Afloat Surface Climate Assessment Survey FY23 Insights

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TABLE OF CONTENTS

TABLE OF CONTENTS II
LIST OF TABLES V
LIST OF FIGURES VI
1 INTRODUCTION 9
1.1 Executive Summary 9
2 SURVEY INSTRUMENT 10
2.1 Survey Overview 10
2.2 Survey Measures 10
2.2.1 Demographics 10
2.2.2 Organizational Climate Perception Measures 10
2.2.3 Safety-Related Measures 12
2.2.4 Human Performance Measures 13
2.2.5 Leader Perceptions of Subordinates 15
2.2.6 Open-Ended Comments 15
3 RESULTS 16
3.1 Introduction 16
3.2 SURFOR (Overall) 16
3.2.1 Demographics 16
3.2.2 Areas of Praise and Concern 18
3.2.3 Comparative Analysis by Demographics 19
3.2.4 Activity Analysis 21
3.2.5 FY22- FY23 Analysis 21
3.3 CNSP/CNSL Analysis 22
3.3.1 Areas of Praise and Concern 22
3.3.2 Constructs with Notable Differences in Means 23
3.3.3 Activity Analysis 23
3.3.4 FY22- FY23 Analysis 24
3.4 Ship-class Analysis 25
3.4.1 Areas of Praise and Concern 25
3.4.2 Comparative Analysis Of Ship-Classes 26
3.4.3 Breakdown of Sleep Factors 28
3.4.3.1 Sleep Factors of Highest Concern 28
3.4.3.2 Sleep Impairment and Sleep Disturbances 28
3.4.1 Activity Analysis 28
3.4.2 FY22- FY23 Analysis 29
3.5 Paygrade Analysis 30
3.5.1 Areas of Praise And Concern 31
3.5.2 Constructs with Notable Differences in Means 32

3.5.3 Comparative Analysis of Paygrades 34
3.5.4 Breakdown of Sleep Factors 36
3.5.4.1 Sleep Factors of Highest Concern 36
3.5.4.2 Sleep Constructs Of Highest Concern 37
3.5.5 Activity Analysis 38
3.5.6 FY22- FY23 Analysis 38
3.6 Department Analysis 40
3.6.1 Areas of Praise and Concern by Department 41
3.6.2 Constructs with Noticeable Differences in Means 42
3.6.3 Comparative analysis of Engineering/Non-Engineering 43
3.6.4 Breakdown of Sleep FactorS 44
3.6.4.1 Sleep Factors of Highest Concern 45
3.6.4.2 Sleep Disturbances and Sleep Impairments 45
3.6.5 Activity Analysis 46
3.6.6 FY22- FY23 Analysis 46
3.7 FDNF Analysis 47
3.7.1 Areas of Praise and concern by FDNF 47
3.7.2 Constructs with Noticeable Differences in Means 49
3.7.3 Comparative Analysis 50
3.7.4 Breakdown of Sleep Factors 52
3.7.4.1 Sleep Factors of Highest Concern 52
3.7.4.2 Sleep Disturbance and Sleep Impairments 52
3.7.5 Activity Analysis 53
3.7.6 FY22- FY23 Analysis 53
3.8 Fit/Fill Analysis 54
3.8.1 Summary 54
3.8.2 Fit Fill Ratios across platforms 54
3.8.3 Constructs with Notable Differences in Means 56
3.8.4 Comparative Analysis 57
3.8.5 Breakdown of Sleep Factors 59
3.8.5.1 Sleep Factors of Highest Concern 59
3.8.5.2 Sleep Disturbance and Sleep Impairment 59
3.8.6 Activity Analysis 60
3.9 OFRP Analysis 61
3.9.1 Constructs with Notable Differences in Means 61
3.10 CO Demographics Analysis 62
3.10.1 CO Race 62
4 SUMMARY OF ADVANCED ANALYTICS 64
4.1 Overview 64

4.2 FY23 Open Ended Comment Topics 64
4.2.1 Methodology 65
4.2.2 Results 65
4.2.2.1 CNSP (PAC)/CNSL (LANT) FY23 69
4.2.2.2 Officer/Enlisted FY23 70
4.2.2.3 Engineering/Non-Engineering FY23 70
4.2.3 Conclusion 70
4.2.4 Future Analysis 71
4.2.5 References 71
4.3 Sleep Analysis 71
4.3.1 Sleep At Home, Inport, and Underway 72
4.3.2 Sleep Deficit Construct Comparisons 77
4.3.2.1 Anxiety vs Sleep Deficit 77
4.3.2.2 Burnout vs Sleep Deficit 80
4.3.2.3 Job Stress vs Sleep Deficit 87
4.3.3 Sleep Analysis Conclusion 89
4.4 Correlations Between Diet and Exercise as Protective Factors in High Stress Individuals 90
4.4.1 High Anxiety Sleep Deficit Protective Factors 90
4.4.1.1 Diet On board for High Anxiety Individuals 90
4.4.1.2 Exercise availability on board for High Anxiety Individuals 91
4.4.1.3 High Anxiety Sleep Deficit Protective Factors Conclusion 92
4.4.2 Burnout Sleep Deficit Protective Factors 92
4.4.2.1 Diet On board for High Burnout Individuals 93
4.4.2.2 Exercise availability on board for High burnout Individuals 94
4.4.2.3 High Burnout Sleep Deficit Protective Factors Conclusion 95
4.4.3 Job Stress Sleep Deficit Protective Factors 95
4.4.3.1 Diet On board for High Job Stress Individuals 95
4.4.3.2 Exercise availability on board for High Job Stress Individuals 96
4.4.3.3 High Job Stress Sleep Deficit Protective Factors Conclusion 97
4.4.4 Protective Factors Conclusion 97
4.5 Stimulant Effect on Job Stress and Disrupted Sleep 97
4.5.1 High Dosage Caffeine usage in Navy Personnel 98
4.5.2 Caffeine use related to Job Stress and Disrupted Sleep 99
4.5.3 Conclusion 102
5 CONCLUSION 103
5.1 Summary 103
5.2 Next Steps 104

LIST OF TABLES

Table 1. Demographics of the ASCAS Respondents (SURFOR) 17
Table 2. Areas of Praise and Concern (SURFOR) 18
Table 3. CNSP/L Areas of Praise and Concern 22
Table 4. Constructs with Notable Differences in Means 23
Table 5. Number of Ships and Surveyed Sailors by Ship-class 25
Table 6. Ship-class Areas of Praise and Concern 25
Table 7. Average Time Spent on Work and Personal Duties by Ship-class 29
Table 8. Number of Respondents by Paygrade 30
Table 9. Number of Respondents by Aggregated Paygrade 30
Table 10. Constructs of Praise and Concern by Paygrade (Officer vs Enlisted) 31
Table 11. Constructs with Significant Differences in Means Based on Officer vs Enlisted 32
Table 12. Number of Respondents by Department 40
Table 13. Number of Respondents by Engineering vs Non-Engineering 40
Table 14. Areas of Praise and Concern by Engineering vs Non-Engineering Department 41
Table 15. Major Mean Differences by Engineering and Non-Engineering Departments 42
Table 16. Number of Ship and Responses by FDNF 47
Table 17. Areas of Praise and Concern by FDNF vs Non-FDNF 48
Table 18. Major Mean Differences between FDNF and Non-FDNF Platform 49
Table 19. Number of Ships and Responses by Fill Status 54
Table 20. Number of Ships and Responses by Fit Status 54
Table 21. Mean Differences between Below Fill and Above Fill Platforms 56
Table 22. Mean Differences between Below Fit and Above Fit Platforms 57
Table 23. Number of Ships and Responses by OFRP Phase 61
Table 24. Constructs with Significant Differences in Means Based on OFRP (Effect Size ≥0.25) 61
Table 25. Number of Crews and Responses by CO Race 62
Table 26: FY23 Repondents: Anxiety Question 1 78
Table 27: FY23 Respondents - Anxiety Question 2 78
Table 28: FY23 Respondents Burnout - Emotional Demands 80
Table 29: FY23 Respondents Burnout - Mental/Cognitive Demands 82
Table 30: FY23 Respondents Burnout - Physical Demands 84
Table 31: FY23 Respondents Burnout - Social Demands 85
Table 32: FY23 Respondents Job Stress Question 1 87
Table 33: FY23 Respondents Job Stress Question 2 88
Table 34: FY23 High Anxiety Respondents to Healthful Diet Onboard 91
Table 35: FY23 High Anxiety Respondents to Exercise Availability Onboard 92
Table 36: FY23 High Burnout Respondents to Healthful Diet Onboard 93
Table 37: FY23 High Burnout Respondents to Exercise Availability Onboard 94
Table 38: FY23 High Job Stress Respondents to Healthful Diet Onboard 96
Table 39: FY23 High Job Stress Respondents to Exercise Availability Onboard 97

LIST OF FIGURES

Figure 1. Mean Constructs of Interest by Age on Likert Scale Questions 20
Figure 2. Mean Constructs of Interest by Age (Reverse Encoded) 20
Figure 3. Mean Constructs of Interest by Age (Days Scale) 20
Figure 4. Mean Constructs of Interest by Age (Days Scale) 20
Figure 5. Average Hours Spent Per Activity Per Day (SURFOR) 21
Figure 6: FY22-FY23 SURFOR Significant Changes 22
Figure 7. Average Hours Spent Per Activity Per Day (CNSP/L) 24
Figure 8: FY22-FY23 SURFOR Significant Changes 24
Figure 9. Mean Constructs of Interest by Ship-class 26
Figure 10. Mean Constructs of Interest by Ship-class (Reverse Encoded) 27
Figure 11. Mean Constructs of Interest by Ship-class (Days Scale) 27
Figure 12. Mean Constructs of Interest by Ship-class (Days Scale) 27
Figure 13. Heatmap of Sleep Factors by Ship-class 28
Figure 14. Heatmap of Sleep Constructs by Ship-class 28
Figure 15. Average Hours Spent Per Activity Per Day (Ship-class) 29
Figure 16: FY22-FY23 Ship Class Significant Changes 30
Figure 17. Heatmap of Constructs by Paygrade 34
Figure 18. Mean Constructs of Interest by Paygrade 35
Figure 19. Mean Constructs of Interest by Paygrade (Days Scale) 35
Figure 20. Mean Constructs of Interest by Paygrade (Days Scale) 35
Figure 21. Heatmap of Sleep Factors by Paygrade 36
Figure 22. Heatmap of Sleep Constructs by Paygrade 37
Figure 23. Average Hours Spent Per Activity Per Day (Paygrade) 38
Figure 24: FY22-FY23 Officer/Enlisted Significant Changes 39
Figure 25. Mean Constructs of Interest by Ship Department 43
Figure 26. Mean Constructs of Interest by Ship Department 44
Figure 27. Mean Constructs of Interest by Ship Department (Days Scale) 44
Figure 28. Mean Constructs of Interest by Ship Department (Days Scale) 44
Figure 29. Sleep Factors by Ship Department 45
Figure 30. Sleep Constructs by Ship Department 45
Figure 31. Average Hours Spent Per Activity Per Day (Department) 46
Figure 32: FY22-FY23 Department Significant Changes 47
Figure 33. Mean Constructs of Interest by FDNF vs Non-FDNF 50
Figure 34. Mean Constructs of Interest by FDNF vs Non-FDNF 51
Figure 35. Mean Constructs of Interest by FDNF vs Non-FDNF (Days Scale) 51
Figure 36. Mean Constructs of Interest by FDNF vs Non-FDNF (Days Scale) 51
Figure 37. Sleep Factors by FDNF vs Non-FDNF 52
Figure 38. Sleep Constructs by FDNF vs Non-FDNF 52
Figure 39. Average Hours Spent Per Activity Per Day (Forward Deployed) 53
Figure 40: FY22-FY23 FDNF Significant Changes 54
Figure 41. FY23 Ship Fill Curve 55
Figure 42: FY23 Ship Fit Curve 55
Figure 43: FY23 Ship Fit/Fill Ratio Curve 56
Figure 44. Mean Constructs of Interest by Fit/Fill 58
Figure 45. Mean Constructs of Interest by Fit/Fill 58
Figure 46. Mean Constructs of Interest by Fit/Fill (Days Scale) 58
Figure 47. Mean Constructs of Interest by Fit/Fill (Days Scale, Reverse Encoded) 59
Figure 48. Sleep Factors by High and Low Fit and Fill 59
Figure 49. Sleep Factors by Fit/Fill 59
Figure 50. Average Hours Spent per Activity per Day (Fit) 60
Figure 51. Mean Constructs of Interest by CO Race 63
Figure 52. Mean Constructs of Interest by CO Race, Reverse Encoded 63
Figure 53. Mean Constructs of Interest by CO Race, Days Scale 63
Figure 54. Mean Constructs of Interest by CO Race (Days Scale) 63

Figure 55: Topic Analysis: Workplace Safety 66
Figure 56: Topic Analysis Food and Health 66
Figure 57: Topic Analysis Procedures and Training 66
Figure 58: Topic Analysis: Daily Activities 67
Figure 59: Topic Analysis: Safety 67
Figure 60: Topic Analysis: Safety Equipment 67
Figure 61: Topic Analysis: Sleep 68
Figure 62: Topic Analysis: Work Related Activities 68
Figure 63: Topic Analysis: Evolution, Safety Briefs 68
Figure 64: FY23 PAC/LANT Topic Frequency 69
Figure 65: FY23 Officers/Enlisted Topic Frequency 70
Figure 66: FY23 Engineering/Non-Engineering Topic Frequency 70
Figure 67: FY23 Sleep Comparison – Overall SURFOR 72
Figure 68: FY23 Sleep Deficits - Overall SURFOR 73
Figure 69: FY23 Sleep Comparison - Ship Class 73
Figure 70: FY23 Sleep Deficits - Ship Class 74
Figure 71: FY23 Sleep Comparison - Engineering/Non-Engineering 75
Figure 72: FY23 Sleep Deficits - Engineering/Non-Engineering 75
Figure 73: FY23 Sleep Comparison - Officer/Enlisted 76
Figure 74: FY23 Sleep Deficits - Officer/Enlisted 77
Figure 75: FY23 Anxiety Question 1 Sleep Deficits 78
Figure 76: FY23 Anxiety Question 2 Sleep Deficits 79
Figure 77: FY23 Anxiety Question 2 Average Sleep Obtained Metrics 80
Figure 78: FY23 Burnout Emotional Demands Sleep Deficits 81
Figure 79: FY23 Burnout Emotional Demands Sleep Obtained Metrics 81
Figure 80: FY23 Burnout Mental/Cognitive Demands Sleep Deficits 82
Figure 81: FY23 Burnout Mental/Cognitive Demands Sleep Obtained Metrics 83
Figure 82: FY23 Burnout Mental/Cognitive Demands Sleep Availability Metrics 83
Figure 83: FY23 Burnout Physical Demands Sleep Deficits 84
Figure 84: FY23 Burnout Physical Demands Sleep Obtained Metrics 85
Figure 85: FY23 Burnout Social Demands Sleep Deficits 86
Figure 86: FY23 Burnout Social Demands Sleep Obtained Metrics 86
Figure 87: FY23 Job Stress Question 1 Sleep Deficits 87
Figure 88: FY23 Job Stress Question 1 Sleep Obtained Metrics 88
Figure 89: FY23 Job Stress Question 2 Sleep Deficits 89
Figure 90: FY23 Job Stress Question 2 Sleep Obtained Metrics 89
Figure 91: Average Sleep Deficits for High Anxiety Individuals Protected by a Healthful Diet 91
Figure 92:Average Sleep Deficits for High Anxiety Individuals Protected by Time Provided for Exercise Onboard 92
Figure 93:Average Sleep Deficits for High Burnout Individuals Protected by Healthful Diet 93
Figure 94:Average Sleep Deficits for High Burnout Individuals Protected by Exercise Availability Onboard 94
Figure 95:Average Sleep Deficits for High Job Stress Individuals Protected by Healthful Diet Onboard 95
Figure 96:Average Sleep Deficits for High Job Stress Individuals Protected by Exercise Availability Onboard 96
Figure 97: Respondents by Caffeinated Consumables 98
Figure 98: Nicotine Usage in Energy Drink Consumers 98
Figure 99: Daily Reported Caffeine Consumables Intake by Energy Drink Consumption 99
Figure 100: Energy Drink Consumption Effect on Job Stress by Sleep Deficit Hours 100
Figure 101: Energy Drink Consumption and Job Stress 100
Figure 102: Energy Drink Consumption and Sleep Disturbances by Sleep Deficit Hours 101
Figure 103: Energy Drink Consumption and Having Problems with Sleep, by Sleep Deficit Hours 101

Figure 104: Energy Drink Consumption and Having Difficulty Falling Asleep by Sleep Deficit Hours *102*
Figure 105: Energy Drink Consumption and Having Trouble Staying Asleep by Sleep Deficit Hours *102*

1 INTRODUCTION

1.1 Executive Summary

The Afloat Surface Climate Assessment Survey (ASCAS) and the Operational Surface Risk Indicators (OSRI) efforts leverage systematic and evidence-based research practices to better understand organizational behavior outcomes (e.g., individual behavior, group dynamics, leadership/management, culture/climate, formal/informal structures, change management, human performance, and work-life balance). The desired end-state of these research efforts is to provide Surface Force leaders empirical data to make guided decisions to enhance Sailor health, well-being, and performance which in turn will improve overall organizational readiness.

Since its conception in the fall of 2020, the ASCAS has demonstrated its ability to empower leadership with valuable data to evaluate key facets of a command's climate. For this annual report, the respondents comprised 56 unique crews. Responses were aggregated with other TYCOM data and analyzed to provide additional insights. For the FY23 ASCAS additional constructs were added including Anxiety, Burnout, International Fitness Scale, Meaningful Work, Organizational Identity, Unit Cohesion (Department), and Midnight Rations.

The analyses identified areas of praise and concern, as well as distinctions amongst the various demographics. In the aggregate, notable findings include:

- **Areas of praise**: Leader Perceptions of Subordinates, Human Performance (Individuals, Departments and Command levels), Supervisor Safety Climate, and Personal Responsibility for Workplace Safety.
- **Areas of concern**: Job Stress, Job Demands, Exercise Onboard, Sleep Disturbances, Diet, and burnout.
- The differences between CNSP/L responses were negligible, which suggests that there are no significant differences between the two.
- Sailors aligned to LCSs tended to respond more favorably to the state of the command than Sailors aligned to CRUDES or Amphibs.
- Enlisted Sailors, particularly Junior Sailors and Petty Officers, responded less favorably to nearly every construct when compared to Chiefs and Officers/CWOs.
- Uncomfortable Sleeping environment (hard mattress, issued pillow, rack width) and heavy workloads had the largest negative impact on Sailor sleep.

Note, more in-depth analyses, to include longitudinal, will be conducted with these data as to garner additional insights.

All ASCAS data are stored in the DoN's enterprise data environment, Jupiter (https://jupiter.data.mil). Included in the Jupiter environment are multiple, robust dashboards outlining up to date results from the latest ASCAS survey results. These dashboards provide interested parties with easily navigable insights regarding shipboard climate and can highlight areas of concern for platforms.

2 SURVEY INSTRUMENT

2.1 Survey Overview

Survey completion was voluntary and all responses are anonymous. Crews were asked to complete the ASCAS during RE-1 and RE-5. The ASCAS draws from multiple scientifically validated psychometric assessments (aka, constructs) from the safety science, psychological, organizational behavior, and human performance literature. The survey constructs are generally comprised of several individual questions (aka, construct items); for example, the *Unit Cohesion* construct comprises three individual questions (i.e., Can the members of the unit depend on one another? Are they able to cooperate? Do they stand up for each other?). This multi-item approach to measurement enhances the reliability of the measures (i.e., the consistency of responses across different forms of the same construct) and their content validity (i.e., the extent to which the items faithfully capture the content of the latent construct). When reported, the individual items that constitute the representation of a latent construct are aggregated to produce a single score (the arithmetic mean).

2.2 Survey Measures

2.2.1 DEMOGRAPHICS

Demographic information gathered by the ASCAS included paygrade (Junior Sailors, Petty Officers, Chiefs, and Officers/CWOs), age range (17-21, 22-25, 26-30, 31-35, 36-40, 41-45, 46-50, 51-55, and 55-60+), departmental assignment (Admin, AIMD, Air, Combat Systems, Deck, Engineering, Medical/Dental, Operations, Safety, Supply, Training/Plans & Tactics, and Weapons), and Ship-classes (LHD, LHA, LPD, LSD, LCC, CG, DDG, LCS Freedom, LCS Independence, and MCM). Note that more specific categories were not used as to help better ensure anonymity among small, unique groups (e.g., to protect the only female CWO in Engineering). Also note that several demographic cohorts are grouped into categories to address concerns related to these specific cohorts or groups of cohorts (e.g., Engineering/Non-Engineering, Officer/Enlisted, etc.).

2.2.2 ORGANIZATIONAL CLIMATE PERCEPTION MEASURES

The primary measures have been validated in peer-reviewed scientific publications and relate directly to operational safety and human performance outcomes. These measures, and brief explanations for their use, include:

Anxiety. Elevated anxiety levels within individuals can have cognitive and physical consequences on wellbeing; for example, high anxiety has been shown to potentially increase brain production of stress hormones including cortisol and adrenaline. This in turn can affect sleep cycles, increase frequency and intensity of headaches dizziness and depression and increase potential for weight gain. Respondents are asked to rate their Anxiety.

Burnout. Studies have shown that burnout as a state of emotional exhaustion, physical fatigue, and cognitive weariness cause by long term uncontrolled and unresolved work stressors or other personal or environmental stressors may be at an increased risk of depression. Respondents are asked to rate their burnout as related to physical, emotional, mental/cognitive, and social burnout.

Unit Cohesion. Previous military studies have found that unit cohesion can impact the resilience and well-being of personnel. While the word "unit" implies a larger command structure in the military context, a unit in the truest sense reflects a composition of two or more people. Respondents are asked to rate their perceptions of their department. Note, this construct was updated from FY22 which directed Unit Cohesion to Watch Team and Work Center.

Leadership Assessment. Numerous studies have demonstrated that perceptions of unit leadership impact morale, performance, and health outcomes. Consistent with those studies, respondents are asked to rate their perceptions of unit leadership.

Job Stress. Chronic stress carries with it far-reaching interrelated negative consequences; for example, chronic stress reduces impairs slow-wave sleep (i.e., the only time when the blood-brain barrier increases in permeability and the brain glymphatic system removes metabolic waste products accumulated during normal activity). This in turn affects cognitive processes that undermine one's ability to make higher-level decisions (e.g., the capacity to make risk decisions) and negatively affects mood. Respondents are asked to rate their perceptions of job stress.

Affective Commitment. An employee's emotional attachment to, identification with, and involvement in an organization reflects their affective commitment to the organization, which in turn has implications for an organization's success.

Social Support. In general terms, social support reflects the degree to which one has people available whom they can rely upon to provide help or counsel. A lack of social support is associated with poor mental and physical health outcomes as well as decreased worker performance.

Team Process. An overall team process is defined as "…interdependent acts that convert inputs to outcomes through cognitive, verbal, and behavioral activities directed toward organizing taskwork to achieve collective goals. Centrally, team process involves members interacting with other members and their task. They are the means by which members work interdependently to use various resources such as expertise, equipment, money, to yield meaningful outcomes (e.g., product development, rate of work, team commitment, and satisfaction)." The team process measure comprises *transition*, *action*, and *interpersonal* subprocesses. Transition processes occur prior to or between performance episodes and have a dual focus whereby members reflect on and interpret previous accomplishments as well as prepare for future actions. Action processes describe the behaviors that members engage in while working toward goal accomplishment. Interpersonal processes focus on the personal relationships between members.

Meaningful Work. Studies have shown that meaningful work can have a mediating effect between negative work conditions and turnover intention within an organization. Meaningful work is often associated with purpose and reason for living. Respondents are asked to rate their perceptions of their works purpose, job enjoyment, and their enthusiasm about their job.

Crew Resilience. Crew resilience reflects their ability to adapt to both incremental changes and sudden disruptions in order to satisfy operational demands. This ability is paramount for high-risk organizations.

2.2.3 SAFETY-RELATED MEASURES

Error Management. The error management construct rests, in part, on the assumption that human errors can never be entirely prevented and therefore focuses on how to mitigate the consequences of errors that have occurred. Whereas error prevention seeks to avoid errors altogether, error management focuses on reducing negative error consequences and amplifying positive consequences (e.g., using the incident as a teaching moment). In sum, error management ensures that errors are quickly reported, negative error consequences are effectively minimized, and that organizational learning transpires.

Firefighting Knowledge. An increase level of firefighting knowledge aboard ships has been shown to increase effectiveness of firefighting activities and a decreased response time in fire mitigation strategies and practices. Respondents are asked to rate their confidence in their ability to effectively conduct major shipboard firefighting and damage control tasks based on their current relevant firefighting/damage control knowledge.

No-blame Error Reporting. Known issues and mistakes often do not get reported for fear of reprisals. As such, minor issues requiring relatively simple fixes can manifest into major mishaps. A no-blame error reporting atmosphere mediates the relationship between safety climate and negative (e.g., unplanned maintenance) or positive (e.g., improved error detection through proactive crew involvement) outcomes.

Psychological Safety. The concept of psychological safety describes one's perception of the consequences associated with taking interpersonal risks (e.g., voicing a concern, sharing an opinion, submitting a recommendation, taking preemptive action). A large body of scientific research has demonstrated that increased psychological safety enhances a worker's willingness to communicate concerns, or promote organizational knowledge acquisition, employee well-being, and overall performance.

Caring. Research concerning organizational climate has repeatedly demonstrated that distinctive group-level climates emerge within organizations and locally influence performance outcomes (e.g., work quality, safety behaviors); for example, an officer who directs Sailors to disregard certain safety procedures whenever their department falls behind schedule creates a distinction between Navy procedures and subordinate group-level practices. This behavior creates the potential for distinctive climates in an organization. Additionally, workers tend to perform better and experience more positive mental and physical health outcomes when they feel that their organization cares about them. Within the military context, various organization levels can influence Sailor perceptions of care. Respondents thus are asked to rate the degree to which they perceived that the Navy, their command, their department, and their direct supervisor care about their health, safety, and well-being.

Command Safety Practices. Perceptions of a unit's safety practices play a key role in group members' behaviors and operational safety outcomes. For example, research in the commercial maritime sector found that worker's positive perceptions of management safety practices are associated with lower accident and crew fatality rates.

Noncompliance. Willful noncompliance with instructions or directions is a complex phenomenon that can lead to grave consequences. Assessing the frequency of noncompliance behaviors and attitudes in a unit is therefore critical to avoiding mishaps, as is examining precipitating or co-occurring circumstances.

Satisfaction. A worker's satisfaction with workplace safety practices/policies is positively associated with an organization's overall safety climate, which in turn increases commitment to organizational safety policies and reduces mishaps/accidents.

Personal Responsibility for Workplace Safety. When workers feel a lack of ownership in regard to their work environment, it can result in underappreciating the important role that they personally play in the organization's successes and failures.

Safety Communication. One of the most effective ways to promote a positive safety climate and mitigate negative outcomes is to ensure that safety-related communications across the entire organization are easily facilitated. Additionally, it is important to recognize that each Sailor has a different style of communication (e.g., passive, aggressive, passive-aggressive, assertive).

Job Demands. Workplace job demands present individuals with a number of potential stressors of varying severity. Excessive job demands can exhaust a Sailor's mental and physical resources, ultimately undermining their personal performance as well as that of the entire command.

Job Resources. Worker positive perceptions of available job resources help them properly conduct their duties as well as offset workplace pressures, both mentally and physically. Positive perceptions of job resources also promote active Sailor workplace engagement and general job satisfaction.

Safety Issue Under-Reporting. In both civilian and military sectors, potential safety issues and accidents are often not reported. To assess if potential safety issues are under-reported, respondents are asked to indicate the number of times (1) they reported a safety issue to their supervisor, (2) a safety issue went unreported to their supervisor, and (3) they experienced or witnessed a near-miss.

2.2.4 HUMAN PERFORMANCE MEASURES

Sleep Hours. Problematic sleep impacts human performance by way of functional impairment and can lead to the onset of numerous mental and physical health issues. Respondents are asked to indicate the number of sleep hours available onboard, number of sleep hours required to feel well-rested, and the number of sleep hours generally obtained onboard and at home.

Naps. There is strong evidence in the scientific literature that naps, defined as a sleep episode less than 30 minutes in duration, promote human performance outcomes (e.g., alertness and cognitive processes). Respondents are asked to indicate how many days per week they take naps, the average duration of their naps, and how well-rested they feel following their naps both while onboard the ship and at home.

Sleep Disturbance. Although the amount of sleep obtained each day is important, so is the quality of the sleep. Generally speaking, good quality sleep means that one typically falls asleep within 30 minutes, sleeps soundly with minimal awakenings, and drifts back to sleep within a few minutes if awakened. Poor quality sleep entails having trouble falling asleep, trouble staying asleep, restlessness, and early terminal awakening (awakening before desired wake time).

Sleep Functional Impairment. Respondents are asked to rate how much sleepiness or fatigue affects their duties or ability to function, as well as falling asleep while on duty.

Sleep Factors. General shipboard environmental factors known to negatively impact sleep (i.e., Ambient Noise, 1MC Announcements, Crew Mate Noise, Uncomfortable Mattress, Temperature, Invasive Lighting, Workload, Meetings, Inspections, Drills, Rack Design) are assessed.

Daily Activities. To account for how personnel allocate their wake-time while onboard, respondents are asked to report how they spend their time per day across eight areas (Work Center Duties, Watch Team Duties, Completing Personnel Qualification Standards, Attending Meetings, Exercising Socializing, Personal Time, and Other).

General Health. Respondents are asked to rate their overall health on a Likert-like scale. Additionally, respondents are asked to indicate how many days their mental and physical health was not good in the past 30 days.

Physical Fitness Activity. Physical fitness activity provides a number of benefits beyond simply enhancing one's ability to pass a PFT. Physical activity affects brain plasticity and improves cognitive performance (e.g., visual pattern recognition), locomotion (e.g., balance), and functions as a mood enhancer. Conversely, a notable decrease in physical activity is a possible indicator of depression. To assess shipboard physical activity, respondents are asked to indicate how many days per week they got vigorous/high-intensity exercise (i.e., experience increased heart rate, breathing rate, sweating, and muscle fatigue) while underway and in-port. Respondents are asked to rate the adequacy of the shipboard fitness facilities/equipment and time allotted to exercise. Additionally, respondents indicate whether command PT is required as a means to gauge the command's commitment to physical fitness.

IFS (International Fitness Scale). The International Fitness Scale gives a measure of fitness based on the answers to basic questions about fitness focused on general physical fitness, cardiorespiratory fitness, muscular strength, speed/agility, and flexibility. Respondents are asked to rate their fitness in each of these categories.

General Diet. Proper nutrition is a key component to maximize human performance, weight management (via energy balance), and improve overall health by reducing disease susceptibility. In relation to human performance, one's diet influences sleep quality, general energy levels, and human performance by way of macro and micro-nutrient composition. Respondents are asked to indicate the healthfulness (i.e., nutrition and proper serving sizes) of their overall diet while both at home and afloat.

Caffeine Use. While caffeine can enhance some aspects of human performance, it is a psychoactive drug that can negatively affect cognitive function and undermine performance. Excessive caffeine consumption has become an area of concern in both the general and military populations with the rapid expansion of energy drinks, supplements, and stimulants in the marketplace, to include ship stores. Generally speaking, consumption of approximately 400 milligrams of caffeine (about four 8-ounce cups of standard brewed coffee) per day appears to be safe for most healthy adults, while 250 milligrams of caffeine per day is considered moderate usage and 500 milligrams is considered excessive usage. Concerning ingredients and sugar content aside, the mass consumption of energy drinks/shots is presenting new concerns as the amount of caffeine per serving size ranges from 35 to >300 milligrams. Energy drink/shot consumption cannot only disrupt sleep, but also cause cardiovascular system, neurological, gastrointestinal, renal, and endocrine system problems. Caffeine can adversely impact general crew performance by disrupting their circadian cycle as it blocks sleep-inducing chemicals in the brain and increases adrenaline production. This, in turn, destabilizes cognitive, emotional, and behavioral processes. Respondents are asked how many times per day they consume various sources of caffeine.

Nicotine Usage. Nicotine is a stimulant that can disrupt circadian cycles. Additionally, most nicotine delivery systems, whether an e-cigarette or traditional cigarette, expose the user to harmful chemicals. Smoking is also associated with an increased prevalence of sleep-related respiratory disorders, which further undermines sleep quality and causes daytime sleepiness. Respondents are asked how many times per day they consume various sources of nicotine.

Midnight Rations. Midnight rations are an established navy tradition of providing food for those working late into the night outside of typical mealtimes at or around midnight. As some Sailors frequently are working outside of a typical circadian rhythm, midnight rations provide an additional and important source of nutrition. Similar to General Diet, Proper nutrition is a key component to maximize human performance, weight management (via energy balance), and improve overall health by reducing disease susceptibility. In relation to human performance, one's diet influences sleep quality, general energy levels, and human performance by way of macro and micro-nutrient composition. Respondents are asked to indicate the healthfulness (i.e., nutrition and proper serving sizes) their experience has been with midnight rations while onboard their current ship.

2.2.5 LEADER PERCEPTIONS OF SUBORDINATES

Procedural Compliance. Although COs are generally responsible for organizational outcomes, subordinates also carry a share of the responsibility. Unfortunately, DoD assessment tools such as the DEOCS, often solely focus on COs. To provide a new perspective, an established measure is used to assess leader perceptions of subordinates (i.e., those who supervise at least 2 Sailors) with respect to workplace compliance, risk management, and general safety behaviors.

2.2.6 OPEN-ENDED COMMENTS

Respondents were given the opportunity to share any thoughts that they might have concerning safety-related issues (e.g., methods to improve workplace safety or current safety-related issues), best and worst safety practices, and/or human performance issues (e.g., sleep, exercise, and nutrition).

3 RESULTS

3.1 Introduction

This report used advanced exploratory data analysis techniques to evaluate survey results. Descriptive statistics, including means and frequency tables, were also applied. Analysis of variance (ANOVA) techniques were used to compare mean differences in groups across continuous variables such as age. Categorical variables include paygrade, ship department, and ship type. Group means and differences in means are provided, along with standardized mean differences as a measure of the size of an effect (a difference in means rescaled by pooled variance; i.e., Cohen's *d*). While there is no definitive cutoff for interpreting Cohen's *d*, benchmarks often used include 0.2, 0.5, and 0.8 as small, medium, and large effects, respectively. Large sample sizes, such as those herein, can produce statistically significant outcomes, even for trivial differences in size. Thus, any use of a *p*-value alone should be interpreted with caution and combined with measures of effect size such as Cohen's *d*.

3.2 SURFOR (Overall)

A total of 56 crews completed the ASCAS in FY23. Although the ASCAS is a mandatory crew requirement, completion of the survey by crewmembers is completely voluntary. Of 12,504 Sailors invited to complete the ASCAS, 5,396 opted to complete it, garnering a 43.15% completion rate.

Those who elected to opt-out of the survey chose the following reasons as to why they did not want to partake:

1) I do not feel that the survey results will change anything (n = 2901; 40.8%);

2) I do not have the time to complete the survey (n = 1559; 21.9%);

3) I simply do not care (n = 2108; 29.7%);

4) I do not believe my identity will be protected (n = 1053; 14.8%); and

5) The ship's internet connection is too bad/slow (n = 1770; 24.9%).

3.2.1 DEMOGRAPHICS

Demographics of the sample are provided in Table 1, which includes counts of participants based on gender, race, age, paygrade, department, and ship-class to which they are assigned.

Table 1. Demographics of the ASCAS Respondents (SURFOR)

	CNSF	%	CNSP	%	CNSL	%
Gender						
Female	1107	20.62%	696	20.63%	411	20.61%
Male	4261	79.38%	2678	79.37%	1583	79.39%
Age						
17-21	714	13.29%	485	14.36%	229	11.47%
22-25	1454	27.06%	880	26.06%	574	28.76%
26-30	1090	20.29%	714	21.14%	376	18.84%
31-35	1041	19.37%	649	19.22%	392	19.64%
36-40	698	12.99%	421	12.47%	277	13.88%
41-45	282	5.25%	168	4.97%	114	5.71%
46-50	68	1.27%	43	1.27%	25	1.25%
51-55	21	0.39%	13	0.38%	8	0.40%
56-60>	5	0.09%	4	0.12%	1	0.05%
Race						
Non-white	2420	45.98%	1614	48.70%	806	41.35%
White	2843	54.02%	1700	51.30%	1143	58.65%
Paygrade						
Junior Sailors (E1-E3)	644	11.97%	432	12.77%	212	10.62%
Petty Officers (E4-E6)	3157	58.68%	1994	58.92%	1163	58.27%
Chiefs (E7-E9)	665	12.36%	412	12.17%	253	12.68%
Officer/CWO	914	16.99%	546	16.13%	368	18.44%
Ship Department						
Admin	347	6.51%	219	6.54%	128	6.46%
AIMD	87	1.63%	45	1.34%	42	2.12%
Air	173	3.25%	112	3.34%	61	3.08%
Combat Systems	1037	19.46%	642	19.16%	395	19.95%
Deck	217	4.07%	122	3.64%	95	4.80%
Engineering	1162	21.80%	763	22.78%	399	20.15%
Medical/Dental	130	2.44%	68	2.03%	62	3.13%
Operations	841	15.78%	503	15.01%	338	17.07%
Safety	14	0.26%	11	0.33%	3	0.15%
Supply	528	9.91%	346	10.33%	182	9.19%
Training / Plans & Tactics	109	2.05%	76	2.27%	33	1.67%
Weapons	685	12.85%	443	13.22%	242	12.22%
Ship-class						
Amphib (LHD, LHA, LPD, LSD, LCC)	1276	23.65%	763	22.51%	513	25.56%
CRUDES (DDG, CG)	3595	66.62%	2355	69.49%	1240	61.78%
LCS (Free, Ind)	357	6.62%	197	5.81%	160	7.97%
MCM	168	3.11%	74	2.18%	94	4.68%

Most respondents were male (79.38%), and the majority (80.01%) were younger than age 35. In terms of racial makeup, 54.02% of the respondents self-reported as White, with the remainder being categorized as Non-White. The most frequent rank was Petty Officer (58.68%). The most prevalent departments represented in survey responses are Engineering (21.80%), Combat Systems (19.46%) and Operations (15.78%). In terms of ship cases, the majority of responses were from Sailors aboard CRUDES (66.62%). The demographics of the respondents are reflective of the overall SURFOR demographics.

3.2.2 AREAS OF PRAISE AND CONCERN

Across all FY23 SURFOR ASCAS responses, which survey constructs scored highly and which scored poorly? Respondents were asked to rate their perceptions on a 5-point Likert-scale, with 1 being an unfavorable response and 5 being a favorable response. *However, in some instances, questions were reverse encoded so that 1 indicated a favorable response. Those constructs are denoted with an asterisk (*) in subsequent tables.* Areas of praise include constructs that reflect overall favorable responses. Areas of concern indicate negative overall responses. Table 2 identifies high and low scoring constructs for all survey respondents.

