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Identifying the Top Factors and Stressors Impacting Flight Performance: A Survey of Army Aviators

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14. ABSTRACT

A descriptive survey of U.S. Army aviators was completed. The purpose of the survey was to identify the most prevalent occupational stressors impacting aviators' performance. In addition, female aviators were asked questions specific to health concerns. Forty-five aviators completed the survey, with the majority being UH-60 pilots. Fatigue, weather, and task saturation were most commonly identified as factors impacting performance. For females, genitourinary and anthropometric health issues were identified as being of concern. The outcomes of the survey will help shape future research.

15. SUBJECT TERMS

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Introduction

U.S. Army aviators are faced with operational stressors known to impact performance including spatial orientation, hypoxia, thermal stress, physiological stress, cognitive workload, and fatigue (e.g., Bushby et al., 2018; Shaw & Harrell, 2023). These stressors degrade aviator performance in terms of declines in vigilance, situational awareness, reaction time, and decision-making (Wingelaar-Jagt et al., 2021). Such declines pose risks to successful mission execution. Various countermeasures to these stressors are available, while new technologies continue to be researched and developed. Available countermeasures include various technology and cueing within the aircraft to assist in maintaining orientation and safe flight (e.g., traffic alert and collision avoidance system [Feltman et al., 2025]). Ongoing research includes the use of multisensory cueing (e.g., Miller et al., 2025) and operator state monitoring (e.g., Vogl et al., 2025) to address a variety of the stressors. However, it is critical that research aligns with the current needs of aviators. This enables the prioritization of future research to optimize aviator performance, especially with an eye to future operational environments that anticipate increasingly complex airspace and flight missions.

Operational stressors remain a significant problem impacting Army aviator performance (Feltman et al., 2018); however, gaps remain, as indicated by increased accidents in recent years (Myers, 2025). While reviewing accident reports can provide valuable insight into factors contributing to and co-occurring with mishaps, they fail to capture the broader implications of day-to-day aviator challenges. For this reason, receiving input from the aviators themselves will aid in determining the current factors impacting aviator performance. Identifying specific stressors beyond just those that are identified as contributing to mishaps provides a more comprehensive understanding of aviator performance. This information can be used alongside that identified from accident reports to guide future research toward more effective interventions to sustain aviator readiness.

As the number of female Army aviators continue to rise, now making up 15% of all Army aviators (Hayes, 2023), it is critical to ensure high standards of readiness and sustain career longevity. Female-specific readiness factors include proper fitting of protective gear, physiological changes during the menstrual cycle, and return-to-duty after pregnancy. For example, to-date, protective gear, such as the aviation helmet, is designed for the shape, musculature, and posture of male aviators resulting in increased muscular fatigue (Yin et al., 2024), potential for injury, and mission-critical performance degradation. In addition, a recent systematic review examining injury rates amongst female and male personnel found females tended to have higher rates of injury across different training events, such as basic training and officer training (Schram et al., 2022). Although these differences diminished after adjusting for fitness levels, females as a whole may still be prone to greater injury rates compared to males. Further, female aviators may be at a higher risk for injury given the flight environment that includes whole-body vibrations. Additional factors that can further limit female readiness include workplace harassment, gender discrimination, and sexual assault. In a similarly male-dominated field, law enforcement, sexual harassment/assault complaints and gender discrimination have shown to be a repetitive experience amongst female police officers but may remain hidden due to the consequences of speaking out (Schafer et al., 2024). Although males are equally susceptible to these situations, the rate at which females report these experiences is significantly higher (Bourke, 2021). As such, determining the prevalence of these experiences in the female aviation

population can help identify whether it should be further explored. Such experiences can place additional stress on the female aviator and potentially decrease performance. Taken together, there are a range of female-specific health and social stressors that could impact female aviator readiness. By identifying and preventing these stressors specific to female aviators we can ensure the readiness of the force.

The current study queried aviators to evaluate the impact of various stressors (degraded visual environment [DVE], fatigue, boredom, task saturation, weather, communications) on their ability to maintain performance within three domains (aviate, navigate, communicate) across three settings (combat deployments, non-combat deployments, combat training centers). In addition, female aviators were queried on a set of female-specific health-related concerns. The following objectives were addressed with the survey:

- Objective 1: To identify significant occupational factors that affect Army aviator's performance across the settings of combat deployments, non-combat deployments, and combat training centers.
- Objective 2: To categorize which aspects of performance (aviate, navigate, communicate) are impacted by factors identified across the three settings.
- Objective 3: To identify the most relevant women's health topics impacting female aviators and mission readiness as well as career longevity.

Methods

The study used a descriptive survey designed to collect quantitative and qualitative data from Army aviators. First, the survey was developed in-house with the assistance of the research pilots assigned to the U.S. Army Aeromedical Research Laboratory's (USAARL) Flight Systems Branch. From there, the survey was reviewed in-house, and modified as needed, to ensure ease of use, readability, and operational relevance. Selectsurvey.net, a customizable, online survey platform, was used to administer the survey and electronically collect responses. Screenshots of the survey items are provided in Appendix B, see Figure 1 below for examples. Survey items, data type collected, and purpose of items are also summarized in Table 1 below.

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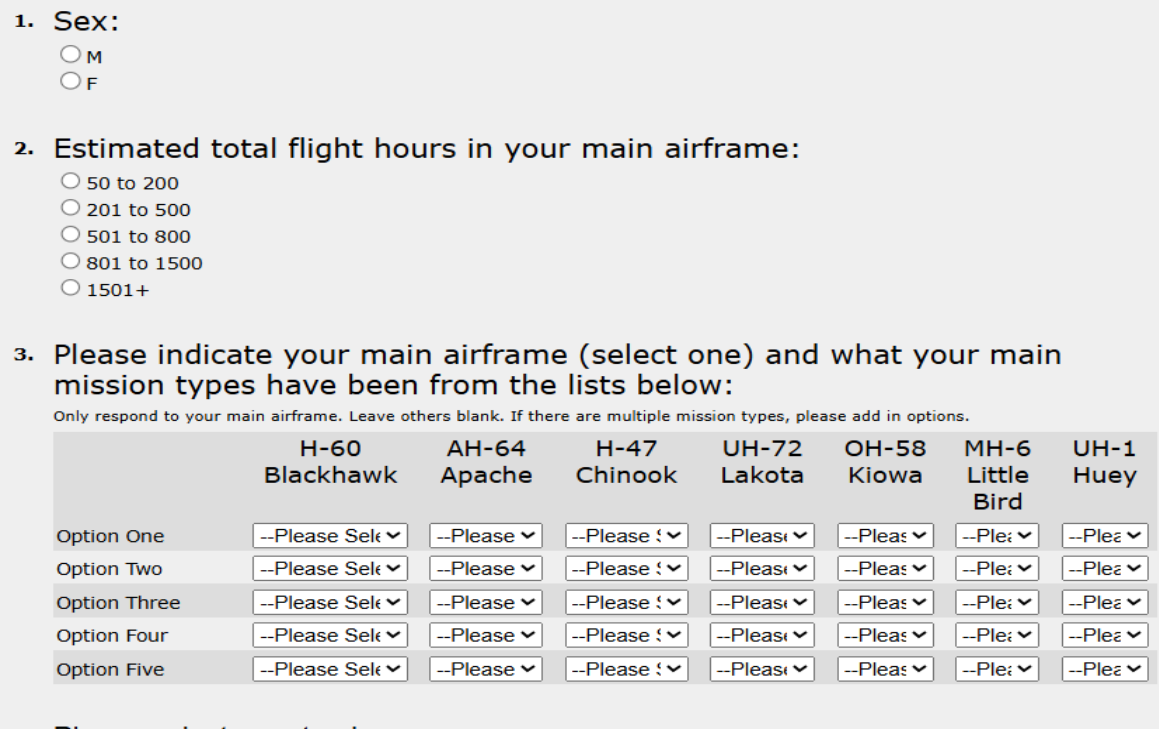

1. Sex:
   - M
   - F

2. Estimated total flight hours in your main airframe:
   - 50 to 200
   - 201 to 500
   - 501 to 800
   - 801 to 1500
   - 1501+

3. Please indicate your main airframe (select one) and what your main mission types have been from the lists below:

Only respond to your main airframe. Leave others blank. If there are multiple mission types, please add in options.

