ANG			AFSOC/ANG			AFSOC/ACC		
	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*	OR [95% CI]	Omnibus $\chi^2(df)$	*p*
Prescription Increase									
Yes	0.57*[b] [0.36, 0.92]			0.78 [0.40, 1.52]			1.37 [0.75, 2.49]		
No[a]		5.10(1)	<.05		0.54(1)	.46		1.01(1)	.31
OTC Increase									
Yes	0.91 [0.57, 1.44]			1.32 [0.72, 2.42]			1.45 [0.87, 2.41]		
No[a]		0.17(1)	.68		0.78(1)	.38		1.95(1)	.16

*Significant chi square (p <.05) and odds ratio.
[a]Comparison category for predictor.
[b]Inverse OR = 1.75, 95% CI [1.09, 2.81].

The results of qualitative analyses of participants' textual responses to the open-ended item revealed the most frequently cited self-reported reasons for an increase in prescription medication usage included *sleep* (e.g., insufficient sleep, obstructive sleep apnea), *respiratory issues* (e.g., asthma, allergies), and *shift work* across MAJCOMs.

4.6.2 OTC Medication. Comparisons in group proportions reporting an increase in OTC medication since being assigned to their current unit are shown in Table 15. Logistic regression results predicting ACC group membership compared to ANG, AFSOC group membership compared to ANG, and AFSOC group membership compared to ACC are shown in Table 16. The results of qualitative analyses of participants' textual responses to the open-ended, write-in response revealed most frequently cited self-reported reasons for increased usage included *sleep* (e.g., insufficient sleep, obstructive sleep apnea), *shift work, occupational stress* (e.g., high levels of stress and discomfort associated with long work demands and poor ergonomics), and *respiratory difficulties* (e.g., allergies due to environmental conditions) across MAJCOMs.

5.0 DISCUSSION

The current study represents an anonymous and voluntary survey assessment of health behaviors within the USAF RPA Predator/Reaper operators. Previous research has documented the relatively high-demand, high-risk nature of the Predator/Reaper career field [4], reporting higher than expected levels of exhaustion and clinical distress within this unique group of operators. Self-reported attributions have identified the operational stressors of low manning, long hours, frequent rotations in shift work, and problematic work-rest cycles, which are driven by the need to sustain around-the-clock missions in support of battlefield operations. Until now, however, no one has investigated the general health habits and behaviors of these operators, who are required to sustain a deployed in-garrison lifestyle. The results of this study suggest two important contributions to the current knowledge about the RPA environment: (1) the stress and operational demands of the Predator/Reaper environment appear to have an impact on operators' short-term health behaviors and medical services utilization, and (2) the types of stressors and demands exacted by the Predator/Reaper mission are affected by the physical, social, and organizational environment in which the operators perform and are therefore not equal across all RPA units.

5.1 Current Health Behaviors

When examining health-promoting behaviors such as sleep and exercise, as a population Predator/Reaper operators are falling below the national averages and recommendations for adults. According to the National Sleep Foundation, the average adult needs 7 to 9 hours of sleep to function at his/her peak [17]. However, only 38.94% of the respondents indicated they received 7 to 8 hours of sleep before a typical shift. Even more concerning is the fact that as many as 668 (61.06%) of the respondents indicated a typical sleep duration prior to a shift that could put them at elevated risk for accidents and illnesses (less than or equal to 5 hours or greater than 9 hours) [17]. Although the categories used in this survey do not allow for the calculation of an exact number of respondents that fall into the ranges stipulated by the National Sleep Foundation, the trend is a concerning one. Insufficient sleep is associated with several chronic disease outcomes such as hypertension [18], cardiovascular disease [19], and obesity [20,21].

The findings of the study reveal a large portion of RPA operators are routinely obtaining inadequate amounts of sleep prior to work, which could present risks to general health, performance, and safety.