Table 2. Areas of Praise and Concern (SURFOR)

Item	Mean (Likert 1-5)
Leadership Assessment of Subordinates	4.18
Crew Performance: I performed well.	3.80
Crew Performance: My department performed well.	3.77
Supervisor Safety Climate	3.64
Personal Responsibility for Workplace Safety	3.59
Sleep Factors*	2.45
International Fitness Scale: General physical fitness.	3.55
Command Safety Practices	3.53
Crew Performance: The command overall performed well.	3.53
Job Resources: Equipment	3.49
Exercise Onboard	2.84
Anxiety*	3.21
Affective Commitment	2.75
Burnout	2.74
Diet	2.66
Sleep Disturbances*	3.37
Exercise Onboard: Time provided to exercise.	2.59
Job Demands*	3.43
Job Stress*	3.72
Midnight Rations	2.06

Notes:
1. For the table above, higher scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange.
*2. * For these questions lower scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange.*

Overall, Sailors responded more favorably towards questions referring to Leader Perception of Subordinates, Crew Performance, Supervisor Safety Climate, Personal Responsibility for Workplace Safety, General Physical Fitness, Sleep Factors, and Job Resources (Equipment). Survey constructs that scored unfavorably included Exercise Onboard (Time Provided to Exercise), Anxiety, Affective Commitment, Burnout, Diet, Sleep Disturbances, Job Demands, Job Stress and Midnight Rations.

3.2.3 COMPARATIVE ANALYSIS BY DEMOGRAPHICS

While the section above details high and low scoring constructs, the heatmaps below detail average scores across all of the constructs. Each row represents a survey construct. Each column represents a different subgroup. Here, each column reflects mean responses for the various age groups. Due to differences in survey metrics (some questions are reverse encoded, some are days rather than Likert-scale), four heatmaps are included. For all figures, less favorable responses are colored orange and more favorable responses are colored blue.

Construct/Survey Item	17-21	22-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60>
Leadership Assessment of Subordinates	4.02	4.09	4.13	4.20	4.27	4.34	4.41	4.18	4.10
Crew Performance: I performed well.	3.78	3.74	3.79	3.83	3.87	3.85	4.08	3.62	4.50
Crew Performance: My department performed well.	3.68	3.64	3.70	3.85	3.98	4.03	4.23	3.90	4.00
International Fitness Scale: General physical fitness.	3.48	3.55	3.56	3.57	3.49	3.66	3.76	3.62	4.00
Supervisor Safety Climate	3.48	3.52	3.59	3.70	3.87	3.89	4.18	3.86	4.45
International Fitness Scale: Speed/agility	3.44	3.48	3.47	3.54	3.40	3.55	3.56	3.52	3.25
International Fitness Scale	3.37	3.43	3.44	3.49	3.40	3.57	3.60	3.50	3.65
Command Safety Practices	3.38	3.41	3.51	3.58	3.75	3.77	4.03	3.82	3.55
Crew Performance: The command overall performed well.	3.41	3.40	3.43	3.59	3.79	3.88	4.06	3.71	3.25
Job Resources: Equipment	3.42	3.39	3.47	3.52	3.60	3.71	3.98	3.62	3.10
Firefighting/Damage Control Knowledge	3.32	3.35	3.44	3.57	3.60	3.73	3.85	3.86	3.75
Job Resources	3.38	3.35	3.43	3.49	3.59	3.70	3.92	3.56	3.00
International Fitness Scale: Flexibility	3.32	3.34	3.33	3.38	3.31	3.53	3.65	3.29	3.75
Job Resources: Training	3.36	3.33	3.41	3.47	3.58	3.69	3.88	3.52	2.93
Personal Responsibility for Workplace Safety	3.19	3.32	3.54	3.80	3.96	4.15	4.24	4.17	3.00
International Fitness Scale: Cardio fitness	3.21	3.31	3.33	3.39	3.30	3.48	3.43	3.43	3.50
Error Management	3.31	3.28	3.38	3.48	3.64	3.73	3.96	3.76	3.80
Safety Satisfaction	3.31	3.25	3.38	3.58	3.76	3.78	4.16	3.88	3.10
Unit Cohesion Department	3.22	3.23	3.36	3.51	3.64	3.77	4.08	3.73	2.75
Safety Communication	3.23	3.20	3.33	3.44	3.65	3.69	4.00	3.76	2.73
Social Support	3.24	3.15	3.22	3.28	3.47	3.58	3.76	3.63	2.20
Crew Resilience	3.18	3.11	3.13	3.28	3.38	3.50	3.69	3.49	3.67
Meaningful Work	3.19	3.09	3.26	3.42	3.61	3.82	4.11	3.88	3.50
Exercise Onboard: Shipboard exercise facilities	3.05	3.07	2.97	3.10	3.13	3.12	3.62	3.65	2.60
Organizational Identity (Navy)	3.08	3.01	3.29	3.55	3.78	4.06	4.33	4.12	3.50
Team Processes: Transition Processes	3.05	2.98	3.04	3.15	3.28	3.38	3.73	3.37	3.07
Leader Assessment	3.01	2.98	3.03	3.08	3.15	3.20	3.34	3.22	3.13
Command Satisfaction	2.96	2.90	3.10	3.32	3.47	3.66	4.11	3.83	3.10
Overall Health	2.92	2.88	2.88	2.93	2.92	3.01	3.11	2.95	3.00
Team Processes: Action Processes	2.97	2.88	2.93	3.02	3.18	3.28	3.60	3.28	3.12
Team Processes	2.96	2.88	2.94	3.06	3.22	3.32	3.66	3.32	3.05
Psychological Safety	2.83	2.83	2.92	3.13	3.26	3.38	3.75	3.43	2.85
Organizational Identity (Command)	2.83	2.79	2.97	3.18	3.41	3.60	4.10	3.60	3.50
Exercise Onboard	2.82	2.77	2.74	2.87	2.93	3.04	3.38	3.50	2.60
Team Processes: Interpersonal Processes	2.84	2.77	2.85	3.02	3.21	3.32	3.70	3.35	2.93
No Blame Error Reporting	2.74	2.69	2.78	3.00	3.13	3.25	3.62	3.30	3.07

Burnout	2.80	2.68	2.67	2.75	2.81	2.82	3.09	3.07	2.75
Diet	2.60	2.58	2.62	2.71	2.77	2.84	2.99	2.85	2.30
Affective Commitment	2.54	2.50	2.64	2.86	3.10	3.31	3.85	3.43	2.73
Exercise Onboard: Time provided to exercise.	2.59	2.47	2.51	2.63	2.73	2.96	3.14	3.42	2.60
Midnight Rations	2.21	2.06	1.98	1.98	2.16	1.99	2.34	1.57	1.67

Figure 1. Mean Constructs of Interest by Age on Likert Scale Questions

Of note, younger Sailors tended to respond less favorably than older Sailors. This is particularly evident within the Affect Commitment, Exercise Onboard, No Blame Error Reporting, and Team Processes constructs. It should be noted that very few sailors reported ages 50+ so these values should be cautiously used. Additionally, Officers tend to be older than their enlisted counterparts which may account for some of the seen differences in constructs.

Construct/Survey Item	17-21	22-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60>
Job Stress*	3.43	3.65	3.77	3.86	3.84	3.75	3.77	3.64	3.20
Job Demands*	3.19	3.41	3.47	3.56	3.45	3.45	3.25	3.12	3.65
Sleep Disturbances*	3.20	3.40	3.43	3.38	3.43	3.40	3.14	3.13	2.20
Anxiety*	3.20	3.35	3.27	3.17	3.05	3.00	2.70	2.67	2.13
Safety Reporting Behavior*	3.11	3.11	3.02	2.94	2.80	2.72	2.37	2.70	2.53
Sleep Impairment*	2.82	3.07	3.02	2.97	2.84	2.76	2.61	2.60	3.00
Non-Compliance (Command)*	2.83	2.94	2.93	2.85	2.75	2.87	2.48	2.32	3.00
Non-Compliance (Individual)*	2.91	2.85	2.73	2.51	2.44	2.21	2.04	2.29	2.70
Sleep Factors*	2.43	2.52	2.52	2.40	2.40	2.34	2.06	2.23	2.56

**For these questions lower scores represent a more favorable response.*

Figure 2. Mean Constructs of Interest by Age (Reverse Encoded)

The same trend (i.e., older Sailors responding more favorably) is evident with reverse encoded constructs. Of note, Sailors aged 46-55 reported more favorably than younger sailors on Anxiety but less favorably on Job Stress.

Construct/Survey Item	17-21	22-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60>
Exercise: Inport	3.69	3.74	3.49	3.24	3.09	3.06	3.36	3.63	3.60
Exercise: Underway	3.11	3.17	2.87	2.68	2.73	2.56	2.59	2.75	3.20
Nap Days: at HOME while Inport.	1.65	1.61	1.48	1.30	1.16	1.08	1.27	1.00	0.20
Nap Days: onboard your current ship while INPORT.	1.24	1.10	0.89	0.80	0.70	0.63	0.46	0.29	0.20
Nap Days: onboard your current ship while UNDERWAY.	1.78	1.77	1.65	1.41	1.26	1.25	1.38	0.85	0.40

Figure 3. Mean Constructs of Interest by Age (Days Scale)

Figure 3 showcases mean responses by age for questions related to Naps and Exercise days. Specifically, they were asked how many days on average per week they engage in exercise and naps. Younger Sailors (17-35) tend to exercise more frequently than older Sailors. The number of days that Sailors nap tends to decrease as Sailor's age.

Construct/Survey Item	17-21	22-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60>
Mental Health*	9.95	12.44	11.74	10.56	9.51	8.97	6.68	7.19	4.40
Physical Health*	4.50	6.27	7.03	6.37	6.93	6.81	5.00	7.24	3.60

**For these questions lower scores represent a more favorable response.*

Figure 4. Mean Constructs of Interest by Age (Days Scale)

These survey questions examine how many days in the past 30 days Sailors' mental and physical health were not good. A higher number denotes a less favorable response. Younger Sailors tend to report more days of poor mental health. Younger Sailors tend to report fewer days of poor physical health.

3.2.4 ACTIVITY ANALYSIS

A portion of the ASCAS focuses on how Sailors spend their time daily. Figure 5 shows the average lengths of time individuals report working in the following areas: Work center duties, Watch Team duties, collateral duties, completing personnel qualification standards, and attending meetings. Please note this analysis does not include time dedicated to sleeping, but it does, by extension, drive the amount of time left each day for sleeping.

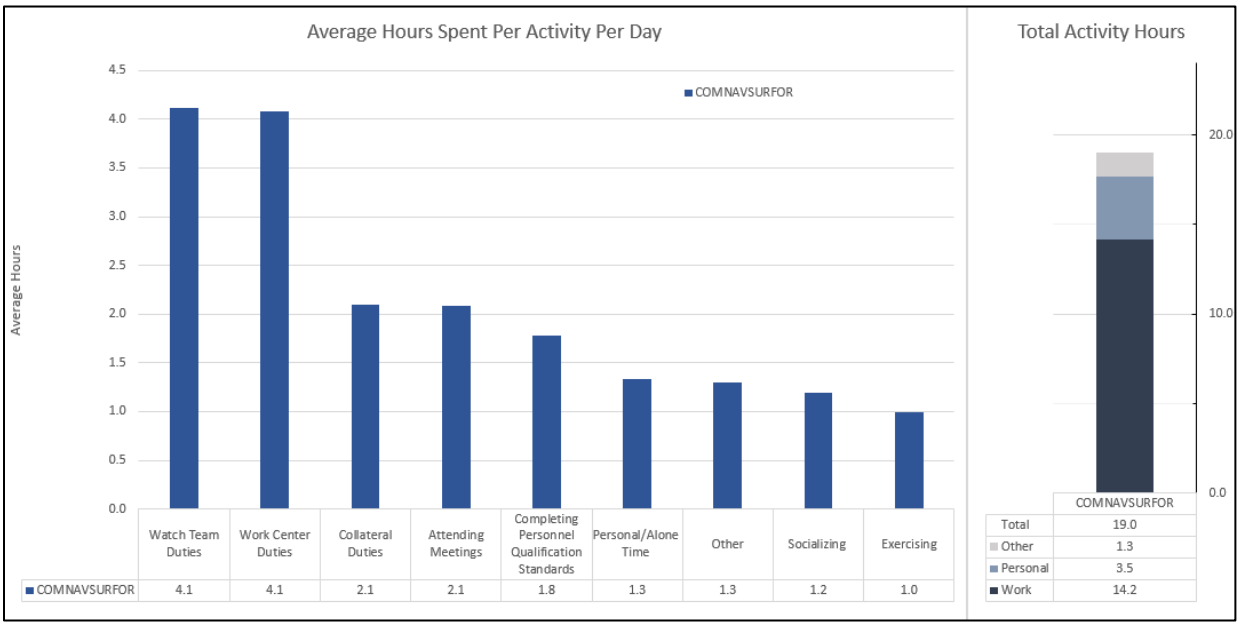


Figure 5. Average Hours Spent Per Activity Per Day (SURFOR)

As indicated in Figure 5, respondents spend most of their time (4 hours and 7 minutes) completing Work Center Duties, followed by Watch Team Duties (4 hours and 5 minute) and Attending Meetings (2 hours and 6 minutes). On average, respondents reported spending (14 hours and 9 minutes) hours on work-related duties and (3 hours and 29 minutes) hours on personal activities. Work related duties include Work Center Duties, Watch Team Duties, Attending Meetings, Collateral Duties, and Completing Personnel Qualification Standards. Personal activities include Personal Time, Socializing and Exercising. The “Other” category is excluded as it cannot be defined as work or personal activities.

3.2.5 FY22- FY23 ANALYSIS

The ASCAS contains questions that have been asked year over year and as part of that process it becomes possible to analyze changes between years for cohorts analyzed. Figure 6 shows the comparison from FY22-FY23 for significant Constructs/Surveyed items. Significance is determined by both the P-Value (<0.005) and Effect Size (±0.25).

Construct/Survey Item	FY22 Mean	FY23 Mean	Effect Size (FY22-23)	P-Value	Difference
Sleep Obtained: onboard your current ship while INPORT.	5.23	5.72	0.33	0.000	0.49
Diet	2.83	2.66	0.26	0.000	-0.18
Nap Days: onboard your current ship while INPORT.	1.49	0.92	0.30	0.000	-0.57

Figure 6: FY22-FY23 SURFOR Significant Changes

Significant changes for FY22-23 include an increase in reported sleep while inport as well as decreases in Diet, and Nap Days while Inport.

3.3 CNSP/CNSL Analysis

This section explores notable differences between the CNSP and CNSL respondents. In the second year of the new ASCAS, 31 crews (3,374 respondents) were aligned to CNSP platforms, and 21 crews (1,944 respondents) were aligned to CNSL platforms. While Section 4.3 details CNSP/L analyses conducted, differences between these two groups were small and bear little practical significance.

3.3.1 AREAS OF PRAISE AND CONCERN

Similar to Section 4.2.2, analysis was performed to identify areas of praise and concern. Table 3 highlights these areas for both CNSP and CNSL.

Table 3. CNSP/L Areas of Praise and Concern

Construct/Survey Item	PAC	LANT
Leadership Assessment of Subordinates	4.21	4.12
Crew Performance: I performed well.	3.80	3.79
Crew Performance: My department performed well.	3.77	3.77
Supervisor Safety Climate	3.65	3.64
Personal Responsibility for Workplace Safety	3.59	3.58
Command Safety Practices	3.56	3.50
Sleep Factors*	2.46	2.43
International Fitness Scale: General physical fitness.	3.53	3.58
Crew Performance: The command overall performed well.	3.49	3.61
International Fitness Scale: Speed/agility	3.47	3.49
Exercise Onboard	2.81	2.88
Anxiety*	3.21	3.21
Affective Commitment	2.77	2.72
Burnout	2.75	2.71
Diet	2.66	2.66
Sleep Disturbances*	3.37	3.38
Job Demands*	3.38	3.51
Exercise Onboard: Time provided to exercise.	2.59	2.59
Job Stress*	3.72	3.72
Midnight Rations	2.06	2.07

Note:
1. For the table above, higher scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange.
*2. *For these questions lower scores represent a more favorable response, with a mean of 3 being neutral.*

CNSP and CNSL respondents tended to response similarly, with the areas of praise and concern being similar to those of CNSF overall.

3.3.2 CONSTRUCTS WITH NOTABLE DIFFERENCES IN MEANS

Mean differences were analyzed between the CNSP and CNSL. Table 4 provides the survey constructs with the largest differences in means. CNSP and CNSL responses tended to be very similar, with construct means nearly identical. Note, in general, most differences are small to negligible.

Table 4. Constructs with Notable Differences in Means

	CNSP		CNSL		T-test		
Item	**Mean**	**SD**	**Mean**	**SD**	**Mean Difference**	**P-Value**	**Effect Size**
Job Demands*	3.38	0.90	3.51	0.89	0.13	<0.001***	0.15
Crew Performance: The command overall performed well.	3.49	1.02	3.61	1.00	0.12	<0.001***	-0.12
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	3.02	1.23	3.16	1.20	0.14	<0.001***	-0.12
Leadership Assessment of Subordinates	4.21	0.82	4.12	0.86	-0.09	<0.001***	0.11
Command Satisfaction	3.21	1.14	3.09	1.16	-0.12	0.001**	0.10

** For these items lower scores represent a more favorable response.*

The constructs above are those that exhibited the largest differences in their means. Most differences were statistically significant, though the effect sizes were negligible (<.15). CNSP expressed slightly more favorable responses towards Job Demands, Leadership Assessment of Subordinates and Command Satisfaction. CNSL expressed slightly more favorable views toward Command Performance and Exercise Onboard Facilities.

3.3.3 ACTIVITY ANALYSIS

Similar to Section 4.2.4, analysis was performed to identify differences in how much respondents spend on various activities. Figure 6 shows the average lengths of time individuals report allotted to various activities for CNSP and CNSL.

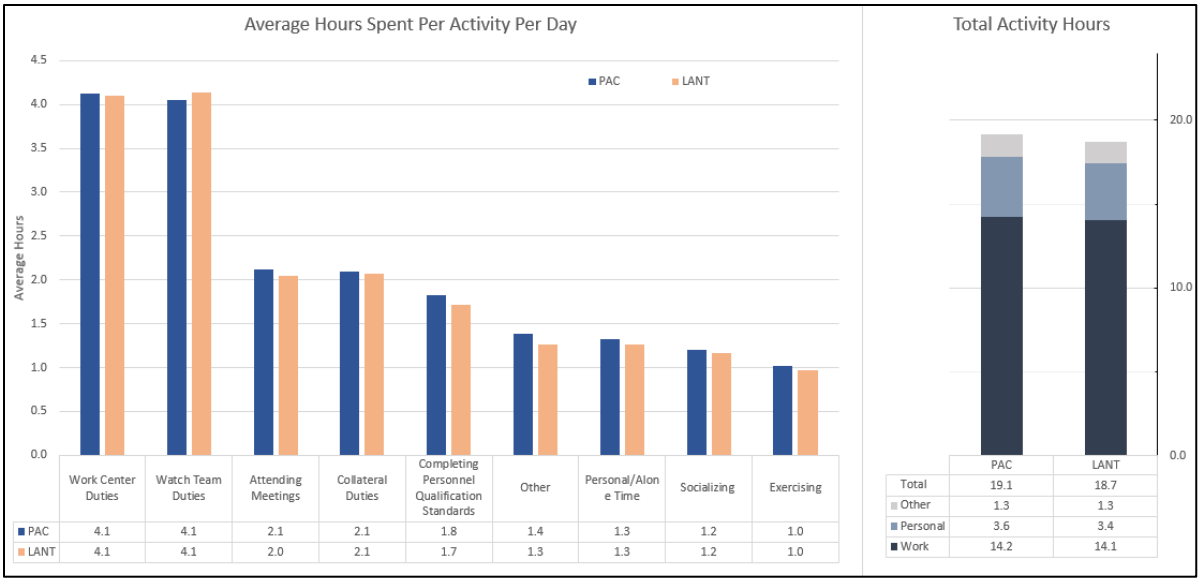


Figure 7. Average Hours Spent Per Activity Per Day (CNSP/L)

CNSP and CNSL Sailors tended to respond similarly. CNSL reported slightly higher time devoted to Watch Team Duties whereas CNSP Sailors spend more time devoted to Work Center Duties, Collateral Duties, Attending Meetings and Completed Personnel Qualification Standards. CNSP Sailors reported spending an average of 14 hours and 13 minutes on work-related activities and 3 hours and 36 minutes on non-work-related activities. While CNSL Sailors reported spending 14 hours and 4 minutes on work-related activities and 3 hours and 24 minutes on non-work-related activities.

3.3.4 FY22- FY23 ANALYSIS

The ASCAS contains questions that have been asked year over year and as part of that process it becomes possible to analyze changes between years for cohorts analyzed. Figure 8 shows the comparison from FY22-FY23 for significant Constructs/Surveyed items. Significance is determined by both the P-Value (<0.005) and Effect Size (±0.25).

Construct/Survey Item	FY22 Mean	FY23 Mean	Effect Size (FY22-23)	P-Value	Difference
LANT					
Sleep Obtained: onboard your current ship while INPORT.	5.31	5.69	0.26	0.000	0.38
Diet	2.86	2.66	0.29	0.000	-0.20
Sleep Availability: onboard your current ship while UNDERWAY.	6.35	5.88	0.26	0.000	-0.47
Nap Days: onboard your current ship while INPORT.	1.51	0.91	0.32	0.000	-0.60
PAC					
Sleep Obtained: onboard your current ship while INPORT.	5.19	5.73	0.37	0.000	0.54
Leadership Assessment of Subordinates	3.97	4.21	0.29	0.000	0.25
Nap Days: onboard your current ship while INPORT.	1.49	0.93	0.29	0.000	-0.55

Figure 8: FY22-FY23 SURFOR Significant Changes

Significant changes for LANT for FY22-23 include an increase in Sleep Obtained Inport and decreases in Diet, Sleep Availability Underway and Nap Days Inport. For PAC, increases in Sleep Obtained Inport and Leadership Assessment of Subordinates were reported as well as a decrease in Nap Days Inport.

3.4 Ship-class Analysis

Results include responses from four main ship-classes: Amphib Ships (LHD, LHA, LPD, LCC, LSD), CRUDES (CG, DDG), Littoral Combat Ships (LCS), and Mine Countermeasure (MCM). Table 5, below, details the number of crews and respondents aligned to each ship-class.

Table 5. Number of Ships and Surveyed Sailors by Ship-class

Ship-class	# of Ships	# Surveyed
Amphib (LHD, LHA, LPD, LCC, LSD)	7	1276
CRUDES (CG, DDG)	29	3595
LCS	11	357
MCM	4	168

3.4.1 AREAS OF PRAISE AND CONCERN

Areas of praise and concern are the constructs with the highest and lowest means for that category, respectively. Table 6 presents areas of praise and concern for each Ship-class.

Table 6. Ship-class Areas of Praise and Concern

Construct/Survey Item	Crudes	LCS	Amphibious	MCM
Leadership Assessment of Subordinates	4.18	4.33	4.10	4.15
Crew Performance: I performed well.	3.78	3.93	3.79	3.83
Crew Performance: My department performed well.	3.75	4.14	3.65	3.90
Supervisor Safety Climate	3.61	3.93	3.61	3.68
International Fitness Scale: General physical fitness.	3.55	3.63	3.50	3.51
Sleep Factors*	2.46	2.24	2.51	2.47
Personal Responsibility for Workplace Safety	3.54	3.91	3.55	3.81
Crew Performance: The command overall performed well.	3.53	3.84	3.42	3.47
Command Safety Practices	3.52	3.78	3.46	3.68
Safety Satisfaction	3.42	3.83	3.40	3.58
Anxiety*	3.23	3.14	3.19	3.07
Exercise Onboard	2.73	3.35	3.01	2.32
Burnout	2.72	2.76	2.75	2.77
Affective Commitment	2.70	3.21	2.65	3.04
Diet	2.63	2.83	2.66	2.65
Sleep Disturbances*	3.38	3.24	3.39	3.56
Job Demands*	3.42	3.63	3.37	3.58
Exercise Onboard: Time provided to exercise.	2.50	2.93	2.75	2.35
Job Stress*	3.74	3.84	3.60	3.87
Midnight Rations	2.08	2.26	1.94	2.27

Note:
1. For the table above, higher scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange.
*2. *For these questions lower scores represent a more favorable response, with a mean of 3 being neutral.*

Areas of praise were consistent across the various ship-classes. Notably, respondents aligned to LCS's tended to respond more favorably than their CRUDES or Amphib counterparts, *except with respect to job demands*. This may be reflective of their small crew size. Exercise Onboard and Affective Commitment are key differentiators across the ship-classes areas of concern.

3.4.2 COMPARATIVE ANALYSIS OF SHIP-CLASSES

Beyond areas of praise and concern, analyses were performed to identify and understand differences across our ship-classes. Results are detailed in the heatmaps below.

Construct/Survey Item	Amphibious	Crudes	LCS	MCM
Leadership Assessment of Subordinates	4.10	4.18	4.33	4.15
Crew Performance: I performed well.	3.79	3.78	3.93	3.83
Crew Performance: My department performed well.	3.65	3.75	4.14	3.90
Supervisor Safety Climate	3.61	3.61	3.93	3.68
Personal Responsibility for Workplace Safety	3.55	3.54	3.91	3.81
International Fitness Scale: General physical fitness.	3.50	3.55	3.63	3.51
Command Safety Practices	3.46	3.52	3.78	3.68
International Fitness Scale: Speed/agility	3.44	3.48	3.58	3.31
Firefighting/Damage Control Knowledge	3.44	3.45	3.68	3.59
Crew Performance: The command overall performed well.	3.42	3.53	3.84	3.47
International Fitness Scale	3.41	3.44	3.55	3.35
Safety Satisfaction	3.40	3.42	3.83	3.58
Job Resources: Training	3.39	3.42	3.65	3.55
Job Resources	3.38	3.45	3.66	3.57
Job Resources: Equipment	3.38	3.49	3.66	3.61
Organizational Identity (Navy)	3.38	3.34	3.50	3.28
Error Management	3.37	3.40	3.74	3.53
Meaningful Work	3.37	3.31	3.34	3.19
International Fitness Scale: Flexibility	3.35	3.35	3.43	3.20
Safety Communication	3.30	3.34	3.74	3.48
International Fitness Scale: Cardiorespiratory fitness (e.g., capacity to run for a long-time).	3.29	3.32	3.46	3.23
Unit Cohesion Department	3.29	3.38	3.81	3.62
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	3.25	2.95	3.75	2.29
Social Support	3.24	3.25	3.51	3.29
Crew Resilience	3.19	3.19	3.50	3.25
Command Satisfaction	3.15	3.13	3.44	3.32
Team Processes: Transition Processes	3.07	3.09	3.29	3.19
Leader Assessment	3.02	3.05	3.15	3.07
Exercise Onboard	3.01	2.73	3.35	2.32
Team Processes	2.96	2.99	3.26	3.12
Psychological Safety	2.96	2.96	3.38	3.21
Organizational Identity (Command)	2.94	3.02	3.51	3.28
Team Processes: Action Processes	2.94	2.98	3.22	3.10
Overall Health	2.92	2.89	3.02	2.86
Team Processes: Interpersonal Processes	2.91	2.91	3.27	3.09
No Blame Error Reporting	2.86	2.82	3.27	3.11
Burnout	2.75	2.72	2.76	2.77
Exercise Onboard: Time provided to exercise.	2.75	2.50	2.93	2.35
Diet	2.66	2.63	2.83	2.65
Affective Commitment	2.65	2.70	3.21	3.04
Midnight Rations	1.94	2.08	2.26	2.27

Figure 9. Mean Constructs of Interest by Ship-class

As identified in Section 4.4.1, LCS respondents aligned tended to respond more favorably than CRUDES and Amphib Sailors. Consistent with CNSF results, responses related to Diet and Exercise were unfavorable for all ship-classes.

Construct/Survey Item	Amphibious	Crudes	LCS	MCM
Sleep Factors*	2.51	2.46	2.24	2.47
Non-Compliance (Individual)*	2.67	2.68	2.47	2.88
Sleep Impairment*	2.93	2.98	2.85	2.87
Non-Compliance (Command)*	2.99	2.89	2.51	2.57
Safety Reporting Behavior*	3.04	3.00	2.79	2.83
Anxiety*	3.19	3.23	3.14	3.07
Job Demands*	3.37	3.42	3.63	3.58
Sleep Disturbances*	3.39	3.38	3.24	3.56
Job Stress*	3.60	3.74	3.84	3.87

**For these questions lower scores represent a more favorable response.*

Figure 10. Mean Constructs of Interest by Ship-class (Reverse Encoded)

While LCS Sailors tend to respond more favorably to some constructs, they scored more negatively towards Job Demands and Job Stress.

Construct/Survey Item	Amphibious	Crudes	LCS	MCM
Exercise: Inport	3.58	3.44	3.33	3.29
Exercise: Underway	3.21	2.84	3.00	1.59
Nap Days: at HOME while inport.	1.52	1.39	1.47	1.40
Nap Days: onboard your current ship while INPORT.	0.91	0.94	0.83	0.95
Nap Days: onboard your current ship while UNDERWAY.	1.41	1.67	1.37	1.23

Figure 11. Mean Constructs of Interest by Ship-class (Days Scale)

On average, regardless of ship-class, sailors reported 3.5 days of exercise per week inport and 2.9 days underway with significant differences found for sailors aboard MCM ships while underway. Sailors reported fewer naps while inport than either underway or at home.

Construct/Survey Item	Amphibious	Crudes	LCS	MCM
Mental Health*	10.53	11.25	10.10	9.79
Physical Health*	6.41	6.33	6.34	5.12

**For these questions lower scores represent a more favorable response.*

Figure 12. Mean Constructs of Interest by Ship-class (Days Scale)

With regard to mental health, Sailors on Amphibs and CRUDES reported an average of 11 days of poor mental health (in the last 30 days). LCS respondents reported 10.1 days of poor mental health. Sailors reported more days of poor mental as compared to poor physical health. Specifically, Sailors on Amphibs reported an average of 6.4 days of poor physical health, those aligned to LCSs reported 6.3 days, and CRUDES reported an average of 6.3 poor physical health days. Sailors aboard MCM ships reported both fewer poor mental health days and fewer poor physical health days.

3.4.3 BREAKDOWN OF SLEEP FACTORS

The Sleep Factors construct is composed of 19 questions in the survey (4 additional factors were added from FY22). This section examines the difference in sleep factors between ship-classes. The factors with the largest negative impact for any individual group are shown to provide a better understanding of reasons for poor sleep. The Sleep Impairment and Sleep Disturbance Constructs are also shown for reference.

3.4.3.1 SLEEP FACTORS OF HIGHEST CONCERN

Factor	Amphibious	Crudes	LCS	MCM
Uncomfortable Mattress*	3.10	2.98	3.23	3.13
Workload*	3.03	3.23	3.21	3.33
Crew Mate Noise (e.g., open/closing rack, chatting, etc.)*	3.02	2.71	2.24	2.21
Uncomfortable Issued Pillow*	2.90	2.70	2.58	2.91
Mattress Too Hard*	2.81	2.68	2.90	2.95
Drills (e.g., General Quarters)*	2.64	2.72	2.13	2.60

**For these factors lower scores represent a more favorable response.*

Figure 13. Heatmap of Sleep Factors by Ship-class

Uncomfortable Mattress on LCSs were the most negative factor for any group. It was also the factor Amphib respondents reportedly most negatively. Workload Impact on Sleep was the most negative factor reported by CRUDES and MCM ships, and the second worst factor reported by Amphib and LCS aligned Sailors.

3.4.3.2 SLEEP IMPAIRMENT AND SLEEP DISTURBANCES

Row Labels	Amphibious	Crudes	LCS	MCM
Sleep Disturbances*	3.39	3.38	3.24	3.56
Sleep Impairment*	2.93	2.98	2.85	2.87

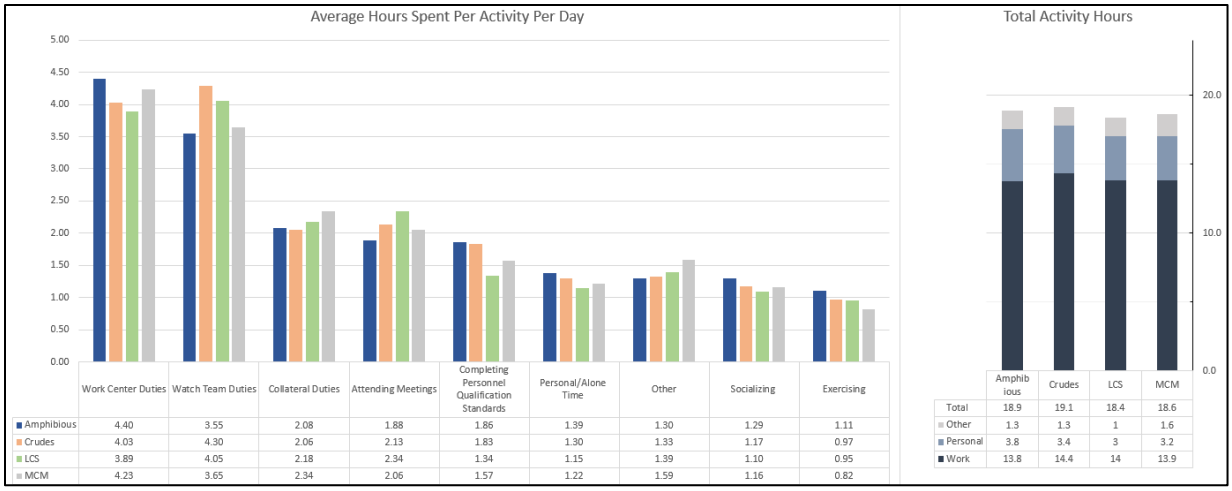
**For these questions lower scores represent a more favorable response.*

Figure 14. Heatmap of Sleep Constructs by Ship-class

Despite some pronounced differences in individual sleep factors, the Sleep Disturbance and Sleep Impairment constructs were relatively consistent across ship-classes.

3.4.1 ACTIVITY ANALYSIS

Figure 13 depicts the average lengths of time individuals reported spending on various activities, across ship-classes.



	Work Center Duties	Watch Team Duties	Collateral Duties	Attending Meetings	Completing Personnel Qualification Standards	Personal/Alone Time	Other	Socializing	Exercising
Amphibious	4.40	3.55	2.08	1.88	1.86	1.39	1.30	1.29	1.11
Crudes	4.03	4.30	2.06	2.13	1.83	1.30	1.33	1.17	0.97
LCS	3.89	4.05	2.18	2.34	1.34	1.15	1.39	1.10	0.95
MCM	4.23	3.65	2.34	2.06	1.57	1.22	1.59	1.16	0.82

	Amphibious	Crudes	LCS	MCM
Total	18.9	19.1	18.4	18.6
Other	1.3	1.3	1	1.6
Personal	3.8	3.4	3	3.2
Work	13.8	14.4	14	13.9

Figure 15. Average Hours Spent Per Activity Per Day (Ship-class)

Of note, respondents aligned to LCS platforms tended to spend less time on Work Center duties than their Amphib and CRUDES counterparts. This is likely due to the LCS contracted maintenance construct. CRUDES and LCSs reported spending more time on Watch Team duties and attending meetings than Amphib respondents.

Table 7. Average Time Spent on Work and Personal Duties by Ship-class.

Ship-class	Average Time Spent on Work Duties	Average Time Spent on Personal Duties
Amphib (LHD, LHA, LPD, LCC, LSD)	13 Hours 46 Minutes	3 Hours 47 Minutes
CRUDES (CG, DDG)	14 hours 21 Minutes	3 Hours 26 Minutes
LCS	13 Hours 48 Minutes	3 Hours 12 Minutes
MCM	13 Hours 51 Minutes	3 Hours 12 Minutes

On average, Sailors aligned CRUDES reported the most time spent on work duties (14 hours and 21 minutes) and Amphibs reported the least (13 hours and 46 minutes).

3.4.2 FY22- FY23 ANALYSIS

The ASCAS contains questions that have been asked year over year and as part of that process it becomes possible to analyze changes between years for cohorts analyzed. Figure 16 shows the comparison from FY22-FY23 for significant Constructs/Surveyed items. Significance is determined by both the P-Value (<0.005) and Effect Size (±0.25).

Construct/Survey Item	FY22 Mean	FY23 Mean	Effect Size (FY22-23)	P-Value	Difference
Amphibious					
Sleep Obtained: onboard your current ship while INPORT.	5.30	5.92	0.41	0.000	0.62
Crudes					
Sleep Obtained: onboard your current ship while INPORT.	5.17	5.67	0.35	0.000	0.50
Diet	2.83	2.63	0.28	0.000	-0.20
Sleep Availability: onboard your current ship while UNDERWAY.	6.12	5.69	0.25	0.000	-0.42
Nap Days: onboard your current ship while INPORT.	1.67	0.94	0.38	0.000	-0.72
LCS					
Sleep Obtained: onboard your current ship while INPORT.	5.27	5.71	0.34	0.000	0.44
Safety Satisfaction	3.60	3.83	0.29	0.000	0.24
Safety Communication	3.52	3.74	0.26	0.000	0.22
Job Resources: Training	3.45	3.65	0.28	0.000	0.20
Nap Days: onboard your current ship while INPORT.	1.31	0.83	0.28	0.000	-0.48

Figure 16: FY22-FY23 Ship Class Significant Changes

Significant changes for Amphibious Ships for FY22-23 include an increase in Sleep Obtained Inport. For CRUDES, increases in Sleep Obtained Inport were reported while decreases in Diet, Sleep Available Underway, and Nap Days Inport were reported. For LCS Ships, increases in Sleep Obtained Inport, Safety Satisfaction, Safety Communication, Job Resources: Training were reported while a decrease in Nap Days Inport was reported. Note, MCM ships were excluded due to small sample sizes from FY22-23.

3.5 Paygrade Analysis

The following section examines the key constructs relative to rank. Analyses was performed on four Paygrade ranges (Junior Sailors E1-E3, Petty Officers E4-E6, Chiefs E7-E9, and Officers/Chief Warrant Officers), and further reduced to two groups (Enlisted and Officers) where applicable. Details regarding the number of respondents for the distinct subgroups are included below.

Table 8. Number of Respondents by Paygrade

Paygrade	Number of Respondents
Junior Sailors (E1-E3)	644
Petty Officers (E4-E6)	3157
Chiefs (E7-E9)	665
Officers (including CWOs)	914

Most respondents who provided their paygrade were Petty Officers (58.68%), followed by Officers (16.99%), Chiefs (12.36%) and Junior Sailors (11.97%).

Table 9. Number of Respondents by Aggregated Paygrade

Paygrade	Number of Respondents
Enlisted (E1-E9)	4466
Officers (CWOs)	914

Aggregating into Enlisted and Officer categories, 83.01% of responses came from Enlisted Sailors, whereas 16.99% were Officers.

3.5.1 AREAS OF PRAISE AND CONCERN

Survey constructs that scored favorably and unfavorably tended to align with those of SURFOR overall. Table 10 details those constructs and the mean scores for the Officer and Enlisted subgroups.

