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Occupational Health Screening of the 70th Intelligence, Surveillance, and Reconnaissance Wing: Intelligence Operators Compared with Non-Combatant Support Personnel

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14. ABSTRACT

The 70th Intelligence, Surveillance, and Reconnaissance Wing (70 ISRW) engages in intelligence operations to provide accurate and timely intelligence products to military and national-level decision-makers. Understanding 70 ISRW health patterns is critical to developing relevant and appropriate medical and mental health strategies to foster optimal health across the entire community. The objective of this study was to identify and discuss between-group differences among the intelligence operators and support personnel on the following items: (a) the frequency of health behaviors related to sleep obtained before work and physical exercise throughout the week; (b) the frequency and increase of poor health habits related to alcohol, tobacco, and caffeine use and the reasons for these increases; (c) self-reported medical conditions believe to have been caused or worsened by occupational stress; (d) availability or access to medical care and the increases in healthcare utilization and the reasons for these increases; and (e) self-reported increases in medication usage and the reasons for these increases. A total of 1223 intelligence operators and 599 support personnel participated in the study. The participants were asked to electronically complete a survey assessing demographics; sleep and physical exercise health behaviors; alcohol, tobacco, and caffeinated beverage use; medical conditions believed to have been created or made worse by current unit assignment; medical, mental health support, and alternative healthcare utilization; and medication utilization. Quantitative and qualitative analyses were calculated. Although the overarching findings of this study indicate substantial similarity between 70 ISRW intelligence operators and support personnel, when differences occurred, intelligence operators tended to present the more notable health concerns, such as poor access to medical health resources, increased use of mental health services due to work stress and personal issues, and self-medication through over-the-counter drugs for stress and sleep difficulties. Both groups attributed their increase in alcohol and tobacco use, as well as alternative health services and prescription medication use, to stress. Additionally, shift work and exhaustion emerged as common attributions for increased caffeine use among all 70 ISRW personnel. Based on these results, it is recommended that line leadership strive to facilitate ready access to medical and mental healthcare, identify areas that will optimize work/rest cycles, and consider supplying sufficient manning to allow for adjustments in shift length, shift work rotations, and break frequency and decreased work hours.

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1.0 SUMMARY

The 70th Intelligence, Surveillance, and Reconnaissance Wing (70 ISRW) engages in intelligence operations to provide accurate and timely intelligence products to military and national-level decision-makers. Understanding 70 ISRW health patterns is critical to developing relevant and appropriate medical and mental health strategies to foster optimal health across the entire community. The objective of this study was to identify and discuss between-group differences among the intelligence operators and support personnel on the following items: (a) the frequency of health behaviors related to sleep obtained before work and physical exercise throughout the week; (b) the frequency and increase of poor health habits related to alcohol, tobacco, and caffeine use and the reasons for these increases; (c) self-reported medical conditions believe to have been caused or worsened by occupational stress; (d) availability or access to medical care and the increases in healthcare utilization and the reasons for these increases; and (e) self-reported increases in medication usage and the reasons for these increases. A total of 1223 intelligence operators and 599 support personnel participated in the study. The participants were asked to electronically complete a survey assessing demographics; sleep and physical exercise health behaviors; alcohol, tobacco, and caffeinated beverage use; medical conditions believed to have been created or made worse by current unit assignment; medical, mental health support, and alternative healthcare utilization; and medication utilization. Quantitative and qualitative analyses were calculated. Although the overarching findings of this study indicate substantial similarity between 70 ISRW intelligence operators and support personnel, when differences occurred, intelligence operators tended to present the more notable health concerns. These included increased consumption of caffeinated beverages and consuming 3-4 caffeinated beverages per day, poor access to medical health resources, increased use of mental health services due to work stress and personal issues, and self-medication through over-the-counter drugs for stress and sleep difficulties. Both groups attributed their increase in alcohol and tobacco use to stress, also reporting increases in use of alternative health services and prescription medication for the same reason. Additionally, shift work and exhaustion emerged as common attributions for increased caffeine use among all 70 ISRW personnel. When asked to list medical conditions believed to have been created or worsened by current unit of assignment, both groups listed sleep issues, anxiety and depression, and musculoskeletal injury or pain, but intelligence operators reported these conditions at a higher rate than their support counterparts. Based on these results, it is recommended that line leadership strive to facilitate ready access to medical and mental healthcare, identify areas that will optimize work/rest cycles, and consider supplying sufficient manning to allow for adjustments in shift length, shift work rotations, and break frequency and decreased work hours.

2.0 INTRODUCTION

Providing critical information to national leaders, combatant commanders, and combat forces is the principal function of the intelligence, surveillance, and reconnaissance (ISR) community. A manpower-intensive function, ISR within the U.S. Air Force (USAF) is conducted by the men and women of the 25th Air Force (25 AF). Formerly the Air Force Intelligence, Surveillance, and Reconnaissance Agency, 25 AF's technical center and five operational wings provide multisource (ISR) products, applications, capabilities, and resources, including cyber and geospatial expertise. Additionally, 25 AF is the Service Cryptologic Component responsible to

the National Security Agency/Central Security Service for USAF matters involving the conduct of cryptologic activities, including missions related to both tactical warfighting and national-level operations (http://www.25AF.af.mil).

The 70th Intelligence, Surveillance, and Reconnaissance Wing (ISRW) is the cryptologic wing within 25 AF and is the lead in signals intelligence and national-tactical capabilities. Comprising over 4700 airmen across six operational groups, the 70 ISRW is one of the largest wings in the USAF, operating from approximately 15 different locations around the globe. Headquartered at Fort Meade, MD, the 70 ISRW trains and develops a proficient and diverse cryptologic workforce to accomplish the needs of modern warfighters in a developing, global, and technological environment (http://www.25af.af.mil/Units/70-ISRW/).

In this regard, the 70 ISRW engages in intelligence operations for the USAF, U.S. Cyber Command, the National Security Agency, and the Central Security Service, with the ultimate goal of providing accurate and timely intelligence products to military and national-level decision-makers. The 70 ISRW must contend with the challenge of sustaining a resilient and robust intelligence workforce that keeps pace with ISR requirements and operational demands, often on a 24/7 and 365 days a year basis. In addition, the 70 ISRW requires a dynamic and responsive support architecture to sustain the administrative and technical support functions that underpin mission operations, including, but not limited to, communications and network support and system engineering. Fulfilling this array of demands requires a diverse workforce, one that is healthy and prepared to keep pace with the evolving paradigm of modern warfare.

While the majority of 70 ISRW intelligence operators and support personnel work daytime schedules, the operational intelligence environment is not without psychological stressors. The subset that is engaged in 24/7 shift work tends to have more direct involvement in combat activities and thereby faces the risk of additional stress effects and resiliency challenges. Supporting the distributed common ground system (DCGS) is a prime example of this type of mission, and one whose occupational health factors have been well established in research. Whether operationally or strategically oriented, 70 ISRW personnel remain physically safe during the course of their duties, because as a rule they are geographically removed from combat events. This reality does not eliminate the risk of occupational health concerns, because they are cognitively and emotionally engaged. Additionally, exposure to combat may increase the likelihood of negative outcomes that can manifest in both psychological and physical ways. Understanding 70 ISRW health patterns in a comprehensive manner is critical to developing relevant and appropriate medical and mental health strategies to foster optimal health across the entire community.

Previous research studies by Prince et al. and Langley provide insight into the relevance of stress level differences and their effects when comparing intelligence operators to their support counterparts (i.e., sustainment and support personnel), based on a DCGS population sample. The published reports documented sources of stress, health and lifestyle coping strategies, as well as psychological health considerations ranging from facets of burnout to clinical psychological distress and post-traumatic stress disorder. Findings revealed that the primary sources of occupational stress for DCGS intelligence operators tended to be occupational in nature, reflective of work hours, shift scheduling, manning, workload, organizational and leadership factors, nature of work, and work-rest cycle management [1,2]. The Prince et al. report also revealed that intelligence personnel were more likely to have a higher rate of emotional exhaustion and clinical distress when compared to sustainment and support personnel [1]. Additionally, health trend indicators from this study suggested less than

optimal coping strategies were commonly used to offset negative impacts of stress, thereby highlighting the need for a more in-depth examination of health and lifestyle patterns within ISR populations.