Similarly, a significant proportion of respondents are falling below the exercise frequency and intensity that are recommended by the Centers for Disease Control and Prevention (CDC) and the U.S. Department of Health and Human Services [22]. The current Physical Activity Guidelines for Americans recommends at least 150 minutes a week of moderate-intensity or 75 minutes a week of vigorous-intensity aerobic physical activity for maximum health benefits [22]. Although the survey in this study did not allow for respondents to specify the intensity of their exercise, assuming most people exercise at a moderate intensity, only those respondents who indicated "daily" exercise would be within the U.S. Department of Health and Human Services recommendations for maximum health benefits (6.32% of RPA operators). Even the most liberal estimate (the top two categories: 20 minutes or more 5 times/week or more) from these responses would only put 20.42% of Predator/Reaper operators within these guidelines. Although RPA operators are falling short of the recommended exercise regimen, the majority of RPA respondents reported exercising about as much as the average American adult (51.6% of Americans report exercising for 30 or more minutes 3 or more days per week [23], while 65.84% of RPA operators reported exercising 20 or more minutes, 3 or more days per week. Regular physical activity has benefits for long-term health, as it decreases the risk of developing conditions such as cardiovascular diseases, diabetes, and obesity [24]. Physical exercise has also been shown to be beneficial for reducing stress [25]. Overall, however, the respondents to this survey are not getting enough exercise to achieve these maximal health benefits.

When looking at health-demoting behaviors such as alcohol and tobacco use, Predator/Reaper operators are consuming at a rate that is similar to or slightly less than the American adult population as a whole. According to the latest Gallup Poll, 63% of American adults (69% of men, 58% of women) consume alcohol while 37% abstain completely (31% of men and 42% of women). Average alcohol consumption for American adults is 6.2 drinks per week for men and 2.2 drinks per week for women [26].

Overall, for those RPA operators who responded to the alcohol-related questions, 26.70% reported abstaining (25.23% of men and 38.21% of women), and the majority of male and female Predator/Reaper operators consume two beverages or less of alcohol on two occasions or less per week (Table 6). When comparing consumption data between the current sample and the Gallup data, it is important to note that the sample in this study is age-restricted due to the nature of military service, while the Gallup data include all adults over age 18. The Gallup data suggest a very different consumption rate for those American adults over age 50, with adults age 18-49 abstaining at a much lower rate (30%) than those 50 and over (46%). Therefore, when considering the age-restricted range of a military population, the rates of consumption and the proportion who consume alcohol versus those who abstain are very similar to the trends observed in the age-comparable American adult population.

In the American adult population, approximately 9% of men and 8% of women reported "excessive drinking," which is defined as consuming two or more alcoholic beverages per day for men and one or more per day for women [26]. In our sample, 1.83% of respondents reported high-risk drinking behaviors based on quantity, and 4.87% reported high-risk drinking behaviors based on both frequency and quantity of alcohol consumption that could place them in the "excessive drinking" category (Table 7). (As a cautionary note, the categories used in this survey

could slightly inflate these numbers because the lower end of the categories used to define excessive drinking falls into the "normal drinking" range.)

Although these survey results cannot be used to assess the prevalence of alcohol abuse or dependence in this population, there is a portion of respondents, albeit a small one, who endorsed alcohol use (approximately 1% to 4%) that has been shown to be associated with elevated risk for health problems such as alcoholism; liver cirrhosis; diseases of the pancreas, heart, and nervous system; cancers of the upper respiratory and digestive tracts; injuries from motor vehicle accidents; and other associated conditions [27-29]. This issue could benefit from line or medical leadership intervention. Overall, these data suggest that the excessive consumption of alcohol by RPA operators occurs at a lower rate than it does in the American adult population at large.

Similarly, the current rates of tobacco use in our survey population are consistent with the smoking rates reported in the American adult population. According to the latest report by the CDC, 19.3% of American adults smoke cigarettes [30], while 18.77% of respondents to this survey reported using tobacco products. The data available in the CDC report only indicate smokers and not people who use other forms of tobacco. The current survey defined "tobacco use" as all forms of tobacco products; therefore, the comparison is not an exact one. Nonetheless, it suggests Predator/Reaper operators use tobacco at a rate similar to or slightly less than the American adult population.

5.2 Changes in Health Behaviors

Although current rates of consumption of alcohol and tobacco in this RPA population are similar to or less than their American adult counterparts, a significant proportion of RPA operators endorsed an increase in their consumption since being assigned to Predator/Reaper duties (Tables 7 & 9). With 148 (13.53%) and 90 (8.23%) respondents reporting increases in alcohol and tobacco use, respectively, and with the majority of these increases being attributed to factors directly related to their work environment (i.e., stress, work schedule/shift work, AF culture and location of base), it seems that a significant proportion of operators may be responding to the demands of their work environment by increasing their use of alcohol and tobacco. The report of increased alcohol intake due to stress is consistent with research that has demonstrated a connection between the experience of daily occupational stress and increased alcohol use [31].