	H-60 Blackhawk	AH-64 Apache	H-47 Chinook	UH-72 Lakota	OH-58 Kiowa	MH-6 Little Bird	UH-1 Huey
Option One	--Please Sele	--Please	--Please S	--Pleas	--Pleas	--Plea	--Plea
Option Two	--Please Sele	--Please	--Please S	--Pleas	--Pleas	--Plea	--Plea
Option Three	--Please Sele	--Please	--Please S	--Pleas	--Pleas	--Plea	--Plea
Option Four	--Please Sele	--Please	--Please S	--Pleas	--Pleas	--Plea	--Plea
Option Five	--Please Sele	--Please	--Please S	--Pleas	--Pleas	--Plea	--Plea

Figure 1. Example of survey items.

The majority of participants (80%) were recruited via advertisement at USAARL's booth at the Army Aviation Mission Solutions Summit (14-16 May 2025, Nashville, TN) which is attended by a variety of Army aviation community members, with some recruited outside of the Summit via word-of-mouth and email. By recruiting at this event, the research team had direct access to aviators who may not have otherwise responded to email survey requests. Samsung Galaxy tablets were available for participants to use to complete the online survey while at the Summit. In addition, potential participants were provided with QR codes that linked to the online survey for completion on their own devices. The survey was completely annonymous with care taken to not ask potentially identifying questions. Participants consented to complete the survey by reading a brief overview of the survey and selecting "Next" to participate.

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Table 1. Overview of Survey Items

Survey Item	Data	Purpose
Sex	Categorical	To describe sample
Track selection	Categorical	To describe sample
Main airframe	Categorical	To describe sample
Main Mission types	Categorical	To describe sample and understand responses on performance questions
Estimated total flight hours	Categorical	To describe experience level of sample
Percentage of pilot in command hours	Numerical	To quantify experience level
Range of years flown	Numerical	To indicate timeframe of experience
Number of combat deployments, non-combat deployments, and visits to a combat training center (note, these are separate items)	N/A or numerical selection: 1 through 6+	To characterize combat experience of sample
Conditions/factors during combat deployments, non-combat deployments, and visits to a combat training center (note, these are separate items)	Categorical	To quantify the frequency of operational stressors experienced during each event type
Indicate aspects of performance affected by conditions/factors	Categorical	To quantify the frequency of operational stressors impacted by aspects of performance during each event type, categorized into: aviate, navigate, and communicate
Additional comments	Textual data	To capture any additional participant comments on the survey items
Identify women's health topics	Categorical	To capture the most urgent and relevant women's health topics impacting female aviators

Data Management

Data were exported from the Selectsurvey.net tool in .CSV format. R version 4.4.0 was used to organize the data and calculate summary statistics. Qualitative data provided by participants were reviewed by the research team to categorize into common themes. Comments specific to aviate, navigate, and communicate were organized in separate tables in order to capture common themes across the three settings (combat deployments, non-combat deployments, and combat training centers) evaluated in the survey.

Results

A total of 45 aviators completed the survey. Of the 45 aviators, 11 (24%) reported sex as female and 34 (76%) as male. Overall, the sample included experienced aviators with a number of flight hours, depicted in the pie chart below (Figure 2). Thirty-nine of 45 responded to the item "Percentage of Pilot in Command hours" with a mean of 55% (*SD* = 28.30). Figure 3 below summarizes the airframes reported by participants.

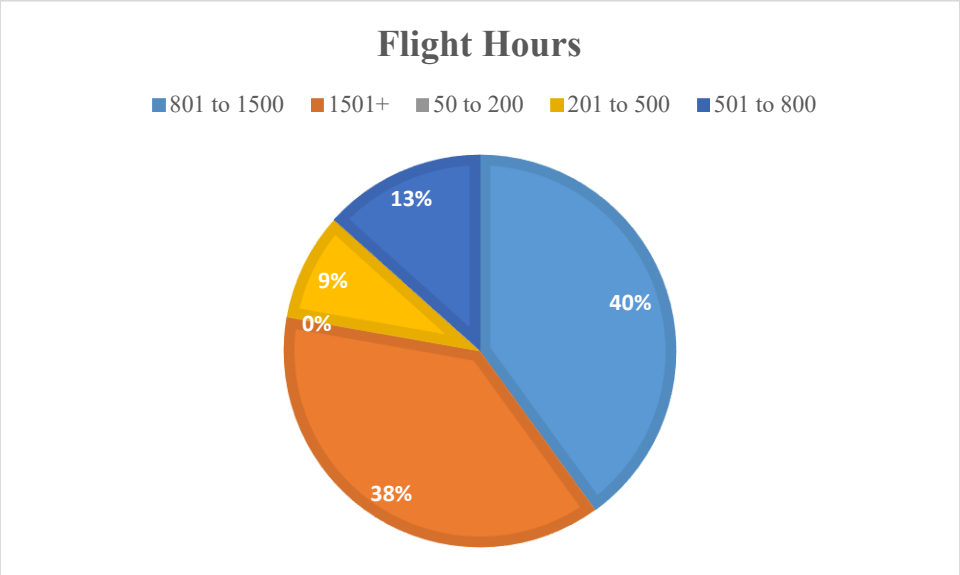

Figure 2. Participant flight hours.

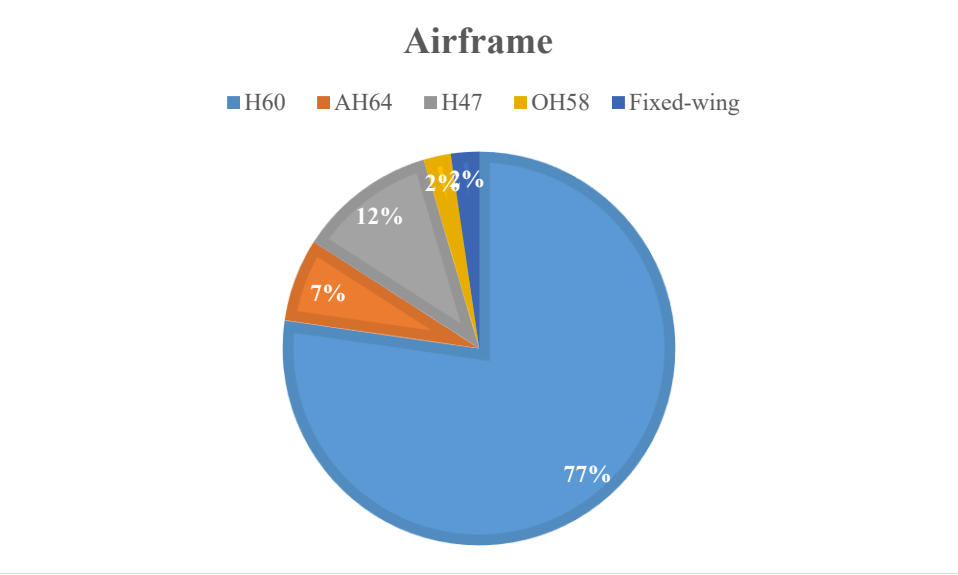

Figure 3. Participant airframes.

Survey participants' experience in terms of number of combat deployments, number of non-combat deployments, and number of visits to a combat training center are summarized in Table 2.

Table 2. Deployment and Combat Training Center Experience

Number of Experiences Reported	Combat Deployments *n total = 25*		Non-Combat Deployments *n total = 29*		Combat Training Center **n total = 20*	
	n	**%**	***n***	**%**	***n***	**%**
1	7	17.1	13	35.1	7	20.6
2	9	22	11	29.7	5	14.7
3	5	12.2	2	5.4	1	2.9
4	2	4.9	1	2.7	2	5.9
5	1	2.4	0	-	1	2.9
6	1	2.4	2	5.4	4	11.8

Note. *In addition to non-responses excluded, one participant's response was removed due to a software malfunction.

Combat Deployments

To evaluate what factors impacted performance during deployments, frequency counts were taken in response to the listed factors experienced. These are summarized in Table 3 below. Overall, the factors receiving the most ratings within the "Often" and "Always" categories were: DVE (52% of the 25 who responded), fatigue (68%), and communications (60%).