A subsequent survey of 70 ISRW personnel rendered similar findings to those in the 2012 DCGS assessment [3]. In that survey, 70 ISRW intelligence personnel were 1.5-1.6 times more likely to experience emotional exhaustion and clinical psychological distress when compared to their support/sustainment counterparts [3]. Specifically, intelligence operator and support/sustainment findings were as follows: emotional exhaustion (15.57% vs. 10.40%) and psychological distress (12.14% vs. 7.48%), respectively. Top sources of stress reported by 70 ISRW personnel, both intelligence operators and support personnel, included intra-organizational leadership, communication and management difficulties, workload and manning, administrative workload, as well as personal and home life stress.

Based on the body of research on ISR occupational stress, it is reasonable to expect that intelligence operators of the 70 ISRW, like those in DCGS, would be at greater risk for worsening health conditions, poor health habits, and increased need and utilization of medication and medical services than their support counterparts. While the data presented by Prince et al. [1,3] and Langley [2] raise concern about the psychological impact for intelligence operators and associated support personnel, understanding of the overall health consequences of working within these unique operations remains limited. Research has demonstrated the impact occupational stress presents to one's physical health. For example, occupational stress has been found to be associated with high-risk health behaviors (e.g., increased alcohol and drug use [4,5]) and negative physical health symptoms (e.g., back pain, eyestrain, gastrointestinal problems, and headaches [6]). Furthermore, high-risk work schedules such as shift work, common across the ISR community [1-3], can place workers at an elevated risk for problem drinking behavior (i.e., binge drinking [7]) and poor health outcomes [8].

It is hypothesized that a significantly higher number of intelligence operators (when compared with support personnel) will report worsening health behaviors, health habits, medical health conditions, as well as increased healthcare service and medication utilization. The objective of this study is to identify and discuss between-group differences among the intelligence operators and support personnel on the following items:

1. The frequency of health behaviors related to sleep obtained before work and physical exercise throughout the week
2. The frequency and increase of poor health habits related to alcohol use, tobacco use, and caffeine use (traditional and designer energy drinks) and the reasons for these increases since being assigned to the 70 ISRW
3. Self-reported medical conditions endorsed that the 70 ISRW personnel believe to have been caused or worsened by occupational stress since being assigned to their current unit
4. Availability or access to medical care and the increases in healthcare utilization (to include medical, mental health, and alternative health services) and the reasons for these increases since being assigned to the 70 ISRW
5. Self-reported increases in medication usage (over the counter (OTC) and prescription) and the reasons for these increases reported since being assigned to the 70 ISRW

Specific recommendations to line leadership and medical personnel related to these items are discussed.

3.0 METHODS

3.1 Participants

A total of 1223 intelligence operators (67.12% of the overall sample) and 599 support personnel (32.88%) from the 25 AF's 70 ISRW participated in the study. The total number of airmen assigned to each unit within the 70 ISRW was obtained from USAF operational leadership and compared with the number of airmen who participated in the study to yield an estimated response rate of 39%.

3.2 Questionnaire

3.2.1 Demographics. The demographics questionnaire assessed age range, marital status, gender, rank range, unit of assignment, whether there were dependents living at home, length of time serving with their current unit, average number of hours worked in a typical week, current shift schedule, and shift rotation frequency. Participants are part of a community with potentially strong cultural stigmas regarding the endorsement of mental health problems; thus, no personal identifiable information (i.e., date of birth, first or last name, Social Security number) was obtained to ensure respondent anonymity.

3.2.2 Sleep and Physical Exercise Health Behaviors. Next, the questionnaire assessed current health behaviors. Participants were asked, *on average, how many hours of sleep do you obtain each night or day, prior to starting work?* The response options for this item were *4 hours or less, 5-6, 7-8, 9-10,* and *11 hours or more.* Participants were also asked *how often do you engage in moderate physical exercise/training each week (e.g., 20-30 minutes of walking, moderate cycling, moderate speed sport or aerobic activity)?* Response options were *none, 1-2, 3-4, 5-6 times a week,* and *daily*.

3.2.3 Alcohol, Tobacco, and Caffeinated Beverage Use. The quantity and frequency of alcohol, tobacco, and caffeine use and changes in these habits were assessed. Participants were asked, *on average, how many times per week do you consume alcohol?* Response options were *N/A (do not drink alcohol), 1, 2, 3, 4, 5, 6 times per week*, and *daily (7 days per week).* Participants were asked, *on average, how many alcoholic beverages do you have on each occasion (1 drink = 12 ounces of beer, or 5 ounces of wine, or 1.5 ounces of liquor)?* Response options were *N/A (do not drink alcohol), 1, 2, 3, 4,* and *5 or more beverages*. Participants were asked, *since being assigned to this unit, has your use of alcohol changed?* Response options were *yes, no,* and *not applicable (do not drink).* If participants endorsed *yes,* they were then asked *how has it changed?* Response options were *do not drink alcohol anymore, decreased,* and *increased.* They were then given an open-ended, write-in response question asking *if your alcohol use changed, to what do you attribute the change?*

Participants were asked *what, if any, types of tobacco products do you use? List all that apply (e.g., cigarettes, smokeless tobacco, electric cigarettes, etc.).* Participants were asked, *on average, how much tobacco have you used over the past month*? Response options were *none, no more than ½ pack of cigarettes per day, no more than ½ packet of chew tobacco per day, no more than ½ can of dip per day, 1 pack of cigarettes per day, 1 packet of chew tobacco per day, 1 can of dip per day, more than 1 pack of cigarettes per day, more than 1 packet of chew tobacco*

per day, and *more than 1 can of dip per day*. Participants were also asked, *since being assigned to this unit, has your use of tobacco changed?* Response options were *yes, no,* and *not applicable (do not use tobacco).* Unlike alcohol and caffeine items assessing quantity of use, participants were able to select more than one response option for this item. If participants endorsed *yes,* they were then asked *how has it changed?* Response options were *do not use tobacco anymore, decreased,* and *increased.* They were then given an open-ended, write-in response question asking *if your tobacco use changed, to what do you attribute the change?*

Participants were asked *what type of traditional caffeinated or designer energy beverages do you typically drink? Please list all types and sizes (e.g., coffee, tea, soda, Monster, Red Bull, 5-hour Energy…8-ounce/12-ounce/16-ounce portion).* Participants were asked, *on average, how many caffeinated/energy drinks do you consume on a given day?* Response options were *N/A (do not consume caffeine), 1-2, 3-4,* and *5 or more beverages.* Participants were also asked, *since your assignment to this unit, has your use of caffeinated/energy drinks changed?* Response options were *increased, decreased, has not changed,* and *not applicable.* They were then given an open-ended, write-in response question asking *if your caffeinated/energy drink use has changed, to what do you attribute the change?*

3.2.4 Medical Conditions Created or Made Worse by Current Unit Assignment. Participants were given an open-ended, write-in response question asking them to *please list any medical conditions you have that you believe have been created or worsened by your current unit of assignment (e.g., back pain, chest pain, neck pain, heart palpitations, heartburn, nausea, diarrhea, constipation, sleep problems, depression, anxiety).*

3.2.5 Medical, Mental Support, and Alternative Healthcare Utilization. Participants were asked the following: *Is access to medical care readily available while you are at work, regardless of your work schedule?* Response options were *yes* and *no*. Participants were asked, *in general, since your current assignment, has your use of medical services changed (e.g., visits for healthcare, consultation with physician)?* Responses were *yes, no*. If participants endorsed *yes,* they were then asked *how has it changed?* Response options were *do not use medical services, decreased,* and *increased.* They were then given an open-ended, write-in response question asking *if your use of medical support services has changed, to what do you attribute the change?*

Participants were asked, *in general, since your current assignment, has your use of mental health support services changed?* Response options were *yes, no,* and *not applicable (have never used mental health support services).* If participants endorsed *yes,* they were then asked *how has it changed?* Response options were *decreased* and *increased.* They were then given an open-ended, write-in response question asking *if your use of mental health support services has changed, to what do you attribute the change?*

Participants were asked the following: *Have you sought treatment from an alternative health provider (e.g., chiropractor, massage therapist, acupuncturist) for the medical condition(s) listed above while in your current assignment?* Responses were *yes* and *no*. If participants endorsed *yes,* they were then asked the following: *Has the frequency of treatment changed since your current assignment?* Response options were *increased* and *decreased.* They were then given an open-ended, write-in response question asking *to what do you attribute the change?*

3.2.6 Medication Utilization (Prescription and OTC). Participants were asked the following: *Has your usage of prescription medication(s) changed since arrival at your current assignment?* Response options were *yes* and *no*. If participants endorsed *yes,* they were then asked *how has it changed?* Response options were *increased* and *decreased.* They were then given an open-ended, write-in response question asking *to what do you attribute the change?*

Participants were also asked the following: *Has your usage of over-the-counter medication changed since arrival at your current assignment?* Response options were *yes* and *no*. If participants endorsed *yes,* they were then asked *how has it changed?* Response options were *increased* and *decreased.* They were then given an open-ended, write-in response question asking *to what do you attribute the change?*

3.3 Procedure

Using mass e-mail correspondence with all intelligence operators and support personnel, USAF 70 ISRW leadership and group commanders advocated survey participation throughout the organization. The mass e-email stated that participation was voluntary and anonymous in an effort to reduce the potential for perceived coercion due to requests for participation coming from USAF leadership.