Table 10. Constructs of Praise and Concern by Paygrade (Officer vs Enlisted)

Row Labels	Enlisted	Officers
Leadership Assessment of Subordinates	4.12	4.36
Crew Performance: I performed well.	3.79	3.87
Crew Performance: My department performed well.	3.70	4.12
Supervisor Safety Climate	3.58	3.96
Personal Responsibility for Workplace Safety	3.50	4.03
International Fitness Scale: General physical fitness.	3.48	3.88
Command Safety Practices	3.47	3.83
Sleep Factors*	2.53	2.06
Crew Performance: The command overall performed well.	3.45	3.93
Job Resources: Equipment	3.42	3.83
Exercise Onboard	2.82	2.90
Anxiety*	3.27	2.91
Burnout	2.72	2.84
Affective Commitment	2.63	3.31
Diet	2.62	2.86
Job Demands*	3.41	3.52
Exercise Onboard: Time provided to exercise.	2.58	2.64
Sleep Disturbances*	3.47	2.91
Job Stress*	3.69	3.89
Midnight Rations	2.05	2.15

Note:
1. For the table above, higher scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange. Scores within 0.05 of neutral (3) are shaded white.
*2. *For these questions lower scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange. Scores within 0.05 of neutral (3) are shaded white.*

3.5.2 CONSTRUCTS WITH NOTABLE DIFFERENCES IN MEANS

The means between the Officers and Enlisted differed for most constructs. A test of statistical significance is given in Table 11 as well and all are significant with small to large effect sizes.

Table 11. Constructs with Significant Differences in Means Based on Officer vs Enlisted

	Officer		Enlisted			T-test	
Item	**Mean**	**SD**	**Mean**	**SD**	**Mean Difference**	**P-Value**	**Effect Size**
Organizational Identity (Command)	2.92	1.16	3.71	1.03	0.80	<0.001***	-0.70
Psychological Safety	2.91	0.88	3.49	0.79	0.58	<0.001***	-0.67
Command Satisfaction	3.04	1.13	3.76	1.06	0.72	<0.001***	-0.65
Unit Cohesion Department	3.30	1.03	3.91	0.78	0.61	<0.001***	-0.61
Affective Commitment	2.63	1.11	3.31	1.12	0.67	<0.001***	-0.60
Personal Responsibility for Workplace Safety	3.50	0.93	4.03	0.86	0.54	<0.001***	-0.59
Sleep Factors*	2.53	0.85	2.06	0.71	-0.47	<0.001***	-0.56
Safety Satisfaction	3.38	0.91	3.85	0.80	0.47	<0.001***	-0.52
Safety Communication	3.30	0.91	3.76	0.79	0.47	<0.001***	-0.52
Team Processes	2.94	0.82	3.36	0.75	0.41	<0.001***	-0.51
Team Processes: Interpersonal Processes	2.87	0.91	3.33	0.84	0.46	<0.001***	-0.51
Sleep Disturbances*	3.47	1.09	2.91	1.11	-0.55	<0.001***	-0.51
Overall Health	2.83	0.92	3.29	0.93	0.46	<0.001***	-0.50
Error Management	3.35	0.94	3.81	0.80	0.46	<0.001***	-0.50
No Blame Error Reporting	2.80	0.91	3.24	0.89	0.44	<0.001***	-0.49
Job Resources: Equipment	3.42	0.88	3.83	0.76	0.41	<0.001***	-0.48
Crew Performance: The command overall performed well.	3.45	1.02	3.93	0.90	0.48	<0.001***	-0.48
Team Processes: Action Processes	2.93	0.83	3.32	0.76	0.39	<0.001***	-0.48
Team Processes: Transition Processes	3.04	0.88	3.45	0.81	0.41	<0.001***	-0.47
Command Safety Practices	3.47	0.82	3.83	0.72	0.35	<0.001***	-0.44
Crew Performance: My department performed well.	3.70	1.00	4.12	0.79	0.42	<0.001***	-0.43
Supervisor Safety Climate	3.58	0.92	3.96	0.75	0.38	<0.001***	-0.43
International Fitness Scale: Cardiorespiratory fitness (e.g., capacity to run for a long-time).	3.25	1.18	3.72	1.11	0.47	<0.001***	-0.40
Organizational Identity (Navy)	3.28	1.13	3.73	1.04	0.44	<0.001***	-0.40
Job Resources	3.40	0.78	3.71	0.67	0.31	<0.001***	-0.40
Leader Assessment	3.02	0.60	3.24	0.51	0.23	<0.001***	-0.39
Crew Resilience	3.16	0.90	3.51	0.82	0.35	<0.001***	-0.39
International Fitness Scale	3.38	1.00	3.76	0.91	0.38	<0.001***	-0.38
International Fitness Scale: General physical fitness.	3.48	1.10	3.88	0.98	0.41	<0.001***	-0.38
Social Support	3.21	1.13	3.61	1.05	0.41	<0.001***	-0.36
Diet	2.62	0.68	2.86	0.69	0.25	<0.001***	-0.36
Non-Compliance (Individual)*	2.72	1.00	2.37	1.04	-0.35	<0.001***	-0.35
International Fitness Scale: Speed/agility	3.42	1.12	3.78	1.00	0.36	<0.001***	-0.33
Anxiety*	3.27	1.25	2.91	1.20	-0.37	<0.001***	-0.30
Job Resources: Training	3.40	0.81	3.63	0.71	0.24	<0.001***	-0.30
International Fitness Scale: Flexibility	3.30	1.14	3.63	1.07	0.33	<0.001***	-0.29
Leadership Assessment of Subordinates	4.12	0.87	4.36	0.70	0.24	<0.001***	-0.29
Meaningful Work	3.28	1.01	3.56	1.03	0.28	<0.001***	-0.28

** For these items lower scores represent a more favorable response*

The means above highlight the constructs with the most considerable (>±0.25 effect size) mean differences between Officer and Enlisted. The constructs were all statistically significant between the groups and represent small, medium and large differences. Officers had more favorable responses towards every item, with Satisfaction with Command and Affective Commitment having the largest differences.

3.5.3 COMPARATIVE ANALYSIS OF PAYGRADES

Upon discovering such notable differences between the Officer and Enlisted subgroups, additional analyses were performed to explore responses between Enlisted and Officers in the ASCAS.

Construct/Survey Item	Enlisted	Officers
Leadership Assessment of Subordinates	4.12	4.36
Crew Performance: I performed well.	3.79	3.87
Crew Performance: My department performed well.	3.70	4.12
Supervisor Safety Climate	3.58	3.96
Personal Responsibility for Workplace Safety	3.50	4.03
International Fitness Scale: General physical fitness.	3.48	3.88
Command Safety Practices	3.47	3.83
Crew Performance: The command overall performed well.	3.45	3.93
Firefighting/Damage Control Knowledge: Relevant firefighting / damage control knowledge	3.44	3.60
International Fitness Scale: Speed/agility	3.42	3.78
Job Resources: Equipment	3.42	3.83
Job Resources	3.40	3.71
Job Resources: Training	3.40	3.63
International Fitness Scale	3.38	3.76
Safety Satisfaction	3.38	3.85
Error Management	3.35	3.81
Unit Cohesion Department	3.30	3.91
International Fitness Scale: Flexibility	3.30	3.63
Safety Communication	3.30	3.76
Organizational Identity (Navy)	3.28	3.73
Meaningful Work	3.28	3.56
International Fitness Scale: Cardiorespiratory fitness (e.g., capacity to run for a long-time).	3.25	3.72
Social Support	3.21	3.61
Crew Resilience	3.16	3.51
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	3.05	3.17
Command Satisfaction	3.04	3.76
Team Processes: Transition Processes	3.04	3.45
Leader Assessment	3.02	3.24
Team Processes	2.94	3.36
Team Processes: Action Processes	2.93	3.32
Organizational Identity (Command)	2.92	3.71
Psychological Safety	2.91	3.49
Team Processes: Interpersonal Processes	2.87	3.33
Overall Health	2.83	3.29
Exercise Onboard	2.82	2.90
No Blame Error Reporting	2.80	3.24
Burnout	2.72	2.84
Affective Commitment	2.63	3.31
Diet	2.62	2.86
Exercise Onboard: Time provided to exercise.	2.58	2.64
Midnight Rations	2.05	2.15

Figure 17. Heatmap of Constructs by Paygrade

Figure 14 shows the mean responses to Likert scale questions, where higher numbers represent more favorable responses. Of note, Enlisted sailors tended to respond less favorably to nearly all constructs and Officers tend to have generally positive views across most constructs (>3.0).

Construct/Survey Item	Enlisted	Officers
Sleep Factors*	2.53	2.06
Non-Compliance (Individual)*	2.72	2.37
Non-Compliance (Command)*	2.89	2.77
Sleep Impairment*	2.99	2.75
Safety Reporting Behavior*	3.02	2.83
Anxiety*	3.27	2.91
Job Demands*	3.41	3.52
Sleep Disturbances*	3.47	2.91
Job Stress*	3.69	3.89

**For these questions lower scores represent a more favorable response.*

Figure 18. Mean Constructs of Interest by Paygrade

In Figure 15, it is evident that reverse encoded constructs (where lower scores are more favorable) follow a similar trend, with Officers generally responding more favorable with notable exceptions in Job Demands and Job Stress where Officers responded more negatively. These two constructs however were not significant in their effect size in Table 11.

Construct/Survey Item	Enlisted	Officers
Exercise: Inport	3.43	3.59
Exercise: Underway	2.93	2.79
Nap Days: at HOME while Inport.	1.54	0.90
Nap Days: onboard your current ship while INPORT.	0.99	0.62
Nap Days: onboard your current ship while UNDERWAY.	1.56	1.60

Figure 19. Mean Constructs of Interest by Paygrade (Days Scale)

Enlisted and Officers are similar in reported exercise days whether inport or underway, with Enlisted personnel reporting a slightly lower number of inport exercise days and a slightly higher number of underway exercise days. For nap days, Enlisted personnel reported more nap days than Officers while inport and at home but a similar number of days while underway. Of note is the increase in number of nape days for Officers while underway.

Construct/Survey Item	Enlisted	Officers
Mental Health*	11.54	7.93
Physical Health*	6.60	4.90

**For these questions lower scores represent a more favorable response.*

Figure 20. Mean Constructs of Interest by Paygrade (Days Scale)

Enlisted personnel reported on average 11.54 days of poor mental health per month compared to 7.93 days of poor mental health for Officers representing a significant difference. Enlisted personnel also reported more days of poor physical health per month as compared to Officers.

3.5.4 BREAKDOWN OF SLEEP FACTORS

The Sleep Factors construct is composed of 19 questions in the survey (4 additional factors were added from FY22). This section examines the difference in sleep factors between the Enlisted and Officer groups, as well as across the four Paygrade categories. The factors with the largest negative impact for either group are shown to provide a better understanding of reasons for poor sleep. The Sleep Impairment and Sleep Disturbance Constructs are also shown for reference.

3.5.4.1 SLEEP FACTORS OF HIGHEST CONCERN

Factor	Enlisted	Officer
Workload*	3.19	3.19
Uncomfortable Mattress*	3.12	2.56
Crew Mate Noise (e.g., open/closing rack, chatting, etc.)*	2.90	1.97
Mattress Too Hard*	2.85	2.17
Uncomfortable Issued Pillow *	2.83	2.35
Drills (e.g., General Quarters)*	2.77	2.14
Rack Height (thinking about turning over or sleeping on your side)*	2.65	1.86
Rack Width*	2.61	1.85
Required Meetings*	2.59	2.78
Uncomfortable Issued Bedding (i.e., sheets/blanket)*	2.54	2.11
Ambient Noise (e.g., air system, miscellaneous equipment)*	2.46	2.13
Invasive Lighting*	2.42	1.73
Hot Temperature*	2.40	2.01
Required Inspections*	2.38	1.89
1MC Announcements*	2.33	2.18
Bad Dreams / Nightmares*	2.25	1.65
Cold Temperature*	2.18	1.79
Rack Length*	2.16	1.67
Mattress Too Soft *	1.35	1.28

**For these factors lower scores represent a more favorable response.*

Figure 21. Heatmap of Sleep Factors by Paygrade

Workload was the largest negative factor for both Enlisted Sailors and Officers, and Uncomfortable Mattress was the second most negative factor for Enlisted personnel. Generally, Officers reported little impact on sleep from the listed factors outside of Workload and required meetings. This differed significantly from Enlisted Personnel.

3.5.4.2 SLEEP CONSTRUCTS OF HIGHEST CONCERN

Construct/Survey Item	Enlisted	Officers
Sleep Disturbances*	3.47	2.91
Sleep Impairment*	2.99	2.75

**For these questions lower scores represent a more favorable response.*

Figure 22. Heatmap of Sleep Constructs by Paygrade

Consistent with the highlighted sleep factors, the Sleep Disturbance and Sleep Impairment constructs showed differences between groups, with the Enlisted group reporting less favorable results than the Officer group.

3.5.5 ACTIVITY ANALYSIS

Analysis was performed to identify differences in how much respondents spend on various activities. Figure 22 shows the average lengths of time individuals report allotted to various activities for Enlisted Sailors and Officers.

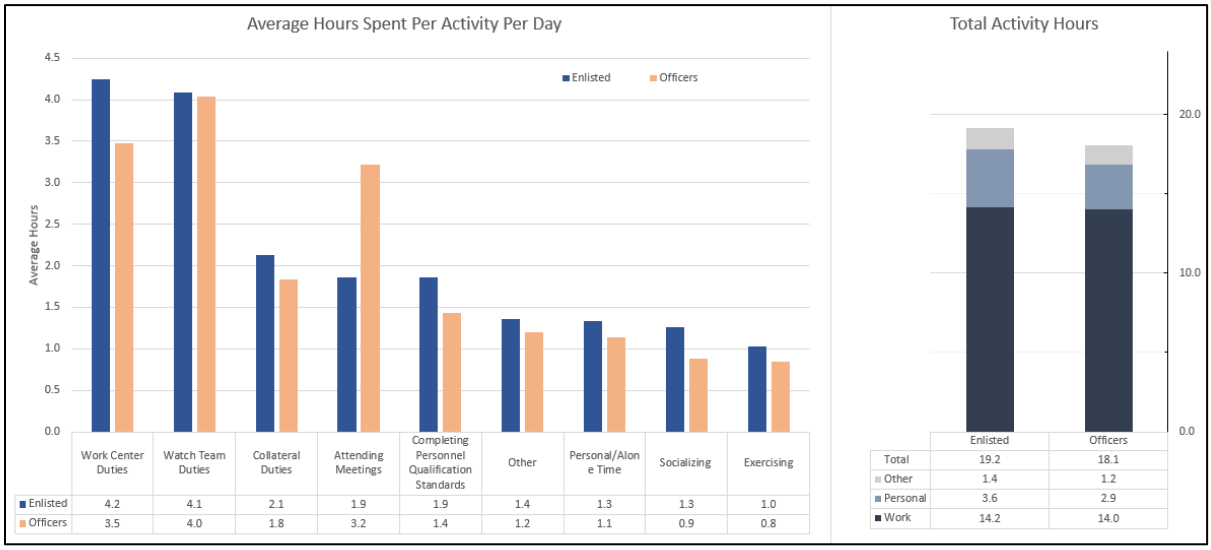


Figure 23. Average Hours Spent Per Activity Per Day (Paygrade)

Officers/CWOs reported more time Attending Meetings than their Enlisted counterparts. Enlisted Sailors reported significantly more time devoted to their Work Center Duties and Completing Personnel Qualifications Standards. The Officers and Enlisted groups reported similar time spent per day on Watch Team Duties.

Officers/CWOs reported spending an average of 14 hours and 1 minute on work-related activities and 2 hours and 51 minutes on personal activities. Enlisted Sailors reported spending 14 hours and 11 minutes on work-related activities and 3 hours and 37 minutes on personal activities. Of note is a 1 hour and 6-minute difference reported between total time spent on work, personal and other activities daily between Enlisted personnel and Officers.

3.5.6 FY22- FY23 ANALYSIS

The ASCAS contains questions that have been asked year over year and as part of that process it becomes possible to analyze changes between years for cohorts analyzed. Figure 24 shows the comparison from FY22-FY23 for significant Constructs/Surveyed items. Significance is determined by both the P-Value (<0.005) and Effect Size (±0.25).

Construct/Survey Item	FY22 Mean	FY23 Mean	Effect Size (FY22-23)	P-Value	Difference
Enlisted					
Sleep Obtained: onboard your current ship while INPORT.	5.18	5.63	0.30	0.000	0.45
Diet	2.81	2.62	0.28	0.000	-0.19
Nap Days: onboard your current ship while INPORT.	1.50	0.99	0.27	0.000	-0.52
Officers					
Sleep Obtained: onboard your current ship while INPORT.	5.50	6.14	0.54	0.000	0.64
No Blame Error Reporting	3.02	3.24	0.26	0.000	0.23
Leadership Assessment of Subordinates	4.14	4.36	0.30	0.000	0.21
Psychological Safety	3.28	3.49	0.26	0.000	0.21
Sleep Availability: onboard your current ship while UNDERWAY.	6.47	6.00	0.32	0.000	-0.47
Nap Days: onboard your current ship while INPORT.	1.45	0.62	0.48	0.000	-0.82

Figure 24: FY22-FY23 Officer/Enlisted Significant Changes

Significant changes for Enlisted Personnel for FY22-23 include an increase in Sleep Obtained Inport and decreases in Diet, and Nap Days Inport. For Officers, increases in Sleep Obtained Inport, No Blame Error Reporting, Leadership Assessment of Subordinates, and Psychological Safety were reported as well as decreases in Sleep Available Underway and Nap Days Inport.

3.6 Department Analysis

This section investigates differences across departments. All results include responses from 12 departments (Engineering, Operations, Combat Systems, Supply, Admin, Deck, Weapons, Medical/Dental, Training / Plans & Tactics, Air, AIMD, and Safety). Analysis was completed both by department (12 groups) and in comparison, to the Engineering department. The FY21 and FY22 ASCAS Reports showed significant differences between Engineering and non-Engineering responses; analysis was repeated to identify whether or not the same trend was evident. Additionally, many of the departments had too few responses to allow for a robust comparative analysis.

Table 12. Number of Respondents by Department

Department	Number of Respondents
Admin	347
AIMD	87
Air	173
Combat Systems	1037
Deck	217
Engineering	1162
Medical/Dental	130
Operations	841
Safety	14
Supply	528
Training / Plans & Tactics	109
Weapons	685

Most respondents were aligned to the Engineering department (1162), followed by Combat Systems (1037), Operations (841) and Weapons (685). The smallest group of respondents came from the Safety Department (14), consistent with the sizes of the departments within ship organization manuals.

Table 13. Number of Respondents by Engineering vs Non-Engineering

Department	Number of Respondents
Engineering	1162
Non-Engineering	4148

Splitting the data into two distinct groups, Engineering comprises 21.80% of the total responses, and non-Engineering include the remaining 77.20%.

3.6.1 AREAS OF PRAISE AND CONCERN BY DEPARTMENT

Survey constructs that scored favorably and unfavorably tended to align those of SURFOR overall. Table 14 details those constructs and the mean scores for the Engineering and non-Engineering subgroups.

Table 14. Areas of Praise and Concern by Engineering vs Non-Engineering Department

Row Labels	Engineering	Non-Engineering
Leadership Assessment of Subordinates	4.04	4.21
Firefighting/Damage Control Knowledge	3.88	3.36
Crew Performance: I performed well.	3.82	3.80
Crew Performance: My department performed well.	3.79	3.76
International Fitness Scale: General physical fitness.	3.73	3.50
International Fitness Scale: Speed/agility	3.70	3.42
Personal Responsibility for Workplace Safety	3.66	3.57
Supervisor Safety Climate	3.63	3.65
Sleep Factors*	2.49	2.44
Crew Performance: The command overall performed well.	3.51	3.54
Exercise Onboard	2.76	2.86
Affective Commitment	2.73	2.75
Anxiety*	3.29	3.19
Burnout	2.70	2.74
Diet	2.59	2.68
Sleep Disturbances*	3.43	3.36
Exercise Onboard: Time provided to exercise.	2.42	2.64
Job Demands*	3.59	3.39
Job Stress*	3.87	3.68
Midnight Rations	2.05	2.07

Note:
1. For the table above, higher scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange. Scores within 0.05 of neutral (3) are shaded white.
2. *For these questions lower scores represent a more favorable response, with a mean of 3 being neutral.

3.6.2 CONSTRUCTS WITH NOTICEABLE DIFFERENCES IN MEANS

Compared across different constructs, notable differences were less pronounced between Engineering and Non-Engineering departments. Significant (> ±0.25 Effect Size) differences were found primarily in Firefighting and Damage Control Knowledge and the International Fitness Scale with Engineering Sailors reporting higher values for each.

Table 15. Major Mean Differences by Engineering and Non-Engineering Departments

	Engineering		Non-Engineering		T-test		
Item	**Mean**	**SD**	**Mean**	**SD**	**Mean Difference**	**P-Value**	**Effect Size**
Firefighting/Damage Control Knowledge	3.88	1.02	3.36	1.04	-0.53	<0.001***	0.51
International Fitness Scale	3.64	1.00	3.39	0.98	-0.25	<0.001***	0.26
International Fitness Scale: Flexibility	3.58	1.15	3.29	1.12	-0.29	<0.001***	0.25
International Fitness Scale: Speed/agility	3.70	1.13	3.42	1.10	-0.28	<0.001***	0.25

**For these items lower scores represent a more favorable response*

The above table reports the constructs with the most considerable mean differences between the Engineering and other departments. The constructs were all statistically significant between the groups but had a small effect size. The non-Engineering department had favorable responses towards every item.

3.6.3 COMPARATIVE ANALYSIS OF ENGINEERING/NON-ENGINEERING

Additional analysis was performed to explore responses of the Engineering and Non-Engineering department groups included in the ASCAS. As noted above, significant difference occurred in Firefighting and Damage Control Knowledge and the International Fitness Scale.

Construct/Survey Item	Engineering	Non-Engineering
Leadership Assessment of Subordinates	4.04	4.21
Firefighting/Damage Control Knowledge	3.88	3.36
Crew Performance: I performed well.	3.82	3.80
Crew Performance: My department performed well.	3.79	3.76
International Fitness Scale: General physical fitness.	3.73	3.50
International Fitness Scale: Speed/agility	3.70	3.42
Personal Responsibility for Workplace Safety	3.66	3.57
International Fitness Scale	3.64	3.39
Supervisor Safety Climate	3.63	3.65
International Fitness Scale: Flexibility	3.58	3.29
International Fitness Scale: Cardiorespiratory fitness (e.g., capacity to run for a long-time).	3.51	3.28
Crew Performance: The command overall performed well.	3.51	3.54
Command Safety Practices	3.49	3.55
Job Resources: Equipment	3.46	3.49
Safety Satisfaction	3.45	3.46
Job Resources	3.43	3.46
Error Management	3.42	3.43
Job Resources: Training	3.41	3.44
Unit Cohesion Department	3.36	3.42
Safety Communication	3.33	3.39
Organizational Identity (Navy)	3.31	3.37
Meaningful Work	3.30	3.33
Social Support	3.24	3.29
Crew Resilience	3.23	3.22
Command Satisfaction	3.14	3.17
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	3.09	3.07
Team Processes: Transition Processes	3.07	3.12
Leader Assessment	3.07	3.05
Psychological Safety	3.00	3.01
Organizational Identity (Command)	3.00	3.07
Team Processes	3.00	3.02
Team Processes: Action Processes	2.99	3.00
Team Processes: Interpersonal Processes	2.93	2.95
No Blame Error Reporting	2.89	2.87
Overall Health	2.82	2.94
Exercise Onboard	2.76	2.86
Affective Commitment	2.73	2.75
Burnout	2.70	2.74
Diet	2.59	2.68
Exercise Onboard: Time provided to exercise.	2.42	2.64
Midnight Rations	2.05	2.07

Figure 25. Mean Constructs of Interest by Ship Department

Taken individually, the results above show that there are not many significant differences between the groups, taken as a group however it can be seen that there are differences in Diet, Exercise, and Overall Health which may suggest that the Engineering Department is less healthy in general.

Construct/Survey Item	Engineering	Non-Engineering
Sleep Factors*	2.49	2.44
Non-Compliance (Individual)*	2.76	2.64
Non-Compliance (Command)*	2.85	2.88
Safety Reporting Behavior*	3.01	2.98
Sleep Impairment*	3.08	2.92
Anxiety*	3.29	3.19
Sleep Disturbances*	3.43	3.36
Job Demands*	3.59	3.39
Job Stress*	3.87	3.68

**For these questions lower scores represent a more favorable response.*

Figure 26. Mean Constructs of Interest by Ship Department

For the reverse encoded constructs, the Engineering Department reported more negative values in Job Demands and Job Stress than the Non-Engineering Departments

Construct/Survey Item	Engineering	Non-Engineering
Exercise: Inport	3.49	3.45
Exercise: Underway	2.93	2.90
Nap Days: at HOME while Inport.	1.53	1.40
Nap Days: onboard your current ship while INPORT.	1.00	0.90
Nap Days: onboard your current ship while UNDERWAY.	1.66	1.55

Figure 27. Mean Constructs of Interest by Ship Department (Days Scale)

Nap and Exercise days were generally consistent from Engineering and Non-Engineering Departments.

Construct/Survey Item	Engineering	Non-Engineering
Mental Health*	11.39	10.80
Physical Health*	6.81	6.17

**For these questions lower scores represent a more favorable response.*

Figure 28. Mean Constructs of Interest by Ship Department (Days Scale)

Days of poor mental health and poor physical health are slightly higher from Engineering Departments to Non-Engineering Departments.

3.6.4 BREAKDOWN OF SLEEP FACTORS

This section examines the difference in sleep factors between Engineering and Non-Engineering departments. The factors with the largest negative impact for either group are shown to provide a better understanding of reasons for poor sleep. The Sleep Impairment and Sleep Disturbance Constructs are also shown for reference.

3.6.4.1 SLEEP FACTORS OF HIGHEST CONCERN

Factor	Engineering	Non-Engineering
Workload*	3.47	3.11
Uncomfortable Mattress*	2.96	3.04
Uncomfortable Issued Pillow *	2.74	2.75
Mattress Too Hard *	2.72	2.74
Drills (e.g., General Quarters)*	2.71	2.65
Crew Mate Noise (e.g., open/closing rack, chatting, etc.)*	2.70	2.75
Required Meetings *	2.67	2.61
Rack Height (thinking about turning over or sleeping on your side)*	2.57	2.49
Uncomfortable Issued Bedding (i.e., sheets/blanket)*	2.53	2.45
Rack Width*	2.53	2.46
Required Inspections*	2.44	2.25
Ambient Noise (e.g., air system, miscellaneous equipment)*	2.38	2.41
Hot Temperature*	2.33	2.33
Bad Dreams / Nightmares*	2.27	2.11
1MC Announcements*	2.27	2.32
Invasive Lighting*	2.24	2.32
Rack Length*	2.12	2.07
Cold Temperature*	2.07	2.12
Mattress Too Soft *	1.38	1.32

Figure 29. Sleep Factors by Ship Department

Workload Impact on Sleep was the largest negative factor for the Engineering Department and showed a pronounced difference between the Engineering and Non-Engineering departments. Uncomfortable Mattress/Rack was an additional factor impacting sleep, but differences between groups were less pronounced. Drills, Crew Mate Noise, and Required Meetings were also factors of concern, but average responses were more positive (with neutral being 3).

3.6.4.2 SLEEP DISTURBANCES AND SLEEP IMPAIRMENTS

Row Labels	Engineering	Non-Engineering
Sleep Disturbances*	3.43	3.36
Sleep Impairment*	3.08	2.92

**For these questions lower scores represent a more favorable response.*

Figure 30. Sleep Constructs by Ship Department

Both Sleep Disturbances and Sleep Impairment show a higher (and thus more negative) value for Engineering as compared to Non-Engineering Departments.

3.6.5 ACTIVITY ANALYSIS

Analysis was performed to identify differences in how much respondents spend on various daily activities. Figure 30 shows the average lengths of time individuals report allotted to various activities for Engineering and Non-Engineering respondents.

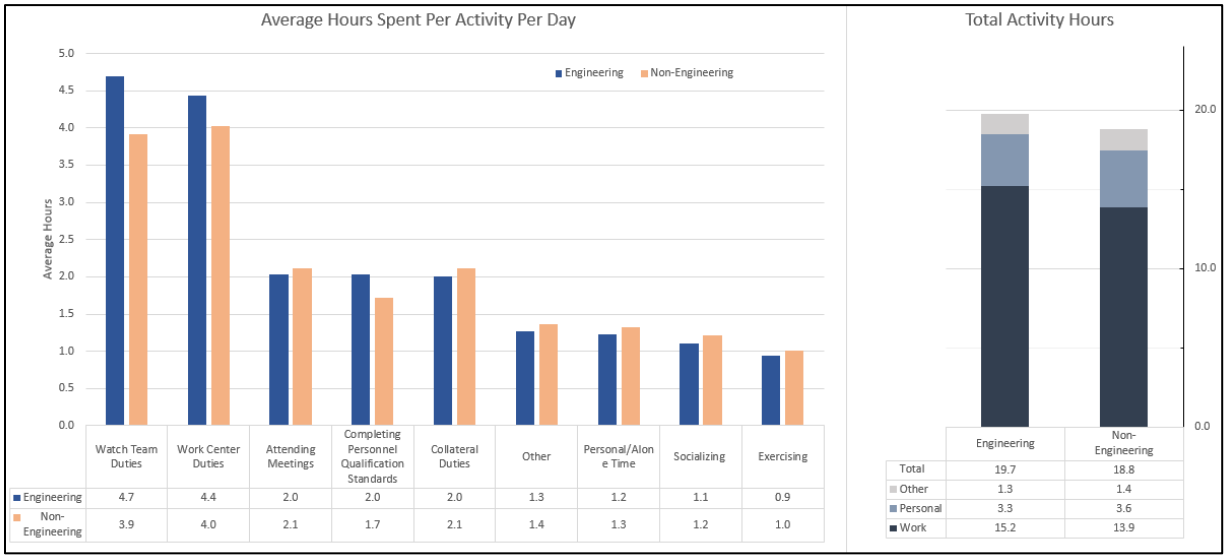


Figure 31. Average Hours Spent Per Activity Per Day (Department)

Those in Engineering departments reported spending an average 15 hours and 12 minutes on work-related activities and 3 hours and 16 minutes on non-work-related activities. All other departments reported spending 13 hours and 52 minutes on work-related activities and 3 hours and 33 minutes on non-work-related activities. Engineering department personnel reported more time being focused on work center and Watch Team duties and slightly less time attending meetings; as well as less time per day devoted to recuperative activities (e.g., personal time, socializing and exercising). Those in the Engineering Department reported spending on average 1 hour and 20 minutes more in work related activities per day than other departments.

3.6.6 FY22- FY23 ANALYSIS

The ASCAS contains questions that have been asked year over year and as part of that process it becomes possible to analyze changes between years for cohorts analyzed. Figure 32 shows the comparison from FY22-FY23 for significant Constructs/Surveyed items. Significance is determined by both the P-Value (<0.005) and Effect Size (±0.25).

Construct/Survey Item	FY22 Mean	FY23 Mean	Effect Size (FY22-23)	P-Value	Difference
Engineering					
Sleep Obtained: onboard your current ship while INPORT.	4.86	5.50	0.44	0.000	0.64
Sleep Availability: onboard your current ship while INPORT.	5.54	6.07	0.32	0.000	0.54
Command Satisfaction	2.85	3.14	0.25	0.000	0.28
Safety Satisfaction	3.20	3.45	0.27	0.000	0.25
Diet	2.79	2.59	0.30	0.000	-0.20
Nap Days: onboard your current ship while INPORT.	1.63	1.00	0.33	0.000	-0.63
Non-Engineering					
Sleep Obtained: onboard your current ship while INPORT.	5.32	5.78	0.32	0.000	0.46
Leadership Assessment of Subordinates	4.00	4.21	0.25	0.000	0.21
Nap Days: onboard your current ship while INPORT.	1.46	0.90	0.30	0.000	-0.55

Figure 32: FY22-FY23 Department Significant Changes

Significant changes for Engineering Department Personnel for FY22-23 include an increase in Sleep Obtained while Inport, Sleep Availability while Inport, Command Satisfaction, and Safety Satisfaction as well as decreases in Diet, and Nap Days while Inport. For Non Engineering Personnel, increases in Sleep Obtained Inport, and Leadership Assessment of Subordinates as well as decreases in Nap Days while Inport were reported.

3.7 FDNF Analysis

Analysis was performed to compare responses from Forward Deployed Naval Forces (FDNF) platforms to their non-FDNF counterparts. Eight platforms (3 MCM, and 5 DDG) were forward deployed at the time that they completed the ASCAS.

Table 16. Number of Ship and Responses by FDNF

FDNF Status	Number of Ships	Number of Responses
FDNF	8	696
Non-FDNF	48	4919

3.7.1 AREAS OF PRAISE AND CONCERN BY FDNF

Survey constructs that scored favorably and unfavorably tended to align those of SURFOR overall. Table 17 details those constructs and the mean scores for the Engineering and non-Engineering subgroups.

Table 17. Areas of Praise and Concern by FDNF vs Non-FDNF

Row Labels	FDNF	Non-FDNF
Leadership Assessment of Subordinates	4.21	4.17
Crew Performance: My department performed well.	3.85	3.76
Crew Performance: I performed well.	3.82	3.80
Supervisor Safety Climate	3.68	3.64
Personal Responsibility for Workplace Safety	3.63	3.58
Command Safety Practices	3.56	3.53
International Fitness Scale: General physical fitness.	3.55	3.55
Job Resources: Equipment	3.53	3.48
Sleep Factors*	2.48	2.45
Job Resources	3.48	3.45
Affective Commitment	2.79	2.74
Anxiety*	3.28	3.20
Burnout	2.70	2.74
Diet	2.65	2.66
Exercise Onboard	2.61	2.87
Sleep Disturbances*	3.41	3.37
Job Demands*	3.54	3.42
Exercise Onboard: Time provided to exercise.	2.34	2.63
Job Stress*	3.88	3.70
Midnight Rations	2.08	2.06

Note:
1. For the table above, higher scores represent a more favorable response, with a mean of 3 being neutral. Favorable scores are colored Blue, and unfavorable scores are shaded Orange. Scores within 0.05 of neutral (3) are shaded white.
2. *For these questions lower scores represent a more favorable response, with a mean of 3 being neutral.

Areas of praise and concern were similar to those seen for SURFOR overall (Table 2). FDNF responded less favorably in Exercise Onboard, Job Stress, and Job Demands.

3.7.2 CONSTRUCTS WITH NOTICEABLE DIFFERENCES IN MEANS

Compared across different constructs, no notable differences were observed between Sailors aligned to FDNF platforms and the rest of the respondents. Table 18 reports the constructs with the most considerable mean differences between the two groups. Note that the only construct determined to be significant (> +-0.25 Effect Size) was Exercise Onboard. Though most results are statistically significant due to large sample sizes, the differences are small and bear little practical significance.

Table 18. Major Mean Differences between FDNF and Non-FDNF Platform

	FDNF		Non-FDNF		T-test		
Item	**Mean**	**SD**	**Mean**	**SD**	**Mean Difference**	**P-Value**	**Effect Size**
Exercise Onboard	2.61	0.96	2.87	1.05	0.26	0.001**	0.25

** For these items lower scores represent a more favorable response*

Most constructs were statistically significant between the groups, but differences were small, as measured by the effect sizes.

3.7.3 COMPARATIVE ANALYSIS

Beyond areas of praise and concern, analysis was conducted to assess how FDNF survey respondents compared to the rest of the fleet. Figure 33 to Figure 38 showcase mean responses.

Construct/Survey Item	FDNF	Non-FDNF
Leadership Assessment of Subordinates	4.21	4.17
Crew Performance: My department performed well.	3.85	3.76
Crew Performance: I performed well.	3.82	3.80
Supervisor Safety Climate	3.68	3.64
Personal Responsibility for Workplace Safety	3.63	3.58
Command Safety Practices	3.56	3.53
International Fitness Scale: General physical fitness.	3.55	3.55
Job Resources: Equipment	3.53	3.48
Job Resources	3.48	3.45
Safety Satisfaction	3.46	3.46
Job Resources: Training	3.45	3.43
Unit Cohesion Department	3.45	3.40
International Fitness Scale: Speed/agility	3.43	3.48
Relevant firefighting / damage control knowledge	3.43	3.48
International Fitness Scale	3.42	3.45
Safety Communication	3.38	3.38
Crew Performance: The command overall performed well.	3.37	3.55
Error Management	3.36	3.44
International Fitness Scale: Flexibility	3.32	3.36
Meaningful Work	3.31	3.33
Organizational Identity (Navy)	3.30	3.37
International Fitness Scale: Cardiorespiratory fitness (e.g., capacity to run for a long-time).	3.29	3.33
Social Support	3.27	3.28
Crew Resilience	3.16	3.23
Command Satisfaction	3.14	3.17
Team Processes: Transition Processes	3.08	3.11
Psychological Safety	3.03	3.00
Leader Assessment	3.02	3.06
Team Processes: Action Processes	3.00	3.00
Team Processes	3.00	3.02
Organizational Identity (Command)	2.93	3.07
Team Processes: Interpersonal Processes	2.91	2.95
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	2.87	3.10
Overall Health	2.87	2.92
No Blame Error Reporting	2.84	2.88
Affective Commitment	2.79	2.74
Burnout	2.70	2.74
Diet	2.65	2.66
Exercise Onboard	2.61	2.87
Exercise Onboard: Time provided to exercise.	2.34	2.63
Midnight Rations	2.08	2.06

Figure 33. Mean Constructs of Interest by FDNF vs Non-FDNF

Differences between FDNF and non-FDNF Sailors were minor, however some small differences are evident.

Construct/Survey Item	FDNF	Non-FDNF
Sleep Factors*	2.48	2.45
Non-Compliance (Individual)*	2.73	2.65
Non-Compliance (Command)*	2.80	2.88
Safety Reporting Behavior*	2.97	2.99
Sleep Impairment*	3.02	2.94
Anxiety*	3.28	3.20
Sleep Disturbances*	3.41	3.37
Job Demands*	3.54	3.42
Job Stress*	3.88	3.70

**For these questions lower scores represent a more favorable response.*

Figure 34. Mean Constructs of Interest by FDNF vs Non-FDNF

Reverse encoded constructs also showed minimal differences between FDNF and non-FDNF respondents, however difference in Job Stress and Job Demands should be noted.

Construct/Survey Item	FDNF	Non-FDNF
Exercise: Inport	3.46	3.46
Exercise: Underway	2.71	2.93
Nap Days: at HOME while inport.	1.42	1.43
Nap Days: onboard your current ship while INPORT.	1.11	0.90
Nap Days: onboard your current ship while UNDERWAY.	1.72	1.55

Figure 35. Mean Constructs of Interest by FDNF vs Non-FDNF (Days Scale)

FDNF respondents reported the same days of exercise as their non-FDNF counterparts, and slightly more naps per week.

Construct/Survey Item	FDNF	Non-FDNF
Mental Health*	11.47	10.86
Physical Health*	5.80	6.38

**For these questions lower scores represent a more favorable response.*

Figure 36. Mean Constructs of Interest by FDNF vs Non-FDNF (Days Scale)

FDNF respondents reported an average of 11.5 days in the last 30 days of poor mental health, compared to 10.9 days for Non-FDNF respondents. Additionally, FDNF respondents reported an average of 5.8 days in the last 30 days of poor physical health, compared to Non-FDNF's 6.4 average.

3.7.4 BREAKDOWN OF SLEEP FACTORS

This section examines the difference in sleep factors between FDNF and Non-FDNF respondents. The factors with the largest negative impact for either group are shown to provide a better understanding of reasons for poor sleep. The Sleep Impairment and Sleep Disturbance Constructs are also shown for reference.