Table 3. Factors Impacting Performance during Deployments

Factor	*Total*	Not at All		Rarely		Sometimes		Often		Always	
		n	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
DVE	25	2	8	0	-	10	40	9	36	4	16
Fatigue	25	0	-	0	-	8	32	14	56	3	12
Boredom	25	0	-	6	24	9	36	9	36	1	4
Task saturation	25	0	-	0	-	15	60	10	40	0	-
Weather	25	0	-	3	12	13	52	8	32	1	4
Communications	25	0	-	1	4	9	36	8	32	7	28

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Five participants provided comments regarding the impact of these factors on performance. The comments provided were the following (acronym descriptions are provided at the end of comments):

- "Fixed wing pilots operate in weather consistently."
- "Fixed wing ISR experience."
- "DVE included both brown and white out conditions."
- "Iraq was air assets and vi0 *[sic]* primarily handstand landings. Afghanistan was medevac primarily to point brownout and frequently zero illum."
- "Afghanistan was an infinite number of unknown LZs which always contained some form of dust contributing to DVE."

Note. ISR = intelligence, surveillance, and reconnaissance; illum = illumination; LZs = landing zones

Next, each of these were evaluated in terms of how they impacted ability to aviate, navigate, and communicate. These are summarized in Table 4 below.

Table 4. Combat Deployments: Frequencies of Factors Impacting Ability to Aviate, Navigate, and Communicate

Factor (total *n*)	Not at All *n* (%)	Very Little *n* (%)	Somewhat *n* (%)	Quite a Bit *n* (%)	A Great Deal *n* (%)	Copilot *n* (%)
Aviate						
DVE (25)	2 (8.0)	2 (8.0)	12 (48.0)	5 (20.0)	3 (12.0)	1 (4.0)
Fatigue (25)	0	7 (28.0)	14 (56.0)	4 (16.0)	0	0
Boredom (25)	9 (36.0)	13 (52.0)	2 (8.0)	1 (4.0)	0	0
Task saturation (25)	0	5 (25.0)	12 (48.0)	8 (32.0)	0	0
Weather (25)	1 (4.0)	4 (16.0)	7 (28.0)	9 (36.0)	4 (16.0)	0
Communications (25)	0	8 (32.0)	10 (40.0)	5 (20.0)	2 (8.0)	0
Navigate						
DVE (24)	4 (16.7)	9 (37.5)	7 (29.2)	2 (8.3)	2 (8.3)	0
Fatigue (24)	4 (16.7)	9 (37.5)	8 (33.3)	1 (4.2)	2 (8.3)	0
Boredom (24)	11 (45.8)	10 (41.7)	1 (4.2)	2 (8.3)	0	0
Task saturation (24)	3 (12.5)	6 (25.0)	9 (37.5)	6 (25.0)	0	0
Weather (24)	4 (16.7)	3 (12.5)	4 (16.7)	11 (45.8)	2 (8.3)	0
Communications (24)	8 (33.3)	10 (41.7)	4 (16.7)	2 (8.3)	0	0
Communicate						
DVE (22)	13 (59.1)	6 (27.3)	1 (4.6)	1 (4.6)	1 (4.6)	0
Fatigue (22)	6 (27.3)	10 (45.5)	5 (22.7)	0	1 (4.6)	0
Boredom (22)	11 (50.0)	8 (36.4)	3 (13.6)	0	0	0
Task saturation (22)	2 (9.1)	6 (27.3)	10 (45.5)	3 (13.6)	1 (4.6)	0
Weather (23)	6 (26.1)	13 (56.1)	2 (8.7)	1 (4.4)	1 (4.4)	0
Communications (21)	1 (4.7)	12 (57.1)	6 (28.6)	2 (9.5)	0	0

Participants provided comments specific to factors affecting performance during combat deployments in relation to their impact on ability to aviate, navigate, and communicate. These are summarized with the comments provided for the non-combat deployments and combat training centers in Tables 9 through 11, starting on page 12, to allow for easy comparison across the three settings.

Non-Combat Deployments

The frequency counts of impressions to factors experienced during non-combat deployments are summarized in Table 5 below. Overall, the factors that received the most ratings within the "Often" and "Always" categories were weather (46% of the 28 who responded), fatigue (33% of the 27 who responded), and task saturation (32% of the 28 who responded).

Table 5. Factors: Non-Combat Deployments

Factor		Not at All		Rarely		Sometimes		Often		Always	
	Total	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**	***n***	**%**
DVE	28	3	10.7	11	39.3	10	35.7	4	14.3	0	-
Fatigue	27	0	-	6	22.2	12	44.4	9	33.3	0	-
Boredom	28	1	3.6	6	21.4	15	53.6	6	21.4	0	-
Task saturation	28	1	3.6	4	14.3	14	50.0	9	32.1	0	-
Weather	28	0	-	1	3.6	14	50.0	12	42.9	1	3.6
Communications	28	0	-	4	14.3	16	57.1	5	17.9	3	10.7

Five participants provided comments related to non-combat deployment experiences (acronyms are defined below):

- "Germany"
- "Europe rotation which communication was more difficult at times due to English being a second language of ATC"
- "Lack of interoperability with multinational forces"
- "Communication meaning number of radios to monitor? Yes. Communication with crew? Not an issue. NRCMS know when to be off ICS when front seaters are talking outside the aircraft"
- "My previous experience in Europe was more fast paced and training focused than any combat deployment."

  Note. ATC = air traffic control; NRCMS = non-rated crew members; ICS = incident command system

Next, each of these were evaluated in terms of how they impacted ability to aviate, navigate, and communicate. These are summarized in Table 6 below.

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Table 6. Non-Combat Deployments: Frequencies of Factors Impacting Ability to Aviate, Navigate, and Communicate

Factor (total *n*)	Not at All *n* (%)	Very Little *n* (%)	Somewhat *n* (%)	Quite a Bit *n* (%)	A Great Deal *n* (%)	Copilot *n* (%)
			Aviate			
DVE (28)	3 (10.7)	8 (28.6)	11 (39.3)	6 (21.4)	0	0
Fatigue (28)	2 (7.1)	8 (28.6)	14 (50.0)	3 (10.7)	1 (3.6)	0
Boredom (28)	5 (17.9)	11 (39.3)	10 (35.7)	2 (7.1)	0	0
Task saturation (28)	2 (7.1)	6 (21.4)	15 (53.6)	4 (14.3)	1 (3.6)	0
Weather (28)	1 (3.6)	5 (17.9)	14 (50.0)	6 (21.4)	2 (7.1)	0
Communications (28)	2 (7.1)	12 (42.9)	10 (35.7)	3 (10.7)	1 (3.6)	0
			Navigate			
DVE (26)	6 (23.1)	9 (34.6)	8 (30.8)	3 (11.5)	0	0
Fatigue (26)	5 (19.2)	10 (38.5)	9 (34.6)	2 (7.7)	0	0
Boredom (26)	9 (34.5)	3 (11.5)	3 (11.5)	3 (11.5)	0	0
Task saturation (26)	3 (11.5)	7 (26.9)	11 (42.3)	5 (19.2)	0	0
Weather (26)	1 (3.9)	9 (34.6)	8 (30.8)	8 (30.8)	0	0
Communications (26)	6 (23.1)	12 (46.2)	6 (23.1)	2 (7.7)	0	0
			Communicate			
DVE (26)	10 (38.5)	7 (26.9)	5 (19.2)	2 (7.7)	0	2 (7.7)
Fatigue (26)	7 (26.9)	11 (42.3)	6 (23.1)	2 (7.7)	0	0
Boredom (26)	10 (38.5)	12 (46.2)	2 (7.7)	2 (7.7)	0	0
Task saturation (26)	3 (11.5)	8 (30.8)	11 (42.3)	3 (11.5)	1 (3.9)	0
Weather (26)	8 (30.8)	6 (23.1)	8 (30.8)	4 (15.4)	0	0
Communications (26)	2 (7.7)	11 (42.3)	8 (30.8)	4 (15.4)	0	1 (3.9)

Participants provided comments specific to factors affecting performance during non-combat deployments in relationship to the impact on ability to aviate, navigate, and communicate. These are summarized with the comments provided for the combat deployments and combat training centers in Tables 9 through 11, starting on page 12.

Combat Training Centers

The frequency counts of impressions to factors experienced during combat training center visits are summarized in Table 7 below. Overall, the factors that received the most ratings within the "Often" and "Always" categories were fatigue (40% of the 18 who responded), task saturation (37%), and DVE (30%).