The mass e-mail participation invitation had an internet link to the USAF School of Aerospace Medicine web-based survey that contained an opening page with an introductory script that reiterated that the study was conducted by independent researchers and participation was voluntary and anonymous. The introductory script stated the nature, purpose, and instructions of the study. The opening page also informed participants that operational leadership would not have access to individual responses, results would be presented in a summarized format at the squadron level, and that participants could withdraw from the survey at any time without any repercussions.

Participants were asked to respond to a question asking 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. The survey took an average of 25-30 minutes to complete. Those who endorsed *no* were not given the survey and were redirected to another web page that instructed them on 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. The survey was open to all 70 ISRW intelligence operators and support personnel over a 6-week period and re-advertised every other week. Participants who completed the survey were instructed on how to obtain the results of the study and when information would be available. Results were aggregated at the squadron level without any identification of individual responses. The purpose and methodology of the study were reviewed and approved by the Air Force Research Laboratory Institutional Review Board.

3.4 Data Analysis

3.4.1 Quantitative Analyses. Frequencies and proportions were calculated for both groups on the following:

1. Demographics (gender, age range, marital status, and dependents at home)

2. Occupational variables (rank range, time on station, shift schedule, frequency of shift rotation, and hours worked per week)
3. Health behaviors (average number of hours of sleep before work and average number of days engaged in moderate exercise per week)
4. Poor health habits (amount of alcohol, tobacco, and caffeinated beverage use) and changes in such 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 percentages for group proportions regarding self-reported increases in poor health habits, healthcare utilization, and medication utilization were based on the number of intelligence operators and support personnel responding to the initial item in each sequence, rather than the number of individuals responding to each of these questions specifically.

Comparisons of independent proportions (intelligence operators vs. support personnel) were run on all the variables listed above to see if the proportions were significantly different from one another. Logistic regression analyses were run to predict intelligence operator group membership (compared to support personnel group membership) regarding the variables listed above. Logistic regressions were not run in instances where sample size assumptions were not met. Intelligence operators and support personnel groups were required to have $n \geq 30$, and the individual categories for each predictor required $n \geq 5$ for that category to be included in the logistic regression analysis. The comparison category is indicated for each categorical predictor in the tables. The comparison category was chosen based on the following for the demographic variables: category with the majority proportion (e.g., males, enlisted, hours worked per week) or category of interest (e.g., age range 18-25 years, single, dependents at home, more than 24 months on current station). The comparison category was chosen based on the behavior of interest for health behaviors (e.g., sleeping 4 hours or less per week, no moderate exercise per week, drinking five or more caffeinated beverages), and the comparison category was the baseline for the elevated alcohol use (e.g., below elevated alcohol use threshold) and health behavior increase comparisons (e.g., no increase in medical services) to compute the odds ratios (ORs) of interest to this study. ORs were reported to explain the relationship between intelligence operators and support personnel on each variable. ***Significant results with a value greater than 1 indicate that the category has greater odds, when compared to the value of 1, for the given predictor.*** A statistical significance level of $p < 0.05$ was established *a priori*.

3.4.2 Qualitative Analyses. A behavioral science researcher performed qualitative analyses on textual responses to all the open-ended, write-in response items listed above. Participants' textual responses were analyzed and coded into a list of categories. Categories that appeared to label the same or similar attribute were consolidated into a single category. For example, responses such as *sleep issues, insomnia,* and *trouble sleeping* were all coded into the category of sleep problems. The frequency of coded responses for each semantic category was computed and ranked in descending order. The top responses are reported.

4.0 RESULTS

4.1 Demographics

The overall (and by group) demographics for 70 ISRW participants are shown in Table 1. Frequencies and proportions of intelligence operator and support personnel and the results for logistic regressions predicting intelligence operator group membership (compared with support personnel group membership) are shown in Table 1. Significant results are highlighted. A larger proportion of intelligence operators endorsed being female, age 18-30, enlisted, single, without dependents at home, spending 24 months or less on station, working shift work, and having rotating shifts (every 2 weeks or less; 30 days to 4 times a year) compared to support personnel. A larger proportion of support personnel reported being age 31-34 and 40 or older than intelligence operators. Intelligence personnel had 1.77 greater odds of being female, 1.94 times greater odds of being enlisted, 1.31 times greater odds of being single, 1.42 greater odds of having no dependents at home, 1.27 greater odds of being in their current duties 24 months or less, 1.73 greater odds of working shift work, and 3.69-5.06 times greater odds of various shift rotations when compared to support personnel. Support personnel had 1.45-2.29 times greater odds of being 31 years or older when compared to intelligence operators.

4.2 Sleep and Physical Exercise Health Behaviors

Frequencies and proportions of sleep and physical exercise health behaviors for intelligence operators and support personnel groups are shown in Table 2. The logistic regressions assessing health behaviors were not significant (see Table 2).

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

4.3.1 Alcohol Use. Frequencies and proportions of alcohol-related health habits for intelligence operators and support personnel groups are shown in Table 3, by gender. For males, a larger proportion of support personnel reported a response of *not applicable* for both frequency of alcohol consumed per week and quantity of alcohol consumed per occasion than intelligence operators. The associated logistic regression found a 1.38 times greater odds of intelligence operators drinking alcohol 1-2 times per week. No proportion comparisons were significant for females. Logistic regressions assessing an increase in alcohol use and those engaged in elevated alcohol use were not significant for males or females (see Table 3).

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response question revealed the most frequently cited reasons for an increase in alcohol use since current unit assignment included *occupational and personal stress, turning the legal age to consume alcohol,* and *social climate and squadron events promoting alcohol usage* for both intelligence operators and support personnel.

Table 1. Demographics Overall and by Group, Proportion Comparisons, and Regression Results

Demographics	Total		Intelligence Operators		Support Personnel		*p*	Logistic Regressions Predicting Intelligence Operators (Compared to Support Personnel)				
	n	%	n	%	n	%		OR	95% CI	Omnibus χ^2	*df*	*p*
Gender												
Male[a]	1290	72.31	823	68.76	467	79.56	<0.01			23.75	1	<0.01
Female	494	27.69	374	31.24	120	20.44	<0.01	1.77[b]	1.40, 2.24			
Age (yr)												
18-25[a]	514	28.29	368	30.14	146	24.50	<0.01			41.76	4	<0.01
26-30	542	29.83	400	32.76	142	23.83	<0.01	1.12	0.85, 1.47			
31-34	287	15.80	175	14.33	112	18.79	<0.01	0.62[b,c]	0.46, 0.84			
35-39	266	14.64	169	13.84	97	16.28	0.17	0.69[b,d]	0.50, 0.95			
40+	208	11.45	109	8.93	99	16.61	<0.01	0.44[b,e]	0.31, 0.61			
Rank & Duty Position												
Enlisted[a]	1560	87.84	1092	90.25	468	82.69	<0.01			19.65	1	<0.01
Officer	216	12.16	118	9.75	98	17.31	<0.01	0.52[b,f]	0.39, 0.69			
Marital Status												
Single[a]	709	39.04	501	41.13	208	34.78	<0.01			6.85	1	<0.01
Married	1107	60.96	717	58.87	390	65.22	<0.01	0.76[b,g]	0.62, 0.94			
Dependents at Home												
Yes[a]	908	50.06	575	47.21	333	55.87	<0.01			12.04	1	<0.01
No	906	49.94	643	52.79	263	44.13	<0.01	1.42[b]	1.16, 1.72			
Time on Station (mo)												
≤24	1180	64.91	814	66.72	366	61.20	<0.05	1.27[b]	1.04, 1.56			
>24[a]	638	35.09	406	33.28	232	38.80	<0.05			5.32	1	<0.05
Shift Schedule												
Standard day[a]	1203	66.03	760	62.14	443	73.96	<0.01			25.64	1	<0.01
Shift work	619	33.97	463	37.86	156	26.04	<0.01	1.73[b]	1.39, 2.15			
Shift Rotation Frequency												
No rotation[a]	1430	78.49	884	72.28	546	91.15	<0.01			96.15	2	<0.01
2 wk or less	92	5.05	82	6.70	10	1.67	<0.01	5.06[b]	2.60, 9.85			
30 days – 4x/yr	300	16.47	257	21.01	43	7.18	<0.01	3.69[b]	2.63, 5.19			
Hours Worked Per Week												
30-50[a]	1467	80.74	984	80.66	483	80.90	0.90			0.02	1	0.90
51+	350	19.26	236	19.34	114	19.10	0.90	1.02	0.79, 1.30			

CI = confidence interval.
[a]Comparison category for predictor.
[b]Significant chi-square ($p < 0.05$) and OR.
[c]Inverse OR = 1.61, 95% CI [1.19, 2.19].
[d]Inverse OR = 1.45 [1.06, 1.98].
[e]Inverse OR = 2.29 [1.64, 3.19].
[f]Inverse OR = 1.94 [1.45, 2.59].
[g]Inverse OR = 1.31 [1.07, 1.61].