When taken as a whole, the Predator/Reaper operators who responded to this survey are not engaging in health-promoting behaviors (i.e., sleep and exercise) at a rate that would be maximally beneficial to their health and well-being, and at the same time they are increasing their amount of alcohol and tobacco use, potentially in response to the demands of their work environment. This combination of factors alone could place these operators at elevated risk for poor health outcomes, especially if these behaviors persist throughout the duration of their time as RPA operators.

5.3 Changes in Medical Symptoms and Conditions

Overall, a significant portion of operators reported negative changes in their health status and health behaviors since being assigned to Predator/Reaper duties. When asked to list medical conditions believed to be caused or exacerbated by their current duty assignment, 147 respondents (13.44%) listed medical conditions. When asked to list medical conditions believed

to be caused or exacerbated by occupational stress, 117 (10.69%) operators listed medical conditions. Although these data are based upon the subjective interpretations of the operators, the medical issues they endorsed (e.g., back/neck pain, sleep problems, and depression/anxiety; Table 11) are consistent with medical conditions documented in other populations working high-risk work schedules and long hours in ergonomically challenging environments [32-34].

Similarly, there was a significant proportion of respondents who reported using more medication and seeking more medical services since being assigned to Predator/Reaper duties. An increase in medical services utilization was reported by 163 respondents (14.90%); 78 respondents (7.13%) reported an increase in mental health service utilization, and 166 (15.17%) reported an increase in alternative health services utilization (Table 12).

Prescription and OTC medication use increases were endorsed by 102 (9.32%) and 131 (11.97%) operators, respectively. Again, these changes were predominantly attributed to their occupational environment (e.g., shift work, job stress, and ergonomic strain) across all three MAJCOMs. The use of OTC medications has been increasing among adults in the United States, with potential for risks to health due to (a) incorrect self-diagnosis delaying diagnosis and treatment of serious illnesses (e.g., delay in seeking advice from a healthcare professional), (b) increased risk of drug-to-drug interactions, (c) increased risk of adverse events when not used as instructed, and (d) the potential for misuse and abuse, especially with medications designed to reduce pain, increase weight loss, and manage cold and flu-like symptoms [35]. As a result, the increasing usage of OTC medications and their high potential for misuse should be given consideration when developing strategies for sustaining health and safety.

5.4 Important Differences Across MAJCOMs

Because of the significant differences in the numbers of respondents representing each MAJCOM, and because of important cultural and work schedule differences among the units participating in this survey, it is essential to examine MAJCOM-specific trends in the data. Logistic regressions were used to predict group membership when comparing MAJCOMs and identify significant differences among the MAJCOMs. A number of important differences and trends were discovered. Respondents in each MAJCOM were first examined in terms of their demographics (i.e., age and gender), their personal responsibilities (i.e., marital status and dependent status), and their occupational demands (i.e., rank, time on station, shift schedule, shift rotation frequency, and hours worked per week) to provide a more complete context for understanding their health behaviors and utilization.

5.4.1 Air Combat Command. On average, ACC respondents had been in Predator/Reaper duties the least amount of time as compared to AFSOC and ANG (Table 3). Additionally, a larger proportion of ACC respondents were in the youngest age category (18-25; Table 2) compared to the proportion in this category from ACC and AFSOC. Demographically, the proportions of ACC respondents in the categories for rank, marital status, dependents at home, and working shift work were similar to the proportions of AFSOC respondents in these categories (Table 2). However, a lesser proportion of ACC respondents endorsed the most taxing of the shift work schedules (i.e., rotating every 30 days) and a greater proportion of ACC respondents endorsed working 50 hours per week or less as compared to the proportions of AFSOC respondents in these categories (Table 2). Taken together, these data suggest that ACC respondents have similar personal demands to AFSOC respondents but less taxing work

demands. As was mentioned previously, the proportion of ACC respondents endorsing increases in alcohol and tobacco use and mental health services utilization was significantly less than the proportion of AFSOC respondents endorsing these changes. However, there was still a substantial percentage of ACC respondents endorsing negative health behavior changes since being assigned to RPA duties: increases of 11.76% in alcohol, 8.34% in tobacco, 12.59% in medical care, and 12.18% in alternative healthcare.

An interesting trend to note in terms of RPA operators in ACC is that only 5.47% endorsed an increase in mental health services utilization since being assigned to RPA duties (as compared to 9.95% in ANG and 11.27% in AFSOC). This, proportionally, represents a significant difference, with the odds of an ANG respondent endorsing an increase in mental health utilization being almost twice that of the odds of an ACC respondent and the odds of an AFSOC respondent endorsing an increase in mental health services being more than twice the odds of an ACC respondent (Table 13). Over the past 2 years, ACC has utilized an embedded psychologist assigned to the units who provides regular mental health consultations, briefings, and education. Although more specific data need to be collected and analyzed to elucidate this relationship, it is possible that this is an indication that education, normalization, and resiliency-building may be working in this MAJCOM as primary and secondary prevention techniques.