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Table 7. Combat Training Centers Factors

Factor	*Total*	Not at All		Rarely		Sometimes		Often		Always	
		n	%	*n*	%	*n*	%	*n*	%	*n*	%
DVE	20	3	15.0	3	15.0	8	40.0	4	20.0	2	10.0
Fatigue	18	0	-	3	16.7	8	44.4	4	22.2	3	16.7
Boredom	21	3	15.8	5	26.3	8	42.1	2	10.5	1	5.3
Task saturation	19	1	5.3	2	10.5	9	47.4	7	36.8	0	-
Weather	19	0	-	5	26.3	11	57.9	3	15.8	0	-
Communications	19	0	-	9	47.4	6	31.6	3	15.8	1	5.3

Four participants provided comments related to combat training center visit experiences (acronyms are provided below):

- "JRTC 2019"
- "Current oct"
- "Most task saturated ever was during a ctc rotation"
  "Anyone who has been to NTC knows that dust and DVE are a common occurrence. JRTC can have adverse weather conditions."
  Note. JRTC = Joint Readiness Training Center; ctc = combat training center; NTC = National Training Center; oct = observer, coach, trainer

Each factor was also evaluated regarding impacts to ability to aviate, navigate, and communicate. The frequency counts are summarized in Table 8.

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Table 8. Combat Training Centers: Frequencies of Factors Impacting Ability to Aviate, Navigate, and Communicate

Factor (total *n*)	Not at All *n* (%)	Very Little *n* (%)	Somewhat *n* (%)	Quite a Bit *n* (%)	A Great Deal *n* (%)	Copilot *n* (%)
			Aviate			
DVE (15)	2 (13.3)	3 (20.0)	6 (40.0)	2 (13.3)	2 (13.3)	0
Fatigue (15)	2 (13.3)	2 (13.3)	5 (33.3)	4 (26.7)	2 (13.3)	0
Boredom (15)	5 (33.3)	5 (33.3)	3 (20.0)	1 (6.7)	1 (6.7)	0
Task saturation (15)	3 (20.0)	2 (13.3)	4 (26.7)	5 (33.3)	1 (6.7)	0
Weather (15)	3 (20.0)	4 (26.7)	7 (46.7)	1 (6.7)	0	0
Communications (15)	4 (26.7)	5 (33.3)	4 (26.7)	2 (13.3)	0	0
			Navigate			
DVE (15)	3 (20.0)	6 (40.0)	4 (26.7)	2 (13.3)	0	0
Fatigue (15)	2 (13.3)	5 (33.3)	5 (33.3)	2 (13.3)	1 (6.7)	0
Boredom (15)	3 (20.0)	10 (66.7)	1 (6.7)	0	1 (6.7)	0
Task saturation (15)	4 (26.7)	4 (26.7)	7 (46.7)	0	0	0
Weather (15)	5 (33.3)	5 (33.3)	3 (20.0)	2 (13.3)	0	0
Communications (15)	6 (40.0)	3 (20.0)	4 (26.7)	2 (13.3)	0	0
			Communicate			
DVE (14)	5 (35.7)	4 (28.6)	4 (28.6)	1 (7.1)	0	0
Fatigue (14)	3 (21.4)	4 (28.6)	4 (28.6)	3 (21.4)	0	0
Boredom (14)	6 (42.9)	5 (35.7)	3 (21.4)	0	0	0
Task saturation (14)	2 (14.3)	1 (7.1)	6 (42.9)	5 (35.7)	0	0
Weather (14)	4 (28.6)	4 (28.6)	6 (42.9)	0	0	0
Communications (14)	3 (21.4)	4 (28.6)	5 (35.7)	0	2 (14.3)	0

Participants provided comments specific to factors affecting performance during non-combat deployments in relation to the impact on ability to aviate, navigate, and communicate. These are summarized with the comments provided for the combat deployments and non-combat deployments in Tables 9 through 11, starting on page 12.

Commentary specific to ability to aviate.

Participant comments specific to factors affecting ability to aviate are organized by themes in Table 9 below. Across the three settings, a total of 29 comments were provided (note, two comments were "none" and are not included in the count). The majority of comments were provided for the combat deployment settings (n = 19). Some participants provided comments within a single response box that spanned multiple themes (e.g., weather *and* fatigue). These comments were separated so that the information specific to each theme were reported within that category only. The total number of comments provided was calculated prior to this separation. To indicate where comments were separated, "…" was added within the table.

Table 9. Participant Comments on Factors Affecting Ability to Aviate

Theme Category	Experience Setting	Comments
Weather	Combat deployment	• Task saturation while performing missions under less than ideal wx • Extreme heat, lack of weather forecast, extreme dust. • Weather drives decision making. • Bad wx • Mission requirements hindered greatly due to wx impacts • Weather … affected ability
	Non-combat deployment	• Different weather patterns and different terrain than home station training. • Weather in Europe was the absolute biggest risk factor. Reduction in visibility, cloud ceiling, and icing all created unique conditions that could often take us by surprise. Despite having dedicated weather briefer, they were clearly unable to give detailed weather analyses due to the lack and range of equipment. Being able to fly in IMC and other considerably poor conditions gave a lot of us the necessary confidence to execute related tasks when the time came. • Weather drives decision making.
	Combat training center	• The weather … affect a lot.
Degraded Visual Environment	Combat deployment	• DVE obviously the ability to see…. • Every landing in Afghanistan was a DVE landing and it created stress, but we mitigated this by training and TTP's. • Residual dust in air post dust storm adding zero vis surface up. • Visibility • Difficulty landing in confined and dust area • DVE is the biggest factor to 'aviate'. We have instruments for poor weather to fall back on.
	Non-combat deployment	• DVE obviously the ability to see…
Task Saturation	Combat deployment	• … Task saturation induces mistakes. • … Pressure to complete staff tasks before and/after flights created a higher level of stress. • Task saturation and completing tasks in order of precedence
	Non-combat deployment	• Ability to complete actions on objective in the most expedient manner • Mission specifics, tasks, etc. • Task saturation induces mistakes.

	Combat training center	• The …. optempo affect a lot.
Fatigue	Combat deployment	• … Fatigue compounds mistakes.
	Non-combat deployment	• I've never heard an RCM say they were bored. Boredom and fatigue are two different things. • Fatigue compounds mistakes.
	Combat training center	• Most units max out duty day, so fatigue becomes an issue. • Ability to stay a mission, focused, especially during extended operations
Decision making, focus, miscellaneous cognitive state(s)	Combat deployment	• Decision making (2x) • Concentration • Staying mission focused. Completing mission. • The ability to cross monitor the pilot on the controls was most often affected • … but also the mental state of the pilots and confidence.
	Non-combat deployment	• Decision making • … but also the mental state of the pilots and confidence.
	Combat training center	• Decision making • I just get bored and zoned out • I think there is 'planned' chaos at these training centers. Many times pilots will arrive and skip the majority of the onboarding process due to time constraints. This in turn leaves crews with a fundamental lack of confidence when flying in new airspace.
Experience/ competence	Combat deployment	• Both deployments were older analog aircraft (h-60L) so compensating for identified aspects relied a lot on crew experience, competent mx teams and TTPs for how to deal with reoccurring issues (e.g., Commo problems or external agencies interruption in operations) • Due to staff position the time between flights did not build same skills as others who flew more often. • Being able to conduct relevant tasks associated with the mission gave us recency and proficiency that was the absolute best mitigator to many adverse effects. Really being able to practice and having the ability to fly on our own time was a huge benefit. I believe this is the biggest contributing factor to Army aviation mishaps. The crew needs more experience and more relevant practice.

Note. wx = weather; DVE = degraded visual environment; IMC = instrument meteorological conditions; RCM = rated crew member; TTPs = tactics, techniques, procedures; optempo = operational tempo; mx = maintenance

Commentary specific to ability to navigate.

Participant comments specific to factors affecting ability to navigate are organized by themes in Table 10 below. Across the three settings, a total of 23 comments were provided (note, three comments were "none" and were not included in the count). Similar to the comments specific to the ability to aviate, the majority of comments were provided for the combat deployment settings (n = 13). Comments provided within a single response box that spanned multiple themes were again separated to summarize within the thematic category only.