Table 2. Sleep and Physical Exercise Overall and by Group, Proportion Comparisons, and Regression Results

Health Behaviors	Total		Intelligence Operators		Support Personnel		*p*	Logistic Regressions Predicting Intelligence Operators (Compared to Support Personnel)				
	n	%	n	%	n	%		OR	95% CI	Omnibus χ^2	*df*	*p*
Hours of Sleep before Work												
≤4 hours[a]	98	5.38	70	5.73	28	4.67	0.35			1.29	2	0.53
5-6	974	53.49	657	53.76	317	52.92	0.73	0.83	0.52, 1.31			
7-8	727	39.92	480	39.28	247	41.24	0.42	0.78	0.49, 1.24			
9+	21	1.15	15	1.23	7	1.17	0.91					
Frequency of Moderate Exercise per Week												
None[a]	55	3.03	39	3.20	16	2.68	0.55			2.97	4	0.56
1-2 times	463	25.52	324	26.60	139	23.32	0.13	0.96	0.52, 1.77			
3-4 times	822	45.31	540	44.33	282	47.32	0.23	0.79	0.43, 1.43			
5-6 times	329	18.14	218	17.90	111	18.62	0.71	0.81	0.43, 1.51			
Daily	145	7.99	97	7.96	48	8.05	0.95	0.83	0.42, 1.63			

Note. No chi-square analyses were significant at $p < 0.05$.
[a]Comparison category for predictor.

Table 3. Alcohol Use by Gender, Overall and by Group, Proportion Comparisons, and Regression Results

Alcohol Use	Total		Intelligence Operators		Support Personnel		*p*	Logistic Regressions Predicting Intelligence Operators (Compared to Support Personnel)				
	n	%	n	%	n	%		OR	95% CI	Omnibus χ^2	*df*	*p*
Males												
Times per Week												
N/A[a]	393	30.49	229	27.86	164	35.12	<0.05			6.75	2	<0.05
1-2	721	55.93	475	57.79	246	52.68	0.08	1.38[b]	1.07, 1.78			
3-4	133	10.32	88	10.71	45	9.64	0.54	1.40	0.93, 2.11			
5-6	24	1.86	18	2.19	6	1.28	0.24					
Daily	18	1.40	12	1.46	6	1.28	0.79					
Drinks per Occasion												
N/A[a]	344	26.69	199	24.21	145	31.05	<0.05			7.60	4	0.11
1	335	25.99	215	26.26	120	25.70	0.85	1.31	0.96, 1.78			
2	373	28.94	247	30.05	126	26.98	0.24	1.43	0.99, 1.93			
3	176	13.65	116	14.11	60	12.85	0.53	1.41	0.97, 2.06			
4	36	2.79	26	3.16	10	2.14	0.28	1.89	0.89, 4.05			
5+	26	2.02	20	2.43	6	1.28	0.16					
Alcohol Increase[c]												
Yes	98	7.60	63	7.66	35	7.49	0.91	1.02	0.67, 1.57			
No[a]	1191	92.40	759	92.34	432	92.51	0.91			0.01	1	0.92
Elevated Use[d]												
Yes	57	4.42	41	4.99	16	3.43	0.19	1.48	0.82, 2.67			
No[a]	1232	95.58	781	95.01	451	96.57	0.19			1.78	1	0.18
Females												
Times per Week												
N/A[a]	173	35.52	130	35.14	43	36.75	0.75			0.00	1	0.99
1-2	262	53.80	197	53.24	65	55.56	0.66	1.00	0.64, 1.56			
3-4	43	8.83	35	9.46	8	6.84	0.38					
5-6	5	1.03	4	1.08	1	0.85	--					
Daily	4	0.82	4	1.08	0	0.00	--					
Drinks per Occasion												
N/A[a]	153	31.42	111	30.00	42	35.90	0.23			1.44	2	0.49
1	153	31.42	117	31.62	36	30.77	0.86	1.23	0.73, 2.06			
2	148	30.39	116	31.35	32	27.35	0.41	1.37	0.81, 2.33			
3	28	5.75	21	5.68	7	5.98	0.90					
4	5	1.03	4	1.08	0	0.00	--					
5+	0	0.00	1	0.27	0	0.00	--					
Alcohol Increase[c]												
Yes	29	5.95	23	6.13	6	5.13	0.67					
No[a]	458	94.05	347	93.78	111	94.87	0.67					
Elevated Use[d]												
Yes	9	1.85	7	1.90	2	1.71	--					
No[a]	478	98.15	363	98.11	115	98.29	--					

Note.
[a]Comparison category for predictor.
[b]Significant chi-square ($p < 0.05$) and OR.
[c]Denominators: Males: overall n = 1289, intelligence n = 822, support n = 467; females: overall n = 487, intelligence n = 370, support n = 117, based on responses to alcohol times per week item. [d]Three or more times a week, three or more drinks per occasion.

4.3.2 Tobacco Use. Frequencies and proportions of tobacco-related health habits, for intelligence operators and support personnel groups, are shown in Tables 4 and 5. For the type and amount of tobacco consumed daily, a larger proportion of intelligence operators reported *no more than ½ pack of cigarettes* and a larger proportion of support personnel reported *no more than ½ can of dip* per day. The logistic regressions assessing tobacco use and an increase in tobacco use were not significant (see Table 5).

Table 4. Tobacco Use Per Day Overall and by Group and Proportion Comparisons

Tobacco Use	Total		Intelligence Operators		Support Personnel		*p*
	n	%	n	%	n	%	
None	1449	82.61	967	81.81	482	8.27	0.20
No more than 1/2 pack of cigarettes	153	18.72	121	10.24	32	5.59	<0.01
No more than 1/2 packet of chew	14	<1.00	9	<1.00	5	<1.00	0.80
No more than 1/2 can of dip	28	1.60	14	1.18	14	2.45	<0.05
1 pack of cigarettes	49	2.79	36	3.05	13	2.27	0.36
1 packet of chew	2	<1.00	0	0.00	2	<1.00	N/A[a]
1 can of dip	5	<1.00	3	<1.00	2	<1.00	N/A[a]
More than 1 pack of cigarettes	1	<1.00	1	<1.00	0	0.00	N/A[a]
More than 1 packet of chew	1	<1.00	1	<1.00	0	0.00	N/A[a]
More than 1 can of dip	0	0.00	0	0.00	0	0.00	N/A[a]

Note. Denominator overall = 1754, intelligence n = 1182, support n = 572, based on responses to tobacco use item. N/A = not applicable.
[a]Sample size assumption (≥5) was not met.

Table 5. Tobacco and Caffeine Use Overall and by Group, Proportion Comparisons, and Regression Results

Tobacco and Caffeine	Total		Intelligence Operators		Support Personnel		*p*	Logistic Regressions Predicting Intelligence Operators (Compared to Support Personnel)				
	n	%	n	%	n	%		OR	95% CI	Omnibus χ^2	*df*	*p*
Tobacco Use												
No[a]	1449	82.61	967	81.81	482	84.27	0.20			1.64	1	0.20
Yes	305	17.39	215	18.19	90	15.73	0.20	1.19	0.91, 1.56			
Tobacco Increase												
Yes	91	5.19	67	5.67	24	4.20	0.17	1.39	0.86, 2.24			
No[a]	1663	94.81	1115	94.33	548	95.80	0.17			1.90	1	0.17
Caffeinated Beverages per Day												
None[a]	334	18.41	215	17.61	119	20.07	0.21			5.52	3	0.14
1-2	1130	62.29	755	61.83	375	63.24	0.56	1.11	0.86, 1.44			
3-4	287	15.82	209	17.12	78	13.15	<0.05	1.48[b]	1.05, 2.09			
5 or more	63	3.47	42	3.44	21	3.54	0.91	1.11	0.63, 1.96			
Caffeine Increase												
Yes	473	26.07	350	28.67	123	20.74	<0.01	1.55[b]	1.23, 1.96			
No[a]	1341	73.93	871	71.33	470	79.26	<0.01			14.05	1	<0.01

[a]Comparison category for predictor.
[b]Significant chi-square ($p < 0.05$) and OR.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response question revealed the most frequently cited reasons for an increase in tobacco use since current unit assignment included *occupational and personal stress* for both intelligence operators and support personnel, as well as *social climate promoting tobacco usage* (i.e., an approved way for airmen to socialize with others and take a break during shift work) and *personal choice/interest* for intelligence operators.