Lastly, of note for ACC respondents was the fact that they were the only command to have a noteworthy proportion of respondents (3.97%) report a decrease in medical services since being assigned to RPA duties. The attribution data indicate this is not due to increased health and wellness but rather to medical services being a significant distance from their duty locations, shift work schedules making daytime appointments difficult, and low manning levels resulting in a perceived pressure to not miss work or be removed from flight status.

5.4.2 Air Force Special Operations Command. Demographically, AFSOC respondents were very similar to ACC in terms of rank, marital status, and dependents living at home. AFSOC respondents were also young, although not as young, on average, as ACC respondents (more than half of AFSOC respondents were 30 years old or younger as compared to 61.46% of ACC respondents and 28.96% of ANG respondents; see Table 2). In terms of occupational demands and exposure to the RPA environment, AFSOC respondents were unique from their ACC and ANG counterparts in a few key areas. Although AFSOC respondents fell in between ACC and ANG in terms of time on station (proportionally, more AFSOC respondents endorsed $\leq$2 years than ANG but a lesser proportion than ACC; see Table 2), a significantly greater proportion of AFSOC respondents endorsed shift work rotating every 30 days (the most demanding of the shift work schedules surveyed here) [36] and a significantly greater proportion of AFSOC respondents endorsed working 51 or more hours per week (i.e., longer working hours) than the proportion of respondents endorsing these categories from ACC and ANG (Table 2). Taken together, this suggests that AFSOC respondents had been exposed to some of the most demanding aspects of the RPA career field, albeit for a shorter period of time, than respondents from ACC and ANG.

Within that occupational context, the odds of an AFSOC respondent reporting an increase in alcohol use since being assigned to RPA duties were two times greater than the odds of an ACC respondent reporting the same (Table 8). Furthermore, the odds of an AFSOC respondent endorsing an increase in tobacco use since being assigned to RPA duties were 2.77 times that of an ANG respondent endorsing the same (Table 10). With such a large proportion of AFSOC respondents endorsing increases in alcohol and tobacco use since beginning RPA duties (21.13% and 12.68% respectively; see Tables 7 & 9), this issue warrants additional investigation, as

stress, shift work, long work hours, and sleep issues were among the top attributions for increases in the use of these substances in the AFSOC sample. While these data do not allow for definitive conclusions regarding causal relationships, it is plausible that AFSOC RPA operators may be using tobacco (a stimulant) and alcohol (a depressant) to regulate the frequent changes in their sleep/wake cycles that are required by their demanding work schedule.

In addition to increasing alcohol and tobacco use, the odds of an AFSOC respondent endorsing an increase in mental health support services utilization since being assigned to RPA duties are two times that of an ACC respondent reporting an increase in mental health support services utilization. Additionally, as compared to ACC respondents reporting an increase in their use of mental health services, a larger proportion of AFSOC respondents attributed the increase to occupational stress and marital/family problems. Although not proportionally different from other MAJCOMs, a substantial portion of the AFSOC respondents also endorse increased prescription (10.56%) and OTC (15.49%) drug use since being assigned to RPA duties (Table 15). The increase in mental health services and substance and medication use in the AFSOC RPA operators suggests that working longer hours and frequently rotating shifts may be exacting a toll. A better understanding of the relationships among shift work schedule, hours worked per week, occupational stress, family/marital problems, medication use, and substance use will be essential to maximizing the health and wellness of these RPA operators.

5.4.3 Air National Guard. Demographically, the proportion of ANG respondents in the oldest category for age (40+) was significantly greater than the proportion of respondents in this category from both ACC and AFSOC (Table 2). Examination of the distribution of the age categories shows that ANG respondents were significantly older on average than respondents from ACC and AFSOC, with more than half of the ANG respondents endorsing being 35 years old or older, while over half of the AFSOC and ACC respondents fell in the lowest two age categories (18-30). Additionally, the proportions of ANG respondents in the categories of dependents living at home, enlisted (rank), time on station ≥24 months, working a standard day (i.e., no shift work), and working 50 or less hours per week were significantly greater than the proportions in these categories from either of the other two MAJCOMs. These data indicate that ANG respondents were older, more likely to have dependents at home, and more likely to have spent 2 years or more in Predator/Reaper duties than their counterparts in AFSOC and ACC. ANG respondents were also more likely to be enlisted, less likely to be working more than 50 hours per week, and less likely to be working a shift work schedule than both AFSOC and ACC respondents. This suggests that ANG respondents have more personal responsibilities at home and have been exposed to RPA duties for significantly longer but endorse fewer of the occupational stressors (e.g., long work hours, frequently rotating shift work) that are reported by the other MAJCOMs (i.e., ACC, AFSOC).