Table 10. Participant Comments on Factors Affecting Ability to Navigate

Theme Category	Experience Setting	Comments
Weather	Combat deployment	• In the L model bad weather navigation relied on predetermined red illum routes but all we had was an EDM connected to center consol and not user friendly. • Obviously, we can fly with instruments, but in some environments you can't. But wx affects everything. • Low ceilings and wx po kets [*sic*] • Weather is unpredictable and often complicated the route planning. • The lack of weather reporting made it very difficult to pick a route. • Weather avoidance became an issue for navigation but rarely were we navigating in weather
	Non-combat deployment	• Obviously, we can fly with instruments, but in some environments you can't. But wx affects if everything. • Again, the abundantly poor weather in Europe would create situations where our crews would either depart VFR or IFR. I believe that my platoon was exceptionally good about not taking unnecessary risks and would often delay or opt for an alternative route.
	Combat training center	• Obviously, we can fly with instruments, but in some environments you can't. But wx affects everything.
Degraded visual environments	Combat deployment	• Residual dust in air post dust storm adding zero vis surface up.
	Non-combat deployment	• Loss of visual references
Decision making, focus, miscellaneous	Combat deployment	• Distraction to focus on critical aspects of flight
	Non-combat deployment	• Decision making

cognitive state(s)	Combat training center	• Decision making
Technology/ equipment	Combat deployment	• Ring routes became more reliant on GPS navigation. • GPS
Experience/ competence	Combat deployment	• Lack of experience in formation would lead to having to be flight lead and AMC at same time • Learning to prioritize actions helped improve abilities
Miscellaneous	Combat deployment	• Getting to the objective area in the most expeditious manner. • Being unable to truly know where we would receive a 9-line mission was the biggest contributing factor to the mission.
	Non-combat deployment	• It's reached the objective area in the most expedient manner • Non-primary English-speaking ATC provided some difficulty to fully understand instructions the first time.
	Combat training centers	• Ability to reach the objective area in the most expeditious manner • Navigating is pretty easy. There are dedicated route structures within training centers.

Note. wx = weather; EDM = electronic data manager; AMC = air mission commander; IMC = instrument meteorological conditions; IFR = instrument flight rules; TTPs = tactics, techniques, procedures; optempo = operational tempo; VFR = visual flight rules; GPS = global positioning system; vis = visibility; ATC = air traffic control

Commentary specific to ability to communicate.

Participant comments specific to factors affecting ability to communicate are organized by themes in Table 11 below. Across the three settings, a total of 21 comments were provided (note, three comments were "none" and are not included in the count). Similar to the comments specific to the previous tables, the majority of comments were provided for the combat deployment settings (n = 11). Comments provided within a single response box that spanned multiple themes were again separated to summarize within the thematic category only.

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Table 11. Participant Comments on Factors Affecting Ability to Communicate

Theme Category	Experience Setting	Comments
Weather	Non-combat deployment	• Communicating in Europe is almost the same as it is in the US. Our biggest obstacle was getting a clear satellite radio link which is related to weather but also more so to the type of satcom service that your allowed to use.
Task saturation	Combat deployment	• When you're tired and task saturated you can miss communication directions without realizing because there are so many people on the line across multiple radios • If you are doing 10 things in the aircraft, comms falls off first depending on environment. • Dealing with multiple radios at once. Dealing with other aircraft communication security problems • Oversaturation of radio chatter . . . • With task saturation and combination of fatigue- brain seemed to be fog to delineate communication in preparation for passenger pick up versus current conditions / crew coordination • Whenever executing a complex flight or landing, communication was often the task that suffered the most. • The ability to communicate within the cockpit, within the flight, with the TOC and the ground forces can sometimes all happen at once • Busy or unreliable radios made it difficult to communicate mission information especially during high workload missions
	Non-combat deployment	• Dealing with multiple frequencies at once or communications security problems from other aircraft
	Training center	• Dealing with multiple frequencies at once and communications security issues from other aircraft • Again, by design NTC and JRTC will continuously provide training events and injects that complicate operations in a purposeful way
Decision making, focus, miscellaneous cognitive state(s)	Non-combat deployment	• Decision making
	Combat training center	• Decision making
Technology/ equipment	Combat deployment	• Lack of satcom frequency made it difficult to communicate with higher • … broken or inoperable radios

		• Unable t0 maintain communication air to toc and air to ground. [*sic*] • In combat the highly layered use of aerial platforms created a dense network that would be very difficult to coordinate with but we almost always communicated through a JTAC which is essentially an ATC controller. The specific UH60M model radios are designed to be used friendly and reduce task saturation. Compared to the UH60L the Mike model is so much easier to use and therefore reduces the pilot's workload.
Miscellaneous	Non-combat deployment	• Inefficient line of sight radios • Non-native English-speaking ATC

Note. TOC = tactical operations center; NTC = National Training Center; JRTC = joint readiness training center; ATC = air traffic control; JTAC = joint terminal attack controller

Additional commentary provided by participants.

At the completion of the main portion of the survey, participants were given the opportunity to provide any additional comments regarding experiences impacting performance. Five participants provided comments (acronyms are defined below):

- "heat and body armor destroy my body on a deployment."
- "For combat deployment how do the additional layers (armor, etc) influence the fatigue and or stress of aircrew in extreme weather conditions"
- "Boots. We need flight boots that aren't gortex. Also, flight boots are super expensive. They're also super hot in places like CENTCOM. We need cheaper and thinner options."
- "Extreme neck and back pain due to vibration and bad support"
- "I think the biggest factor to safety in Army aviation is the lack of relevant experience that flight crews can obtain. It used to be common to find pilots with 3000 plus hours and now that is incredibly rare. Compounding this is how many aviators are ETSing or UQRing. The experience we have is constantly leaving and resetting our overall experience. We need more hours doing real tasks in real helicopters."
  Note. CENTCOM = U.S. Central Command; ETSing = expiration of term of service; UQRing = unqualified resignation

Female Aviator-Specific Items

Female aviators were given the list below of women's health topics from which to identify the top three they see as: 1) being most important to female aviators as a whole, 2) affecting female medical readiness in large-scale combat operations (LSCO), 3) yielding the most severe short-term outcomes impacting mission readiness, and 4) being the most severe long-term condition resulting from a previous disease or injury that limits career longevity:

- Genitourinary health (e.g., urinary tract infection, vaginitis, tactical dehydration, in-flight urination)
- Sleep
- Behavioral health
- Reproductive health and contraception
- Physical assault
- Sexual assault
- Pregnancy and peripartum health
- Access to primary care
- Female-specific anthropometric operational protective equipment (e.g., improved outer tactical vest, advanced combat helmet, aviation life support equipment)
- Musculoskeletal injury susceptibility

Medical issues faced by current female aviators.

Seven of the 11 female participants responded to the items regarding women's health issues they see as being most important to female aviators as a whole. The frequency counts are reported in Table 12 below, summarized by the order in which they responded (choice 1, choice 2, choice 3; *note*, these were not instructed to be rank ordered, rather they were given the opportunity to select 3 response items). Of the medical issues selected, genitourinary and anthropometric were both selected the most frequently (total of 4 each, 57%). Next were sexual assault, pregnancy, and musculoskeletal injury susceptibility (total of 3 each, 43%).

Table 12. Health Issues Affecting Female Aviators as a Whole

Medical Issue	Choice 1		Choice 2		Choice 3	
	n	**%**	***n***	**%**	***n***	**%**
Genitourinary	4	57.1	0	-	0	-
Sleep	1	14.3	1	14.3	0	-
Behavioral health	0	-	1	14.3	0	-
Reproductive health	0	-	1	14.3	0	-
Physical assault	0	-	0	-	0	-
Sexual assault	1	14.3	1	14.3	1	14.3
Pregnancy	1	14.3	1	14.3	1	14.3
Access to primary care	0	-	0	-	0	-
Anthropometric	0	-	2	28.	2	28.6
Injury	0	-	0	-	3	42.9

Female medical readiness in LSCO.

All seven female participants responded to the items regarding health issues they see as impacting medical readiness in LSCO. The frequency counts are reported in Table 13 below, summarized by the order in which they were rated (choice 1, choice 2, choice 3). Of the medical issues selected, sleep, behavioral health and anthropometric issues were all selected the most frequently (total of 4 each, 57%). Next was genitourinary (total of 3, 43%).

Table 13. Health Issues Affecting Female Aviator Readiness in LSCO

Health Issue	Choice 1		Choice 2		Choice 3	
	n	**%**	***n***	**%**	***n***	**%**
Genitourinary	3	42.9	0	-	0	-
Sleep	2	28.6	2	28.6	0	-
Behavioral health	2	28.6	1	14.3	1	14.3
Reproductive health	0	-	2	28.6	0	-
Physical assault	0	-	0	-	0	-
Sexual assault	0	-	1	14.3	1	14.3
Pregnancy	0	-	0	-	0	-
Access to primary care	0	-	0	-	0	-
Anthropometric	0	-	1	14.3	3	42.9
Injury	0	-	0	-	2	28.6

Short-term outcomes impacting female mission readiness.