4.3.3 Caffeine Use (Combined Use of Traditional and Designer Energy Drinks). Frequencies and proportions of caffeine use, for intelligence operators and support personnel groups, are shown in Table 5. A larger proportion of intelligence operators reported consuming three to four caffeinated beverages per day, as well as increased use of caffeine since their current unit

assignment, than did support personnel. The associated logistic regression revealed that intelligence operators had 1.48 times greater odds of consuming three to four caffeinated beverages per day compared to support personnel. The results of logistic regressions assessing caffeine use and an increase in such use are also shown in Table 5, with intelligence operators reporting an increase in caffeine use at 1.55 greater odds than support personnel.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response question revealed the most frequently cited reasons for an increase in caffeinated beverage use since assignment to current unit included *exhaustion and fatigue* (e.g., working 10-hour shifts, excessive work hours), *insufficient sleep* (e.g., lack of sleep due to changing shift work rotations), and *sustaining vigilance* (e.g., increasing alertness during shift) for both intelligence operators and support personnel.

4.4 Medical Conditions

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response question revealed that the most frequently cited medical conditions either created or worsened by their occupational assignment were similar for both groups (see Table 6). However, a larger proportion of intelligence operators reported *sleep problems, emotional distress,* and *musculoskeletal injury/pain* to have been created or worsened by their occupational assignment than did support personnel counterparts.

Table 6. Most Frequency Cited Conditions Perceived to be Created or Worsened by their Unit Assignment and Proportion Comparisons

Medical Condition	Intelligence Operators[a]		Support Personnel[b]		*p*
	n	%	n	%	
Sleep problems (e.g., insufficient sleep)	177	14.47	54	9.02	<0.01
Emotional distress (e.g., anxiety, depression)	175	14.31	45	7.51	<0.01
Musculoskeletal injury/pain (e.g., back, neck, joint pain)	135	11.04	47	7.85	<0.05

Note. There were 454 responses from intelligence operators and 214 responses from support personnel.
[a]Denominator n = 1223.
[b]Denominator n = 599.

4.5 Healthcare Utilization

4.5.1 Medical Services. Frequencies and proportions on the availability of medical care while at work, and an increase in medical care since being assigned to their current unit, for both the intelligence operators and support personnel groups are shown in Table 7. A larger proportion of support personnel reported having availability of medical care while at work (2.11 times greater odds) as compared to intelligence operators.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response question revealed the most frequently cited reasons for an increase in medical utilization since current unit assignment included *musculoskeletal injury/pain* (back, neck, shoulder joint pain), *declining health associated with increasing age,* and *sleep issues* (e.g., insufficient sleep) for intelligence operators. For support personnel, the most frequently cited reasons included *declining health associated with increasing age, musculoskeletal injury/pain,* and *increased access to medical care.*

Table 7. Healthcare Utilization Overall and by Group, Proportion Comparisons, and Regression Results

Healthcare Service	Total		Intelligence Operators		Support Personnel		*p*	Logistic Regressions Predicting Intelligence Operators (Compared to Support Personnel)				
	n	%	n	%	n	%		OR	95% CI	Omnibus χ^2	*df*	*p*
Medical Care Available at Work												
Yes[a]	1478	81.43	951	78.08	527	88.27	<0.01			29.36	1	<0.01
No	337	18.57	267	21.92	70	11.73	<0.01	2.11[b]	1.59, 2.81			
Medical Services Increase												
Yes	392	21.53	264	21.59	128	21.40	0.92	1.01	0.80, 1.29			
No[a]	1429	78.47	959	78.41	470	78.60	0.92			0.01	1	0.92
Mental Health Support Increase												
Yes	167	9.22	124	10.21	43	7.20	<0.05	1.46[b]	1.02, 2.09			
No[a]	1644	90.78	1090	89.79	554	92.80	<0.05			4.40	1	<0.05
Alternative Health Provider Increase												
Yes	202	11.15	136	11.16	66	11.13	0.95	1.01	0.74, 1.38			
No[a]	1610	88.85	1083	88.84	527	88.87	0.95			0.00	1	0.95

[a]Comparison category for predictor.
[b]Significant chi-square ($p < 0.05$) and OR.

4.5.2 Mental Health Support Services. A significant difference in participant group proportions (and logistic regression) reporting an increase in use of mental healthcare since being assigned to their current unit is shown in Table 7. A larger proportion of intelligence operators reported an increase in mental healthcare utilization since their current unit assignment (1.46 times greater odds) than support personnel.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in response question revealed the most frequently cited reasons for an increase in mental healthcare since current unit assignment included *marital/family-related problems, occupational stress,* and *increased access and availability* for both intelligence operators and support personnel (see Table 8).

4.5.3 Alternative Health Services. Frequencies and proportions of an increase in utilization of alternative healthcare by intelligence operators and support personnel groups, since being assigned to their current unit, are shown in Table 7. A proportion comparison was not significant.

The results of qualitative analyses for participants' textual responses to the open-ended, write-in response item revealed the most frequently cited reasons for an increase in alternative healthcare utilization included *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) for both intelligence operators and support personnel. Additionally, intelligence operators cited *workstation issues* (e.g., uncomfortable chairs, poor ergonomics, etc.) and support personnel cited *increased access and availability* as reasons for an increase.

Table 8. Most Frequently Self-Reported Reasons for Increased Mental Health Support Services and Proportion Comparisons

Self-Report Reasons (per Coded Category)	Intelligence Operators[a]		Support Personnel[b]		*p*
	n	%	n	%	
Marital/family problems (e.g., partner-relational difficulties, geographical separation from family, workload and duties affecting family relationship)	45	3.68	18	3.01	0.46
Occupational stress (e.g., long hours, shift work, relational conflict with co-worker/supervisor)	43	3.52	14	2.34	0.17
Increased access and availability (e.g., ADAPT program etc.)	3	0.25	2	0.33	N/A[c]

Note. There were 87 responses from intelligence operators and 35 responses from support personnel. ADAPT = Alcohol and Drug Abuse Prevention and Treatment Program.
[a]Denominator n = 1223.
[b]Denominator n = 599.
[c]Sample size assumption (≥5) was not met.

4.6 Medication Utilization

4.6.1 Prescription Medication. Frequencies and proportions of intelligence operators and support personnel reporting an increase in prescription medication use, since being assigned to their current unit, are shown in Table 9. A proportion comparison was not significant.

The results of qualitative analyses of participants' textual responses to the open-ended, write-in question revealed the most frequently cited reasons for an increase in prescription utilization included *emotional distress* (e.g., stress, anxiety, depression) and *musculoskeletal pain* (e.g., back, neck, joint pain) for both intelligence operators and support personnel. Additionally, intelligence operators cited *heart issues* (e.g., high blood pressure, heart palpitations, chest pain) and support personnel cited *declining health associated with increasing age.*

4.6.2 OTC Medication. Frequencies and proportions of intelligence operators and support personnel reporting OTC medication usage, since being assigned to their current unit, are shown in Table 9. A larger proportion of intelligence operators self-reported an increase in their use of OTC medication than support personnel (1.37 times greater odds).

The results of qualitative analyses of participants' textual responses to the open-ended, write-in question revealed the most frequently cited reasons for increased OTC utilization since current unit assignment included *sleep problems* (i.e., insufficient sleep, poor sleep quality due to shift work), *musculoskeletal injury/pain* (e.g., back, neck, shoulder pain), and *occupational stress* (e.g., high levels of stress and discomfort associated with long work demands) for both intelligence operators and support personnel.