Within that social/occupational context, a greater proportion of ANG respondents endorsed drinking alcohol 1-4 times per week than ACC respondents (Table 6). However, this difference could be an artifact of the significantly younger age of ACC respondents (a significant portion [24.83%] of ACC respondents endorsed being in the lowest age category [18-24 years], which includes those under legal drinking age). Although male ANG respondents were more likely to endorse drinking alcohol 1-4 times per week than their counterparts in ACC, they were no more likely to report an increase in alcohol consumption since being assigned to RPA duties than operators in either ACC or AFSOC.

Although ANG respondents did not have greater odds than the other MAJCOMs of endorsing an increase in alcohol since being assigned to RPA duties, 14.48% of ANG respondents endorsed an increase and attributed this increase to social climate, occupational and personal stress, and shift work, suggesting that a significant proportion of the population might benefit from line or medical leadership intervention to alter the social mores regarding alcohol and to provide alternate coping mechanisms for their sources of stress.

When considering healthcare utilization, the odds of an ANG respondent endorsing an increase in utilization of medical services, an increase in utilization of mental health support services, and an increase in utilization of alternative health services were significantly greater than the odds of ACC respondents endorsing such increases (Table 13). Additionally, ANG respondents endorsed an increase in prescription medication use more than one and a half times that of ACC respondents. Although advancing age could explain some of these differences (as ACC respondents were on average significantly younger than ANG respondents and some of the ANG respondents did attribute these changes to increasing age), the majority of the attributions for these changes were related to the work schedule and work environment (e.g., shift work, stress, ergonomic strain, etc.). In addition to being younger than ANG respondents, ACC respondents were also significantly more likely to have been in RPA duties for 24 months or less. Additional data are needed to support this hypothesis, but it seems possible that an exposure (time in RPA duties)-response (increased health conditions and health services utilization) relationship could explain the differences between ANG operators and their counterparts in ACC.

6.0 STUDY OUTCOME RECOMMENDATIONS

6.1 First Tier – Line Leadership

These data suggest that the most impactful changes line leadership can make are to (a) optimize work hours and shift work schedules, (b) manage the ergonomic strains inherent in the Predator/Reaper workstations, and (c) maintain sufficient manning for sustaining around-the-clock operations. Optimizing work/rest cycles and shift rotation schedules is necessary to minimize transition periods from one cycle to another and to allow operators to fully adjust to a shift before requiring another change. Additionally, fully assessing the ergonomics of the workstations in which operators work and improving the setup where feasible and limiting exposure through more frequent breaks and shorter shifts where change is not feasible due to costs and/or the limits of technology may also beneficial for optimizing performance. Lastly, maintaining sufficient manning to support operations will allow for these adjustments in shift length and break frequency, as well as allow operators opportunities to care for themselves (e.g., medical appointments and exercise), which will, in turn, ensure they are performing at their maximum capabilities when they are at work. These changes would significantly improve quantity and quality of sleep, decrease exposure to ergonomic stressors, and allow time for exercise and healthcare appointments, which would, in turn, decrease the need for alcohol, tobacco, and prescription and OTC medications.

Additionally, taking measures to encourage base facilities (e.g., the gym, commissary, and recreational facilities) to support 24/7 operations increases opportunities for shift workers to take charge of their personal fitness and rest time without having the perception that their only option when they finish their shift is to go home and consume alcohol alone until they can fall

asleep. Lastly, line leadership should take the necessary steps to assess the unique challenges inherent in a given geographic and organizational climate. This information will allow leadership to make additional, targeted changes to maximize the health and well-being of this unique population of warriors.