All seven female participants responded to the items regarding health issues they see as yielding the most severe short-term outcomes impacting mission readiness. The frequency counts are reported in Table 14 below, summarized by the order in which they were rated (choice 1, choice 2, choice 3). Of the medical issues selected, genitourinary and sleep were both selected the most frequently (total of 5 each, 71%). Next was anthropometric issues (total of 4, 57%).

Table 14. Short-Term Outcomes Impacting Female Mission Readiness

Health Issue	Choice 1		Choice 2		Choice 3	
	n	**%**	***n***	**%**	***n***	**%**
Genitourinary	5	71.4	0	-	0	-
Sleep	2	28.6	3	42.9	0	-
Behavioral health	0	-	2	28.6	0	-
Reproductive health	0	-	0	-	0	-
Physical assault	0	-	0	-	0	-
Sexual assault	0	-	0	-	0	-
Pregnancy	0	-	1	14.3	1	14.3
Access to primary care	0	-	0	-	1	14.3
Anthropometric	0	-	1	14.3	3	42.9
Injury	0	-	0	-	2	28.6

Long-term conditions limiting female aviator career longevity.

All seven female participants responded to the items regarding health issues they see as being the most severe long-term condition resulting from a previous disease or injury that limits career longevity. The frequency counts are reported in Table 15 below, summarized by the order in which they were rated (choice 1, choice 2, choice 3). Of the medical issues selected, musculoskeletal injury susceptibility was selected the most frequently (total of 6, 86%). Next was behavioral health (total of 4, 57%).

Table 15. Long-Term Conditions Limiting Female Aviator Career Longevity

Health Issue	Choice 1		Choice 2		Choice 3	
	n	**%**	***n***	**%**	***n***	**%**
Genitourinary	0	-	0	-	0	-
Sleep	3	42.9	0	-	0	-
Behavioral health	4	57.1	0	-	0	-
Reproductive health	0	-	2	28.6	0	-
Physical assault	0	-	0	-	0	-
Sexual assault	0	-	1	14.3	0	-
Pregnancy	0	-	1	14.3	1	14.3
Access to primary care	0	-	0	-	0	-
Anthropometric	0	-	3	42.9	0	-
Injury	0	-	0	-	6	85.7

Finally, participants were provided the opportunity to expand on the items through comments. Three participants provided additional comments. These are included below:

- "Standards of when females can fly pre/post-partum *[sic]* limiting their ability to catch up to male counterparts in time"
- "Overall diet available affecting health and overall well-being. When deployed to Poland, shared the local DFAC with Polish soldiers and food was very starch and fatty meat heavy. After a couple months, overall wellness dropped quickly and also affected gut health and caused multiple gastrointestinal issues. Army supplemented with standard dry cereal and protein bars, but all the processed food and lack of fresh fruits and vegetables really dropped immunity and overall health within a couple months."
- "Understanding and treating pre-menopausal *[sic]* and menopausal hormones therapy."

Discussion

This descriptive survey was conducted to gain insight on the various occupational stressors impacting aviator performance across combat deployments, non-combat deployments, and combat training centers, with the goal of using the information to drive prioritization of future research efforts. In addition to gaining insight on factors impacting performance across these settings, female-specific health issues were also explored to identify how research can be designed to improve female aviator medical and mission readiness. This is critical to consider given the growing number of female aviators within the force.

Regarding the sample who completed the survey, just under half (45%) indicated experiencing at least one combat deployment. More participants (64%) had experience with at least one non-combat deployment, while fewer (44%) attended a combat training center at least once. As such, the sample had a wide range of experience across the three settings of interest. In addition, the sample was highly experienced, with the majority reporting in the highest hour categories (801 to 1500, 40%; 1501+ 38%). The majority were H60 pilots, but AH64, H47, OH58, and UH72, as well as one fixed-wing, were all represented within the survey as well.

Objective One

In addressing the first objective of the study, "*To identify significant factors that affect Army aviators' performance in-flight*," frequency counts were calculated within each of the three settings on responses to the list of factors impacting performance. For each factor (DVE, fatigue, boredom, task saturation, weather, communications), participants rated its impact on performance using the following scale: "Not at All," "Rarely," "Sometimes," "Often," or "Always." Fatigue was the only factor that received high numbers of "Often" and/or "Always" ratings across all three settings (combat deployments, 68%; non-combat deployments, 33%; and combat training centers, 39%). This is in-line with other research on the topic of fatigue in military aviation (Morris et al., 2020; Wingelaar-Jagt et al., 2021). DVE was frequently rated as being experienced "Often" and/or "Always" in both combat deployments (52%) and combat training centers (30%), while task saturation was indicated for non-combat deployments (32%) and combat training centers (37%). The finding of DVE as a stressor in combat deployments and combat training centers is likely due to the desert environments where many combat deployments took place at (Middle East) and training center locations (the National Training Center is located in the Mojave Desert). Task saturation noted as a stressor during non-combat deployments and training centers is likely related to the heavy focus on training scenarios where a high OPTEMPO and difficult scenarios are created.

In addition to the commonly identified factors across the three settings, there were also factors identified that are unique to each setting. In combat deployments, communications was frequently identified as a factor, with 60% of the participants rating this as a factor that "Often/Always" impacted performance. Comments provided by participants under the aviate, navigate, and communicate sub-questions alluded to faulty equipment frequently being responsible for the problems experienced related to communications. In non-combat deployments, participants frequently cited weather as "Often/Always" being problematic (46%). Comments indicated that this was frequently due to the various weather conditions that occurred during European non-combat deployments.

Finally, review of the comments provided highlighted some factors that were not part of the query. For example, multiple comments alluded to issues related to confidence and lack of training/flight hours in the actual aircraft. This is something that should be taken into consideration while designing the training plans for the Future Long-Range Assault Aircraft. Not only will aviators be learning a whole new airframe, but they are already indicating that they are not receiving enough flight hours and that some pilots lack confidence in skills. With a new airframe, it will be crucial to equip the aviators with the training needed to ensure they are confident with their skills.

Objective Two

To address the second objective of the study, "*To categorize which aspects of performance (aviate, navigate, communicate) are impacted by factors identified as affecting performance*," frequency counts were calculated within each setting (combat deployments, etc.) and performance category (aviate, etc.). For each factor (DVE, etc.), participants rated the impact it had on their performance using: "Not at All," "Very Little," "Somewhat," "Quite a Bit," "A Great Deal," or "My performance was not affected, but my copilot's was."

For *aviate*, focusing on only those items rated as "Quite a Bit" and/or "A Great Deal," the highest rated factors included weather (combat deployments, 52%; non-combat deployments, 28%), fatigue (combat training centers, 40%) and task saturation (combat training centers, 40%). The difference in ratings between combat and non-combat deployments and combat training centers, is likely indicative of the different environments aviators are operating in while at each location. Regarding combat training centers, the experience of fatigue is likely part of the design of the training event. Several of the comments mentioned "planned" chaos at these events, which likely exacerbates the effects of fatigue.

For *navigate*, using the same approach, essentially the same pattern emerged. For both combat and non-combat deployments, weather was most frequently indicated as impacting performance (54% and 31%, respectively). For combat training centers, fatigue received the most frequent ratings of "Quite a Bit/A Great Deal," with 20% indicating its impact. Similar to aviate, these differences are likely related to the different environments and tasks experienced in each setting.

Finally, *communicate* resulted in a different pattern across the three settings. Across all three settings, ratings of "Quite a Bit/A Great Deal" were much lower. Task saturation was frequently rated for combat deployments (19%), non-combat deployments (16%), and combat training centers (35%). Within non-combat deployments, weather and communications were also frequently rated as "Quite a Bit" (15% for each). The commonality of task saturation affecting performance related to communicating across the three settings is likely due to the inherent difficulty in properly communicating when taxed with additional tasks. Indeed, comments provided by participants indicated that when workload is high, communication is frequently the first task to be shed.