Table 9. Medication Use Overall and by Group, Proportion Comparisons, and Regression Results

Medication	Total		Intelligence Operators		Support Personnel		*p*	Logistic Regressions Predicting Intelligence Operators (Compared to Support Personnel)				
	n	%	n	%	n	%		OR	95% CI	Omnibus χ^2	*df*	*p*
Prescription Increase												
Yes	302	16.65	210	17.24	92	15.44	0.33	1.14	0.87, 1.49			
No[a]	1512	83.35	1008	82.76	504	84.56	0.33			0.96	1	0.33
OTC Increase												
Yes	222	12.24	162	13.30	60	10.08	<0.05	1.37[b]	1.00, 1.88			
No[a]	1591	87.76	1056	86.70	535	89.92	<0.05			4.04	1	<0.05

[a]Comparison category for predictor.
[b]Significant chi-square ($p < 0.05$) and OR.

5.0 DISCUSSION

The current study represents an anonymous and voluntary assessment of health behaviors within the 70 ISRW population. Results of this study offer insights to the impact of ISR operations on 70 ISRW intelligence operator and support personnel from a health and wellness perspective, in light of reported occupational stressors and rates of emotional exhaustion (10-16%) and psychological distress (7.5-12%) [3]. Specifically this study reveals valuable information regarding health behaviors, health habits, endorsed medical conditions, and increased utilization of medication and healthcare services within this population. Results for each category are discussed below, along with preliminary recommendations to leadership and medical personnel regarding the cultivation of strategies to mitigate and/or address key health concerns.

5.1 Demographics

The current study's sample consisted of 1223 intelligence operators (67.12% of the overall sample) and 599 support personnel (32.88%). Overall, 81% of the 70 ISRW sample reported working 50 hours or less per week, and 61.20-66.72% had been at their current station of assignment for less than 2 years. Shift work was more common for intelligence operators (37.86%) as compared to support personnel (26.04%). Intelligence operators as a group also tended to be slightly younger, with 62.90% endorsing 18-30 years of age, as compared to 48.33% of the support personnel group in the same age ranges. While intelligence personnel were more likely to be female (31.24%) than those in the support personnel group (20.44%), support personnel were more likely to be older, married, and with dependents at home.

5.2 Health Behaviors

The first objective of the study was to assess for the frequency of health behaviors related to sleep before work and physical exercise routine between intelligence operators and support personnel.

5.2.1 Hours of Sleep Prior to Work. There were no significant differences between intelligence operators and support personnel in the number of hours of sleep before work. This is an interesting finding considering the relationship between shift work and inadequate sleep before shift. In the current study, intelligence personnel had a greater odds than support personnel of

endorsing shift work, OR = 1.73; 95% CI [1.39, 2.15] (see Table 1). However, the results did demonstrate that a high percentage of both intelligence operators and support personnel reported sleeping 6 hours or less prior to work, which may be a concern to leadership within the 70 ISRW. Specifically, 59.49% of intelligence operators and 57.59% of support personnel reported a total of 6 hours or less of sleep before work (see Table 2). These low hours of reported sleep are contrary to the recommendations by the National Sleep Foundation, where the average adult is recommended to have 7 to 9 hours of sleep to function at their peak [9]. Furthermore, these low hours of reported sleep may present risks to the mission of the 70 ISRW. Decreased sleep has been associated with negative health, work performance, and work safety [10-13], such as traffic crashes [11] and work-related injuries [12,13].

In addition, adults who receive less than or equal to 5 hours of sleep are at an elevated risk for morbidity and mortality from accidents and illnesses [10]. Related to one's health, a lack of sleep is associated with several chronic disease outcomes, such as diabetes [14], hypertension [15], cardiovascular disease [16], and obesity [17,18]. Although a comprehensive list of reasons for inadequate sleep is beyond the scope of this study, interventions centered on operational factors (i.e., long work hours and shift work), as well as problematic health behaviors (i.e., poor sleep hygiene and excess caffeine use), would be ideal for developing strategies to improve sleep quantity and quality in this population. Efforts to foster a workforce of well-rested airmen should be integral to line and medical leadership efforts for promoting health and readiness.

5.2.2 Physical Exercise. No significant differences were found between intelligence operators and support personnel in the frequency of moderate physical exercise completed per week. That being said, study findings still present a concern for 70 ISRW leadership, as nearly one-third (28.55%) of all sampled intelligence operators and support personnel reported engaging in physical exercise two or fewer times per week (see Table 2). Given the current USAF physical fitness standards, this constitutes a notable portion of 70 ISRW personnel who should be exercising with greater frequency.

There are many health benefits from physical exercise. From a bodily health perspective, it decreases risk of chronic conditions such as cardiovascular diseases, diabetes mellitus, and obesity [19]. As for psychological well-being, exercise has been shown to reduce the perception of stress [20] and the severity of emotional impacts due to stress. In addition to these benefits, USAF airmen who exercise are inherently more conscious of their physical activity levels and are more inclined to sustain them to meet USAF physical fitness standards. Failing a fitness test can result in discharge, which would negatively impact the already critical manning of the 70 ISRW. Line and medical leadership strategies for promoting health and readiness should therefore focus on promoting engagement in physical exercise and removing occupational obstacles to doing so.

5.3 Health Habits

The second objective of the study was to assess for the frequency of poor health habits and any increases in these health habits since being assigned to the 70 ISRW, specifically with regard to excessive alcohol use, tobacco use, and caffeine use (traditional and designer energy drinks).

5.3.1 Alcohol Use. It was hypothesized that intelligence operators would have higher rates of alcohol use when compared to support counterparts; however, results of the study indicated more similarities than differences in alcohol use among intelligence operators and support personnel for both males and females. Specifically, analysis of the study indicated that a total of 86.42% of overall males and 89.32% of overall females consumed alcohol twice a week or less, and 81.62% of overall males and 93.23% of overall females consumed two or fewer alcoholic beverages per occasion (see Table 3). This means that the vast majority of individuals surveyed from the 70 ISRW consume alcohol within seemingly healthy ranges, regardless of group. Additionally, the intel operators and support personnel had similar alcohol rates in terms of "elevated quantity and frequency of alcohol use." For the purpose of this study, elevated alcohol use was defined as consuming three or more drinks per occasion on three or more days per week. Elevated alcohol consumption was reported as 4.42% of males and 1.85% of females, regardless of work group. Although the intelligence operators and support personnel were found to have many similarities in their alcohol consumption, results of the analysis did indicate one difference between the two groups that supported the hypothesis. Male intelligence operators had 1.38 times greater odds of reporting drinking 1-2 times per week compared to male support personnel.

When asked about their increase in alcohol use since being assigned to the 70 ISRW, similar rates for intelligence operators and support personnel were reported. In total, 7.60% of males and 5.95% of females reported an increase in alcohol consumption. In addition, both groups attributed stress to this increase. This is consistent with research that has demonstrated a connection of the experience of daily occupational stress to daily alcohol use and the desire to drink [21]. While percentages of increased alcohol use, "elevated alcohol use linked to health risks – quantity and frequency," and current alcohol use may appear low, one must consider the associated health problems with chronic alcohol consumption. For example, chronic alcohol consumption is associated with risk for developing 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 and other accidents; alcohol dependence; and possible death due to these or other associated conditions [22-25]. Although most alcohol findings did not support the study hypotheses regarding alcohol, they still present valuable information with regard to alcohol use within the 70 ISRW. The results of this study provide salient target areas for line and medical leadership to consider when developing strategies for mitigating alcohol usage.

5.3.2 Tobacco Use. It was hypothesized that intelligence operators would have higher rates of tobacco use when compared to support personnel; however, results of the analysis did not support the hypothesis of this study, as the two groups reported similar rates of tobacco use (18.19% of intelligence operators and 15.73% of support personnel reported the use of tobacco products; see Table 5). Additionally, the two groups reported similar rates for increased use since being assigned to the 70 ISRW (5.67% of intelligence operators and 4.20% of support personnel reported an increase in use). Although results of the study did not identify any significant differences between intelligence operators and support personnel, both groups listed stress as the top attribute for increasing their tobacco use since being assigned to their unit. This finding highlights an issue that may be of concern for unit leadership within the 70 ISRW. These personnel are reporting tobacco use as an effort to reduce stress; however, research has indicated that nicotine dependency is more likely to exacerbate stress [26], thus indicating a perpetual

cycle of encouraged use. Strategies that help airmen identify and mitigate stress may also lead to beneficial reductions in tobacco use.