3.7.4.1 SLEEP FACTORS OF HIGHEST CONCERN

Factor	FDNF	Non-FDNF
Workload*	3.44	3.15
Uncomfortable Mattress*	2.90	3.05
Uncomfortable Issued Pillow*	2.79	2.74
Drills (e.g., General Quarters)*	2.72	2.65
Required Meetings*	2.72	2.61
Mattress Too Hard*	2.68	2.74
Hot Temperature*	2.67	2.28
Rack Height (thinking about turning over or sleeping on your side)*	2.61	2.50
Crew Mate Noise (e.g., open/closing rack, chatting, etc.)*	2.57	2.76
Rack Width*	2.51	2.47
Uncomfortable Issued Bedding (i.e., sheets/blanket)*	2.47	2.46
Required Inspections*	2.44	2.27
Ambient Noise (e.g., air system, miscellaneous equipment)*	2.37	2.41
Invasive Lighting*	2.25	2.31
1MC Announcements*	2.24	2.32
Rack Length*	2.17	2.07
Bad Dreams / Nightmares*	2.13	2.15
Cold Temperature*	2.12	2.11
Mattress Too Soft*	1.29	1.34

**For these questions lower scores represent a more favorable response.*

Figure 37. Sleep Factors by FDNF vs Non-FDNF

Workload and Uncomfortable Mattress/Rack were the largest negative factors for the FDNF and non-FDNF groups, but the differences between groups were minor except notable with Workload. Crew Mate Noise, Drills, and Hot Temperature showed more pronounced differences between the groups, but these factors were less negatively reported.

3.7.4.2 SLEEP DISTURBANCE AND SLEEP IMPAIRMENTS

Construct/Survey Item	FDNF	Non-FDNF
Sleep Disturbances*	3.41	3.37
Sleep Impairment*	3.02	2.94

**For these questions lower scores represent a more favorable response.*

Figure 38. Sleep Constructs by FDNF vs Non-FDNF

The Sleep Disturbance and Sleep Impairment constructs showed negligible differences between groups.

3.7.5 ACTIVITY ANALYSIS

Analysis was performed to identify differences in how much time respondents spend on various daily activities. Figure 37 shows the average lengths of time individuals report allotted to various activities for FDNF and Non-FDNF respondents.

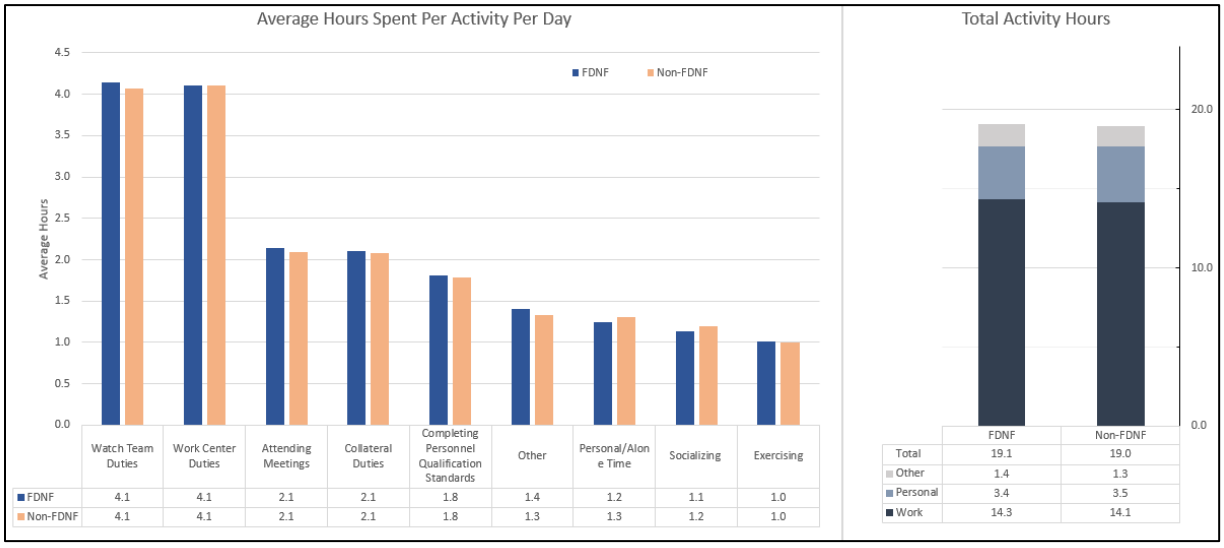


Figure 39. Average Hours Spent Per Activity Per Day (Forward Deployed)

Very few differences emerge from FDNF to Non-FDNF platforms surveyed. On average, FDNF-aligned Sailors reported 14 hours and 18 minutes on work related activities, and 3 hours and 23 minutes on non-work-related activities. Sailors whose platforms were Non-FDNF at the time of the ASCAS reported 14 hours and 8 minutes on work activities and 3 hours and 30 minutes on non-work activities.

3.7.6 FY22- FY23 ANALYSIS

The ASCAS contains questions that have been asked year over year and as part of that process it becomes possible to analyze changes between years for cohorts analyzed. Figure 40 shows the comparison from FY22-FY23 for significant Constructs/Surveyed items. Significance is determined by both the P-Value (<0.005) and Effect Size (±0.25).

Construct/Survey Item	FY22 Mean	FY23 Mean	Effect Size (FY22-23)	P-Value	Difference
FDNF					
Leadership Assessment of Subordinates	3.97	4.21	0.30	0.000	0.25
No Blame Error Reporting	2.61	2.84	0.26	0.000	0.23
Psychological Safety	2.80	3.03	0.26	0.000	0.23
Sleep Availability: onboard your current ship while UNDERWAY.	6.28	5.57	0.40	0.000	-0.71
Non-FDNF					
Sleep Obtained: onboard your current ship while INPORT.	5.23	5.75	0.36	0.000	0.52
Diet	2.84	2.66	0.26	0.000	-0.18
Nap Days: onboard your current ship while INPORT.	1.51	0.90	0.33	0.000	-0.61

Figure 40: FY22-FY23 FDNF Significant Changes

Significant changes for FDNF Ships for FY22-23 include an increase in leadership Assessment of Subordinates, No Blame Error Reporting, and Psychological Safety as well as decreases in Sleep Availability while underway. For Non-FDNF ships, increases in Sleep Obtained Inport were reported as well as decreases in Diet and Nap Days Inport.

3.8 Fit/Fill Analysis

3.8.1 SUMMARY

Responses were compared to Fit/Fill metrics recorded for these platforms at the time the survey was administered. Means and analysis below show the percentage of billets filled and the number of people trained in those billets on each ship (Fit) vs filled by any individual (Fill). The threshold of fill above 95% and fit above 92% was used to dichotomize the fit and fill measure to determine if these manning metrics are associated with safety climate and responses to the ASCAS. Analysis was performed to identify areas of praise and concern for ships below and above the Navy mandated Fill thresholds. Findings were analogous to the overall SURFOR findings (See Table 19).

Table 19. Number of Ships and Responses by Fill Status

Fill Status	Number of Crews	Number of Responses
Below Fill (<.95)	45	4713
Above Fill (>=0.95)	11	900

Table 20. Number of Ships and Responses by Fit Status

Fit Status	Number of Crews	Number of Responses
Below Fit (<.92)	54	5387
Above Fit (>=0.92)	2	156

3.8.2 FIT FILL RATIOS ACROSS PLATFORMS

While the Navy mandates threshold for Fit and Fill across Naval platforms as 92% and 95% respectively, there exist significant differences in ships. The following charts demonstrate some of these differences and alternative methods for comparison across platforms.

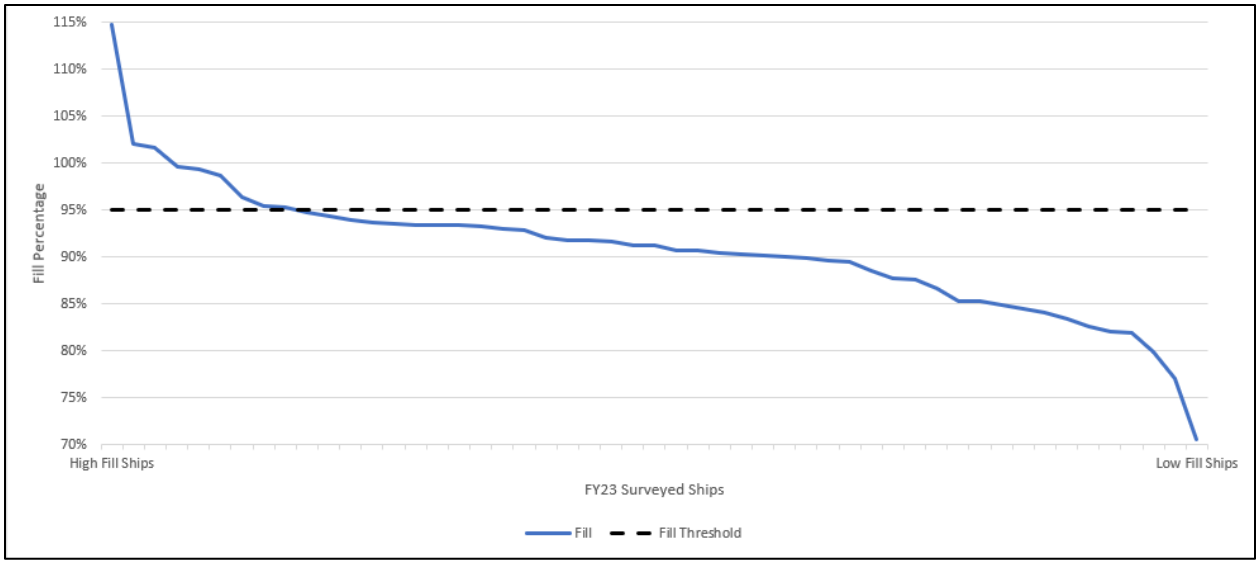


Figure 41. FY23 Ship Fill Curve

In FY23 it is evident that there are only a few ships meeting or exceeding the Navy defined threshold of 95% fill aboard the platforms. The curve also demonstrates there are many other Naval platforms that while not meeting the threshold, are still maintaining above an 80% Fill rate.

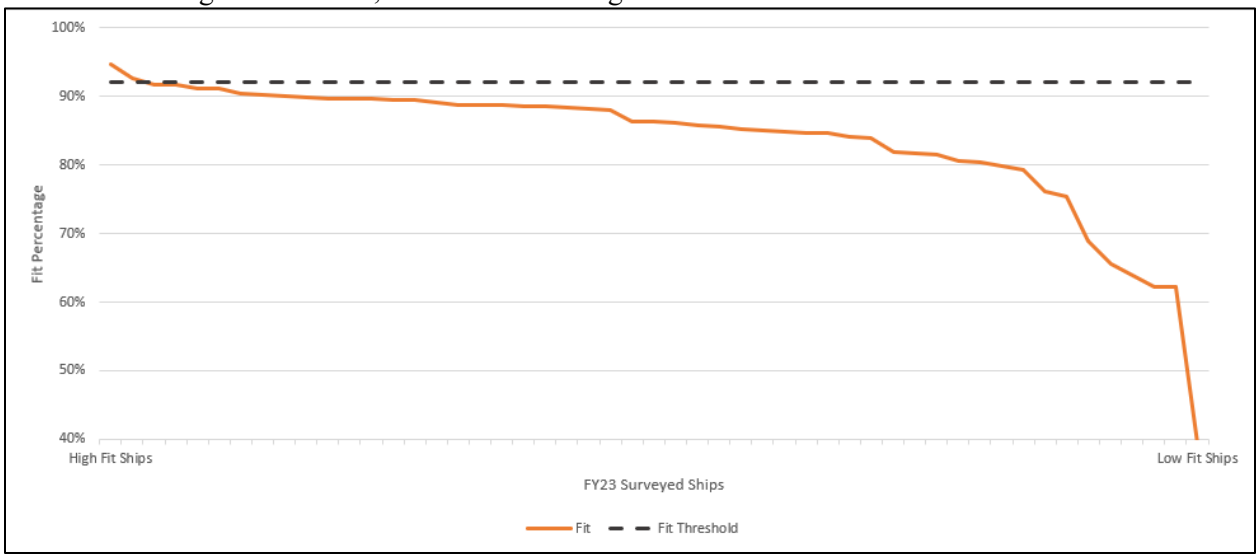


Figure 42: FY23 Ship Fit Curve

The FY23 Fit curve above shows that while only a few ships are maintaining above a 92% fit rate of sailors aboard their platform, a significant number are exceeding an 80% fit rate with some ships showing a significant decrease in Fit values.

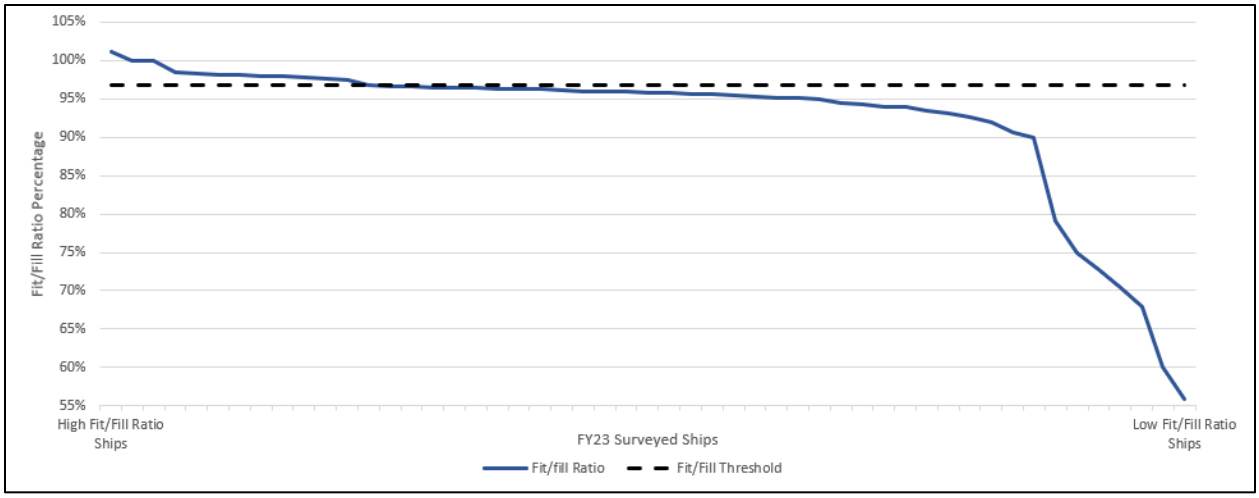


Figure 43: FY23 Ship Fit/Fill Ratio Curve

The Fit/Fill ratio curve above shows a significant number of ships with a greater than 90% Fit/Fill ratio showing that while many ships may not have a full crew, of that crew a high number are fit for their roles. There are several ships that show a sharp decrease in this ratio demonstrating a crew that may not be properly trained for their roles. A total of 43 platforms have a Fit/Fill ratio greater than 90%. This ratio may be important for future analysis regarding the readiness of platforms and may better inform job related stress, anxiety, and performance aboard ships as well as overall attitudes towards command resources and leadership.

3.8.3 CONSTRUCTS WITH NOTABLE DIFFERENCES IN MEANS

The means between the ships above and below Fit/Fill were generally similar. The constructs below are those with the greatest differences between the mean scores. A test of statistical significance is given in Table 21 as well and all are significant but with very low effect sizes.

Table 21. Mean Differences between Below Fill and Above Fill Platforms

	Fill >= 0.95		Fill < 0.95		T-test		
Item	**Mean**	**SD**	**Mean**	**SD**	**Mean Difference**	**P-Value**	**Effect Size**
Midnight Rations	2.24	1.05	2.03	1.05	-0.21	<0.001***	0.20
Team Processes: Transition Processes	2.96	0.92	3.13	0.87	0.17	<0.001***	-0.19
Exercise Onboard	2.67	1.03	2.87	1.04	0.20	<0.001***	-0.19
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	2.89	1.20	3.11	1.22	0.22	<0.001***	-0.18
Command Satisfaction	3.01	1.18	3.20	1.14	0.19	<0.001***	-0.16

** For these items lower scores represent a more favorable response*

As there are only 11 platforms that had an above 95% fill, these results may be skewed toward the particular ship class or individual ships represented. All construct, though statistically significant, had negligible mean differences and hence little practical significance.

Table 22. Mean Differences between Below Fit and Above Fit Platforms

	Fit >= 0.92		Fit < 0.92		T-test		
Item	Mean	SD	Mean	SD	Mean Difference	P-Value	Effect Size
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	2.50	1.05	3.08	1.22	0.57	<0.001***	-0.47
Team Processes	2.69	0.71	3.02	0.82	0.32	<0.001***	-0.40
Team Processes: Action Processes	2.69	0.75	3.00	0.83	0.32	<0.001***	-0.38
Team Processes: Transition Processes	2.78	0.80	3.11	0.88	0.33	<0.001***	-0.38
Exercise Onboard	2.45	0.88	2.83	1.04	0.39	<0.001***	-0.37
Team Processes: Interpersonal Processes	2.62	0.81	2.95	0.92	0.32	<0.001***	-0.36
Psychological Safety	2.70	0.96	3.01	0.89	0.31	<0.001***	-0.35
Organizational Identity (Command)	2.68	1.15	3.05	1.17	0.37	<0.001***	-0.32
Affective Commitment	2.43	1.19	2.75	1.14	0.32	<0.001***	-0.28
Non-Compliance (Command)*	3.14	0.99	2.87	1.00	-0.27	0.001**	-0.27
Unit Cohesion Department	3.15	1.06	3.41	1.02	0.25	0.003**	-0.25

** For these items lower scores represent a more favorable response*

While there were only two platforms with above a 92% fit rate, these two platforms were found to have several significant differences statistically and in terms of effect size. Exercise Onboards and Team Processes were the most predominant differences followed by Psychological Safety, Command Organizational Identity, Affective Commitment, Command Non-Compliance, and Unit Cohesion Department. These differences could be accounted for due to differences in Ship Class and/or differences among individual ships.

3.8.4 COMPARATIVE ANALYSIS

Beyond areas of praise and concern, analysis was conducted to assess how responses of Sailors above and below fit and fill thresholds differed. Figure 44 through Figure 49 showcase mean responses. Additional analysis was completed for fit/fill groups by ship-class. Minimal differences were observed both at an aggregate level and for each ship-class.

Construct/Survey Item	High Fill	Low Fill	High Fit	Low Fit
Leadership Assessment of Subordinates	4.10	4.19	4.10	4.18
Crew Performance: I performed well.	3.79	3.80	3.64	3.80
Crew Performance: My department performed well.	3.75	3.77	3.64	3.77
Supervisor Safety Climate	3.62	3.65	3.51	3.64
Personal Responsibility for Workplace Safety	3.56	3.59	3.47	3.59
International Fitness Scale: General physical fitness.	3.51	3.55	3.59	3.55
International Fitness Scale: Speed/agility	3.48	3.48	3.46	3.48
Crew Performance: The command overall performed well.	3.47	3.54	3.39	3.53
Command Safety Practices	3.46	3.55	3.43	3.53
Job Resources: Equipment	3.45	3.49	3.31	3.49
Relevant firefighting / damage control knowledge	3.43	3.48	3.55	3.47
International Fitness Scale	3.42	3.45	3.47	3.44
Job Resources	3.41	3.46	3.32	3.46
Unit Cohesion Department	3.39	3.41	3.15	3.41
Job Resources: Training	3.39	3.45	3.34	3.44
International Fitness Scale: Flexibility	3.38	3.35	3.46	3.35

Safety Satisfaction	3.38	3.47	3.30	3.46
Organizational Identity (Navy)	3.36	3.36	3.37	3.36
Error Management	3.35	3.44	3.40	3.42
International Fitness Scale: Cardiorespiratory fitness (e.g., capacity to run for a long-time).	3.30	3.33	3.35	3.33
Meaningful Work	3.28	3.33	3.27	3.33
Safety Communication	3.27	3.40	3.16	3.38
Crew Resilience	3.17	3.23	3.03	3.22
Social Support	3.17	3.30	3.25	3.28
Leader Assessment	3.03	3.06	3.02	3.05
Organizational Identity (Command)	3.01	3.06	2.68	3.05
Command Satisfaction	3.01	3.20	2.89	3.17
Team Processes: Transition Processes	2.96	3.13	2.78	3.11
Psychological Safety	2.94	3.02	2.70	3.01
Team Processes: Action Processes	2.91	3.02	2.69	3.00
Team Processes	2.90	3.04	2.69	3.02
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	2.89	3.11	2.50	3.08
Overall Health	2.86	2.92	2.81	2.91
Team Processes: Interpersonal Processes	2.83	2.97	2.62	2.95
No Blame Error Reporting	2.76	2.90	2.76	2.87
Burnout	2.70	2.74	2.59	2.74
Affective Commitment	2.69	2.76	2.43	2.75
Diet	2.68	2.65	2.67	2.66
Exercise Onboard	2.67	2.87	2.45	2.83
Exercise Onboard: Time provided to exercise.	2.45	2.62	2.41	2.59
Midnight Rations	2.24	2.03	2.14	2.06

Figure 44. Mean Constructs of Interest by Fit/Fill

Row Labels	High Fill	Low Fill	High Fit	Low Fit
Sleep Factors*	2.45	2.45	2.50	2.45
Non-Compliance (Individual)*	2.61	2.67	2.64	2.66
Non-Compliance (Command)*	2.92	2.86	3.14	2.87
Sleep Impairment*	3.01	2.94	3.14	2.95
Safety Reporting Behavior*	3.02	2.98	3.07	2.98
Anxiety*	3.24	3.21	3.36	3.20
Sleep Disturbances*	3.38	3.37	3.56	3.37
Job Demands*	3.48	3.42	3.48	3.42
Job Stress*	3.80	3.71	3.74	3.72

**For these questions lower scores represent a more favorable response.*

Figure 45. Mean Constructs of Interest by Fit/Fill

Row Labels	High Fill	Low Fill	High Fit	Low Fit
Exercise: Inport	3.27	3.50	3.14	3.47
Exercise: Underway	2.64	2.96	2.90	2.91
Nap Days: at HOME while inport.	1.40	1.44	1.72	1.42
Nap Days: onboard your current ship while INPORT.	1.00	0.91	0.93	0.93
Nap Days: onboard your current ship while UNDERWAY.	1.66	1.55	1.84	1.57

Figure 46. Mean Constructs of Interest by Fit/Fill (Days Scale)

Row Labels	High Fill	Low Fill	High Fit	Low Fit
Mental Health*	10.96	10.93	12.17	10.93
Physical Health*	6.29	6.31	5.60	6.29

**For these questions lower scores represent a more favorable response.*

Figure 47. Mean Constructs of Interest by Fit/Fill (Days Scale, Reverse Encoded)

3.8.5 BREAKDOWN OF SLEEP FACTORS

The Sleep Factors construct is composed of 19 questions in the survey. This section examines the difference in sleep factors between respondents above and below the fit and fill thresholds. The factors with the largest negative impact for either group are shown to provide a better understanding of reasons for poor sleep. The Sleep Impairment and Sleep Disturbance Constructs are also shown for reference.

3.8.5.1 SLEEP FACTORS OF HIGHEST CONCERN

Factor	Fill High	Fill Low	Fit High	Fit Low
Workload	3.23	3.18	3.12	3.19
Uncomfortable Mattress	3.06	3.02	3.32	3.02
Required Meetings	2.71	2.60	2.53	2.62
Uncomfortable Issued Pillow	2.68	2.76	2.83	2.75
Crew Mate Noise (e.g., open/closing rack, chatting, etc.)	2.65	2.75	2.93	2.73
Mattress Too Hard	2.65	2.75	2.87	2.73
Drills (e.g., General Quarters)	2.63	2.66	2.59	2.66
Rack Height (thinking about turning over or sleeping on your side)	2.58	2.50	2.54	2.51
Rack Width	2.48	2.48	2.44	2.48
Hot Temperature	2.47	2.31	2.67	2.32
Uncomfortable Issued Bedding (i.e., sheets/blanket)	2.45	2.47	2.60	2.46
1MC Announcements	2.37	2.30	2.53	2.30
Ambient Noise (e.g., air system, miscellaneous equipment)	2.37	2.41	2.33	2.41
Invasive Lighting	2.32	2.30	2.49	2.30
Required Inspections	2.28	2.30	2.28	2.30
Bad Dreams / Nightmares	2.13	2.15	2.30	2.14
Rack Length	2.07	2.08	2.02	2.08
Cold Temperature	2.06	2.12	1.96	2.11
Mattress Too Soft	1.33	1.34	1.26	1.34

**For these questions lower scores represent a more favorable response.*

Figure 48. Sleep Factors by High and Low Fit and Fill

Workload Impact and Uncomfortable Mattress/Rack on Sleep were the largest negative factors for the fit/fill groups, but the differences between groups were minor. Differences in Fit High and Fit low may be accounted for by low number of ships with a High Fit value.

3.8.5.2 SLEEP DISTURBANCE AND SLEEP IMPAIRMENT

Row Labels	High Fill	Low Fill	High Fit	Low Fit
Sleep Disturbances*	3.38	3.37	3.56	3.37
Sleep Impairment*	3.01	2.94	3.14	2.95

**For these questions lower scores represent a more favorable response.*

Figure 49. Sleep Factors by Fit/Fill

Consistent with the highlighted sleep factors, the Sleep Disturbance and Sleep Impairment constructs showed small differences between groups. Differences between High Fit and Low Fit can be accounted for by low number of ships with a High Fit value.

3.8.6 ACTIVITY ANALYSIS

Analysis was performed to identify differences in how much respondents spend on various daily activities. Figure 44 shows the average lengths of time individuals report allotted to various activities for below 92% Fit and above 92% Fit respondents. Activity analysis by fill status was nearly identical to that of fit.

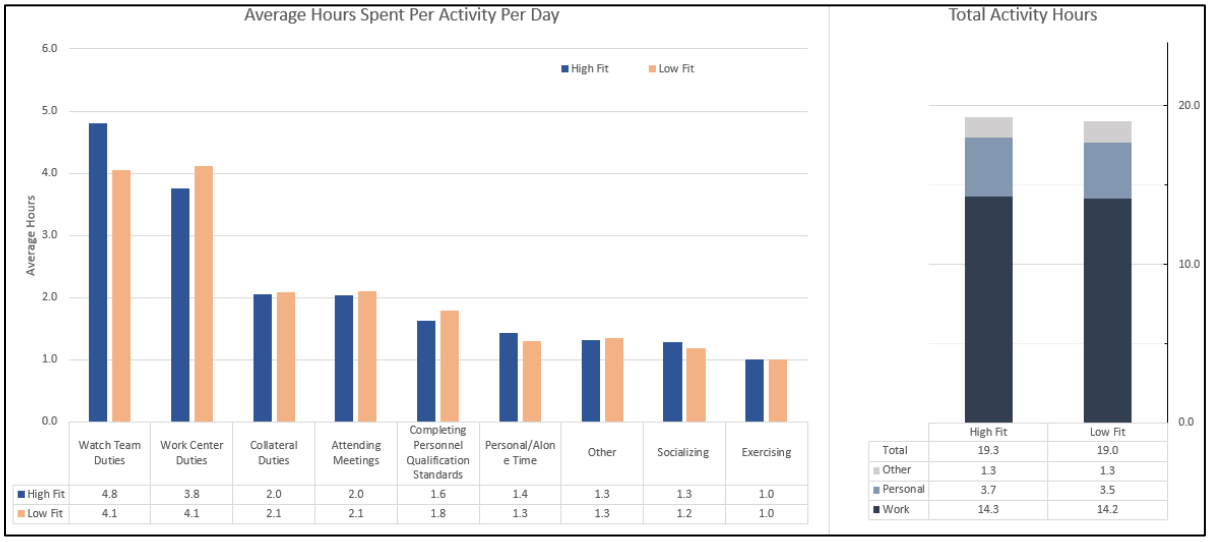


Figure 50. Average Hours Spent per Activity per Day (Fit)

Sailors on platforms that were below 92% Fit reported spending an average of 14 hours and 9 minutes on work-related activities and 3 hours and 29 minutes on non-work-related activities. Sailors on platforms above 92% Fit reported spending 14 hours and 15 minutes on work-related activities and 3 hours and 44 minutes on non-work-related activities.

Of note, Sailors aboard High Fit platforms reported spending 4 hours and 48 minutes on Watch Team Duties while Low Fit platforms reported spending 4 hours and 3 minutes on the same activity. Additionally High Fit platforms only reported spending 3 hours and 45 minutes on Work Center Duties while Low Fit platforms reported 4 hours and 7 minutes for the same activity.

3.9 OFRP Analysis

The ASCAS instructions require commands to complete the survey during READ-E1 (Basic) and READ-E5 (Sustainment) phases of the OFRP. Analysis was performed to assess whether phase correlated with aggregate responses of the constructs of interest amongst 44 Basic-phase and 27 Sustainment-phase crews.

Table 23. Number of Ships and Responses by OFRP Phase

OFRP Phase	Number of Ships	Number of Responses
READ-E1	25	2848
READ-E5	28	2390

3.9.1 CONSTRUCTS WITH NOTABLE DIFFERENCES IN MEANS

Table 24 shows the differences between these means and their tests of significance and effect size.

Table 24. Constructs with Significant Differences in Means Based on OFRP (Effect Size ≥0.25)

	READ-E1		READ-E5		T-test		
Item	Mean	SD	Mean	SD	Mean Difference	P-Value	Effect Size
Exercise Onboard	3.03	1.03	2.58	1.01	-0.45	<0.001***	0.44
Exercise Onboard: Time provided to exercise.	2.82	1.26	2.33	1.22	-0.49	<0.001***	0.40
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	3.24	1.18	2.83	1.22	-0.41	<0.001***	0.34
Job Demands*	3.32	0.89	3.55	0.89	0.23	<0.001***	0.25

** For these items lower scores represent a more favorable response*

The table above details the constructs with the most considerable mean differences between READ-E1 and READ-E5. Those in READ-E1 had significantly better scores on Exercise Onboard and Job Demands than READ-E5. All constructs were statistically significant between the groups and were of small to medium effect sizes.

3.10 CO Demographics Analysis

During the administering of ASCAS, CO gender and race information is captured to explore whether or not differences are observed based on the gender or race of a CO. This analysis is exploratory, and the conclusions—while they may appear compelling—are very much provisional and subject to change as more data is collected. These conclusions should be tempered by the fact that sample sizes are small and confounding variables not captured in these data are present. As only 3 ships with Female COs were surveyed in FY23, analysis of CO gender has been removed due to small sample sizes.

3.10.1 CO RACE

Analysis was completed to identify differences between respondents based on CO race. Due to low numbers of minority COs, initial analysis was completed on White and Non-white subgroups.

Table 25. Number of Crews and Responses by CO Race

CO Race	Number of Crews	Number of Responses
White	52	4860
Non-White	4	753

Differences between white and non-white COs were minimal. Figure 47 depicts means for Likert constructs.

Construct/Survey Item	Non-White	White
Leadership Assessment of Subordinates	4.17	4.18
Crew Performance: I performed well.	3.78	3.80
Crew Performance: My department performed well.	3.74	3.77
Supervisor Safety Climate	3.61	3.65
Personal Responsibility for Workplace Safety	3.58	3.59
International Fitness Scale: General physical fitness.	3.57	3.54
Command Safety Practices	3.54	3.53
Firefighting/Damage Control Knowledge: Relevant firefighting / damage control knowledge	3.53	3.46
International Fitness Scale: Speed/agility	3.48	3.48
International Fitness Scale	3.47	3.44
Crew Performance: The command overall performed well.	3.45	3.54
Safety Satisfaction	3.43	3.46
Job Resources: Equipment	3.43	3.50
Job Resources	3.41	3.46
Job Resources: Training	3.41	3.44
International Fitness Scale: Flexibility	3.40	3.35
Safety Communication	3.36	3.38
Error Management	3.36	3.44
International Fitness Scale: Cardiorespiratory fitness (e.g., capacity to run for a long-time).	3.34	3.33
Unit Cohesion Department	3.32	3.42
Organizational Identity (Navy)	3.29	3.37
Meaningful Work	3.28	3.33
Crew Resilience	3.24	3.22
Social Support	3.17	3.29
Command Satisfaction	3.12	3.17
Team Processes: Transition Processes	3.09	3.11
Leader Assessment	3.03	3.06
Team Processes	2.99	3.02
Team Processes: Action Processes	2.97	3.00
Psychological Safety	2.96	3.02
Overall Health	2.94	2.91
Organizational Identity (Command)	2.93	3.07
Team Processes: Interpersonal Processes	2.92	2.95

No Blame Error Reporting	2.88	2.88
Exercise Onboard: Shipboard exercise facilities (i.e., fitness equipment and space).	2.77	3.12
Burnout	2.76	2.73
Exercise Onboard	2.73	2.85
Exercise Onboard: Time provided to exercise.	2.69	2.58
Affective Commitment	2.63	2.77
Diet	2.62	2.66
Midnight Rations	1.94	2.09

Figure 51. Mean Constructs of Interest by CO Race

Minimal differences exist between constructs of interest in Figure 45 and demonstrate that CO Race is likely not a determining factor in differences between ships.

Construct/Survey Item	Non-White	White
Sleep Factors*	2.61	2.43
Non-Compliance (Individual)*	2.74	2.65
Non-Compliance (Command)*	2.92	2.86
Sleep Impairment*	2.94	2.96
Safety Reporting Behavior*	2.98	2.99
Anxiety*	3.18	3.22
Job Demands*	3.26	3.46
Sleep Disturbances*	3.44	3.36
Job Stress*	3.62	3.74

**For these questions lower scores represent a more favorable response.*

Figure 52. Mean Constructs of Interest by CO Race, Reverse Encoded

For the reverse encoded items in Figure 46, small differences exist between groups Job Demands and Job Stress but this may be accounted for by the small number of ships surveyed with Non-White COs.

Construct/Survey Item	Non-White	White
Exercise: Inport	3.83	3.40
Exercise: Underway	3.33	2.84
Nap Days: at HOME while inport.	1.58	1.41
Nap Days: onboard your current ship while INPORT.	1.04	0.91
Nap Days: onboard your current ship while UNDERWAY.	1.50	1.58

Figure 53. Mean Constructs of Interest by CO Race, Days Scale

Differences exist between exercise both inport and underway for Non-White and White CO ships. This may be accounted for by the small number of ships with Non-White COs that were surveyed in FY23.

Construct/Survey Item	Non-White	White
Mental Health*	10.58	10.99
Physical Health*	6.74	6.24

**For these questions lower scores represent a more favorable response.*

Figure 54. Mean Constructs of Interest by CO Race (Days Scale)

Minimal Differences exist between days of bad mental or physical health days between Non-White and White CO platforms.

4 SUMMARY OF ADVANCED ANALYTICS

4.1 Overview

Descriptive statistics can inform command practices by providing the senior leadership with a snapshot of organizational climate and safety climate at a given point in time. While these metrics are informed by the best available scientific findings from the academic literature, there are unique factors in a military operating environment that may not be addressed by other sources. The ASCAS data provide an opportunity to gain deeper insight from the data by using advanced analytical techniques. For example, descriptive statistics might provide information about the number of safety incidents Sailors did not report, but logistic regression techniques can weigh the relative contribution of varied factors that might lead a Sailor to not report safety issues. This information can then inform potential interventions and next steps that enhance safety culture rather than provide descriptive information about its status.

The FY23 ASCAS report contains two analytical priorities with topics that include: Open Ended Comment Topics, sleep analysis: factors affecting sleep, safety effects, mental health effects. Brief overviews of findings are in the following sections; full detail briefs are also available on request to the author.

4.2 FY23 Open Ended Comment Topics

Included in the FY23 ASCAS survey are three open ended comments sections where sailors can respond freely to the following questions:

- As we truly value your opinions, please feel free to share any thoughts that you might have concerning safety-related issues (e.g., ideas to improve workplace safety) and/or human performance issues (e.g., ideas to improve onboard sleep, exercise, and nutrition) at your current command.
- Please describe the BEST safety-related behaviors/practices that you have witnessed at your current command?
- Please describe the WORST safety-related behaviors/practices that you have witnessed at your current command?

While the FY23 ASCAS Survey includes a broad range of surface ship related climate and safety constructs, it does not account for all possible feedback and scenarios that can occur aboard a ship. Hence the open-ended comment sections add additional depth to feedback for commanders and provide a broader sense to the climate aboard these ships.

The open-ended comment sections can provide a broad understanding of the climate aboard ships, but this can be difficult to analyze quantitatively and objectively as many comments can relate to several topics, include sensitive subjects (accidents, depression, etc.). In order to best analyze these comments in a quick and robust way, a methodology was developed utilizing Natural Language Processing (NLP) techniques to quantify and cluster each comment and topic areas that were common across the ships surveyed. These methods are used as well because of the large number of comments that are submitted with surveys. In FY23 more than 4300 comments were submitted for feedback and a manual review of these, while possible, is unsustainable and inaccurate in large volumes.

4.2.1 METHODOLOGY

To quantify each comment, the pre-trained language model MPNet was utilized to create the embeddings for the comments included in the ASCAS survey. A word embedding model takes text input and computes (encodes) that text as a vector representation in a word embedding space. Encoded text that are close in that vector space often have the same sematic meaning and representation. For instance the sentences “The dog went on a walk” and “After the trip to the store, I went on a walk with my dog” would have a relatively close proximity in a vector space as similar ideas are expressed. The MPNet model utilizes the advantages of both Masked language Modelling (MLM) and Permuted Language Modelling (PLM) by using the dependency among predicted tokens and taking the auxiliary position information for tokens as input to reduce the position dependency. MPNet was trained on 160GB of text data to learn general patterns, nuances, and structures of the English Language. With MPNet, the content is distilled into abstract concepts represented by vectors that can be analyzed quantitatively.

Once encoded, a K-Means clustering algorithm was performed to align the individual comments into large clusters. The number of clusters was chosen utilizing an ‘Elbow” method, seeking to find an optimal number of clusters based on the internal sum of squared distances in each cluster. The number of clusters may change over time depending on the types of comments expressed, differences in respondents, etc. Utilizing this method across all comments, 10 clusters were determined to be optimally number of clusters for FY23 ASCAS Comments.

Once a number of clusters was determined, the TextRank Algorithm was run against comments within the cluster to identify keyword and sentence extraction. TextRank is a graph based ranking model built upon ideas first introduced in Google’s PageRank algorithm utilizing the linkage that exists between words instead of linkages in webpages to determine the “most Important” nodes within the graph. These most important nodes categorize the most important words for the particular cluster and can give insight into the types of topics that the cluster includes. Once these keywords are established, a topic is then assigned to each keyword cluster to represent the cluster and the associated comments.

Once topics are assigned to cluster, analysis is conducted for each of the interested cohorts to establish how frequent a particular topic is established within that cohort. The inter-cohort analyses can be used to establish differences in how various cohorts respond and the types of topics that are more important to different groups.

4.2.2 RESULTS

As described in Section 4.2.1, clusters are identified through TextRank for each cluster of comments to best identify the most relevant words for each cluster and then identified as a given cluster. For instance a cluster containing top key words such as: Safety, Sailor, Ship, Work, Onboard, Training might best be described as a “Workplace Safety” topic. Each of the identified clusters are outlined in Figure 55 to Figure 63 with their respective top 30 associated words and importance.