Objective Three

The female data were evaluated independently to address objective three, "*To identify the most relevant women's health topics impacting female aviators and mission readiness as well as career longevity*." Female aviators were requested to respond to items that address four different aspects related to mission readiness, top current medical issues, issues affecting readiness in LSCO, short-term outcomes, and long-term conditions affecting career longevity. Across these four aspects, genitourinary (top current, 57%; LSCO, 43%; short-term, 71%) and anthropometric (top current, 57%; LSCO, 57%; short-term, 57%) health concerns were repeatedly identified as a factor. Sexual assault and pregnancy were both identified only under the top current medical issues (43% each). Musculoskeletal injury susceptibility was identified as a concern in both top current medical issues (43%) and long-term conditions affecting career longevity (86%). Finally, sleep was identified as a concern for both LSCO (57%) and short-term outcomes (71%), while behavioral health was identified as a concern for both LSCO (57%) and long-term conditions (57%).

The repeated indications of genitourinary and anthropometric issues being of concern highlights the need for further understanding of these issues for female aviators. Concerns related to genitourinary health are not unique to U.S. Army aviation. A phone interview study was completed to assess women's pelvic health concerns within the Australian Defense Force (Freire et al., 2023). This interview spanned all occupations within the Defense Force, not just aviators,

and identified the following nine themes as areas of concern: suppressing the urge to go, adjusting hydration depending on toilet access, managing menstruation, regaining "full" fitness postpartum, awareness and prevention of pelvic health conditions, and inhibiting conversations about women's health. However, studies examining methods of mitigating these concerns are limited. Regarding anthropometric concerns, this also appears to be an area of limited research, specifically in regard to U.S. Army aviators. One study that focused specifically on U.S. Army aviators was completed in 2020 (Moczynski et al., 2020). This study evaluated whether the current anthropometric screening process and limits imposed were adequate for female Army aviators. The study concluded that they were sufficient overall, other than for those on the extreme ends of the spectrum. However, given the responses to the current survey, this may be an area of research worth revisiting, particularly with future operations in mind.

Limitations

The survey was limited in several ways. First, the question order remained the same for every administration, such that participants were first asked about combat deployment experiences, followed by non-combat deployments, and finally combat training center experiences. By structuring the survey this way, it is possible that those who have experienced all three stopped providing responses to the later items. This seems likely when examining how many participants reported experience at each location in contrast to the number who responded to the items specific to aviate, navigate, and communicate within each setting. For example, 20 participants indicated having attended a combat training center, but only 15 responded to the aviate and navigate items, and 14 responded to the communicate items. Alternatively, 25 indicated having done a combat deployment, with 25 responding to aviate items, 24 to navigate items, and then 21 to 23 responding to communicate items specific to combat deployments. Future surveys using this similar approach should consider randomizing the order of items to increase the likelihood of accurate responses. In addition, the overall length of the survey likely contributed to how many participants completed it in its entirety.

In addition to the survey layout, the number of participants completing the survey at the Summit was limited. 2025 was a unique year for government travel, with many organizations severely limiting the ability for individuals to travel. As such, there were fewer aviators attending the Summit compared to past years (this was determined by word-of-mouth). The Summit remains a desirable forum to recruit individuals to complete these types of surveys, with the use of a tablet adding to the ease of survey completion; however, the year 2025 was not an ideal time to attempt such an effort. Future surveys targeting Army aviators should continue to consider this forum as a recruiting location. Although additional participants were recruited outside of the Summit via email and word-of-mouth, the majority were recruited at the Summit itself. Moreover, the representativeness of the sample was limited as well.

Conclusion and Recommendations

The responses to the survey highlighted several areas to consider in future research efforts. Fatigue remains a significant concern within Army aviation. Continued research in this area should focus on countermeasures specific to the aviation community, with a focus on the future operational environment. In addition, weather and task saturation have been highlighted as areas of concern. In recent years, much of the weather-related issues have been related to DVE

caused by dust. Future operations will likely include different weather challenges than what was experienced during operations in the Middle East. Research should be conducted using flight scenarios that mimic what is anticipated for future operations. In addition, studies examining workload should utilize tasks that were indicated here under the task saturation comments. It was clear that communications pose a significant problem for workload and should be used to manipulate workload in future studies to increase ecological validity.

Participants' responses to factors impacting ability to aviate, navigate, and communicate provided further insight into ways to better design future studies. For example, future studies should be designed to manipulate workload in ways that participants indicated impacted abilities to perform within each set of task categories (aviate, navigate, communicate). Then, key aspects of performance within each of those (e.g., aviate = maintaining airspeed and altitude) should be evaluated to see how performance is negatively impacted. In doing so, researchers can more accurately identify areas where mitigations such as the use of automation or cueing, can assist in maintaining performance. Additionally, the findings here can be used to influence training plans. In particular, the Army is posed to begin receiving the Future Long-Range Assault Aircraft as soon as 2028 (Judson, 2025). Given that multiple participants indicated issues related to confidence, and a lack of training and actual flight hours, leadership should carefully plan how to train aviators on the new airframe. Current aviators are suggesting that they are not receiving enough flight hours and that some lack confidence in skills. Introducing a new airframe will necessitate significant training efforts to ensure that aviators are able to confidently fly.

Finally, across both the overall question items and the female-specific items, it was clear that context mattered. Participants as a whole highlighted different factors for the three settings evaluated (combat deployments, non-combat deployments, and combat training centers), while female aviators also identified different health concerns depending on the context the question referred to (e.g., current medical issues vs. those in LSCO). These differences suggest that when considering methods of sustaining performance, it will be important to consider which *context* one is most concerned with impacting.

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Appendix A. Acronyms and Abbreviations

ATC	Air Traffic Control
CENTCOM	U.S. Central Command
DVE	Degraded Visual Environment
ETSing	Expiration of Term of Service
GPS	Global Positioning System
ICS	Incident Command Center
IFR	Instrument Flight Rules
IMC	Instrument Meteorological Conditions
LCSO	Large-Scale Combat Operations
LDM	Local Data Management
NRCMS	Non-Rated Crew Members
NRTC	National Readiness Training Center
NTC	National Training Center
OPTEMPO	Operational Tempo
RCM	Rated Crew Member
TTPs	Tactics, Techniques, Procedures
UQRing	Unqualified Resignation
USAARL	U.S. Army Aeromedical Research Laboratory
VFR	Visual Flight Rules
vis	Visibility
wx	Weather

Appendix B. Survey Screenshots

The purpose of this survey is to determine factors that are affecting **today's** aviators and **what** aspects of performance are being affected. We plan to use this information to direct our future research efforts or in future research studies.

It is important you understand that your responses to this survey will be **completely anonymous** and **voluntary**. You may discontinue the survey at any time or **skip** any questions. To discontinue, simply close the browser. In completing the survey in-person, we cannot guarantee complete privacy. Others may see you while you are completing it. If you wish to discontinue now and complete the survey in privacy, you are free to do so. Completion of the survey may take up to 10 minutes. Please **do not** add any responses in the comment sections that can identify you.

Please complete the survey as truthfully as able. Your honest responses will help us to find ways to best help aviation operations.

By completing this survey, I voluntarily consent to participate in this study. Please click "next" to consent and begin the survey.

1. Sex:
   - ○ M
   - ○ F

2. Estimated total flight hours in your main airframe:
   - ○ 50 to 200
   - ○ 201 to 500
   - ○ 501 to 800
   - ○ 801 to 1500
   - ○ 1501+

3. Please indicate your main airframe (select one) and what your main mission types have been from the lists below:

Only respond to your main airframe. Leave others blank. If there are multiple mission types, please add in options.

	H-60 Blackhawk	AH-64 Apache	H-47 Chinook	UH-72 Lakota	OH-58 Kiowa	MH-6 Little Bird	UH-1 Huey
Option One	--Please Sele	--Please	--Please S	--Please	--Pleas	--Plea	--Plea
Option Two	--Please Sele	--Please	--Please S	--Please	--Pleas	--Plea	--Plea
Option Three	--Please Sele	--Please	--Please S	--Please	--Pleas	--Plea	--Plea
Option Four	--Please Sele	--Please	--Please S	--Please	--Pleas	--Plea	--Plea
Option Five	--Please Sele	--Please	--Please S	--Please	--Pleas	--Plea	--Plea

4. Please select your track:

Select all that apply

- ☐ Aviation Safety Officer
- ☐ Instructor Pilot / Standardization Officer
- ☐ Aviation Mission Survivability Officer
- ☐ Maintenance Test Pilot
- ☐ N/A
- ☐ Other (fill in)

Combat Deployments

The following questions will be answered based on your experience during **combat deployment**.