5.3.3 Caffeine Use. Results of the study revealed that intelligence operators and support personnel of the 70 ISRW reported similar rates of caffeine intake at the moderate level of one to two drinks per day (61.83-63.24%); however, a larger proportion of intelligence operators (17.12%) endorsed drinking three to four caffeinated beverages a day compared to support personnel (13.15%) (see Table 5). While reporting the specific amount of milligrams of caffeine consumed was not requested in this survey, the number of caffeinated beverages consumed per day was assessed. The average cup of coffee is said to have between 100-200 mg of caffeine. For the overall 62.29% of 70 ISRW personnel who endorsed consuming one to two caffeinated beverages per day, this equates to approximately 200-400 mg of caffeine per day, the total of which research has shown to render no adverse effects on the consumer [27]. However, if the high use of caffeinated designer beverages such as Monster, Red Bull, 5-hour Energy (known to have more than 200 mg per beverage) endorsed by these personnel is also taken into consideration, it is possible that 70 ISRW personnel consume substantially more caffeine than average within the U.S. population, approximately 300 mg a day [28]. This is especially a concern for the 16.40-20.56% of personnel endorsing drinking three or more caffeinated beverages a day. This is an important finding for unit leadership within the 70 ISRW to consider, as excess caffeine use has been associated with disruption of sleep patterns, sleep deprivation, insomnia, and fatigue [29]. Although research has indicated some benefits to consuming caffeine in moderation, a recent study indicated that individuals under the age of 55 who consume an average of 28 cups of coffee a week (average of 4 cups a day) are at significant increased risk of mortality [27].

Reported rates of increased caffeine use did appear to support the hypothesis of this study, specifically, study results indicating that the odds of intelligence operators endorsing increased caffeine use since being assigned to the 70 ISRW were greater than the odds of their support counterparts, OR = 1.55; 95% CI [1.23, 1.96], with 28.67% of intelligence operators and 20.74% of support personnel endorsing increased caffeine use (see Table 5). However, both intelligence operators and support personnel listed similar attributes for their increase in caffeine use. Top reasons were exhaustion/tiredness, long shift work, and maintaining alertness at work.

5.4 Medical Conditions

The third objective of the study was to assess for the frequency of endorsed medical conditions by intelligence operators and support personnel believed to have been worsened by occupational stress since being assigned to the 70 ISRW.

Results of the study revealed that both intelligence operators and support personnel reported similar medical conditions that they perceived to have been worsened by occupational stress since being assigned to the 70 ISRW. The top five conditions reported by both groups included problems with sleep (9.02-14.47%), emotional distress such as anxiety and depression (7.51-14.31%), and musculoskeletal injury or pain, such as back, neck, or joint pain (7.85-11.04%; see Table 6). While the same types of conditions were commonly reported across the two groups, intelligence operators reported these conditions at higher rates than support personnel. This suggests there may be a greater risk to physical health and performance among intelligence operators. An array of factors may contribute to increased health risks in this

population when compared to their support counterparts (e.g., ergonomic design of workstations, shift work requirements, higher levels of occupational stress). Regardless of potential reasons, the increased incidence of self-reported health problems warrants additional investigation.

5.5 Healthcare Utilization

The fourth objective of the study was to assess for the frequency of reported access to care and the increases in healthcare utilization (to include medical, mental health, and alternative health services) and the attributes for these increases since being assigned to the 70 ISRW.

5.5.1 Medical Services. Results of the study indicated that intelligence operators had 2.11 times greater odds of reporting that medical care is not available at work, with 21.92% of intelligence operators and 11.73% of support personnel reporting not having access to medical services at work (see Table 7). When assessed for changes in medical care since being assigned to the 70 ISRW, the two groups did not show any significant differences. Overall, 21.53% of the 70 ISRW intelligence operators and support personnel reported an increase in medical service utilization since being assigned to their unit. The intelligence operators and support personnel reported attributions to this increase in utilization differently. In rank order of frequency, intelligence operators listed existing medical conditions, injuries, physical issues due to physical training, aging, and sleep as their top reasons for increased use of medical services, while the rank order among support personnel was aging, physical training/physical issues, injuries, and medical conditions.

5.5.2 Mental Health Support Services. Results of the study indicated that intelligence operators had 1.46 times greater odds of reporting increased mental health service utilization since being assigned to the 70 ISRW, with 10.21% of intelligence operators and 7.20% of support personnel reporting increased use of mental health services since being assigned to the 70 ISRW (see Table 7). Both groups, however, had similar attributes for their increase in mental health services; these attributes were reported as personal issues, work stress, and increased access and availability (see Table 8). These first two attributes are not surprising when considering the reported high rates of sleep issues and increased rates of alcohol, tobacco, and caffeine use since being assigned to their current duties. While the third most common attribution was increased access and availability of mental health services, there may be a residual occupational cultural in which seeking mental health services comes with a stigma. This is not uncommon within military culture, particularly among units in which there is still a belief that simply seeking mental health treatment may result in disqualification for specific duties that are necessary to accomplish one's occupational tasks. Developing line and medical leadership strategies to promote self-disclosure may help to identify those in need of mental healthcare.

5.5.3 Alternative Health Services. Results of the study indicated no significant differences between intelligence operators and support in their rates of increased alternative health services utilization (11.16% of intelligence operators and 11.13% of support personnel reported an increase; see Table 7). Alternative health services include, but are not limited to, care from a chiropractor, massage therapist, acupuncturist, or other non-traditional provider. Attributions for this increase in utilization were similar among intelligence operators and support personnel in

that back pain, stress relief, and need for chiropractic/physical therapies were identified as the top three attributes. Workstation ergonomic issues were again cited as an attribution for the intelligence operators. Although these findings did not support the hypothesis of between-group differences, they do offer information to the organization as a whole.

The results of the study suggest that when alternative services are available, they are likely to be utilized for pain and stress management. Perhaps increasing the availability of alternative care services may help to mitigate the reliance on medication to control such conditions. The reasons for seeking alternative healthcare services also provide support to the importance of an integrated medical/mental health provider approach to the delivery of healthcare services. The management of pain and stress is influenced by emotional, behavioral, and social factors. Understanding and integrating such factors into treatment are necessary for developing a holistic strategy in the evaluation and treatment of such conditions.

5.6 Medication Utilization

The fifth objective of the study was to assess for the frequency of reported increase in medication usage (OTC and prescription) and the attributes for this increase since being assigned to the 70 ISRW.

5.6.1 Prescription Utilization. Results of the study suggest that intelligence operators and support personnel share many similarities related to their increase in prescription medication utilization since being assigned to the 70 ISRW. Although not in support of the hypothesis of the study, these results again offer information to leadership on the organization as a whole. Together 16.65% of both intelligence operators and support personnel reported an increase in their prescription medication utilization (see Table 9). More concerning was the attribute for this increase, as both groups assigned emotional distress as their top attribute, suggesting that some intelligence operators and support personnel in the 70 ISRW are reporting a level of stress that may be better managed with the assistance of medication. *Musculoskeletal pain* (e.g., back, neck, joint pain) was the next most frequently cited reason for an increase in prescription use among both intelligence operators and support personnel. Of particular note, intelligence operators endorsed *heart issues* (e.g., high blood pressure, heart palpitations, chest pain) as the third most common reason for increased prescription medication use. Poor cardiovascular health, in combination with high stress and stress-related issues, increases the mortality risk in what should be, for the most part, a lower risk population.

5.6.2 OTC Medication Utilization. Results of the study indicated that 13.30% of intelligence operators and 10.08% of support personnel reported an increase in their OTC medication use since being assigned to the 70 ISRW. Separated by just 3%, this represents a statistically significant difference between groups and supports the study hypothesis that intelligence operators would display greater OTC use (intelligence operators have 1.37 times greater odds of engaging in increased use of OTC medication than support personnel; see Table 9). Furthermore, attributes for their increase in OTC medication were similar for the two groups. Sleep issues, including insufficient sleep and poor sleep quality due to shift work, musculoskeletal injury/pain, and occupational stress were the most commonly reported attributes for an increase in OTC medication use. Intelligence operators tended to report health issues that might also reflect

psychosomatic aspects (stress that manifests itself physically) in association with increased medication use.

Although there are numerous benefits to OTC medications, it should not be assumed that OTC use is inherently safe just because these medications do not require a prescription. OTC medication use continues to increase among adults in the United States and has the potential to pose health risks due to (a) incorrect self-diagnosis causing delay in seeking advice from a healthcare professional, thus delaying accurate diagnosis and treatment of serious illness; (b) increased risk of negative or compounding drug-on-drug interactions; (c) increased risk of adverse effects when not used as instructed; and (d) the potential for misuse and/or abuse, especially with medications designed to reduce pain, increase weight loss, and manage cold and flu-like symptoms [30]. The rates and risks associated with OTC medication use should be of concern to both line and medical leadership, particularly when considered in the context of other reported findings regarding prevalent health issues, as well as the elevated rates of alcohol, caffeine, and other substance use that can ultimately affect readiness and performance.