6.2 Second Tier – Medical Treatment Facilities

The current survey results also indicate changes that could be made in the military medical treatment facilities to mitigate some of the health impacts of sustaining around-the-clock in-garrison operations in the Predator/Reaper community. A key issue for medical treatment facility commanders to consider is the access to care issues created by 24/7 flight operations. Access to flight medicine physicians and other healthcare providers is essential to maintaining a safe, healthy force, but a significant percentage of Predator/Reaper operators indicated that poor access to care – due to distance, schedule availability, and types of services available – was a significant issue in maintaining their health and fitness. Along this line, it is highly recommended to embed a dedicated doctoral level mental health provider with the appropriate security clearances (e.g., Top Secret) within these units to perform primary and secondary intervention briefings to educate operators regarding sleep hygiene and other alternatives to relying on substances to manage sleep/wake cycles. This mental health provider can also improve access to health services by decreasing stigma and being an advocate, as well as advising line leadership regarding organizational, physical, and social climate factors unique to the unit.

To help optimize the success of this recommendation, mental health providers embedded within line units or flight medicine should be selected based upon their consultation capabilities, leadership qualifications and experience as mental health providers, clinical diagnoses and treatment acumen, intrinsic interest in learning and being a part of RPA operations, and capabilities to effectively bridge the gap and remove stigmas to mental healthcare.

6.3 Areas of Future Study

Future research into the health behaviors and healthcare utilization of Predator/Reaper operators should begin to understand and model the exposure-response relationship among the various individual, organizational, and mission-related factors involved in RPA operations. The potential factors to be considered as involved in this relationship are the age of the operator, time spent in RPA duties, hours worked per week, length of shifts, frequency of shift work rotation, and the protective benefit of factors such as physical fitness, sleep hygiene, and resiliency training. Developing such a model will begin to elucidate questions such as the following:

- “Is there a limit to how long someone should be an RPA operator?”
- “Is there an age at which someone is too old to be an RPA operator without sustaining significant negative health consequences?”
- “What is the work schedule that will minimize negative health consequences for operators while minimizing manning and maximizing performance?”

7.0 STRENGTHS AND LIMITATIONS OF THE STUDY

The current study was not able to comment on or describe stimulant use in this sample due to a very low response rate for the caffeine/stimulant use questions. Initial analyses did not indicate a problem with survey administration, and the format and wording of questions to assess caffeine and stimulant use in the survey have already been altered to minimize the likelihood that this will happen in future research. Additionally, response categories for some survey items did not allow for direct comparisons with national averages/trends or diagnostic thresholds, and the format of these questions has been altered for future survey data collection. In addition to these survey content issues, the absence of an Air Force comparison group assigned to the same location as the Predator/Reaper operators limits our ability to make definitive statements about changes and challenges that are unique to this RPA community versus unique to a given geographic and cultural milieu that exists at a specific base.

Although analyses of textual responses provide reasons for increased use of alcohol, tobacco, caffeine, and medical/mental healthcare, and medication usage (prescription and OTC), additional studies are needed for making definitive conclusions. The results of this study did not fully address the functional impairment of the health behaviors reported, such as insufficient sleep and substance use (i.e., alcohol, prescription drugs). Furthermore, participants reporting high levels of sleep issues, increased medical use, medical problems, and substance abuse do not necessarily require treatment. The study can be improved via simultaneous assessment of functional impairment to support the validity of assumptions to performance that are made.

Self-report surveys are prone to response bias from a self-selected sample that might affect generalization of results. Simply put, whenever assessing for the impact within an organization, it is always a possibility there will be sampling bias. This bias may occur as a result of those individuals who are at highest risk and wanting to expose their concerns. However, sampling bias is not necessarily a negative issue if it helps reveal the intended at-risk population. In spite of these limitations, the current findings support the notion that working around-the-clock real-time operations may place one at risk for adverse health consequences that would benefit from being addressed by leadership and medical personnel.

8.0 CONCLUSION

The operators who maintain battlefield-essential, around-the-clock RPA operations face demands that are inherently arduous and taxing. However, organizational and environmental factors such as work schedules, manning status, duration of assignment, and even local climate can present additional stressors and demands that can negatively impact the health and well-being of these operators. The increases in substance use, medical issues, and healthcare utilization do not have to be necessary outcomes for these operators. The current survey results indicate that modifications to aspects of the RPA work environment, such as frequency of shift work rotations and hours worked per week, may go a long way toward primary and secondary prevention of poor health behaviors and outcomes.

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LIST OF ABBREVIATIONS AND ACRONYMS

ACC	Air Mobility Command
AFSOC	Air Force Special Operations Command
ANG	Air National Guard
CI	confidence interval
DCGS	distributed common ground system
MAJCOM	major command
OR	odds ratio
OTC	over-the-counter
RPA	remotely piloted aircraft
USAF	U.S. Air Force