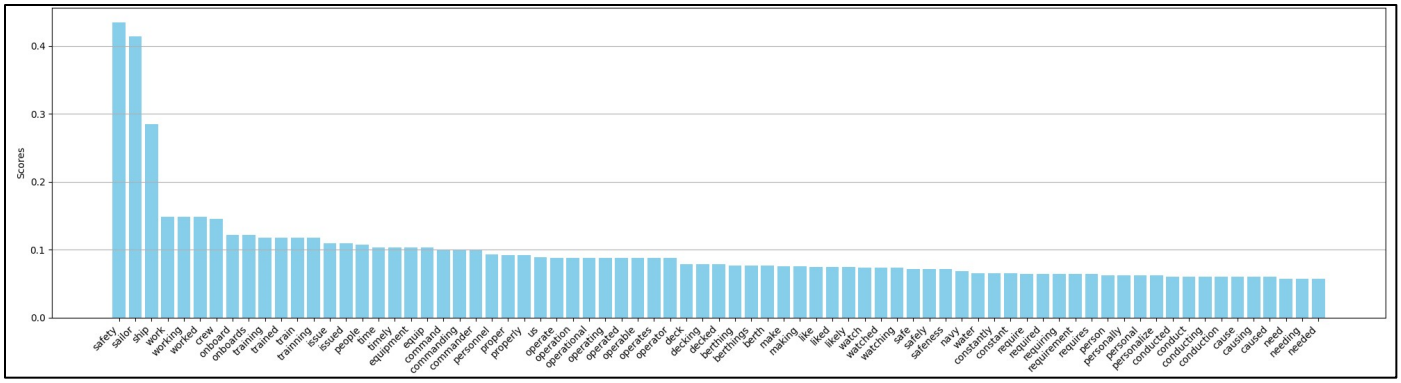


Figure 55: Topic Analysis: Workplace Safety

Top Keywords in the Workplace Safety Topic include Safety, Sailor, Ship, Work, Crew, Onboard, Training, and Issue.

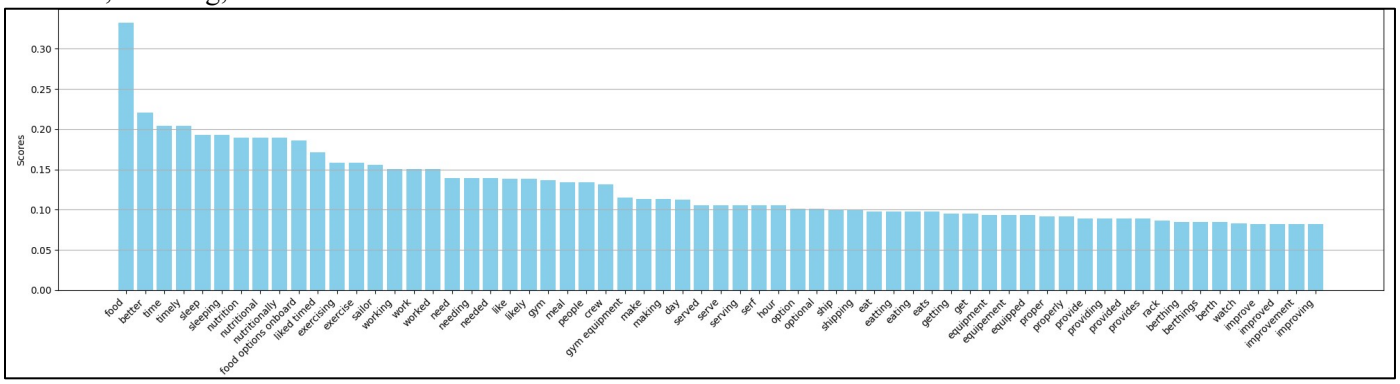


Figure 56: Topic Analysis Food and Health

Top keywords in the Food and Health Topic include Food, Better, Time, Sleep, Nutrition, Food Options, Exercise, Sailor, and Work.

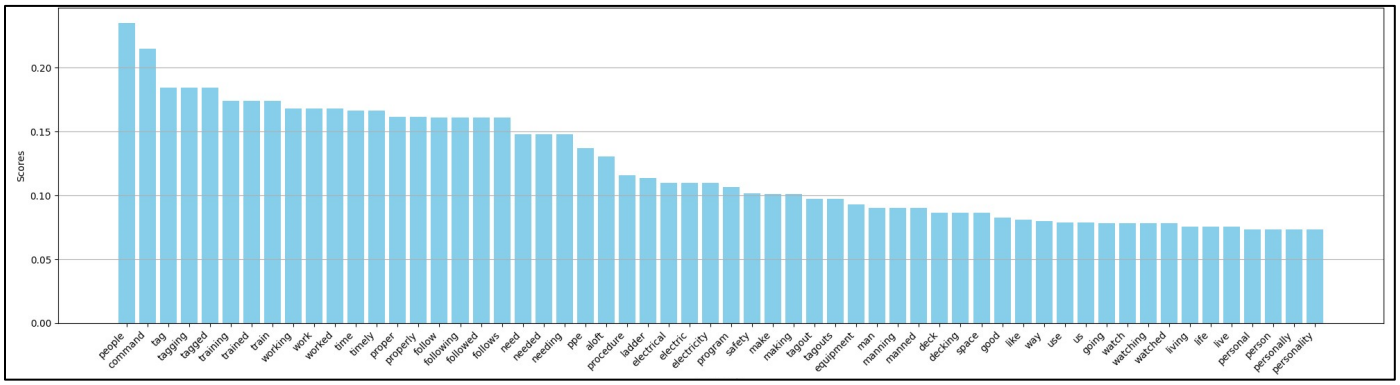


Figure 57: Topic Analysis Procedures and Training

Top keywords for the Procedures and Training Topic include People, Command, Tag (out), Training, work, time, proper, follow, need, PPE, Aloft, Procedure, Ladder, Electrical, Program, and Safety.

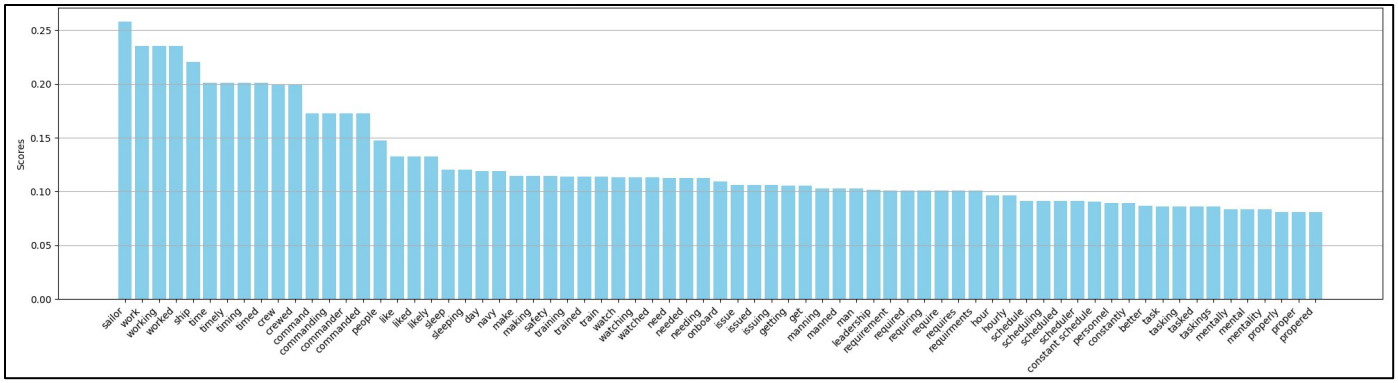


Figure 58: Topic Analysis: Daily Activities

Top keywords in the Daily Activities topic include Sailor, Work, Ship, Time, Crew, Command, Sleep, day, Navy, Safety, Training, Watch, need, onboard, issue, manning, leadership, required, hour, scheduling and personnel.

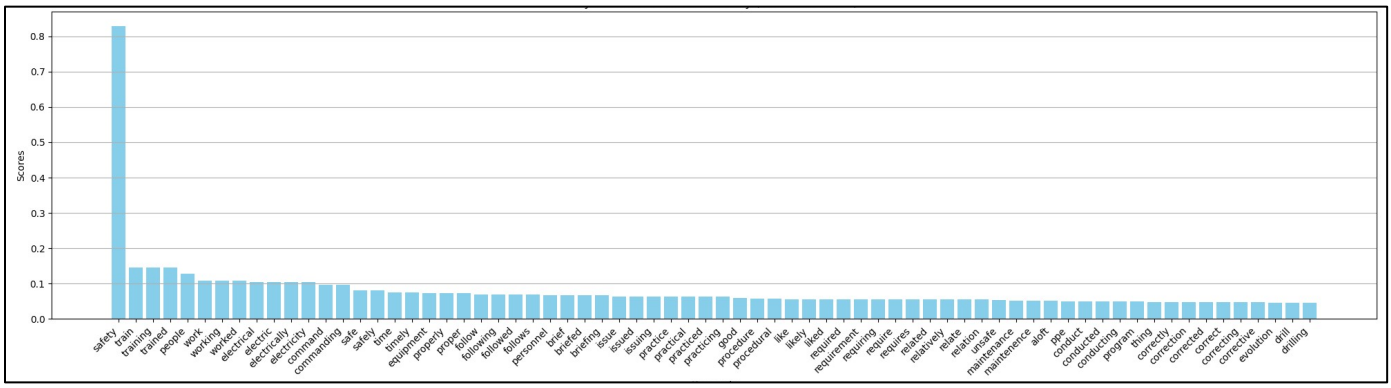


Figure 59: Topic Analysis: Safety

Top keywords in the Safety topic include safety, training, people, work, electrical, and command.

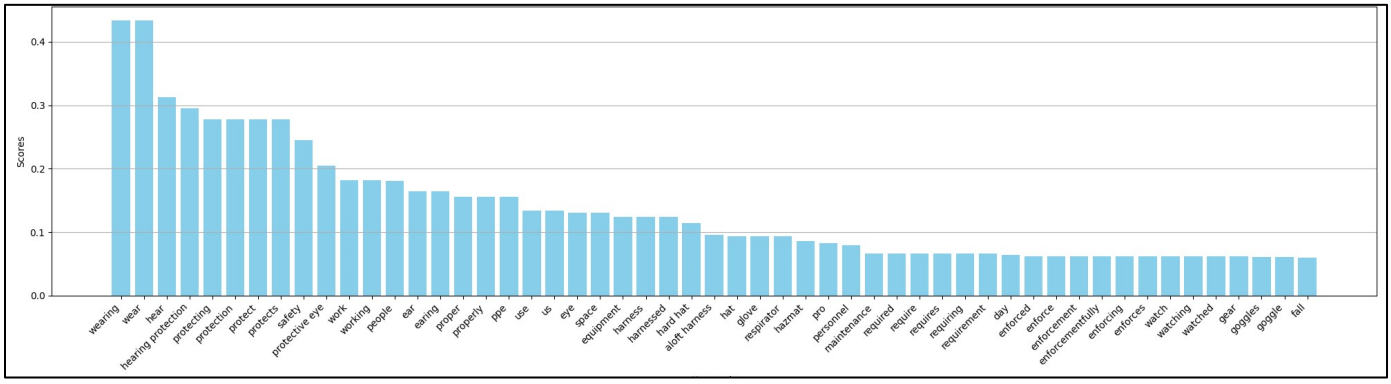


Figure 60: Topic Analysis: Safety Equipment

Top keywords in the Safety Equipment topic include Wearing, hearing protection, protect, safety, protective eye, work, ear, proper, PPE, and space.

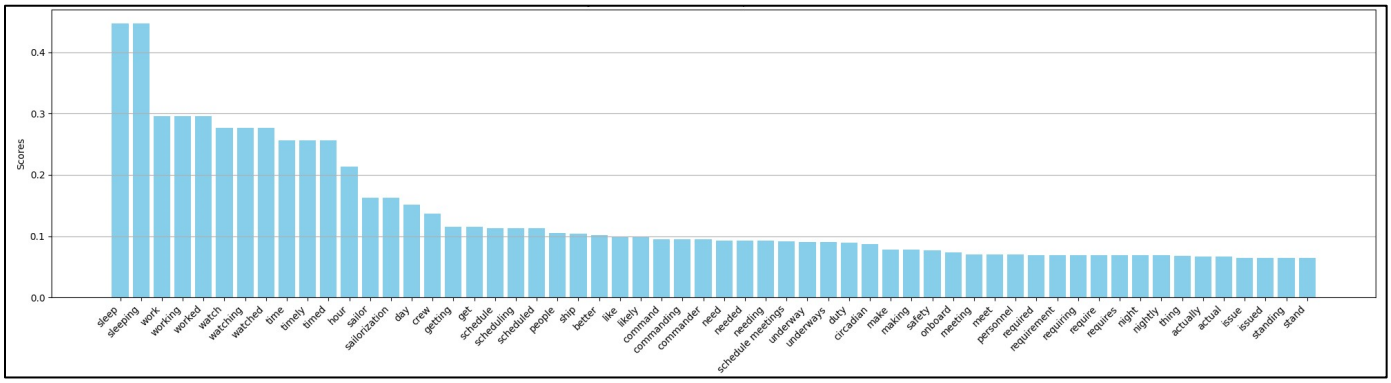


Figure 61: Topic Analysis: Sleep

Top keywords in the sleep topic include sleep, work, watch, time, hour, sailor, day, crew, get, schedule, people, better, and command.

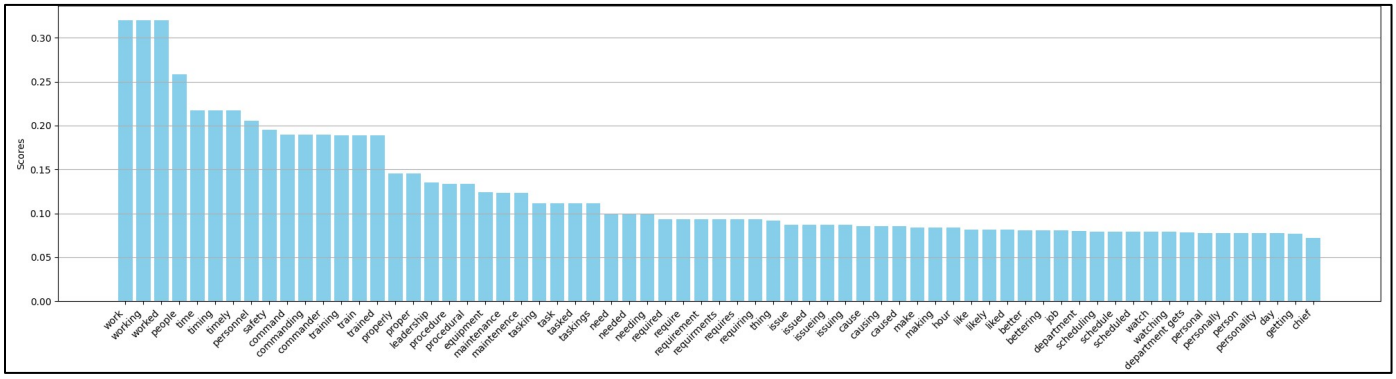


Figure 62: Topic Analysis: Work Related Activities

Top keywords in the Work-Related Activities topic include: Work, people, time, personnel, safety, command, train, proper, leadership, procedure, maintenance, tasking, need, requirement and issue.

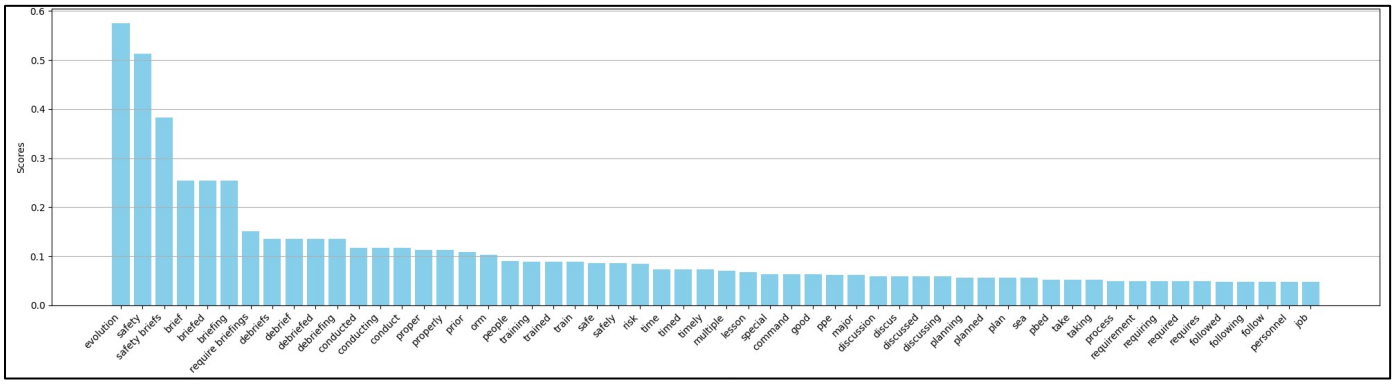


Figure 63: Topic Analysis: Evolution, Safety Briefs

Top keywords in the Evolution, Safety Briefs topic include Evolution, safety, safety briefs, briefs, required briefs, debriefs, conducted, proper, prior, people, training, risk, time, multiple, special, and command.

For each of the outlined topics above, keywords represent the most important words to the cluster of comments in the space and do not suggest that all comments contain the same types of information or the same subset of key words. As there may be many comments that contain several different ideas, there is overlap in some of the keywords and their frequency. For instance, the word "safety" appears across most topics likely due to the prompt for the open-ended response also containing the word safety so many individuals respond using that word or variations of it.

Once each comment is categorized into a topic, subsets of comments based on interesting cohorts can occur. For this study, cohorts included: CNSP/CNSL, Officer/Enlisted, and Engineering/Non-Engineering. As they were remarkably similar, Workplace Safety and Safety topics were combined into a single topic for ease of understanding.

4.2.2.1 CNSP (PAC)/CNSL (LANT) FY23

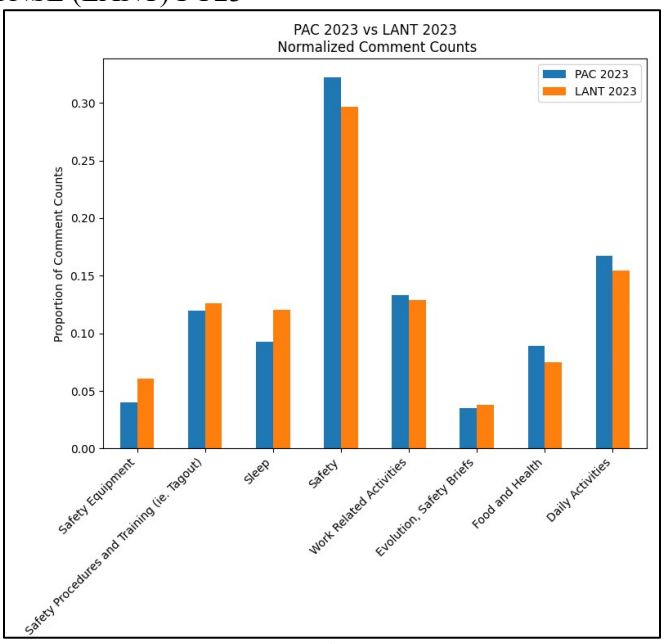


Figure 64: FY23 PAC/LANT Topic Frequency

Figure 64 shows that PAC received a higher frequency of comments related to safety, daily activities, food and health and work-related activities while LANT received a higher frequency of comments related to safety equipment, safety procedures and training, sleep and evolutions.

4.2.2.2 OFFICER/ENLISTED FY23

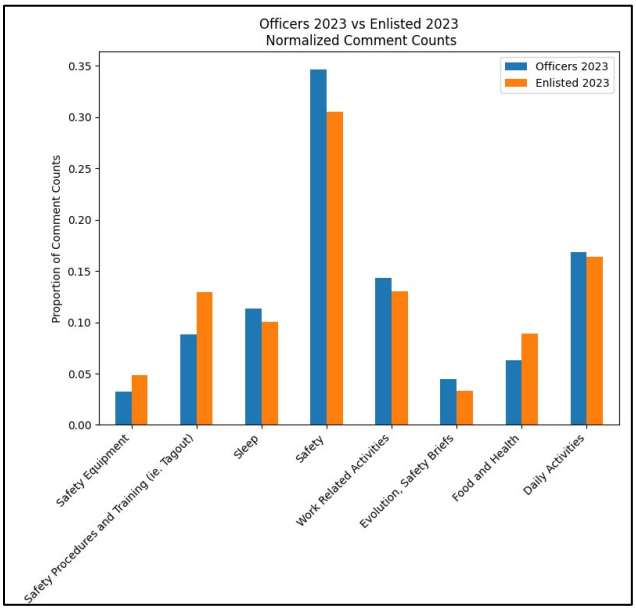


Figure 65: FY23 Officers/Enlisted Topic Frequency

Figure 65 shows that Officers had a higher frequency of comments related to sleep, safety, evolutions/safety briefs, and daily activities while Enlisted personnel had a high frequency of comments related to safety equipment, safety procedures, and food/health.

4.2.2.3 ENGINEERING/NON-ENGINEERING FY23

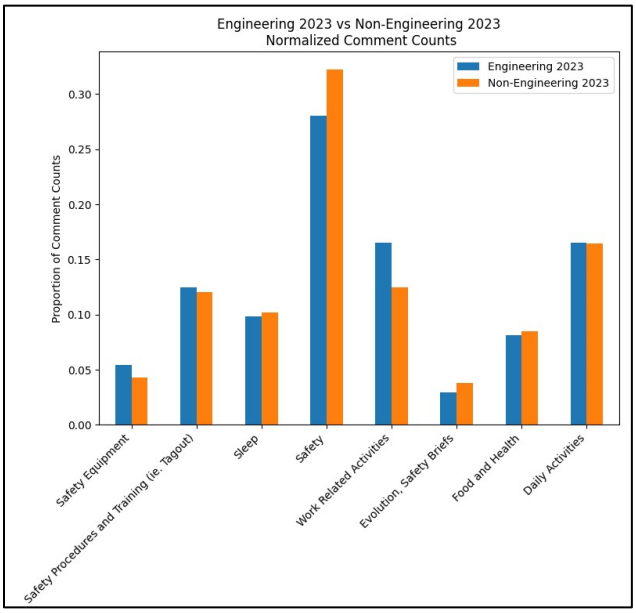


Figure 66: FY23 Engineering/Non-Engineering Topic Frequency

Figure 66 shows that Engineering Department personnel had a higher frequency of comments related to work related activities, safety equipment, safety procedures and daily activities while Non-Engineering personnel had a high frequency of comments related to sleep, safety, evolution/safety briefs, and food and health.

4.2.3 CONCLUSION

This section presents a novel approach to topic analysis within ASCAS comments and provides interesting information about the types of comments, keywords, and topics that are most important to the sailors providing feedback. As shown in previous studies, sleep and food/health continue to be important topics for sailors aboard ships in addition to work related activities and safety related activities. The continued refinement of this model will help identify common topics and time-based analysis of topic movement as new ASCAS surveys are conducted. While NLP and free text analysis can be difficult, there continue to be added benefits for exploring new techniques and adding additional resources for context to the survey.

4.2.4 FUTURE ANALYSIS

Future analysis and methodologic refinement should include a ship-based analysis for topic modeling as well as the ability to identify multiple topics within a comment. This will further refine the topic analysis from more general comments to more specific comments addressing very specific issues within the navy. Additionally, future analysis should include a time-based component to see how frequent topics are through time and if specific topics are increasing or decreasing in frequency.

4.2.5 REFERENCES

Rada Mihalcea and Paul Tarau. 2004. TextRank: Bringing Order into Text. In Proceedings of the 2004 Conference on Empirical Methods in Natural Language Processing, pages 404–411, Barcelona, Spain. Association for Computational Linguistics.

Kaitao Song , Xu Tan, Tao Qin, Jianfeng Lu, and Tie-Yan Liu. 2020. MPNet: Masked and Permuted Pre-training for Language Understanding. arXiv:2004.09297 [cs]

J. MacQueen (1967). Some methods for classification and analysis of multivariate observations. Proc. Fifth Berkeley Symp. on Math. Statist. and Prob., Vol. 1 (Univ. of Calif. Press, 1967), 281--297.

4.3 Sleep Analysis

The availability of sleep aboard ships is an ongoing priority for the Navy as fatigue and exhaustion has been recognized as a contributing factor to several high-profile incidents in the last decade including the two major ship collisions that spurred the ASCAS initiative. Continual analysis of sleep factors, indicators, and deficits can improve the overall safety climate aboard ships as well as improve quality of life for sailors. The availability of sleep onboard ships has been mandated at 7.5 hours being provided for sailors. In this analysis a comparison is conducted looking at the overall sleep obtained as compared to the naval mandate as well as identify sleep deficits with Sailors as correlated with Job Stress, Anxiety and Burnout.

The primary measures and terms used in the section are as follows:

Sleep Available - A self-reported value indicating on average how many hours are available for you to sleep while either At Home, Inport, or Underway. This value is reported as an integer value.

Sleep Obtained – A self-reported value indicating on average how many hours of regular sleep (excluding naps) do you get while either At Home, Inport, or Underway. This value is reported as an integer value.

Navy Mandate – The Navy has mandated that 7.5 hours of protected sleep hours be available to sailors daily. This increment is either an uninterrupted 7.5-hour increment or split into a 6 hour sleep period with

an uninterrupted 1.5 hours restorative nap (COMNAVSURFPACINST/COMNAVSURFLANTINST 3120.2A.)

Sleep Well Rest - A self-reported value indicating on average how many hours of sleep do you require to feel well-rested. This value is reported as an integer value.

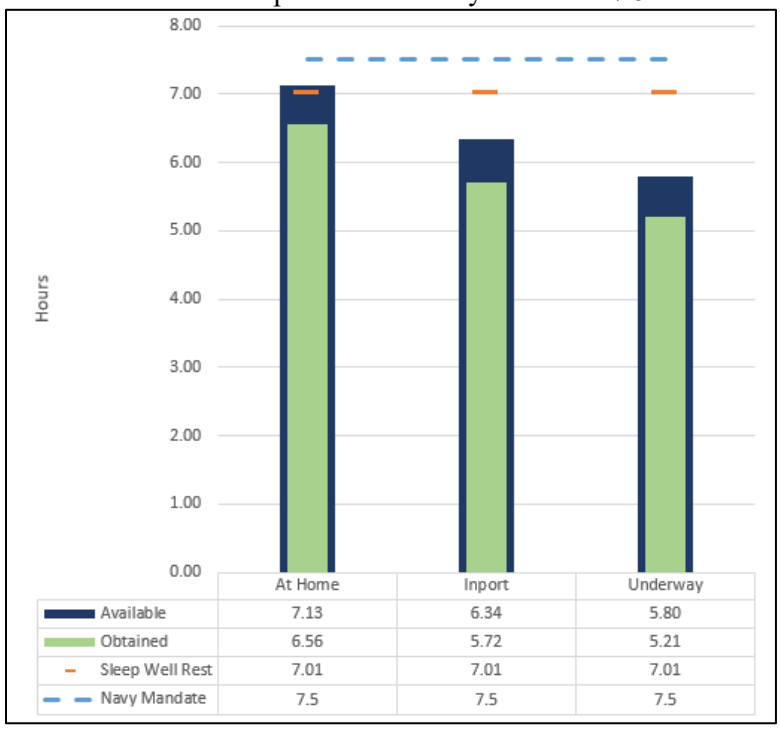
Sleep Deficit – A sleep deficit is defined in this report as the difference between Sleep Well Rest and Sleep Obtained for an individual sailor. If a sailor obtains less sleep than is required to feel well rested, then this is considered a deficit. For our analysis a positive number indicates a sleep deficit whereas a negative number indicates more sleep than required to feel well rested.

4.3.1 SLEEP AT HOME, INPORT, AND UNDERWAY

This section explores the availability of sleep, and sleep obtained relative to the Navy mandated 7.5 hours of sleep and compared to the reported average sleep needed to feel well rested for the overall Navy, Ship Classes, Departments and Paygrades. Additional analysis is conducted to identify areas of significant sleep deficits for sailors.

4.3.1.1 OVERALL FY23 ASCAS REPORTED SLEEP METRICS

Analysis was conducted identifying differences in sleep at home, inport and underway as self-reported by a sailor. For the FY23 ASCAS report, sailors reported significant differences in the amount of sleep obtained in these various locations. Figure 67 shows the averages for sleep available, sleep obtained and sleep needed to feel well rested as compared to the Navy mandated 7.5 hours of available sleep.



	At Home	Inport	Underway
Available	7.13	6.34	5.80
Obtained	6.56	5.72	5.21
Sleep Well Rest	7.01	7.01	7.01
Navy Mandate	7.5	7.5	7.5

Figure 67: FY23 Sleep Comparison – Overall SURFOR

While on average a sailor reports less sleep and less sleep available than the Navy mandated 7.5 hours, there is a significant difference between what sailors are obtaining at home, inport and underway with 6 hours and 34 minutes reported on average at home and only 5 hours and 13 minutes obtained while underway, nearly 2 hours less than the Navy mandated available time for sleep.

The sleep deficits recorded for FY23 ASCAS overall measure the difference between the amount of sleep obtained and the amount of sleep reported by sailors needed to feel well rested. Figure 68 shows these values for comparison for at home, inport and underway living conditions.

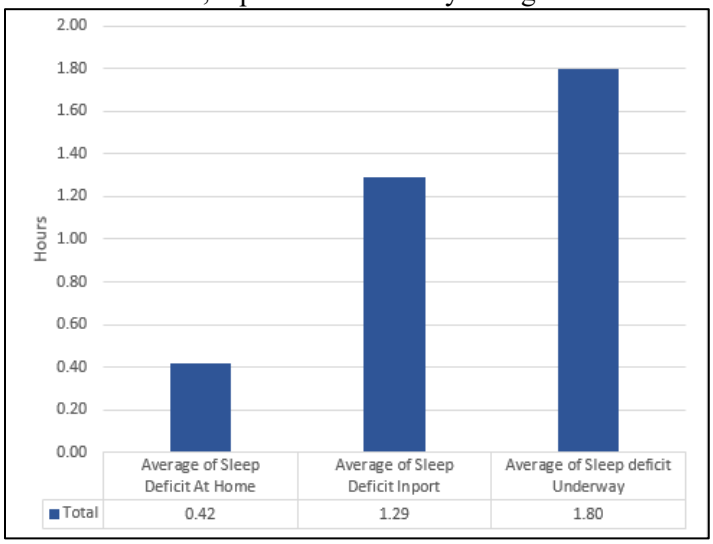


Figure 68: FY23 Sleep Deficits - Overall SURFOR

It can be seen from Figure 68 that there are significant differences in sleep deficits across living conditions with sailors reporting they achieve a 1 hour and 48 minute sleep deficit daily while underway. This sleep loss may contribute significantly to safety issues while onboard a naval vessel.

4.3.1.2 FY23 ASCAS REPORTED SLEEP METRICS BY SHIP CLASS

Analysis was conducted identifying differences in sleep at home, inport and underway as self-reported by a sailor aboard surface ship classes surveyed. For the FY23 ASCAS report, sailors reported significant differences in the amount of sleep obtained in these various living conditions. Figure 69 shows the averages for sleep available, sleep obtained and sleep needed to feel well rested as compared to the Navy mandated 7.5 hours of available sleep aboard surveyed ship classes.

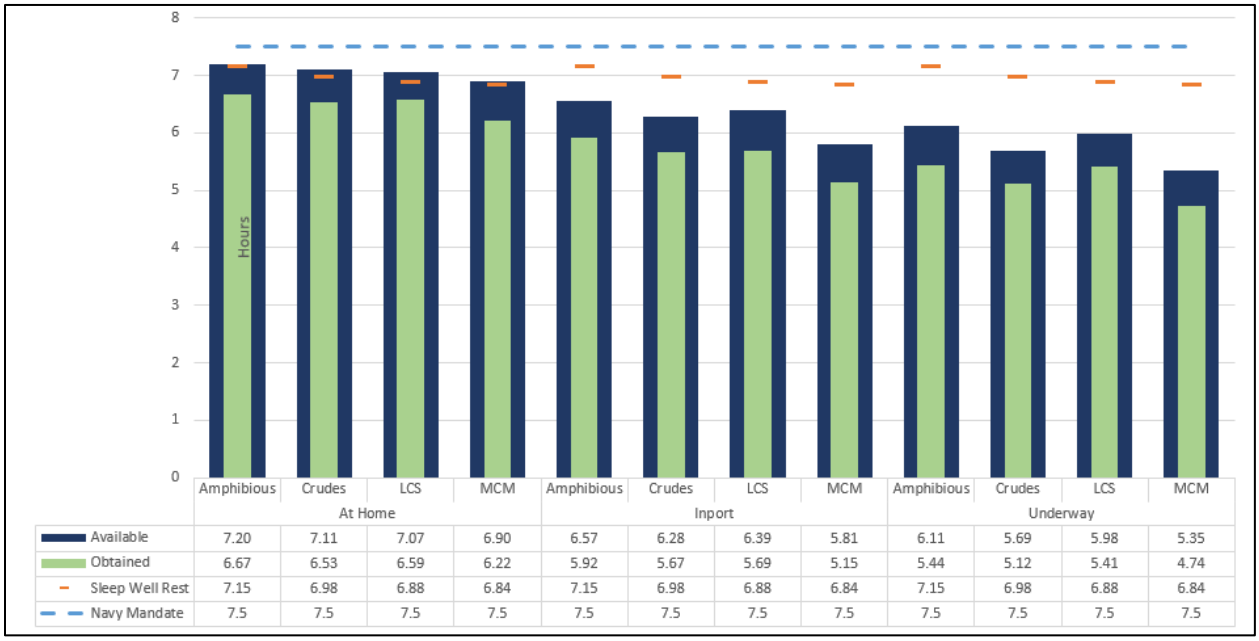
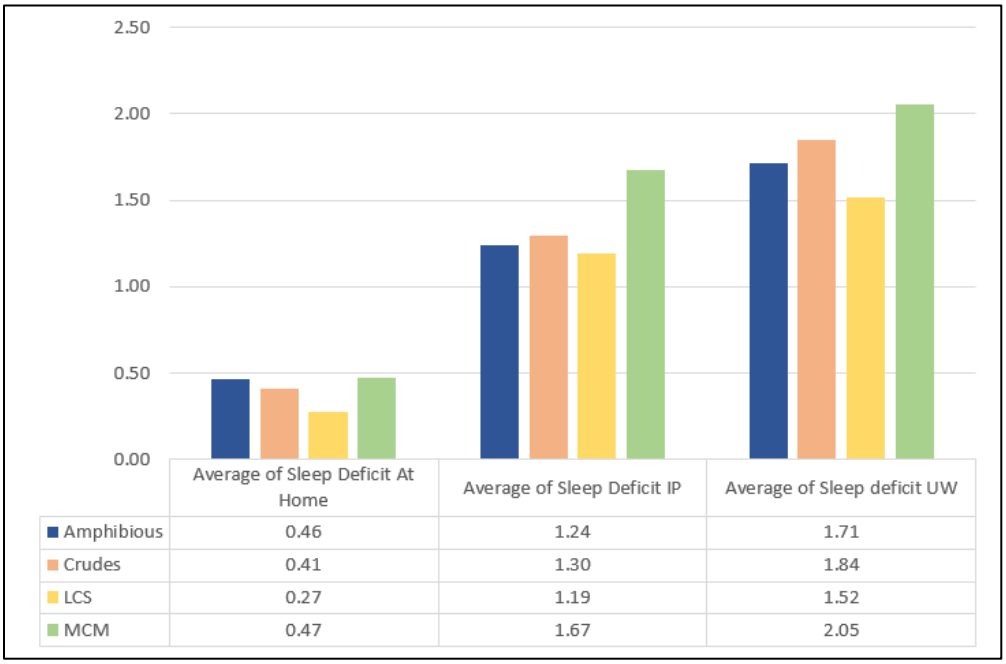


Figure 69: FY23 Sleep Comparison - Ship Class

While on average a sailor reports less sleep and less sleep available than the Navy mandated 7.5 hours, aboard all ship types there is a significant difference between what sailors are obtaining at home, inport and underway with all ship types reporting less sleep during the inport and underway living conditions. It should be noted that MCM ships reported the least amount of sleep obtained while inport (5 hours and 9 minutes) and while underway (4 hours and 44 minutes).

The sleep deficits recorded for FY23 ASCAS ship classes measure the difference between the amount of sleep obtained and the amount of sleep reported by sailors needed to feel well rested onboard the surveyed ship types. Figure 70 shows these values for comparison for at home, inport and underway living conditions.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Amphibious	0.46	1.24	1.71
Crudes	0.41	1.30	1.84
LCS	0.27	1.19	1.52
MCM	0.47	1.67	2.05

Figure 70: FY23 Sleep Deficits - Ship Class

It can be seen from Figure 70 that there are significant differences in sleep deficits across living conditions aboard the various ship types surveyed with under 30 minutes of sleep deficit reported at home and over 2 hours reported while underway with MCM ships. LCS ships reported the lowest sleep deficit across all three living conditions.

4.3.1.3 FY23 ASCAS REPORTED SLEEP METRICS BY ENGINEERING/NON-ENGINEERING

Analysis was conducted identifying differences in sleep at home, inport and underway as self-reported by sailors surveyed in Engineering and Non-Engineering Departments. Specific focus on this delineation of departments is due to historically reported fatigue among Engineering Department sailors. For the FY23 ASCAS report, sailors reported significant differences in the amount of sleep obtained in these various living conditions. Figure 71 shows the averages for sleep available, sleep obtained and sleep needed to feel well rested as compared to the Navy mandated 7.5 hours of available sleep for Engineering and Non-Engineering Departments.

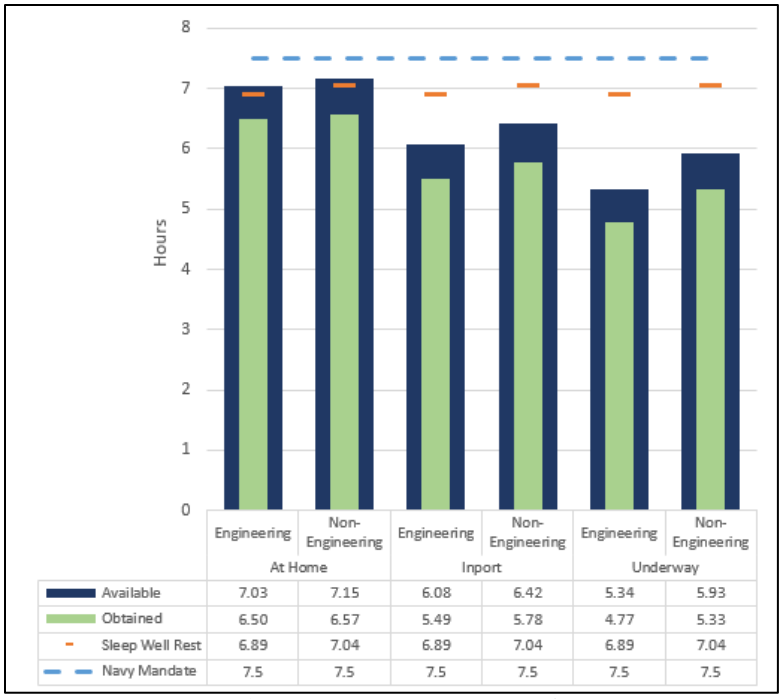


Figure 71: FY23 Sleep Comparison - Engineering/Non-Engineering

While on average a sailor reports less sleep and less sleep available than the Navy mandated 7.5 hours, Engineering Department sailors report significant differences from what other sailors are obtaining inport and underway with Engineering reporting less sleep during the inport (17 minutes less) and underway (34 minutes less) living conditions.