6.0 CONCLUSIONS AND RECOMMENDATIONS

Although the overarching findings of this study indicate substantial similarity between 70 ISRW intelligence operators and support personnel, when differences occurred, intelligence operators tended to present the more notable health concerns. Marked among these are poor access to medical health resources, increased use of mental health services due to work stress and personal issues, and self-medication through OTC drugs for stress and sleep difficulties. Both groups attributed their increase in negative health behaviors to stress and reported increases in use of alternative health services and prescription medication for the same reason. Additionally, shift work and exhaustion emerged as common attributions for increased caffeine use among all 70 ISRW personnel. This combination of factors is indicative of elevated occupational stress [3], a likely point of concern to line leadership, since chronic occupational stress is associated with high-risk health behaviors such as alcohol misuse and drug use [4,5], symptoms of diminished physical health (e.g., back pain, eyestrain, gastrointestinal problems, and headaches) [6], and negative, sleep-related health outcomes [14].

Research suggests that workplace stress reduction can positively influence well-being in the workforce on many fronts and has been associated with a decreased need for self-medication through substance use [10,31,32]. While it is often important to consider changes and interventions at the subgroup level of an organization, the many similarities found between intelligence operators and support personnel in this study allow for recommendations regarding health behaviors and health resource utilization to be presented for the 70 ISRW as a whole.

The following are recommendations that may be of specific interest to line leaders:

1. Line leadership should strive to facilitate ready access to *medical and mental healthcare resources to address immediate needs and seek strategies for long-term sustainment of organizational well-being.* Leadership is strongly encouraged to assign medical and mental health personnel strategically within the 70 ISRW to closely monitor and support assigned personnel. Medical and mental health support that works closely with this population can provide command-level consultation specific to the 70 ISRW and its subordinate groups (i.e., strategies to optimize workforce energy management), monitor and assess for occupational health hazards in the work environment and identify areas for

improvement, and provide on-going outreach and prevention education classes and briefings specifically tailored for the unique challenges of the 70 ISRW. Finally, having mental health support assigned within the 70 ISRW can create rapport and decrease the stigma often associated with utilizing mental health services. In cases, where the USAF is unable to assign mental health personnel to specific locations, it is encouraged that the 70 ISRW and subordinate leadership meet with local mental health leadership to request psychological oversight of their units.

2. Line leadership is also recommended to identify areas that will *optimize work/rest cycles* (i.e., optimize shift work schedules; maintain sufficient manning for the mission). Optimizing work/rest cycles and shift rotation schedules is necessary to minimize transition periods from one cycle to another and allow operators to fully adjust to a shift before requiring another change. These adjustments would likely improve the number of sleep hours and reduce the use of stimulants such as caffeine in this population. Research has demonstrated effective techniques for personnel who work in shift work. Whenever possible, assigned medical and mental health personnel should be consulted to create effective shift work schedules appropriate for the unit. Additionally, improvement of 70 ISRW work routines and break schedules should be considered. For example, ensuring more frequent breaks and shorter shifts when other schedule changes are not feasible due to costs and/or the limits of technology may help to prevent and mitigate problems with back pain and headaches endorsed in this study.
3. Line leadership is recommended to consider supplying *sufficient manning* to support the operations to allow for these adjustments in shift length, shift work rotations, decreased work hours, and break frequency. In addition, sufficient manning will allow operators an increased opportunity to care for themselves (e.g., medical appointments and exercise).

The results of this survey also highlight specific areas that medical leadership and healthcare personnel can target for prevention and intervention on behalf of the 70 ISRW community. The following are recommendations for associated medical personnel:

1. An important factor for medical personnel to consider in supporting the 70 ISRW is reducing the inherent restrictions these personnel experience in *accessing medical care* when working 24/7 operations. As discussed, the results of this study revealed that when compared to support personnel, the 70 ISRW intelligence operators appear to have less access to medical care. Intelligence operators were also found more likely to work shift work, the most probable factor inhibiting access to medical care. Medical personnel are recommended to designate a mental health and/or medical point-of-contact who will be available after hours or on-call for consultation to meet the needs of the 70 ISRW personnel who work night shifts. Access to medical and mental health providers is essential to maintaining a safe, healthy force.
2. As previously discussed in the line leadership section, it is recommended that medical leadership consider embedding dedicated medical and/or mental health providers with operational backgrounds and security clearance within the 70 ISRW to perform educational briefings, on-going educational classes, and consultation services. There are many advantages to having the presence of a mental health provider in units that engage in 24/7operations. In the event there are limitations to doing so, base medical leadership

may need to consider other staffing options, but offering dedicated and consistent care options is essential to establishing rapport and trust with the ISR community.

3. It is recommended that the provider tailor strategies for outreach and interaction with the unique population that is the 70 ISRW. Such a provider should consider conducting small-scale, intermittent assessments with outcome measures that would identify symptoms of occupational stress and offer consultation, intervention, and educational briefs on topics of interest, such as addressing shift work challenges, stress reduction, relaxation techniques, substance use (i.e., tobacco, alcohol, and caffeine use), and sleep hygiene.
4. Medical and mental health leadership and care providers should be postured to mitigate the risks of negative coping strategies associated with substance use. Stress was identified by 70 ISRW personnel as a top attribute for increased use of tobacco, alcohol, and prescription and OTC medication. The increase in substance use as a means to cope with stress presents many concerns, including the increased potential for self-medication. Engaging in this behavior, through alcohol or unprescribed medication, can pose significant health risks and can serve as a serious detriment to physical and mental health if motivated by addictive mechanisms [31]. Providers should be prepared to offer educational material and interventions that reduce the risk of alcohol, medication, and other substance use.

In conclusion, the men and women of the 70 ISRW demonstrate health dynamics centered on around-the-clock, high-stress, occupational demands. While the rates of reported health concerns are not excessive, they still warrant attention on the part of line and medical leaders. This study provides these leaders with degrees of severity and demographic information on the health behaviors and healthcare utilization of 70 ISRW personnel, which could be used to orient and posture efforts and resources toward improving workforce health in this operational community. Future studies with larger samples from this ISR population are necessary to determine the generalizability of these preliminary findings. In addition, follow-up studies using structured diagnostic interviews could further our understanding of the unique operational factors that contribute to 70 ISRW stress. Moreover, examination of potential interactions between reported high-risk health behaviors in this population could elucidate our newfound knowledge.

7.0 LIMITATIONS OF THE STUDY

The intent of this study was not to diagnose illness, but to screen for indicators and determine any demographic or negative health behavior trends. This study was also not able to account for preexisting conditions, whether physical or psychological, unless self-reported within the survey. Several additional limitations warrant discussion. First, the current study did not match the questionnaire pattern to pull information that would allow for direct comparisons with national averages and trends, which limits our ability to definitively conclude how this population compares to national averages. Second, the epidemiological nature of this study raises the concern for external validity (i.e., the generalizability of the results to all ISR personnel). The foundation of generalizability of results is dependent upon the sample representing the general population. This study relies upon a convenience sample of personnel who were available to complete the survey during specific time periods. It is recognized this convenience sample may not be an adequate representation the general population of ISR personnel. Lastly, the results of

this study did not fully address the functional impairment of the health behaviors reported, such as sleep impairment and substance use (i.e., alcohol, prescription drugs). Therefore, we cannot assume that personnel reporting high levels of sleep issues, increased medical use, medical problems, and substance abuse are in need of care. However, simultaneous assessment of functional impairment is needed to support the validity of this assumption, and a prospective study would be necessary to validate a higher rate of personnel in need of medical care. It is possible that many ISR personnel who endorse symptoms of sleep impairment, alcohol use, and medical problems remain functionally resilient and fit for duty. In spite of these limitations, the current findings support the contention that working around-the-clock, real-time operations may place one at risk for adverse health consequences that should be addressed by leadership and medical personnel.

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LIST OF ABBREVIATIONS AND ACRONYMS

25 AF	25th Air Force
CI	confidence interval
DCGS	distributed common ground system
ISR	intelligence, surveillance, and reconnaissance
ISRW	Intelligence, Surveillance, and Reconnaissance Wing
N/A	not applicable
OR	odds ratio
OTC	over the counter
USAF	U.S. Air Force