Combat deployments include those meeting the criteria for SSI-MOHC ("combat patch"). They do not include Combat Training Centers, Multinational Readiness Centers.

Please use the following definitions to answer the questions.

Degraded visual field / environment (DVE): this includes factors such as nighttime or brownout/whiteout, cloud levels, and precipitation.
Fatigue: defined as extreme tiredness resulting from a lack of sleep (e.g., sleeping only a few hours each night over multiple days), mental exhaustion, physical exertion or illness.
Task Saturation: defined as too many tasks to complete with the time allotted.
Weather: this includes increased winds, precipitation, etc., this does **not** include weather causing reduced visibility, which is captured with degraded visual field/environment.
Communication: this includes communication disruptions or difficulties with ATC and within aircraft.

5. Please indicate how many combat deployments you have been on. **Only** consider deployments that included piloting your main airframe. If you select "n/a" please skip ahead to the non-combat deployment section starting on page 3.

- ○ N/A
- ○ 1
- ○ 2
- ○ 3
- ○ 4
- ○ 5
- ○ 6+

6. Thinking of your previous combat deployments, please rate how often you have experienced the following conditions and/or factors **when in flight (or executing a mission?)**.

	Not at all	Rarely	Sometimes	Often	Always
DVE	○	○	○	○	○
FATIGUE	○	○	○	○	○
BOREDOM:	○	○	○	○	○
TASK SATURATION:	○	○	○	○	○
WEATHER:	○	○	○	○	○
COMMUNICATION:	○	○	○	○	○

7. In the question below, please indicate how the previous factors impacted your ability to ***aviate*** and the degree to which it negatively affected that performance when in flight on a combat deployment.

Here, aviate refers to any activities required to keep the aircraft flying, such as maintaining desired altitude, airspeed and attitude, or executing specific flight maneuvers.

	DVE	Fatigue	Boredom	Task Saturation	Weather	Communication
This negatively affected my ability to AVIATE:	--Pl	--Please	--Please S	--Please Sel	--Please	--Please Select--

8. Please indicate specific aspects of ability to **aviate** that were negatively affected.

Please note, these items will be repeated separately for navigate and communicate.

9. In the question below, please indicate how the previous factors impacted your ability to ***navigate*** and the degree to which it negatively affected that performance when in flight on a combat deployment.

Here, navigate refers to activities needed to determine your current location, plan your route and ensure you're on the proper path for reaching your destination.

	DVE	Fatigue	Boredom	Task Saturation	Weather	Communication
This negatively affected my ability to NAVIGATE:	--Pl	--Please	--Please S	--Please Se	--Please	--Please Select--

10. Please indicate specific aspects of ability to **navigate** that were negatively affected.

11. In the question below, please indicate how the previous factors impacted your ability to ***communicate*** and the degree to which it negatively affected that performance when in flight on a combat deployment.

Here, communicate refers to relaying information to others (inside or outside own aircraft), and crew coordination.

	DVE	Fatigue	Boredom	Task Saturation	Weather	Communication
This negatively affected my ability to COMMUNICATE:	--P	--Pleas	--Please	--Please Se	--Please	--Please Select--

12. Please indicate specific aspects of ability to **communicate** that were negatively affected.

Non-Combat Deployments

The following questions will be answered based on your experience during **non-combat deployment**.

Non-combat deployments include operational or training rotations that do not meet SSI-MOHC criteria.

Please use the following definitions to answer the questions.

Degraded visual field / environment (DVE): this includes factors such as nighttime or brownout/whiteout, cloud levels, and precipitation.
Fatigue: defined as extreme tiredness resulting from a lack of sleep (e.g., sleeping only a few hours each night over multiple days), mental exhaustion, physical exertion or illness.
Task Saturation: defined as too many tasks to complete with the time allotted.
Weather: this includes increased winds, precipitation, etc., this does **not** include weather causing reduced visibility, which is captured with degraded visual field/environment.
Communication: this includes communication with ATC and within aircraft.

Combat Training Centers

The following questions will be answered based on your experience attending **combat training centers.**

Combat training center examples include JRTC, NTC, JPMRC, and JMRC.

Please use the following definitions to answer the questions.

Degraded visual field / environment (DVE): this includes factors such as nighttime or brownout/whiteout, cloud levels, and precipitation.
Fatigue: defined as extreme tiredness resulting from a lack of sleep (e.g., sleeping only a few hours each night over multiple days), mental exhaustion, physical exertion or illness.
Task Saturation: defined as too many tasks to complete with the time allotted.
Weather: this includes increased winds, precipitation, etc., this does **not** include weather causing reduced visibility, which is captured with degraded visual field/environment.
Communication: this includes communication with ATC and within aircraft.

Factors Impacting Female Aviators

The following items address topics that may be affecting female aviators. Please respond only if you are female.

Some of the response selections include reference to sexual and physical assault. If you or anyone you know has been the victim of sexual and/or physical assault, please contact the DoD Safe Helpline for assistance (1-877-995-5247). You can call or text this number 24/7.

30. Please identify which of these issues do you think would be **most important for current female aviators as a whole** from the list below. Select up to **3** topics.

- ☐ Genitourinary Health (e.g. urinary tract infection, vaginitis, tactical dehydration, in-flight urination)
- ☐ Sleep
- ☐ Behavioral Health
- ☐ Reproductive health and contraception
- ☐ Physical Assault
- ☐ Sexual Assault
- ☐ Pregnancy and peripartum health
- ☐ Access to Primary Care
- ☐ Female-specific anthropometric operational personal protective equipment (e.g. Improved Outer Tactical Vest (IOTV), Advanced Combat Helmet (ACH), Aviation Life Support Equipment (ALSE))
- ☐ Musculoskeletal Injury susceptibility

31. Please identify which of the Women's Health topic(s) affecting **female medical readiness in large-scale combat operations (LSCO) is most important to female aviators as a whole** from the list below. Select up to **3** topics.

- ☐ Genitourinary Health (e.g. urinary tract infection, vaginitis, tactical dehydration, in-flight urination)
- ☐ Sleep
- ☐ Behavioral Health
- ☐ Reproductive health and contraception
- ☐ Physical Assault
- ☐ Sexual Assault
- ☐ Pregnancy and peripartum health
- ☐ Access to Primary Care
- ☐ Female-specific anthropometric operational personal protective equipment (e.g. Improved Outer Tactical Vest (IOTV), Advanced Combat Helmet (ACH), Aviation Life Support Equipment (ALSE))
- ☐ Musculoskeletal Injury susceptibility

32. Please identify which **of the** Women's Health topic(s) yields the **most severe short-term outcomes impacting mission readiness for female aviators as a whole** from the list below. Select up to **3** topics.

- ☐ Genitourinary Health (e.g. urinary tract infection, vaginitis, tactical dehydration, in-flight urination)
- ☐ Sleep
- ☐ Behavioral Health
- ☐ Reproductive health and contraception
- ☐ Physical Assault
- ☐ Sexual Assault
- ☐ Pregnancy and peripartum health
- ☐ Access to Primary Care
- ☐ Female-specific anthropometric operational personal protective equipment (e.g. Improved Outer Tactical Vest (IOTV), Advanced Combat Helmet (ACH), Aviation Life Support Equipment (ALSE))
- ☐ Musculoskeletal Injury susceptibility

33. Please identify which of the Women's Health topic(s) yields the **most severe long-term condition resulting from a previous disease or injury that limits career longevity for female aviators as a whole** from the list below. Select up to **3** topics.

- ☐ Genitourinary Health (e.g. urinary tract infection, vaginitis, tactical dehydration, in-flight urination)
- ☐ Sleep
- ☐ Behavioral Health
- ☐ Reproductive health and contraception
- ☐ Physical Assault
- ☐ Sexual Assault
- ☐ Pregnancy and peripartum health
- ☐ Access to Primary Care
- ☐ Female-specific anthropometric operational personal protective equipment (e.g. Improved Outer Tactical Vest (IOTV), Advanced Combat Helmet (ACH), Aviation Life Support Equipment (ALSE))
- ☐ Musculoskeletal Injury susceptibility

34. Please provide any additional comments regarding urgent women's health topics. You may also reach out to the study investigator if you have additional information you would like to share (Dr. Katie Feltman, kathryn.a.feltman.civ@health.mil).

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