The sleep deficits recorded for FY23 ASCAS Engineering and Non-Engineering Departments measure the difference between the amount of sleep obtained and the amount of sleep reported by sailors needed to feel well rested for the Department types. Figure 72 shows these values for comparison for at home, inport and underway living conditions.

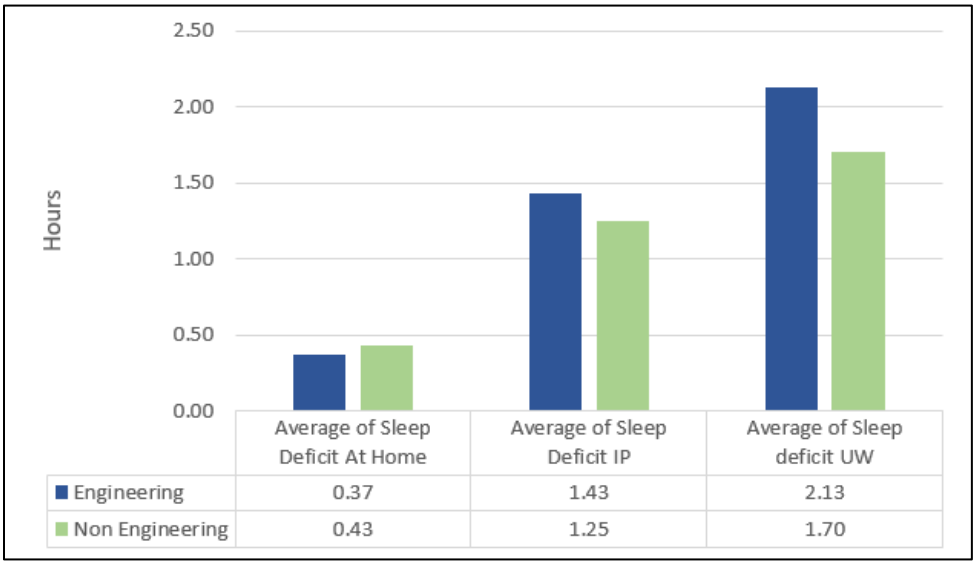


Figure 72: FY23 Sleep Deficits - Engineering/Non-Engineering

It can be seen from Figure 72 that there are significant differences in sleep deficits across living conditions in the various Departments surveyed with under 30 minutes of sleep deficit reported at home and over 2 hours reported from the Engineering Department.

4.3.1.4 FY23 ASCAS REPORTED SLEEP METRICS BY OFFICER/ENLISTED SAILORS

Analysis was conducted identifying differences in sleep at home, inport and underway as self-reported by Officer and Enlisted sailors surveyed. Specific focus on this delineation of paygrades is due to historically reported differences between officers and enlisted personnel. For the FY23 ASCAS report, sailors reported significant differences in the amount of sleep obtained in these various living conditions. Figure 73 shows the averages for sleep available, sleep obtained, and sleep needed to feel well rested as compared to the Navy mandated 7.5 hours of available sleep for officers and enlisted personnel.

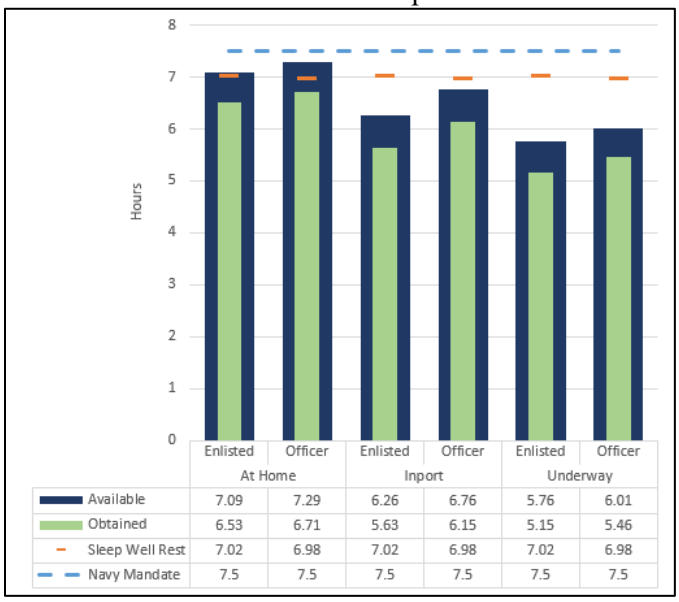


Figure 73: FY23 Sleep Comparison - Officer/Enlisted

While on average a sailor reports less sleep and less sleep available than the Navy mandated 7.5 hours, enlisted sailors report significant differences from what officers are obtaining inport and underway with enlisted reporting less sleep during the inport (37 minutes less) and underway (19 minutes less) living conditions. Of interest is that the difference in sleep deficits are less while underway then while inport.

The sleep deficits recorded for FY23 ASCAS officers and enlisted measure the difference between the amount of sleep obtained and the amount of sleep reported by sailors needed to feel well rested for the paygrade types. Figure 74 shows these values for comparison for at home, inport and underway living conditions.

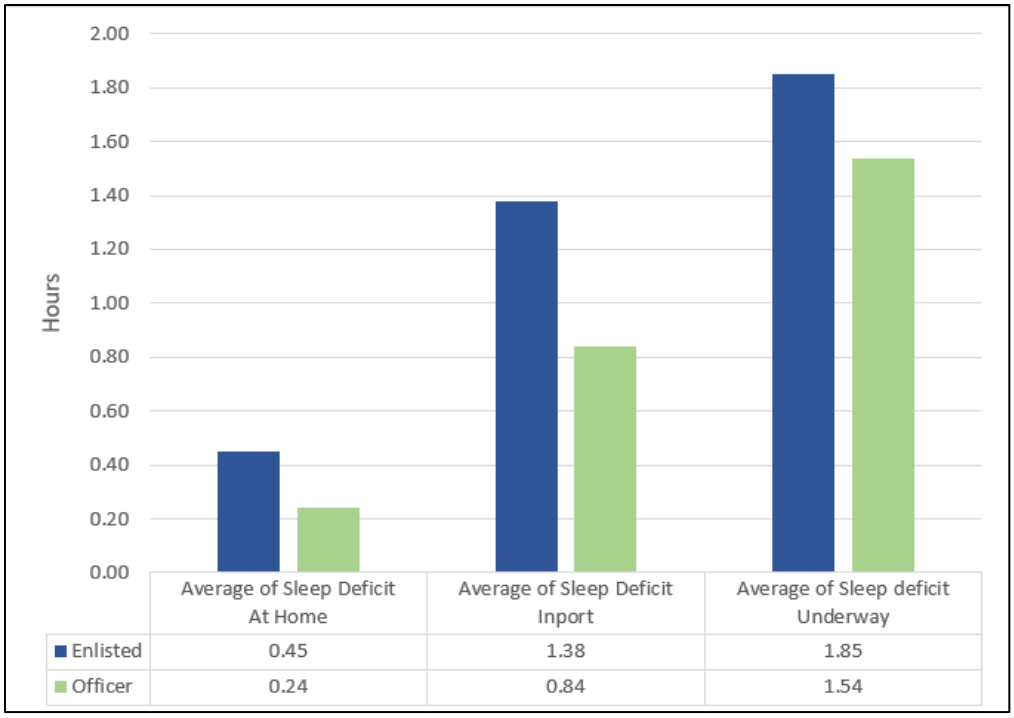


Figure 74: FY23 Sleep Deficits - Officer/Enlisted

It can be seen from Figure 74 that there are significant differences in sleep deficits across living conditions for officers and enlisted personnel. Of interest is the differences at home in sleep deficits between officers and enlisted individuals as well as the large gap in sleep deficits while inport.

4.3.2 SLEEP DEFICIT CONSTRUCT COMPARISONS

Sleep deprivation has been shown to contribute significantly to short and long term mental and physical health impairments (https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5449130/) and has been shown specifically to increase anxiety, burnout, and job stress. Mental health and sailor health have been areas of interest to the Navy for the last two decades and the connection to sleep deprivation should not be overlooked. This section highlights sailor responses to specific ASCAS questions as connected to reported sleep deficits.

4.3.2.1 ANXIETY VS SLEEP DEFICIT

The Anxiety construct consists of two questions asking sailors to respond to how often the following occurs:

- Not being able to stop or control worrying
- Worrying too much about different things

These two questions were adapted from the Generalized Anxiety Disorder 7-Item scale (GAD-7)

(Spitzer RL, Kroenke K, Williams JBW, Löwe B. A Brief Measure for Assessing Generalized Anxiety Disorder: The GAD-7. Arch Intern Med. 2006;166(10):1092–1097. doi:10.1001/archinte.166.10.1092)

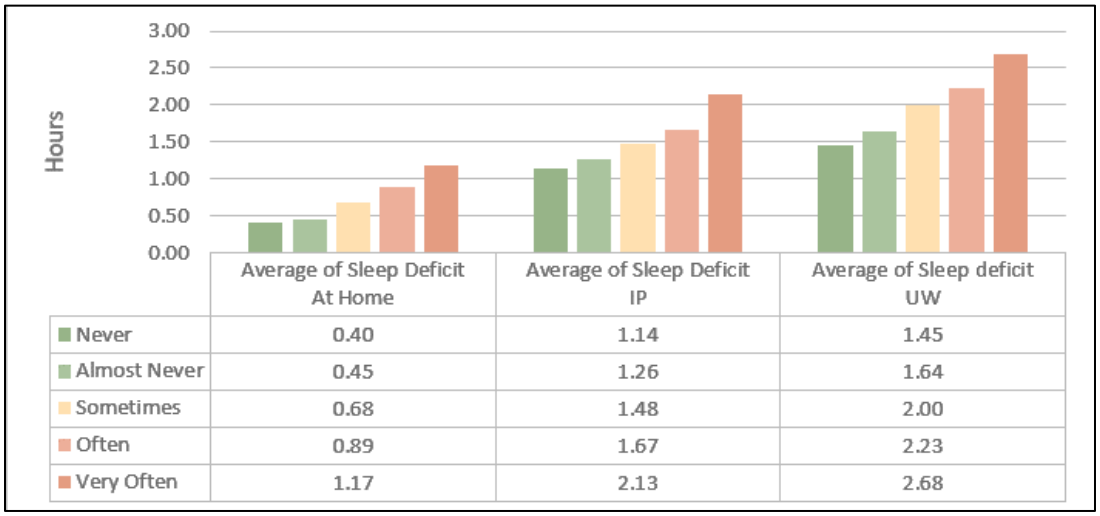
Anxiety: Not being able to stop or control worrying

For FY23 respondents, 5103 responded to question about how often not being able to stop or control worrying occurs with sizable populations responding to each of the available Likert options included (Never – Very Often).

Table 26: FY23 Respondents: Anxiety Question 1

FY23 Anxiety: Not being able to stop or control worrying					
Never	**Almost Never**	**Sometimes**	**Often**	**Very Often**	**Grand Total**
904 (17.7%)	903 (17.7%)	1421 (27.8%)	955 (18.7%)	920 (18.0%)	5103

An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 75 shows these values.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Never	0.40	1.14	1.45
Almost Never	0.45	1.26	1.64
Sometimes	0.68	1.48	2.00
Often	0.89	1.67	2.23
Very Often	1.17	2.13	2.68

Figure 75: FY23 Anxiety Question 1 Sleep Deficits

As seen in Figure 75 a strong correlation exists between respondents sleep deficits and how often they are unable to stop of control worrying with an increasing sleep deficit associated with more often not being able to stop or control worrying. On average, individuals responding that they are Very Often not able to stop of control worrying have 1 hour and 14-minute additional sleep deficit while underway than those responding Never. These analyses suggest a strong relationship between Anxiety and sleep deficits aboard ships.

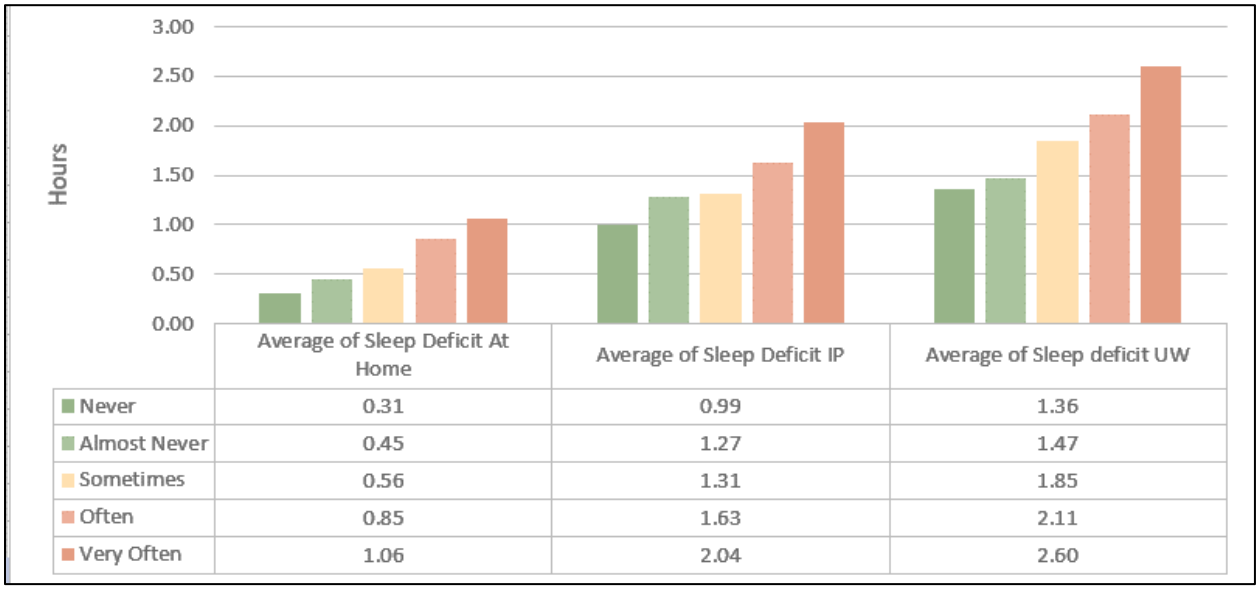
Anxiety: Worrying too much about different things

For FY23 respondents, 5104 responded to question about how often worrying too much about different things occurs with sizable populations responding to each of the available Likert options included (Never – Very Often).

Table 27: FY23 Respondents - Anxiety Question 2

FY23 Anxiety: Worrying too much about different things					
Never	**Almost Never**	**Sometimes**	**Often**	**Very Often**	**Grand Total**
540 (10.6%)	617 (12.1%)	1450 (28.4%)	1233 (24.2%)	1264 (24.8%)	5104

An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 76 shows these values.

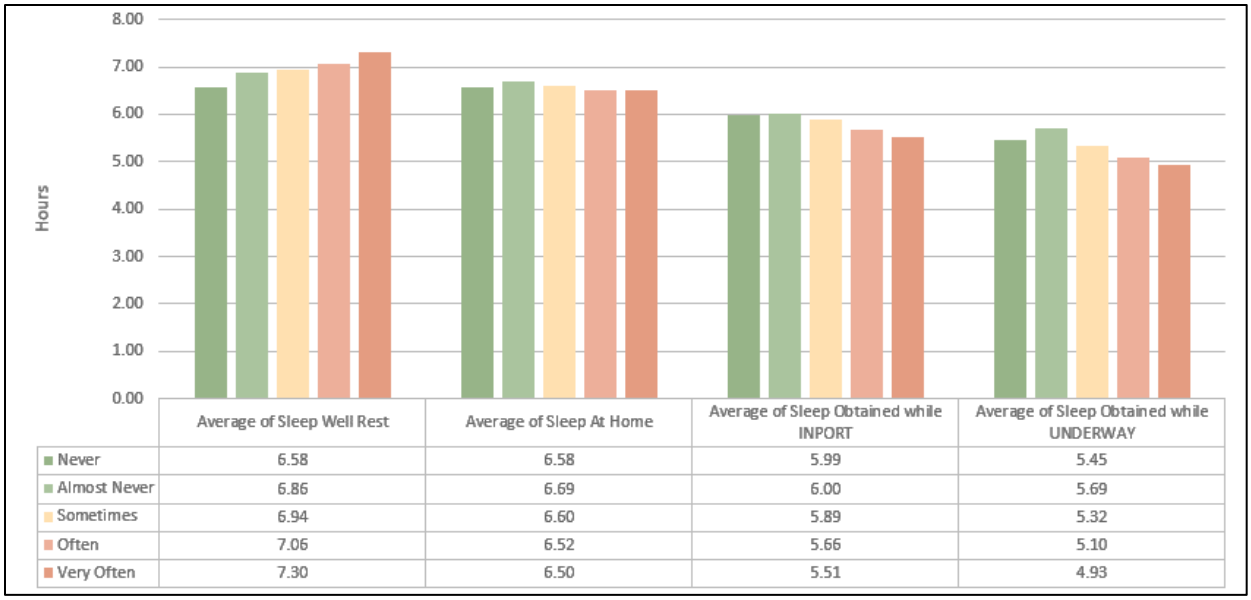


	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Never	0.31	0.99	1.36
Almost Never	0.45	1.27	1.47
Sometimes	0.56	1.31	1.85
Often	0.85	1.63	2.11
Very Often	1.06	2.04	2.60

Figure 76: FY23 Anxiety Question 2 Sleep Deficits

As seen in Figure 76 a strong correlation exists between respondents sleep deficits and how often worrying too much about different things with an increasing sleep deficit associated with more often worrying too much about different things. On average, individuals responding that they are Very Often worrying too much about different things have 1 hour and 14-minute additional sleep deficit while underway than those responding Never. These analyses suggest a strong relationship between Anxiety and sleep deficits aboard ships.

In regard to sleep deficit for high anxiety individuals, additional analysis was conducted to identify where how sleep deficits were occurring. More specifically whether sleep deficits were caused by requiring more sleep to feel well rested, less sleep was obtained or both. Figure 77 shows these averages derived for those responding to the second anxiety question, how often they were worrying too much about different things.



	Average of Sleep Well Rest	Average of Sleep At Home	Average of Sleep Obtained while INPORT	Average of Sleep Obtained while UNDERWAY
Never	6.58	6.58	5.99	5.45
Almost Never	6.86	6.69	6.00	5.69
Sometimes	6.94	6.60	5.89	5.32
Often	7.06	6.52	5.66	5.10
Very Often	7.30	6.50	5.51	4.93

Figure 77: FY23 Anxiety Question 2 Average Sleep Obtained Metrics

Of interest in Figure 77 are the differences in not only sleep obtained by high anxiety individuals but also in the required sleep needed to feel well rested. Both of these observations taken into account result in a higher sleep deficit than low anxiety counterparts.

4.3.2.2 BURNOUT VS SLEEP DEFICIT

The Burnout construct consists of four questions asking sailors to respond to how each of the following aspects of their job has affected their health/wellbeing:

- Emotional Demands (hiding/suppressing feelings or dealing with work related frustrations)
- Physical Demands (Intensity of physical activity required to complete tasks)
- Mental/Cognitive (thinking, deciding, or calculating task load)
- Social Demands (working in teams, interactions with crewmates, and living/cohabitating with crewmates)

These four questions were developed as an internal measure.

Burnout: Emotional Demands

For FY23 respondents, 5101 responded to the question about how Emotional Demands have affected their health and wellbeing with sizable samples responding to each of the available Likert options included (Very Negative – Very Positive).

Table 28: FY23 Respondents Burnout - Emotional Demands

FY23 Burnout: Emotional Demands					
Very Negative Effect	**Some Negative Effect**	**Neutral**	**Some Positive Effect**	**Very Positive Effect**	**Grand Total**
1154 (22.6%)	2086 (40.9%)	1300 (25.5%)	441 (8.6%)	120 (2.3%)	5101

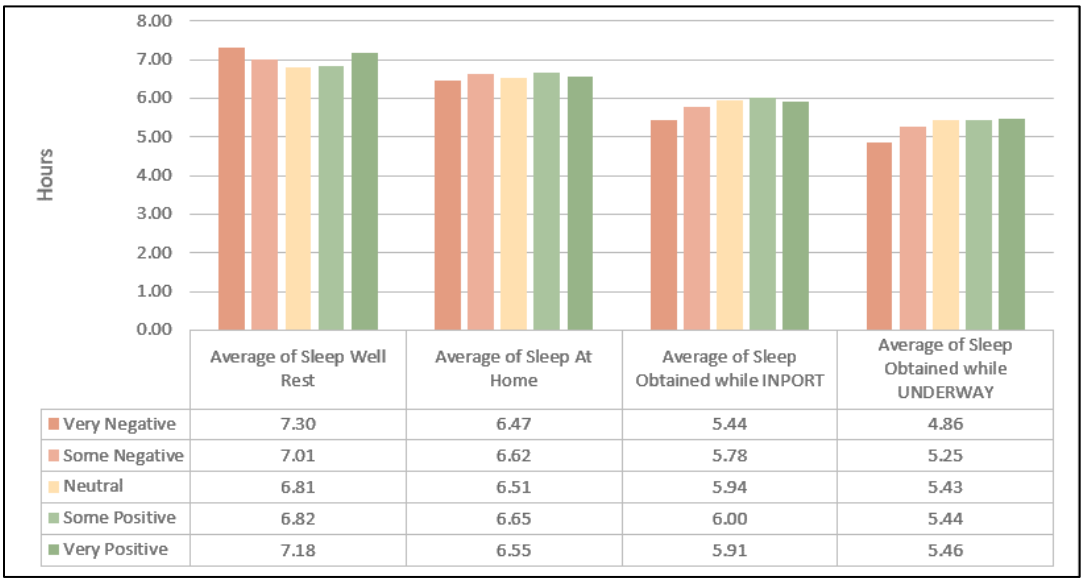
An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 78 shows these values.

	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Very Negative Effect	0.77	1.86	2.43
Some Negative Effect	0.35	1.21	1.74
Neutral	0.26	0.86	1.35
Some Positive Effect	0.14	0.81	1.37
Very Positive Effect	0.69	1.32	1.90

Figure 78: FY23 Burnout Emotional Demands Sleep Deficits

As seen in Figure 78 a correlation exists between respondents sleep deficits and how Emotional Demands affect their health and wellbeing with an increasing sleep deficit associated with Very Negative Effects on health and wellbeing. Of note is the increase in sleep deficit from Some Positive Effect to a Very Positive Effect. This may be due to a smaller sample size (120) as compared to other Likert responses. On average, individuals responding that Emotional Demands have a Very Negative Effect on their health and wellbeing reported an additional 32-minute sleep deficit while underway than those responding with a Very Positive Effect.

In regard to sleep deficit for respondents responding that Emotional Demands have a negative effect on their health and wellbeing, additional analysis was conducted to identify where how sleep deficits were occurring. More specifically whether sleep deficits were caused by requiring more sleep to feel well rested, less sleep was obtained or both. Figure 79 shows these averages.



	Average of Sleep Well Rest	Average of Sleep At Home	Average of Sleep Obtained while INPORT	Average of Sleep Obtained while UNDERWAY
Very Negative	7.30	6.47	5.44	4.86
Some Negative	7.01	6.62	5.78	5.25
Neutral	6.81	6.51	5.94	5.43
Some Positive	6.82	6.65	6.00	5.44
Very Positive	7.18	6.55	5.91	5.46

Figure 79: FY23 Burnout Emotional Demands Sleep Obtained Metrics

Of note is that while the average sleep obtained at home remains relatively the same, sleep obtained while inport or underway decreases for individuals who report that Emotional Demands have a negative effect on their health and wellbeing. Additionally, these individuals report needing more sleep to feel well rested. Interestingly, individuals who report that Emotional Demands have a very positive effect on their health and wellbeing report needing more sleep to feel well rested as well. This accounts for the increased sleep deficit reported by these individuals as seen in Figure 78.

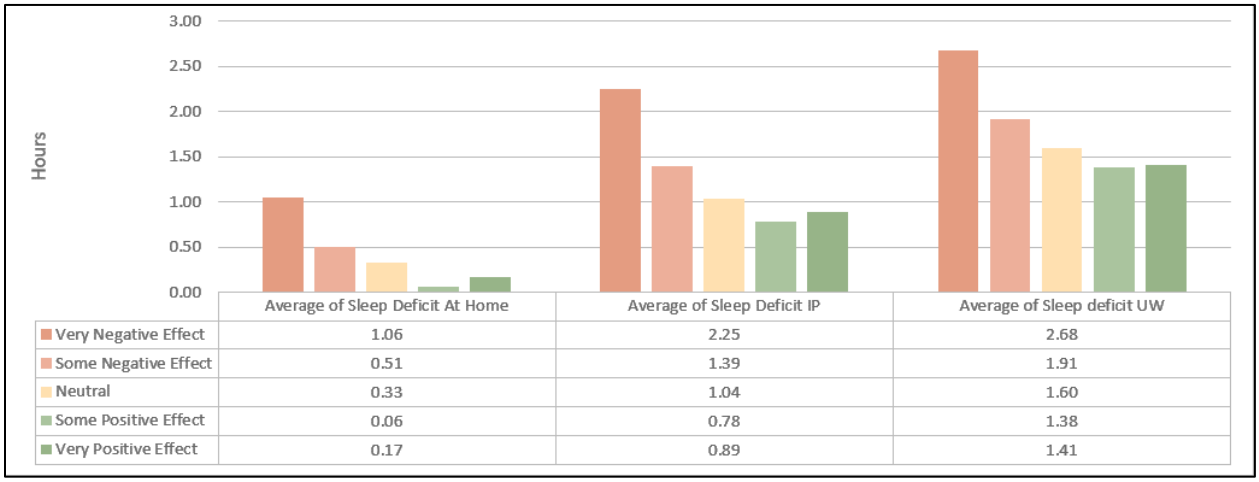
Burnout: Mental/Cognitive Demands

For FY23 respondents, 5092 responded to the question about how Mental/Cognitive Demands have affected their health and wellbeing with sizable samples responding to each of the available Likert options included (Very Negative – Very Positive).

Table 29: FY23 Respondents Burnout - Mental/Cognitive Demands

FY23 Burnout: Mental/Cognitive Demands					
Very Negative Effect	**Some Negative Effect**	**Neutral**	**Some Positive Effect**	**Very Positive Effect**	**Grand Total**
616 (12.1%)	1551 (30.5%)	1527 (30.0%)	1147 (22.5%)	251 (4.9%)	5092

An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 80 shows these values.

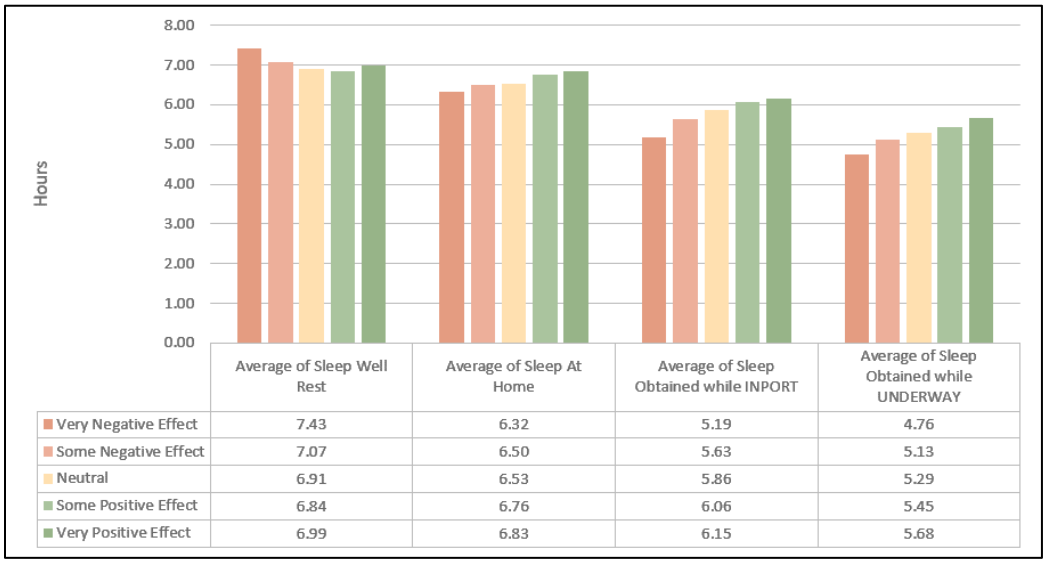


	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Very Negative Effect	1.06	2.25	2.68
Some Negative Effect	0.51	1.39	1.91
Neutral	0.33	1.04	1.60
Some Positive Effect	0.06	0.78	1.38
Very Positive Effect	0.17	0.89	1.41

Figure 80: FY23 Burnout Mental/Cognitive Demands Sleep Deficits

As seen in Figure 80 a strong correlation exists between respondents sleep deficits and how Mental/Cognitive Demands affect their health and wellbeing with an increasing sleep deficit associated with Very Negative Effects on health and wellbeing. On average, individuals responding that Mental/Cognitive Demands have a Very Negative Effect on their health and wellbeing reported an additional 1 hour and 16-minute sleep deficit while underway than those responding with a Very Positive Effect.

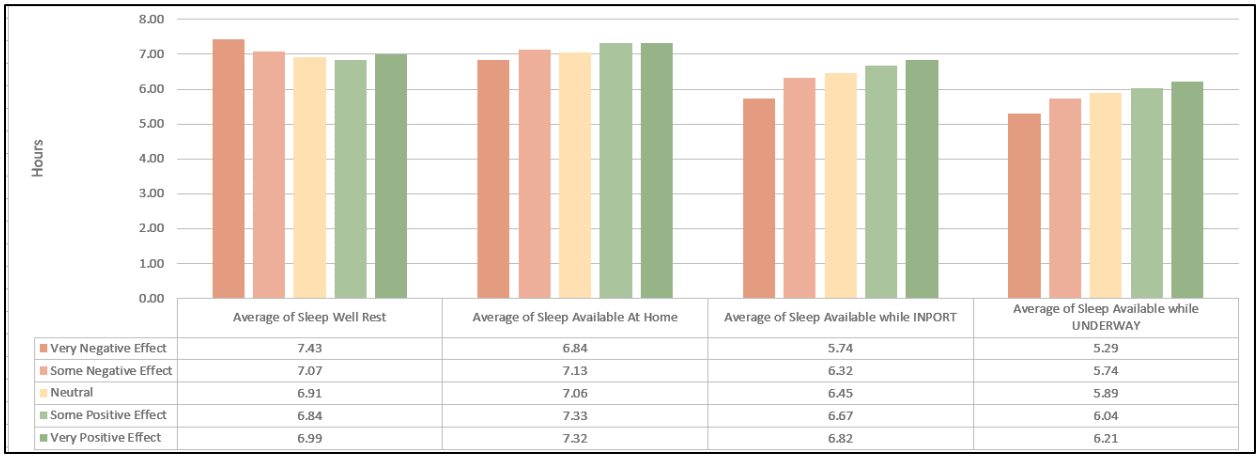
In regard to sleep deficit for respondents responding that Mental/Cognitive Demands have a negative effect on their health and wellbeing, additional analysis was conducted to identify where how sleep deficits were occurring. More specifically whether sleep deficits were caused by requiring more sleep to feel well rested, less sleep was obtained or both. Figure 81 shows these averages.



	Average of Sleep Well Rest	Average of Sleep At Home	Average of Sleep Obtained while INPORT	Average of Sleep Obtained while UNDERWAY
Very Negative Effect	7.43	6.32	5.19	4.76
Some Negative Effect	7.07	6.50	5.63	5.13
Neutral	6.91	6.53	5.86	5.29
Some Positive Effect	6.84	6.76	6.06	5.45
Very Positive Effect	6.99	6.83	6.15	5.68

Figure 81: FY23 Burnout Mental/Cognitive Demands Sleep Obtained Metrics

Of note is for individuals reporting that Mental/Cognitive Demands have a Very Negative Effect on their health and wellbeing, there is both an increased amount of sleep needed to feel well rested, and a decreased amount of sleep obtained whether at home, inport or underway. It should also be noted that those who report that Mental/Cognitive Demands having a Very Negative Effect on their health and wellbeing also report a lower availability of time available for sleep as shown in Figure 82.



	Average of Sleep Well Rest	Average of Sleep Available At Home	Average of Sleep Available while INPORT	Average of Sleep Available while UNDERWAY
Very Negative Effect	7.43	6.84	5.74	5.29
Some Negative Effect	7.07	7.13	6.32	5.74
Neutral	6.91	7.06	6.45	5.89
Some Positive Effect	6.84	7.33	6.67	6.04
Very Positive Effect	6.99	7.32	6.82	6.21

Figure 82: FY23 Burnout Mental/Cognitive Demands Sleep Availability Metrics

Of interest is the strong correlation between those reporting that Mental/Cognitive Demands have a Very Negative effect on their health and wellbeing and the amount of sleep reported to be available whether at home, inport or underway. Further study is needed to identify potential causes of these differences.

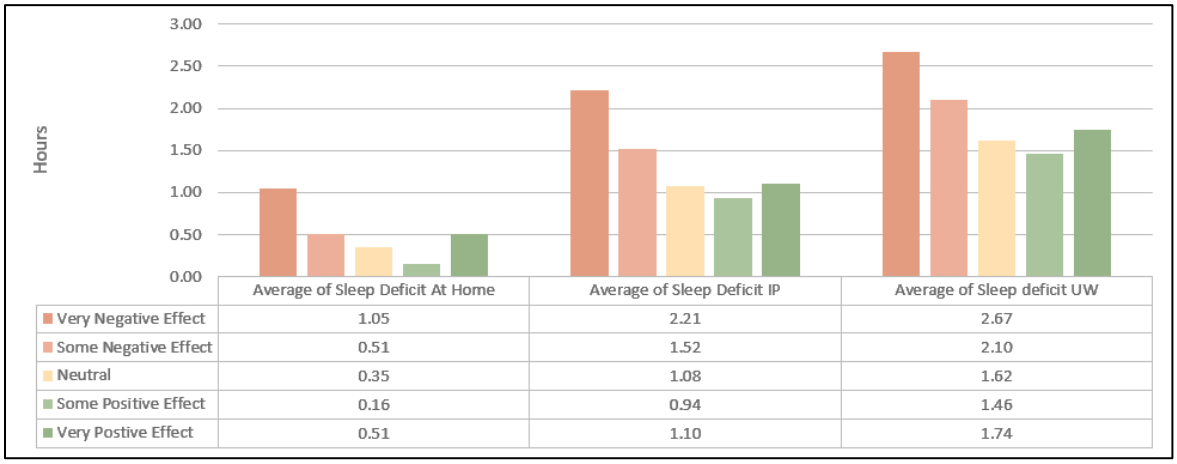
Burnout: Physical Demands

For FY23 respondents, 5089 responded to the question about how Physical Demands have affected their health and wellbeing with sizable samples responding to each of the available Likert options included (Very Negative – Very Positive).

Table 30: FY23 Respondents Burnout - Physical Demands

FY23 Burnout: Physical Demands					
Very Negative Effect	**Some Negative Effect**	**Neutral**	**Some Positive Effect**	**Very Positive Effect**	**Grand Total**
371 (7.3%)	1049 (20.6%)	2601 (51.1%)	904 (17.8%)	164 (3.2%)	5089

An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 83 shows these values.

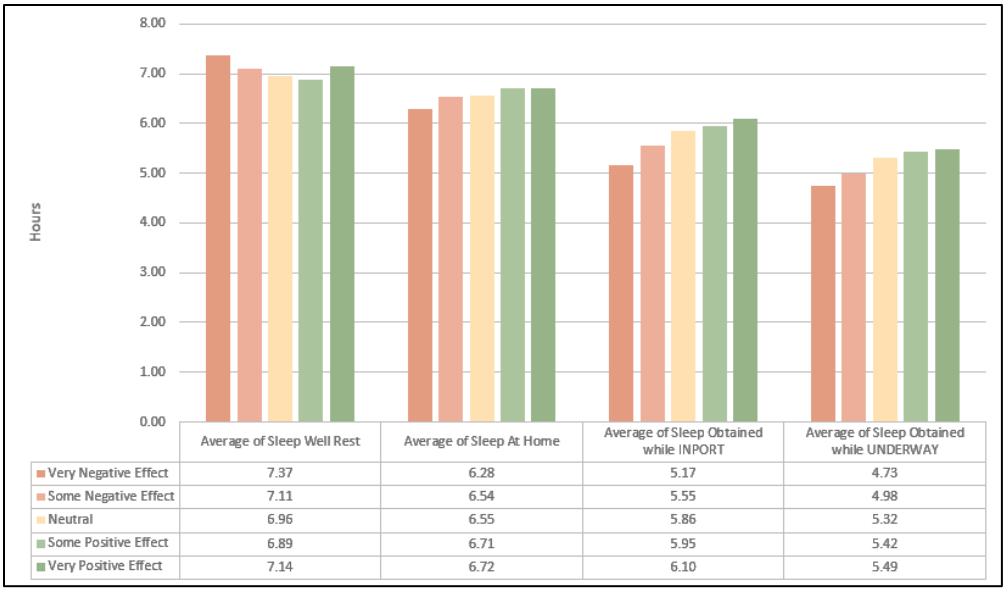


	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Very Negative Effect	1.05	2.21	2.67
Some Negative Effect	0.51	1.52	2.10
Neutral	0.35	1.08	1.62
Some Positive Effect	0.16	0.94	1.46
Very Postive Effect	0.51	1.10	1.74

Figure 83: FY23 Burnout Physical Demands Sleep Deficits

As seen in Figure 83 a strong correlation exists between respondents sleep deficits and how Physical Demands affect their health and wellbeing with an increasing sleep deficit associated with Very Negative Effects on health and wellbeing. On average, individuals responding that Physical Demands have a Very Negative Effect on their health and wellbeing reported an additional 56-minute sleep deficit while underway than those responding with a Very Positive Effect.

In regard to sleep deficit for respondents responding that Physical Demands have a negative effect on their health and wellbeing, additional analysis was conducted to identify where how sleep deficits were occurring. More specifically whether sleep deficits were caused by requiring more sleep to feel well rested, less sleep was obtained or both. Figure 84 shows these averages.



	Average of Sleep Well Rest	Average of Sleep At Home	Average of Sleep Obtained while INPORT	Average of Sleep Obtained while UNDERWAY
Very Negative Effect	7.37	6.28	5.17	4.73
Some Negative Effect	7.11	6.54	5.55	4.98
Neutral	6.96	6.55	5.86	5.32
Some Positive Effect	6.89	6.71	5.95	5.42
Very Positive Effect	7.14	6.72	6.10	5.49

Figure 84: FY23 Burnout Physical Demands Sleep Obtained Metrics

Of note is for individuals reporting that Physical Demands have a Very Negative Effect on their health and wellbeing, there is both an increased amount of sleep needed to feel well rested, and a decreased amount of sleep obtained whether at home, inport or underway.

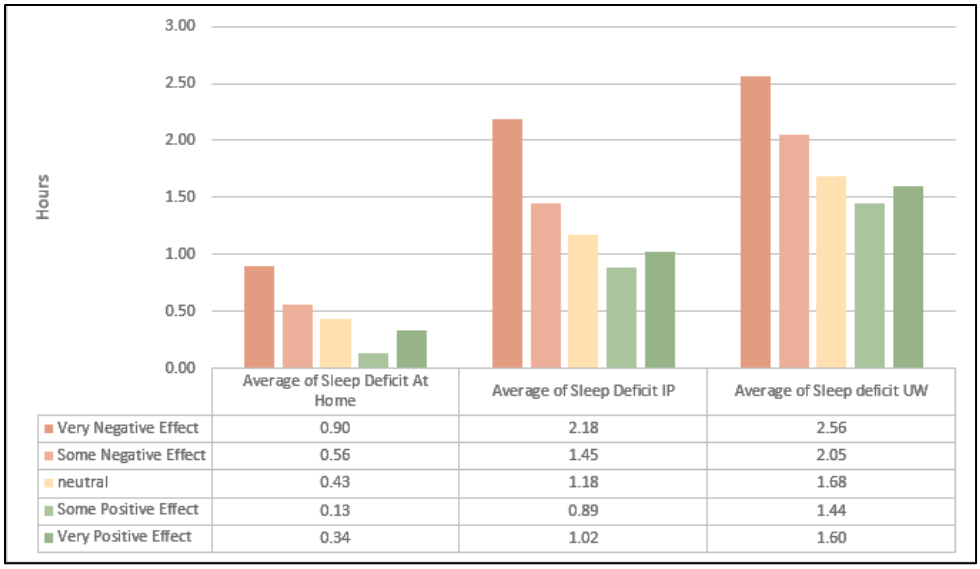
Burnout: Social Demands

For FY23 respondents, 5096 responded to the question about how Social Demands have affected their health and wellbeing with sizable samples responding to each of the available Likert options included (Very Negative – Very Positive).

Table 31: FY23 Respondents Burnout - Social Demands

FY23 Burnout: Social Demands					
Very Negative Effect	**Some Negative Effect**	**Neutral**	**Some Positive Effect**	**Very Positive Effect**	**Grand Total**
434 (8.5%)	1181 (23.1%)	1734 (34.0%)	1401 (27.5%)	346 (6.8%)	5096

An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 85 shows these values.

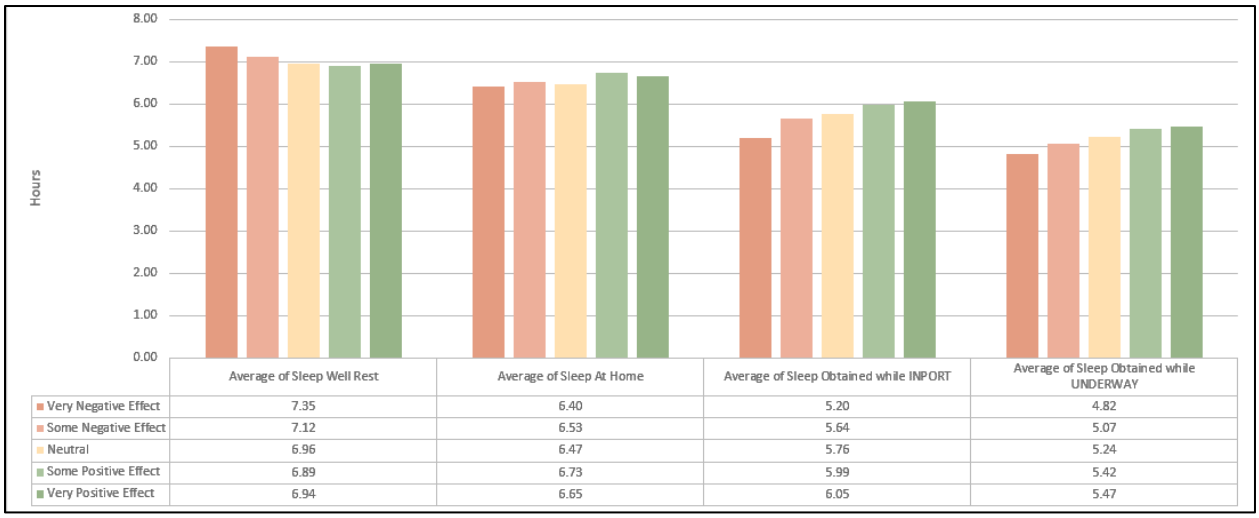


	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Very Negative Effect	0.90	2.18	2.56
Some Negative Effect	0.56	1.45	2.05
neutral	0.43	1.18	1.68
Some Positive Effect	0.13	0.89	1.44
Very Positive Effect	0.34	1.02	1.60

Figure 85: FY23 Burnout Social Demands Sleep Deficits

As seen in Figure 85 a strong correlation exists between respondents sleep deficits and how Social Demands affect their health and wellbeing with an increasing sleep deficit associated with Very Negative Effects on health and wellbeing. On average, individuals responding that Social Demands have a Very Negative Effect on their health and wellbeing reported an additional 58-minute sleep deficit while underway than those responding with a Very Positive Effect.

In regard to sleep deficit for respondents responding that Social Demands have a negative effect on their health and wellbeing, additional analysis was conducted to identify where how sleep deficits were occurring. More specifically whether sleep deficits were caused by requiring more sleep to feel well rested, less sleep was obtained or both. Figure 86 shows these averages.



	Average of Sleep Well Rest	Average of Sleep At Home	Average of Sleep Obtained while INPORT	Average of Sleep Obtained while UNDERWAY
Very Negative Effect	7.35	6.40	5.20	4.82
Some Negative Effect	7.12	6.53	5.64	5.07
Neutral	6.96	6.47	5.76	5.24
Some Positive Effect	6.89	6.73	5.99	5.42
Very Positive Effect	6.94	6.65	6.05	5.47

Figure 86: FY23 Burnout Social Demands Sleep Obtained Metrics

Of note is for individuals reporting that Social Demands have a Very Negative Effect on their health and wellbeing, there is both an increased amount of sleep needed to feel well rested, and a decreased amount of sleep obtained whether at home, inport or underway.

4.3.2.3 JOB STRESS VS SLEEP DEFICIT

The Job Stress construct consists of two questions asking sailors to respond to how strongly they agree with the following:

- I am usually under a lot of pressure while at work
- My job is stressful

These two questions were adapted from the Job Stress Scale (Lambert, et al. 2006)

Lambert, E.G., Hogan, N.L., Camp, S.D., and Ventura, L.A. (2006). The impact of work–family conflict on correctional staff: A preliminary study. Criminology and Criminal Justice, 6, 371–387

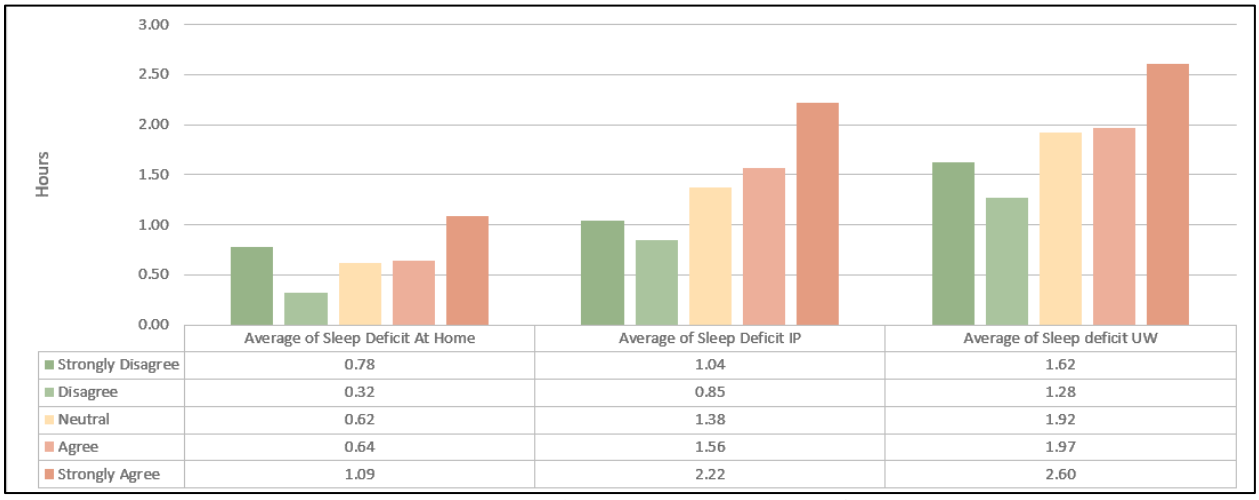
Job Stress: I am usually under a lot of pressure while at work

For FY23 respondents, 5321 responded to the question about how strongly they agree that they are usually under a lot of pressure while at work with sizable samples responding to each of the available Likert options included (Strongly Disagree – Strongly Agree).

Table 32: FY23 Respondents Job Stress Question 1

FY23 Job Stress: I am usually under a lot of pressure while at work					
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Grand Total**
139 (2.6%)	501 (9.4%)	1688 (31.7%)	1909 (35.9%)	1084 (20.4%)	5321

An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 87 shows these values.

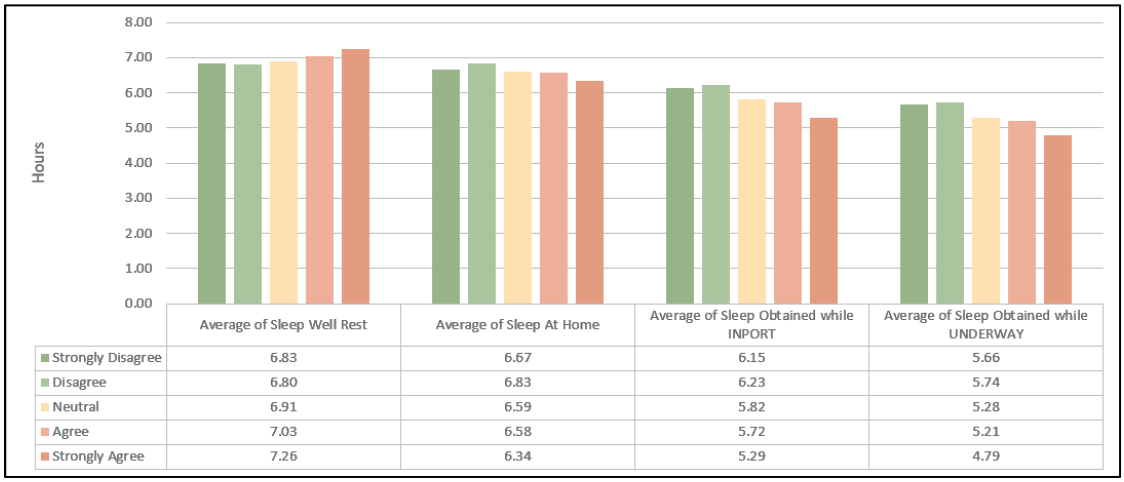


	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Strongly Disagree	0.78	1.04	1.62
Disagree	0.32	0.85	1.28
Neutral	0.62	1.38	1.92
Agree	0.64	1.56	1.97
Strongly Agree	1.09	2.22	2.60

Figure 87: FY23 Job Stress Question 1 Sleep Deficits

As seen in Figure 87 a correlation exists between respondents sleep deficits and how strongly they agree that they are unusually under a lot of pressure at work with an increasing sleep deficit associated with agreement. On average, individuals responding that they Strongly Agree that they usually are under a lot of pressure at work reported an additional 59-minute sleep deficit while underway than those responding that they Strongly Disagree.

In regard to sleep deficit for respondents responding that they agree, additional analysis was conducted to identify where sleep deficits are occurring. More specifically whether sleep deficits were caused by requiring more sleep to feel well rested, less sleep was obtained or both. Figure 88 shows these averages.



	Average of Sleep Well Rest	Average of Sleep At Home	Average of Sleep Obtained while INPORT	Average of Sleep Obtained while UNDERWAY
Strongly Disagree	6.83	6.67	6.15	5.66
Disagree	6.80	6.83	6.23	5.74
Neutral	6.91	6.59	5.82	5.28
Agree	7.03	6.58	5.72	5.21
Strongly Agree	7.26	6.34	5.29	4.79

Figure 88: FY23 Job Stress Question 1 Sleep Obtained Metrics

Of note is that sleep obtained while at home, inport, or underway decreases for individuals who report that they agree that they are usually under a lot of pressure at work. Additionally, these individuals report needing more sleep to feel well rested.

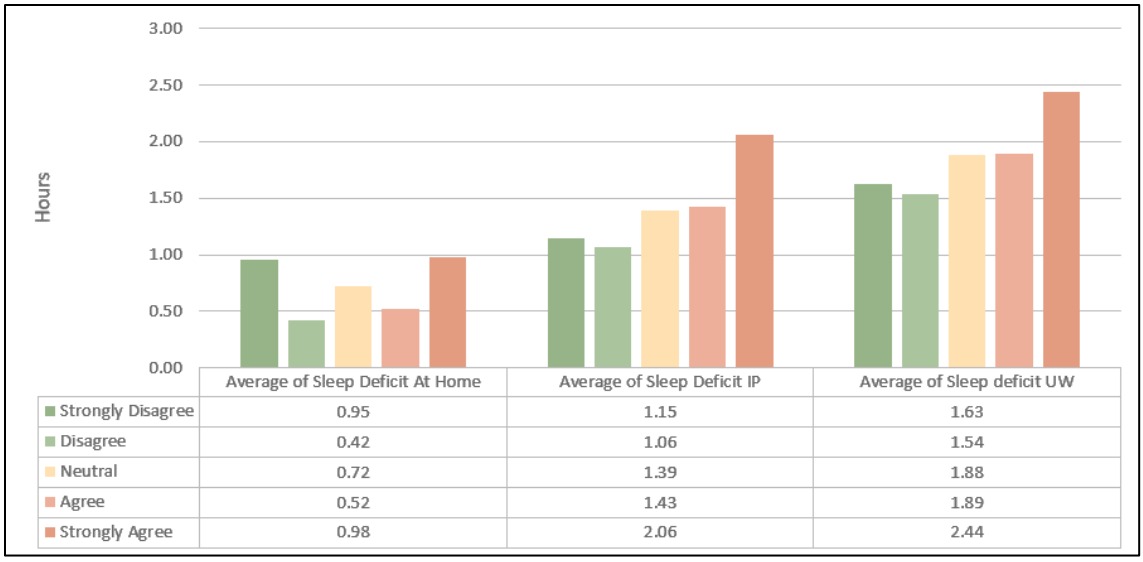
Job Stress: My job is stressful.

For FY23 respondents, 5324 responded to the question about how strongly they agree that their job is stressful with sizable samples responding to each of the available Likert options included (Strongly Disagree – Strongly Agree).

Table 33: FY23 Respondents Job Stress Question 2

FY23 Job Stress: My job is stressful					
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**	**Grand Total**
126 (2.4%)	371 (7.0%)	1312 (24.6%)	2084 (39.1%)	1431 (26.9%)	5324

An analysis was conducted on FY23 survey respondents identifying the average sleep deficit for each of the Likert options available by living condition. Figure 89 shows these values.

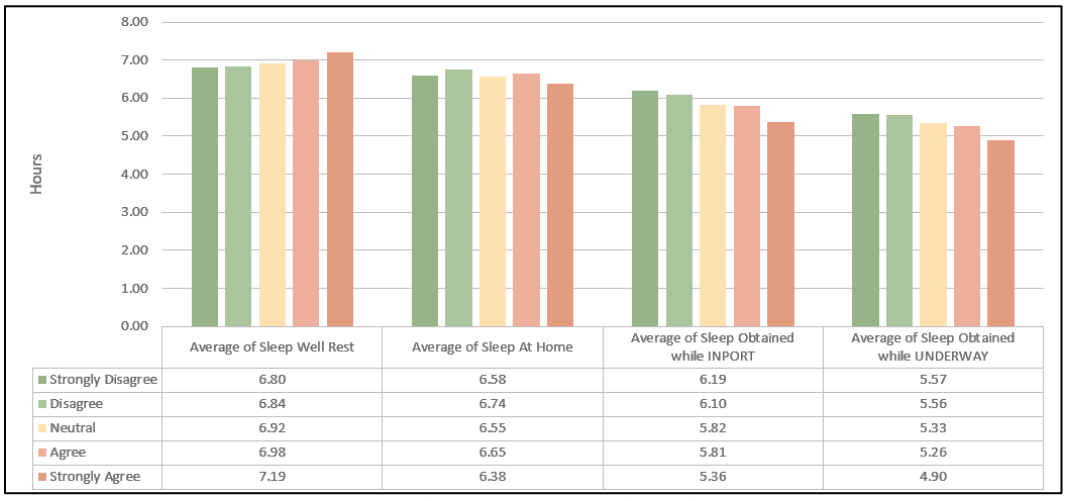


	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Strongly Disagree	0.95	1.15	1.63
Disagree	0.42	1.06	1.54
Neutral	0.72	1.39	1.88
Agree	0.52	1.43	1.89
Strongly Agree	0.98	2.06	2.44

Figure 89: FY23 Job Stress Question 2 Sleep Deficits

As seen in Figure 89 a correlation exists between respondents sleep deficits and how strongly they agree that their job is stressful with an increasing sleep deficit associated with agreement. On average, individuals responding that they Strongly Agree that their job is stressful reported an additional 48-minute sleep deficit while underway than those responding that they Strongly Disagree.

In regard to sleep deficit for respondents responding that they agree, additional analysis was conducted to identify where sleep deficits are occurring. More specifically whether sleep deficits were caused by requiring more sleep to feel well rested, less sleep was obtained or both. Figure 90 shows these averages.



	Average of Sleep Well Rest	Average of Sleep At Home	Average of Sleep Obtained while INPORT	Average of Sleep Obtained while UNDERWAY
Strongly Disagree	6.80	6.58	6.19	5.57
Disagree	6.84	6.74	6.10	5.56
Neutral	6.92	6.55	5.82	5.33
Agree	6.98	6.65	5.81	5.26
Strongly Agree	7.19	6.38	5.36	4.90

Figure 90: FY23 Job Stress Question 2 Sleep Obtained Metrics

Of note is that sleep obtained while at home, inport, or underway decreases for individuals who report that they agree that their job is stressful. Additionally, these individuals report needing more sleep to feel well rested.

4.3.3 SLEEP ANALYSIS CONCLUSION

The above analysis while not exhaustive, provides increased insight into both the affected cohorts of individuals aboard ships but also the potential impact that sleep deficits can cause on individuals. While it cannot yet be stated that sleep deficits are caused by increases in Job Stress and Anxiety or cause increased Burnout, there are significant correlations suggesting that these constructs and sleep deficits are related to one another. Further analysis must be conducted to solidify these relationships and suggest potential mitigating factors for sailors aboard surface ships.

4.4 Correlations Between Diet and Exercise as Protective Factors in High Stress Individuals

Section 4.3.2 focused on Sleep Analysis specifically focusing on Sleep Deficits correlated with Anxiety, Job Stress and Burnout constructs in the FY23 ASCAS Survey. While it is important to identify potential cause of sleep deficits among sailors, a natural question arises focused on what could be done about it. This section focuses on potential Protective Factors of Sleep Deficits among individuals with High Stress categorized but the Anxiety, Job Stress and Burnout constructs in the survey.

Protective factors can give individuals greater protection from experiencing mental or physical effects associated with stress and anxiety. Protective factors may include individual habits, participation in group activities, supportive relationships, religious or spiritual practices, physical exercise or healthy diet, positive emotions, active coping skills, using support groups, writing, creating art of music or developing a hobby. Many potential avenues that have documented results may not be available or inside the Navy's control while aboard a ship, however there are some factors that are not only in the Navy's control but regulations either exist or could be created to support these factors. In the ASCAS FY23 survey, exercise availability aboard ships and a healthy diet are both measured and can be analyzed in conjunction with current stress related effects on sleep deficits of sailors.

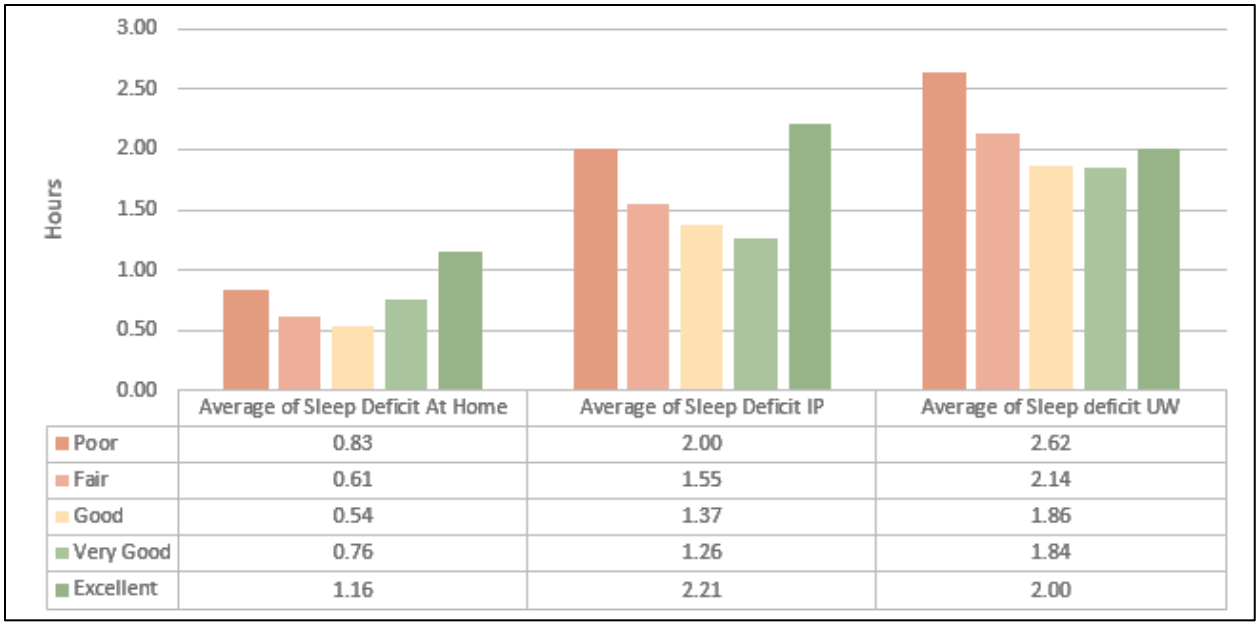
4.4.1 HIGH ANXIETY SLEEP DEFICIT PROTECTIVE FACTORS

For the FY23 ASCAS Survey, two questions were asked of sailors as related to Anxiety, these are outlined and analyzed in Section 4.3.2.1 and identified a strong correlation between High Anxiety and Sleep deficits in sailors. This section outlines both Diet on board ships as well as Exercise Availability on board as potential protective factors against Sleep Deficits for improved sailor health and improved safety aboard ships.

Sleep deficits in high anxiety individuals identified in Section 4.3.2.1 were identified as increasing with stronger responses to the two anxiety questions. For individuals with high anxiety (responses of >=4.0 average response to the two anxiety questions) analysis was conducted on the average sleep deficit these individuals had in relation to both Diet on Board and Exercise Availability on board. Of individuals responding to the survey, approximately 35.1% identified as high anxiety.

4.4.1.1 DIET ON BOARD FOR HIGH ANXIETY INDIVIDUALS

Diet on Board ships in the FY23 ASCAS Survey consists of one question identifying how healthful an individual's overall diet is while onboard their current ship. Responses to this section are Likert items ranging from Poor to Very Good. Figure 91 shows the relationship between Onboard Diet responses, and average Sleep deficits in High Anxiety individuals.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Poor	0.83	2.00	2.62
Fair	0.61	1.55	2.14
Good	0.54	1.37	1.86
Very Good	0.76	1.26	1.84
Excellent	1.16	2.21	2.00

Figure 91: Average Sleep Deficits for High Anxiety Individuals Protected by a Healthful Diet

As shown in Figure 91, there exists a significant correlation between individuals who report having a healthful diet and their average sleep deficit with those having a more healthful diet typically experiencing a smaller sleep deficit. It should be noted that there were only 21 individuals who identified as having an Excellent diet on board and had high anxiety as shown in Table 34.

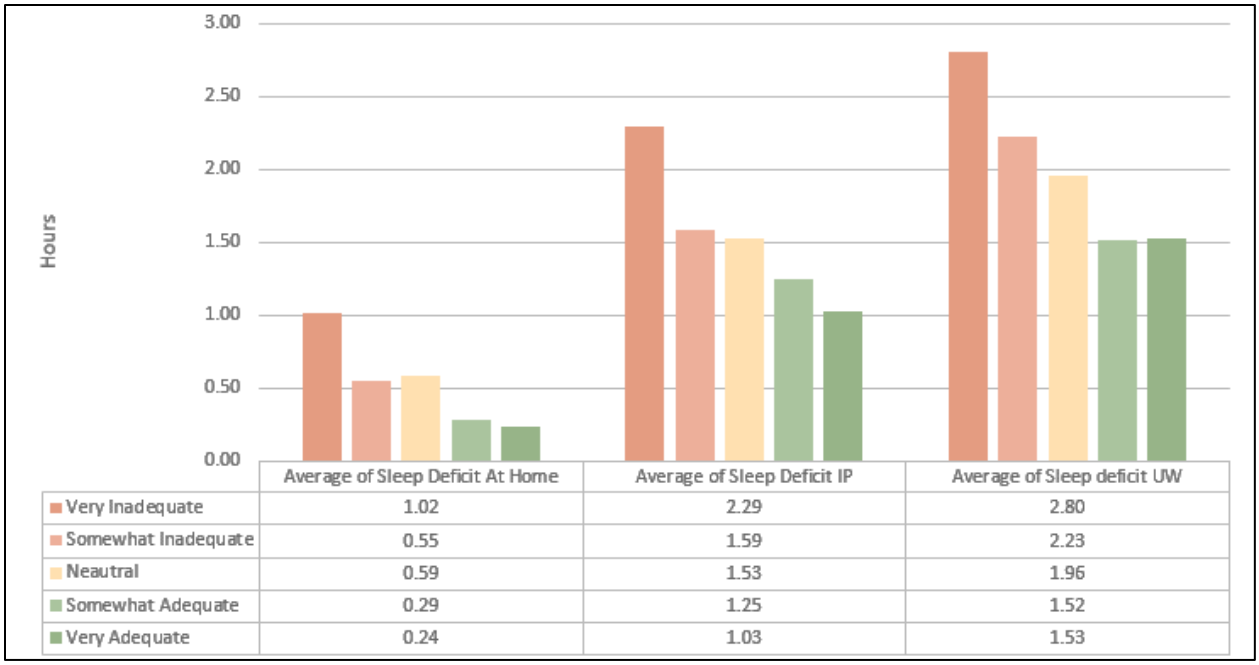
Table 34: FY23 High Anxiety Respondents to Healthful Diet Onboard

	Diet On Board					
	Poor	Fair	Good	Very Good	Excellent	Total
High Anxiety Individuals	724 (38.2%)	666 (35.1%)	392 (20.7%)	92 (4.9%)	21 (1.1%)	1895

As shown in Figure 91, it can be seen that a healthful diet is a potential protective factor against sleep deficits in high anxiety individuals with High Anxiety individuals reporting a Poor diet reporting a 2 hour and 37 minute sleep deficit and those reporting a Very Good or Excellent Diet while onboard reporting a 1 hour and 50 minute and 2 hours sleep deficit respectively. Further study is needed to provide adequate recommendations for a healthful diet onboard and high anxiety individuals but this analysis suggests a correlation between the two in decreasing overall sleep deficits in sailors.

4.4.1.2 EXERCISE AVAILABILITY ON BOARD FOR HIGH ANXIETY INDIVIDUALS

Exercise Availability on Board ships in the FY23 ASCAS Survey consists of one question identifying how adequate time provided to exercise onboard your current ship is in order to maintain physical fitness. Responses to this section are Likert items ranging from Very Inadequate to Very Adequate. Figure 92 shows the relationship between Onboard Exercise Time Availability responses, and average Sleep deficits in High Anxiety individuals.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Very Inadequate	1.02	2.29	2.80
Somewhat Inadequate	0.55	1.59	2.23
Neautral	0.59	1.53	1.96
Somewhat Adequate	0.29	1.25	1.52
Very Adequate	0.24	1.03	1.53

Figure 92:Average Sleep Deficits for High Anxiety Individuals Protected by Time Provided for Exercise Onboard

As shown in Figure 92, there exists a significant correlation between individuals who report having a adequate time provided for exercise onboard and their average sleep deficit with those reporting a more adequate amount of time for exercise experiencing a smaller sleep deficit.

Table 35: FY23 High Anxiety Respondents to Exercise Availability Onboard

	Exercise Availability Onboard					
	Very Inadequate	Somewhat Inadequate	Neutral	Somewhat Adequate	Very Adequate	Total
High Anxiety Individuals	628 (33.9%)	455 (24.5%)	433 (23.3%)	240 (12.9%)	99 (5.3%)	1855

As shown in Figure 92, it can be seen that adequate time provided for exercise is a potential protective factor against sleep deficits in high anxiety individuals with High Anxiety individuals reporting Very Inadequate time provided reporting a 2 hour and 48-minute sleep deficit and those reporting Very Adequate time provided for exercise while onboard reporting a 1 hour and 32 minute sleep deficit. Further study is needed to provide adequate recommendations for adjusting time provided for exercise while onboard, but these data suggest a correlation for future analysis.

4.4.1.3 HIGH ANXIETY SLEEP DEFICIT PROTECTIVE FACTORS CONCLUSION

Sections 4.4.1.1 and 4.4.1.2 outline the relationships that exist between diet, exercise and sleep deficits onboard for High Anxiety individuals and suggest potential avenues for mitigating or reducing sleep deficits in sailors. While these results are preliminary, they are promising for future studies focused on these areas and other potential protective factors aboard ships.

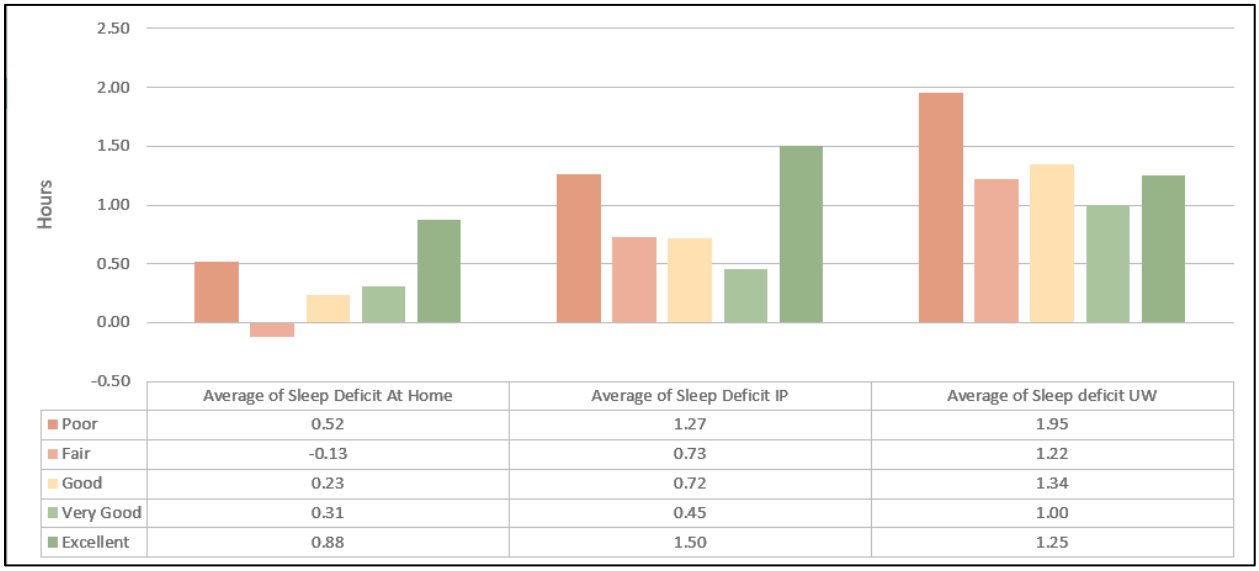
4.4.2 BURNOUT SLEEP DEFICIT PROTECTIVE FACTORS

For the FY23 ASCAS Survey, four questions were asked of sailors as related to Burnout, these are outlined and analyzed in Section 4.3.2.2 and identified a strong correlation between Burnout and sleep deficits in sailors. This section outlines both Diet on board ships as well as Exercise Availability on board as potential protective factors against Sleep Deficits for improved sailor health and improved safety aboard ships.

Sleep deficits in high burnout individuals identified in Section 4.3.2.2 were identified as increasing with stronger responses to the four burnout questions. For individuals with high burnout (responses of >=4.0 average response to the four burnout questions) analysis was conducted on the average sleep deficit these individuals had in relation to both Diet on Board and Exercise Availability on board. Of individuals who responded to the survey, 8.4% identified as High Burnout.

4.4.2.1 DIET ON BOARD FOR HIGH BURNOUT INDIVIDUALS

Diet on Board ships in the FY23 ASCAS Survey consists of one question identifying how healthful an individuals overall diet is while onboard their current ship. Responses to this section are Likert items ranging from Poor to Very Good. Figure 93 shows the relationship between Onboard Diet responses, and average Sleep deficits in High Burnout individuals.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Poor	0.52	1.27	1.95
Fair	-0.13	0.73	1.22
Good	0.23	0.72	1.34
Very Good	0.31	0.45	1.00
Excellent	0.88	1.50	1.25

Figure 93:Average Sleep Deficits for High Burnout Individuals Protected by Healthful Diet

As shown in Figure 93, there exists a correlation between individuals who report having a healthful diet and their average sleep deficit with those having a more healthful diet typically experiencing a smaller sleep deficit. It should be noted that there were only 10 individuals who identified as having an Excellent diet on board and had high burnout as shown in Table 36.

Table 36: FY23 High Burnout Respondents to Healthful Diet Onboard

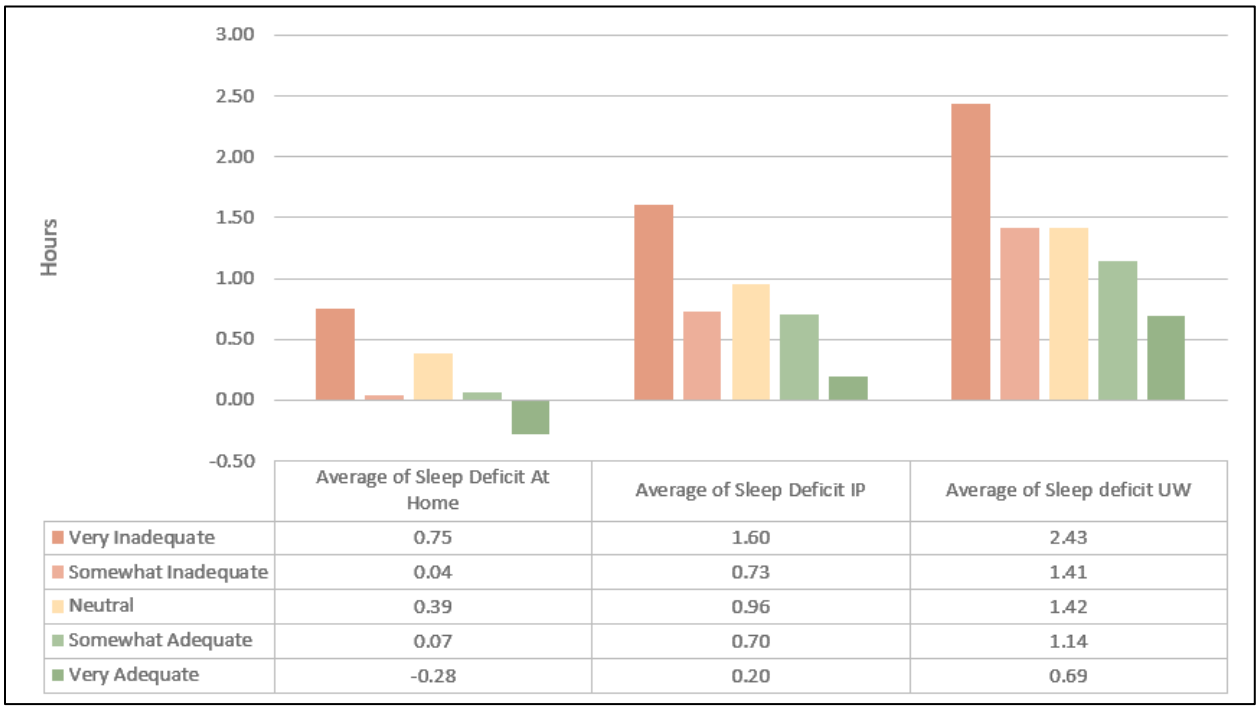
	Diet On Board					
	Poor	Fair	Good	Very Good	Excellent	Total
High Burnout Individuals	71 (15.6%)	160 (35.2%)	152 (33.4%)	52 (11.4%)	10 (2.2%)	445

As shown in Figure 93, it can be seen that a healthful diet is a potential protective factor against sleep deficits in high burnout individuals with high burnout individuals reporting a Poor diet reporting a 1 hour

and 57 minute sleep deficit and those reporting a Very Good or Excellent Diet while onboard reporting a 1 hour, and 1 hour and 15 minute sleep deficit respectively. Further study is needed to provide adequate recommendations for a healthful diet onboard and high-burnout individuals but this analysis suggests a correlation between the two in decreasing overall sleep deficits in sailors.

4.4.2.2 EXERCISE AVAILABILITY ON BOARD FOR HIGH BURNOUT INDIVIDUALS

Exercise Availability on Board ships in the FY23 ASCAS Survey consists of one question identifying how adequate time provided to exercise onboard your current ship is in order to maintain physical fitness. Responses to this section are Likert items ranging from Very Inadequate to Very Adequate. Figure 94 shows the relationship between Onboard Exercise Time Availability responses, and average Sleep deficits in high burnout individuals.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Very Inadequate	0.75	1.60	2.43
Somewhat Inadequate	0.04	0.73	1.41
Neutral	0.39	0.96	1.42
Somewhat Adequate	0.07	0.70	1.14
Very Adequate	-0.28	0.20	0.69

Figure 94:Average Sleep Deficits for High Burnout Individuals Protected by Exercise Availability Onboard

As shown in Figure 94, there exists a significant correlation between individuals who report having a adequate time provided for exercise onboard and their average sleep deficit with those reporting a more adequate amount of time for exercise experiencing a smaller sleep deficit.

Table 37: FY23 High Burnout Respondents to Exercise Availability Onboard

	Exercise Availability Onboard					
	Very Inadequate	Somewhat Inadequate	Neutral	Somewhat Adequate	Very Adequate	Total
High Burnout Individuals	58 (12.7%)	87 (19.1%)	119 (26.2%)	113 (24.8%)	73 (16.0%)	450

As shown in Figure 94, it can be seen that adequate time provided for exercise is a potential protective factor against sleep deficits in high burnout individuals with high burnout individuals reporting Very Inadequate time provided reporting a 2 hour and 26-minute sleep deficit and those reporting Very Adequate time provided for exercise while onboard reporting a 41 minute sleep deficit. Further study is

needed to provide adequate recommendations for adjusting time provided for exercise while onboard, but these data suggest a correlation for future analysis.

4.4.2.3 HIGH BURNOUT SLEEP DEFICIT PROTECTIVE FACTORS CONCLUSION

Sections 4.4.2.1 and 4.4.2.2 outline the relationships that exist between diet, exercise and sleep deficits onboard for high burnout individuals and suggest potential avenues for mitigating or reducing sleep deficits in sailors. While these results are preliminary, they are promising for future studies focused on these areas and other potential protective factors aboard ships.

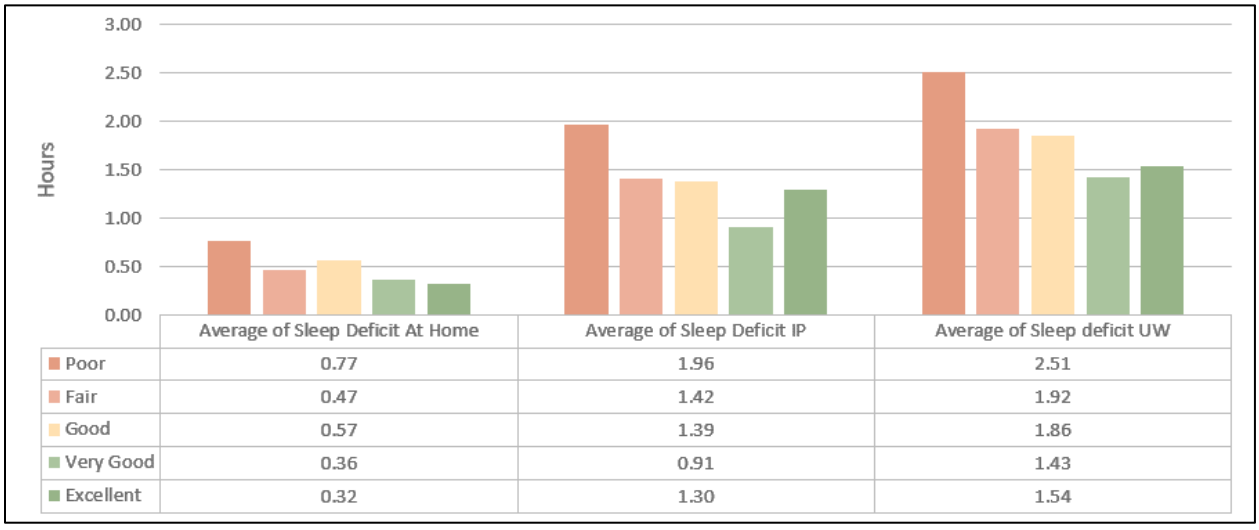
4.4.3 JOB STRESS SLEEP DEFICIT PROTECTIVE FACTORS

For the FY23 ASCAS Survey, two questions were asked of sailors as related to Job Stress, these are outlined and analyzed in Section 4.3.2.3 and identified a strong correlation between Job Stress and sleep deficits in sailors. This section outlines both Diet on board ships as well as Exercise Availability on board as potential protective factors against Sleep Deficits for improved sailor health and improved safety aboard ships.

Sleep deficits in high Job Stress individuals identified in Section 4.3.2.3 were identified as increasing with stronger responses to the two burnout questions. For individuals with high Job Stress (responses of >=4.0 average response to the two Job Stress questions) analysis was conducted on the average sleep deficit these individuals had in relation to both Diet on Board and Exercise Availability on board. Of individuals responding to the survey, 57.0% identified as having High Job Stress.

4.4.3.1 DIET ON BOARD FOR HIGH JOB STRESS INDIVIDUALS

Diet on Board ships in the FY23 ASCAS Survey consists of one question identifying how healthful an individual's overall diet is while onboard their current ship. Responses to this section are Likert items ranging from Poor to Very Good. Figure 95 shows the relationship between Onboard Diet responses, and average Sleep deficits in High Job Stress individuals.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Poor	0.77	1.96	2.51
Fair	0.47	1.42	1.92
Good	0.57	1.39	1.86
Very Good	0.36	0.91	1.43
Excellent	0.32	1.30	1.54

Figure 95:Average Sleep Deficits for High Job Stress Individuals Protected by Healthful Diet Onboard

As shown in Figure 95, there exists a correlation between individuals who report having a healthful diet and their average sleep deficit with those having a more healthful diet typically

experiencing a smaller sleep deficit. It should be noted that there were only 10 individuals who identified as having an Excellent diet on board and had high burnout as shown in Table 38.

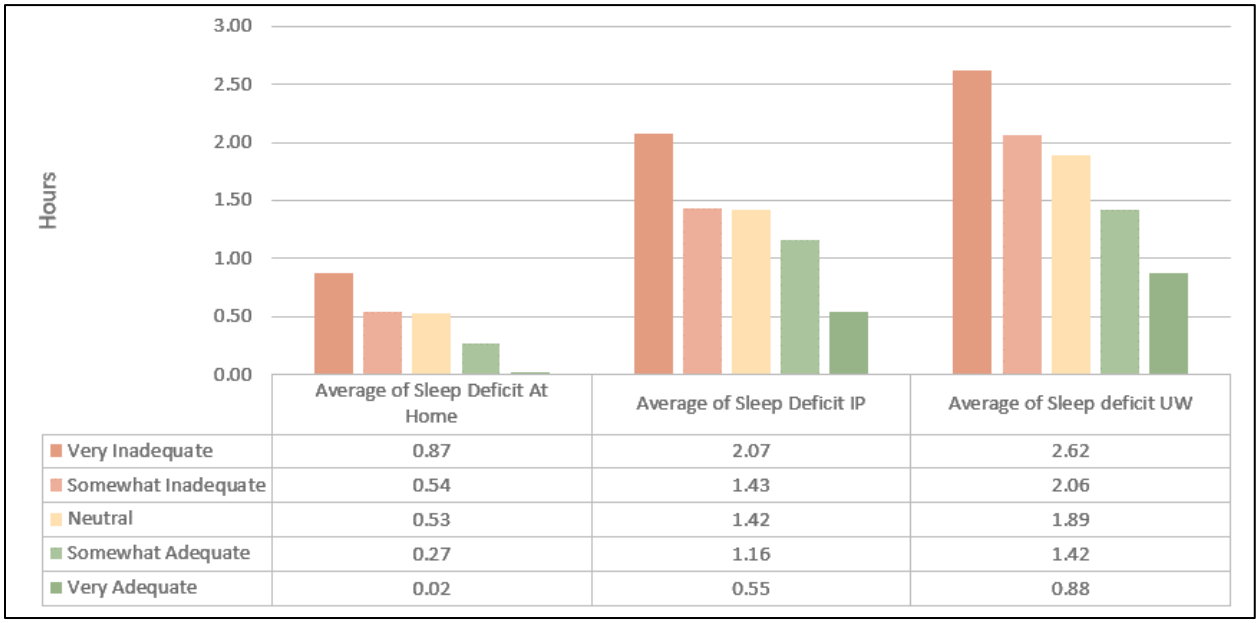
Table 38: FY23 High Job Stress Respondents to Healthful Diet Onboard

	Diet On Board					
	Poor	Fair	Good	Very Good	Excellent	Total
High Burnout Individuals	958 (31.23%)	1153 (37.5%)	746 (24.3%)	178 (5.8%)	40 (1.3%)	3075

As shown in Figure 95, it can be seen that a healthful diet is a potential protective factor against sleep deficits in high job stress individuals with high job stress individuals reporting a Poor diet reporting a 2 hour and 31 minute sleep deficit and those reporting a Very Good or Excellent Diet while onboard reporting a 1 hour and 26 minute, and 1 hour and 32 minute sleep deficit respectively. Further study is needed to provide adequate recommendations for a healthful diet onboard and high job stress individuals but this analysis suggests a correlation between the two in decreasing overall sleep deficits in sailors.

4.4.3.2 EXERCISE AVAILABILITY ON BOARD FOR HIGH JOB STRESS INDIVIDUALS

Exercise Availability on Board ships in the FY23 ASCAS Survey consists of one question identifying how adequate time provided to exercise onboard your current ship is in order to maintain physical fitness. Responses to this section are Likert items ranging from Very Inadequate to Very Adequate. Figure 96 shows the relationship between Onboard Exercise Time Availability responses, and average Sleep deficits in high job stress individuals.



	Average of Sleep Deficit At Home	Average of Sleep Deficit IP	Average of Sleep deficit UW
Very Inadequate	0.87	2.07	2.62
Somewhat Inadequate	0.54	1.43	2.06
Neutral	0.53	1.42	1.89
Somewhat Adequate	0.27	1.16	1.42
Very Adequate	0.02	0.55	0.88

Figure 96:Average Sleep Deficits for High Job Stress Individuals Protected by Exercise Availability Onboard

As shown in Figure 96, there exists a significant correlation between individuals who report having a adequate time provided for exercise onboard and their average sleep deficit with those reporting a more adequate amount of time for exercise experiencing a smaller sleep deficit.

Table 39: FY23 High Job Stress Respondents to Exercise Availability Onboard

	Exercise Availability Onboard					
	Very Inadequate	Somewhat Inadequate	Neutral	Somewhat Adequate	Very Adequate	Total
High Burnout Individuals	997 (32.2%)	772 (25.0%)	671 (21.7%)	446 (14.4%)	207 (6.7%)	3093

As shown in Figure 96, it can be seen that adequate time provided for exercise is a potential protective factor against sleep deficits in high job stress individuals with high job stress individuals reporting Very Inadequate time provided reporting a 2 hour and 37-minute sleep deficit and those reporting Very Adequate time provided for exercise while onboard reporting a 53 minute sleep deficit. Further study is needed to provide adequate recommendations for adjusting time provided for exercise while onboard, but these data suggest a correlation for future analysis.

4.4.3.3 HIGH JOB STRESS SLEEP DEFICIT PROTECTIVE FACTORS CONCLUSION

Sections 4.4.3.1 and 4.4.3.2 outline the relationships that exist between diet, exercise and sleep deficits onboard for high job stress individuals and suggest potential avenues for mitigating or reducing sleep deficits in sailors. While these results are preliminary, they are promising for future studies focused on these areas and other potential protective factors aboard ships.

4.4.4 PROTECTIVE FACTORS CONCLUSION

Sections 4.4.1 through 4.4.3 outline potential protective factors for sleep deficits associated with high anxiety, burnout, and job stress while onboard ships. While it might not always be possible to mitigate the underlying results of high anxiety, burnout, or job stress onboard due to the nature of the work aboard ships, it may be possible to mitigate these consequences effect on sleep deficits onboard. Sleep deficits are two-fold in that changes in sleep obtained or sleep required to feel well rested can both affect sleep deficits positively or negatively.

Healthful Diet and Exercise availability onboard have both been shown to correlate to decreased sleep deficits for high anxiety, burnout and job stress individuals. Further study will be needed to increase/validate certainty on these protective factors as well as discount potential other influences to these constructs from other sources such as ship department, ship class or OFRP phase. Additionally, other protective factors may be investigated for future integration into the ASCAS report to identify other ways in which the Navy may influence sleep deficits among sailors and thereby increase safety aboard surface ships.

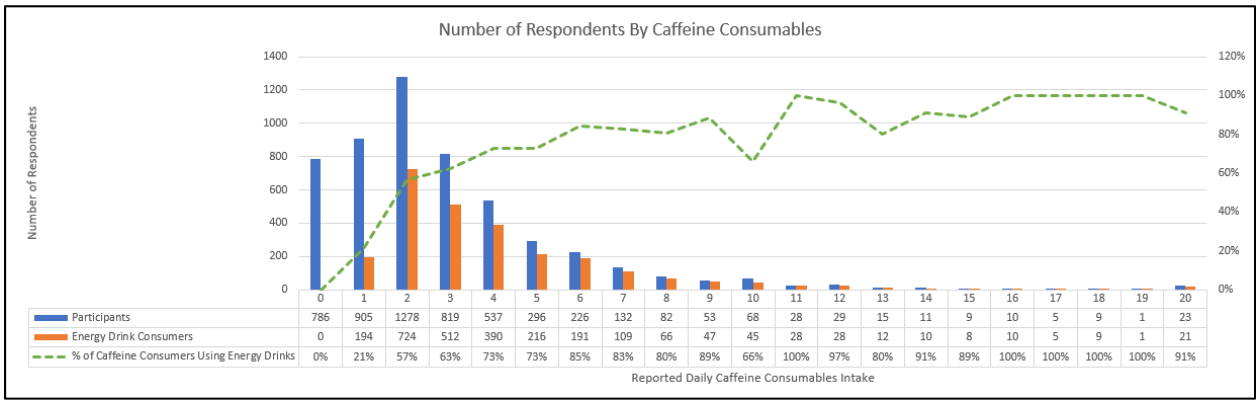
4.5 Stimulant Effect on Job Stress and Disrupted Sleep

In high-stress, continuous operations work environments, personnel face multiple threats to performance and health. Those working in occupational settings such as defense, transportation, first response, energy, and healthcare must routinely manage multiple concurrent stressors, including intense performance pressure, high workload, and disrupted sleep through shiftwork and 24/7 operations. A common countermeasure to these stressors in operational populations is the use of stimulant products, specifically caffeine and nicotine. Of increasing concern is the rising prevalence and chronic high-dose use of stimulants, further enabled by the rising availability and use of caffeinated energy drinks and supplements, and electronic nicotine delivery systems (ENDS; e.g., e-cigarettes, “vaping” products) sometimes marketed directly to operational populations. Using results from the ASCAS, an analysis was

conducted to determine is if the chronic use of stimulants is actually effective as a sustained operational countermeasure, and how chronic use of stimulants impacts operational health.

4.5.1 HIGH DOSAGE CAFFEINE USAGE IN NAVY PERSONNEL

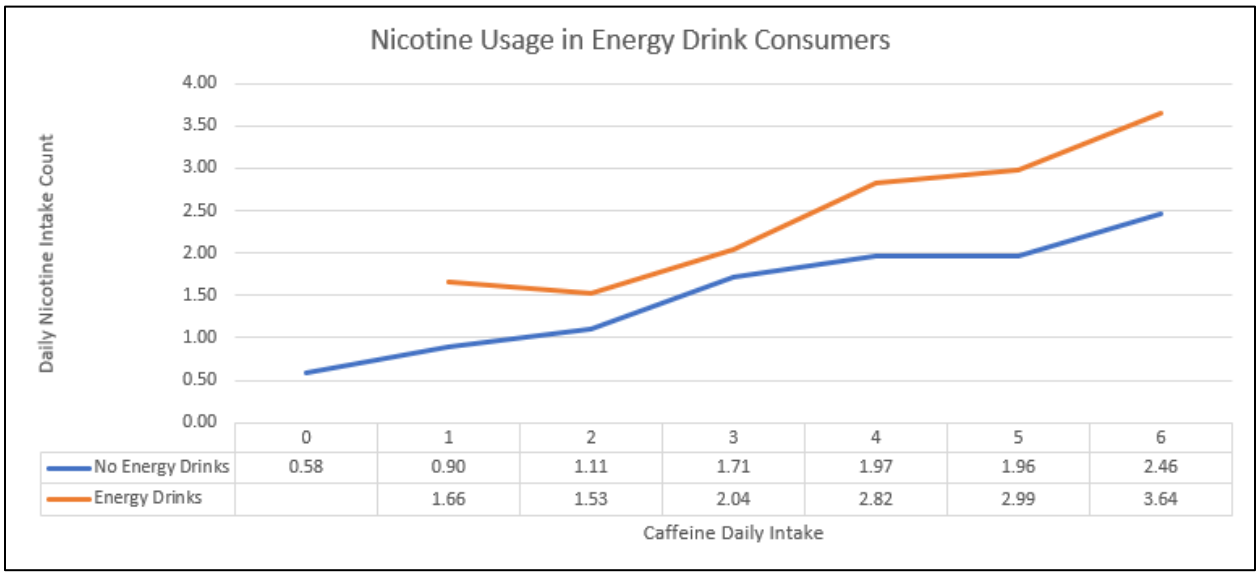
High dose caffeinated consumables utilized by Navy personnel is predominately through the use of energy drinks which for a 16 ounce can contains on average 170mg of caffeine, the equivalent of approximately 2 cups of coffee. In the FY23 ASCAS survey, of the 5,396 participants 4,610 reported caffeine usage of any kind and 2,700 reported consuming energy drinks daily. Many users of caffeine reported consuming multiple sources of caffeine daily as well as an increase total number of caffeine servings daily. Figure *97* highlights the number of caffeinated products used daily by total caffeine users, total energy drink users and the percentage of caffeine users that are consuming energy drinks.



	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Participants	786	905	1278	819	537	296	226	132	82	53	68	28	29	15	11	9	10	5	9	1	23
Energy Drink Consumers	0	194	724	512	390	216	191	109	66	47	45	28	28	12	10	8	10	5	9	1	21
% of Caffeine Consumers Using Energy Drinks	0%	21%	57%	63%	73%	73%	85%	83%	80%	89%	66%	100%	97%	80%	91%	89%	100%	100%	100%	100%	91%

Figure 97: Respondents by Caffeinated Consumables

As shown in Figure *97*, the ratio of caffeine users that use energy drinks increases steadily and of those who consume 6 or more caffeinated products daily, 80% are energy drink consumers. Energy drink consumption can also be seen to be correlated with an increase in nicotine consumption daily as compared to other caffeine users. Figure 98 shows that while energy drink users and non-energy drink caffeine consumers both have an increase in nicotine usage with additional caffeine usage, energy drink users have a higher consumption of nicotine use.



	0	1	2	3	4	5	6
No Energy Drinks	0.58	0.90	1.11	1.71	1.97	1.96	2.46
Energy Drinks		1.66	1.53	2.04	2.82	2.99	3.64

Figure 98: Nicotine Usage in Energy Drink Consumers

Energy Drink use is also associated with an increase in use of other caffeinated consumables other than Energy Drinks (such as coffee, caffeine supplements, caffeinated gum, etc.). Figure 99 shows the increase in caffeinated consumables consumption by the number of energy drinks consumed.

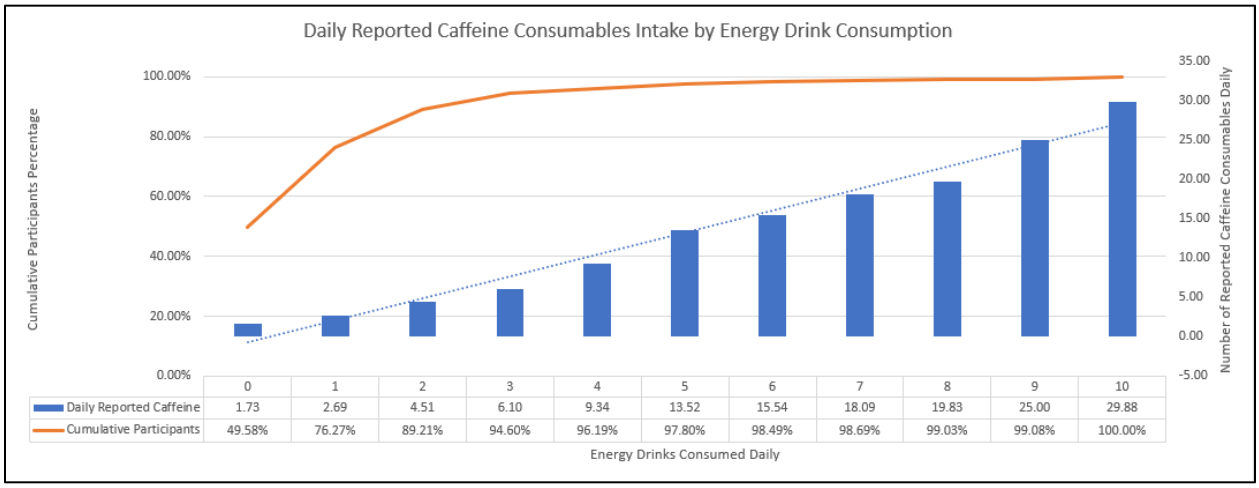
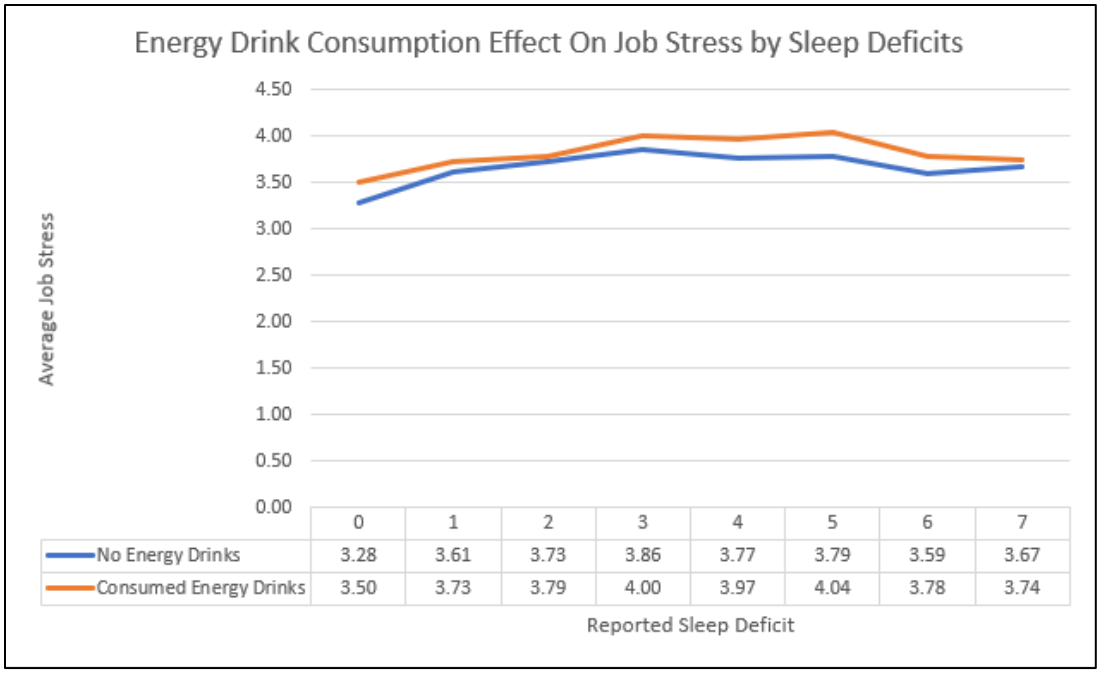


Figure 99: Daily Reported Caffeine Consumables Intake by Energy Drink Consumption

A linear regression model in Figure 99 shows that for every increase in energy drink consumption the number of additional products consumed increased by 1.78 with R^2 =0.97. In other words, for every energy drink consumed, it would be expected that an additional 1.78 other caffeinated products are also consumed. It should be noted that nearly 19.85% of surveyed Navy personnel reported 5 or more caffeinated consumables used per day from all sources and the FDA recommends to keep caffeine consumption below 400mg per day, the equivalent of 5 8 oz cups of coffee.

4.5.2 CAFFEINE USE RELATED TO JOB STRESS AND DISRUPTED SLEEP

For those Navy personnel consuming energy drinks an analysis of job stress and disrupted sleep was conducted to determine potential effects of energy drink consumption. Figure 100 shows the relationship between Job Stress, reported sleep deficit underway, and energy drink consumption.

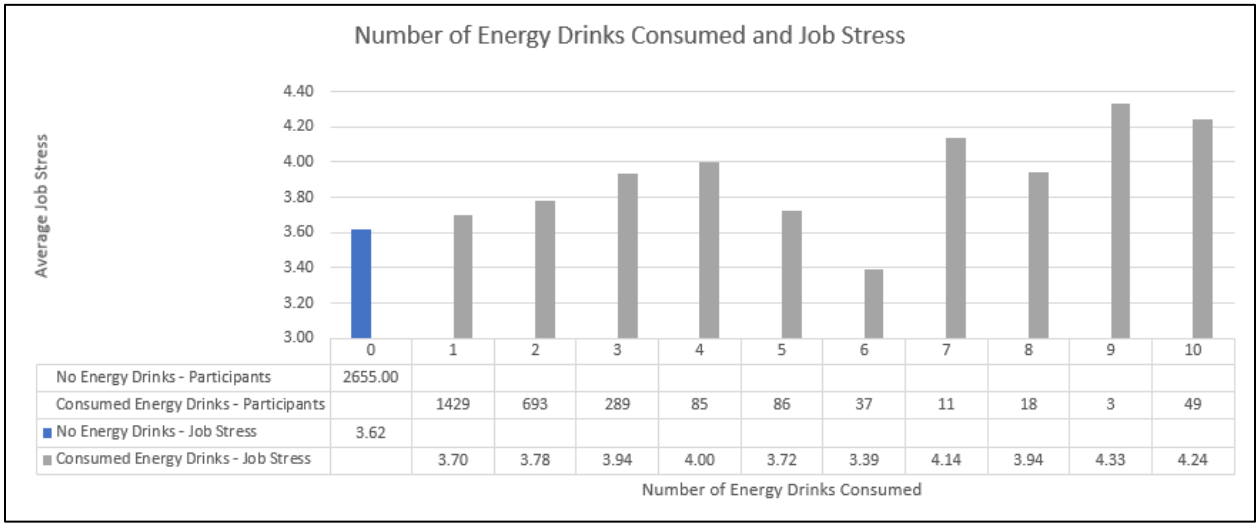


	0	1	2	3	4	5	6	7
No Energy Drinks	3.28	3.61	3.73	3.86	3.77	3.79	3.59	3.67
Consumed Energy Drinks	3.50	3.73	3.79	4.00	3.97	4.04	3.78	3.74

Figure 100: Energy Drink Consumption Effect on Job Stress by Sleep Deficit Hours

Of interest is that while job stress tends to increase with a higher reported sleep deficit, those reporting that they consumed energy drinks daily reported a higher average job stress than those who did not consume energy drinks.

Additionally, the number of energy drinks consumed daily correlates to a higher job stress as shown in Figure 101 (it should be noted that there were few respondents who reported consuming more than 3 energy drinks per day so some variability in responses is expected).



	0	1	2	3	4	5	6	7	8	9	10
No Energy Drinks - Participants	2655.00										
Consumed Energy Drinks - Participants		1429	693	289	85	86	37	11	18	3	49
No Energy Drinks - Job Stress	3.62										
Consumed Energy Drinks - Job Stress		3.70	3.78	3.94	4.00	3.72	3.39	4.14	3.94	4.33	4.24

Figure 101: Energy Drink Consumption and Job Stress

Sailors who consumed energy drinks also reported a higher average sleep disturbance response relative to their non energy drink consuming colleagues. Figure 102 shows this relationship.

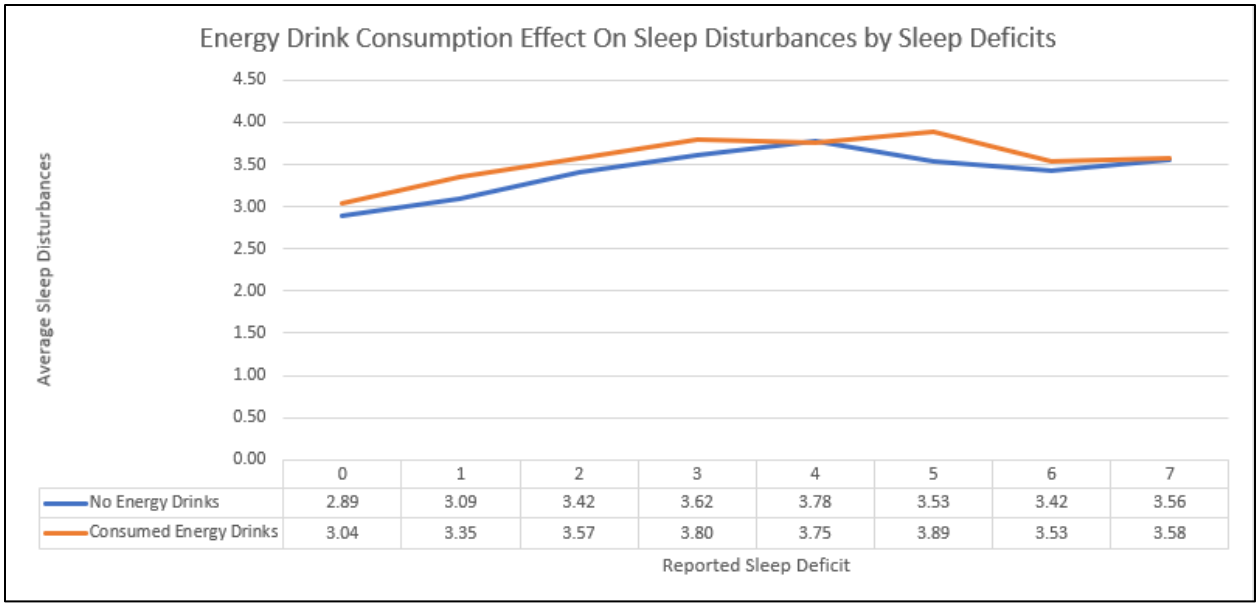


Figure 102: Energy Drink Consumption and Sleep Disturbances by Sleep Deficit Hours

The sleep disturbance construct consists of 3 separate questions pertaining to disturbances in sleep. These three items ask respondents to rate their level of agreement regarding general sleep while onboard their current ship and are as follows:

- I have problems with my sleep
- I have difficulty falling asleep
- I have trouble staying asleep

For those individuals consuming energy drinks, their responses were generally more in agreement with these statements than their non energy consuming counterparts when accounting for reported sleep deficits while underway. Figure 103 to Figure 105 highlight each of these three items in the construct.

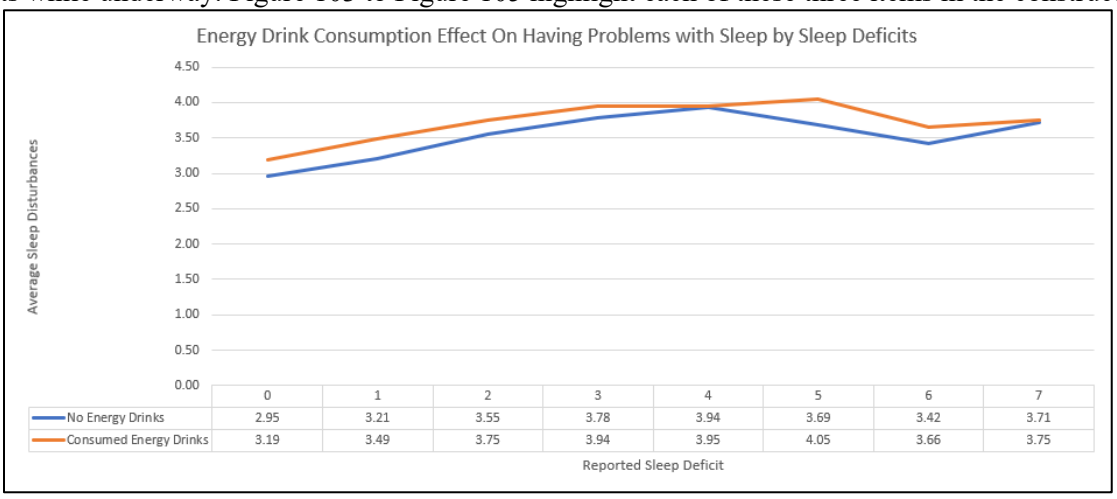


Figure 103: Energy Drink Consumption and Having Problems with Sleep, by Sleep Deficit Hours

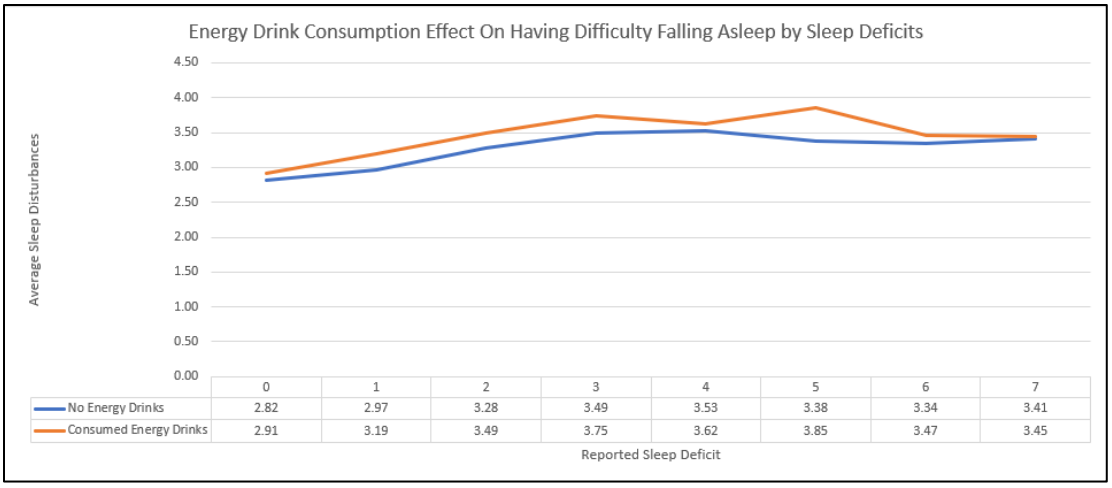


Figure 104: Energy Drink Consumption and Having Difficulty Falling Asleep by Sleep Deficit Hours

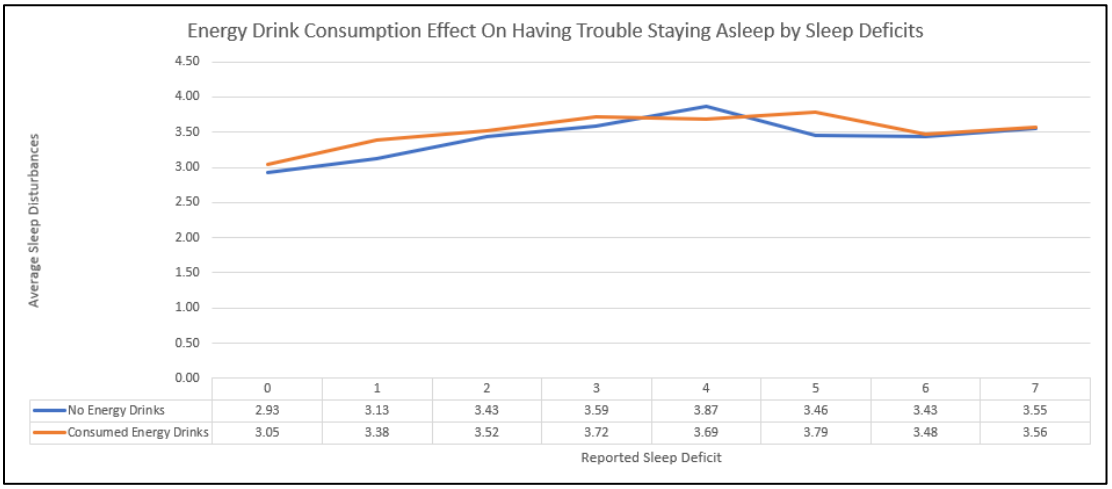


Figure 105: Energy Drink Consumption and Having Trouble Staying Asleep by Sleep Deficit Hours

Interestingly, when accounting for sleep deficits in sailors, generally those individuals who are consuming energy drinks are more likely to report having problems with their sleep, having more difficult time falling asleep and have trouble staying asleep. It should be noted that some individuals report no deficit or report more than a 7-hour sleep deficit but these cohorts of individuals are small and are not displayed here.

4.5.3 CONCLUSION

Energy drink consumption among military personnel is pervasive and more than 50% of respondents to the FY23 ASCAS survey reported consuming energy drinks daily. From the self-reported data in the ASCAS survey, energy drink consumption is associated with higher nicotine usage, higher job stress, and more sleep disturbances. Energy Drink Users report on average the same amount of sleep needed to feel well rested as their non energy drink using counterparts (two minutes difference between the two groups), however, report on average less sleep obtained whether at home, inport or underway. While stimulant usage alone may contribute to a variety of different health and mental concerns, energy drink usage may increase the effect of these concerns and may be an indicator for increased susceptibility to job stress, increased nicotine usage and increase sleep disturbances.

5 CONCLUSION

5.1 Summary

The ASCAS is an insightful resource to capture a comprehensive operational climate profile within SURFOR. More broadly, the ASCAS can be viewed as part of a larger effort that seeks to: 1) identify crew problems; and 2) provide robust data that can later be incorporated into analyses that attempt to identify the underlying causes of those problems (e.g., using structural equation modeling or Bayesian network construction, both of which can support "What if?" tests of the possible outcomes from implementing different courses of action). Both components are essential for successfully monitoring operational climate.

The conclusions drawn in this report are provisional and may change as more ASCAS data are collected. Of particular importance, with a larger sample size, the OSRI team will be in a better position to generate norms for judging when a problem is present or absent in a given command. As it stands now, in defining an "area of praise or concern," preliminary thresholds of .05 above and below the "neutral" option served to identify problematic or praiseworthy circumstances. However, this choice of criterion is limited as it does not consider the individual variation that might hold across constructs. With that caveat in mind, overall, SURFOR's areas of praise included Leader Perception of Subordinates, Crew Performance (individual, department), Supervisor Safety Climate and Personal Responsibility to Workplace Safety. Areas of concern included Midnight Rations, Job Stress, Job Demands, Exercise Onboard, Sleep disturbances, Diet and Burnout.

On the whole, when comparing CNSP and CNSL data, there are no significant differences between the two groups. However, CNSP expressed slightly more favorable responses towards Job Demands, Command Safety Practices and Burnout; while CNSL expressed slightly more favorable responses towards Exercise Onboard, and Human Performance: Command.

Of greater note are the differences observed in by paygrades. These analyses identified differences in nearly every survey construct, with Enlisted Sailors responding more unfavorably than Officers/CWOs. Constructs manifesting the largest differences included Organizational Identity: Command, Psychological Safety, Command Satisfaction, Unit Cohesion: Department, and Affective Commitment with significant differences noted for most constructs.

The FY22 ASCAS dataset was joined to several other metrics to better understand how these factors affect surface ship climate. Specifically, FDNF status, FIT/FILL metrics, OFRP phase and CO Race/Ethnicity. Major findings are as follows:

- Sailors on platforms that were forward deployed (FDNF) at the time of the administration of the ASCAS tended to respond less favorably towards Exercise Onboard than their Non-FDNF counterparts.
- Commands with below standard FIT (< 92%) had significant differences with their above standard FIT counterparts in Exercise Onboard, Team Processes, Psychological Safety, Organizational Identity: Command and Affective Commitment. There were no significant differences between below standard FILL (<95%) and above standard FILL ships.
- OFRP analyses indicated that Sailors in the Basic phase (READ-E1) responded more favorably to questions around Exercise Onboard, and Job Demands than those in Sustainment phase (READ-E5).
- CO Race/Ethnicity analysis, while potentially interesting, are not significant, provisional and subject to change as additional data is collected.

These findings serve to help SURFOR identify and mitigate operational Surface climate and human performance concerns. The ASCAS lays the foundation that will ultimately help promote a deeper and richer understanding of the complex multifaceted interplay of factors that contribute to overall surface ship culture with a high-risk organization. The Navy is poised to leverage robust analytic techniques for use on the ASCAS data, which will produce a tool that will complement ongoing strategic lines of effort, ultimately enabling better decision making and more effective implementation of countermeasures designed to promote safety and operational surface climate improvements.

5.2 Next Steps

Leveraging scientific literature and factor analysis, the FY24 ASCAS will be further streamlined to allow for additional insights. The updated version of the survey will be merged with historic data (FY21-23), and further analyses performed. The ASCAS data has been incorporated into the Operational Safety Risk Indicator (OSRI) machine learning model within the Jupiter platform. Specifically, ASCAS data will be joined to disparate data sources, including as personnel systems (e.g., COGNOS, NSIPS, MNA, and DMDC), training (e.g., STRMS and TORIS), health-related records (e.g., NMCPHC and ADMITS), safety-related data (e.g., RMI and SURFOR Critiques and Lessons Learned), and other data sources (e.g., 90-day SURFOR CO reports) to better understand relationships and causal factors. To access the ASCAS interactive dashboard and additional products, join the DoN enterprise data environment, Jupiter (https://jupiter.data.mil).

As more interrelationships between construct measures, naval platforms and data sources are established, additional analysis will be conducted to identify potential avenues for research, increased safety and surface climate awareness and mitigation strategies for areas of increase concern. The ASCAS has provided invaluable insight into life/climate aboard surface ships and will continue to provide a window into active members of the Naval Surface Force to promote data driven decision making across naval platforms.