



# A NOVEL SURVEY OF U.S. NAVY SAILORS TO INFORM THE DESIGN OF NEXT-GENERATION SHIPBOARD MATTRESSES THAT IMPROVE SLEEP AND READINESS

Evan D. Chinoy<sup>1</sup>, Trevor B. Viboch<sup>1,2</sup>, Krisztina Marosi<sup>1,2</sup>, Andrew G. Kubala<sup>1,2</sup>, Jason T. Jameson<sup>1,2</sup>, Rachel R. Markwald<sup>1</sup>

<sup>1</sup>Warfighter Performance Department, Naval Health Research Center, San Diego, CA; <sup>2</sup>Leidos, Inc., San Diego, CA



## Background

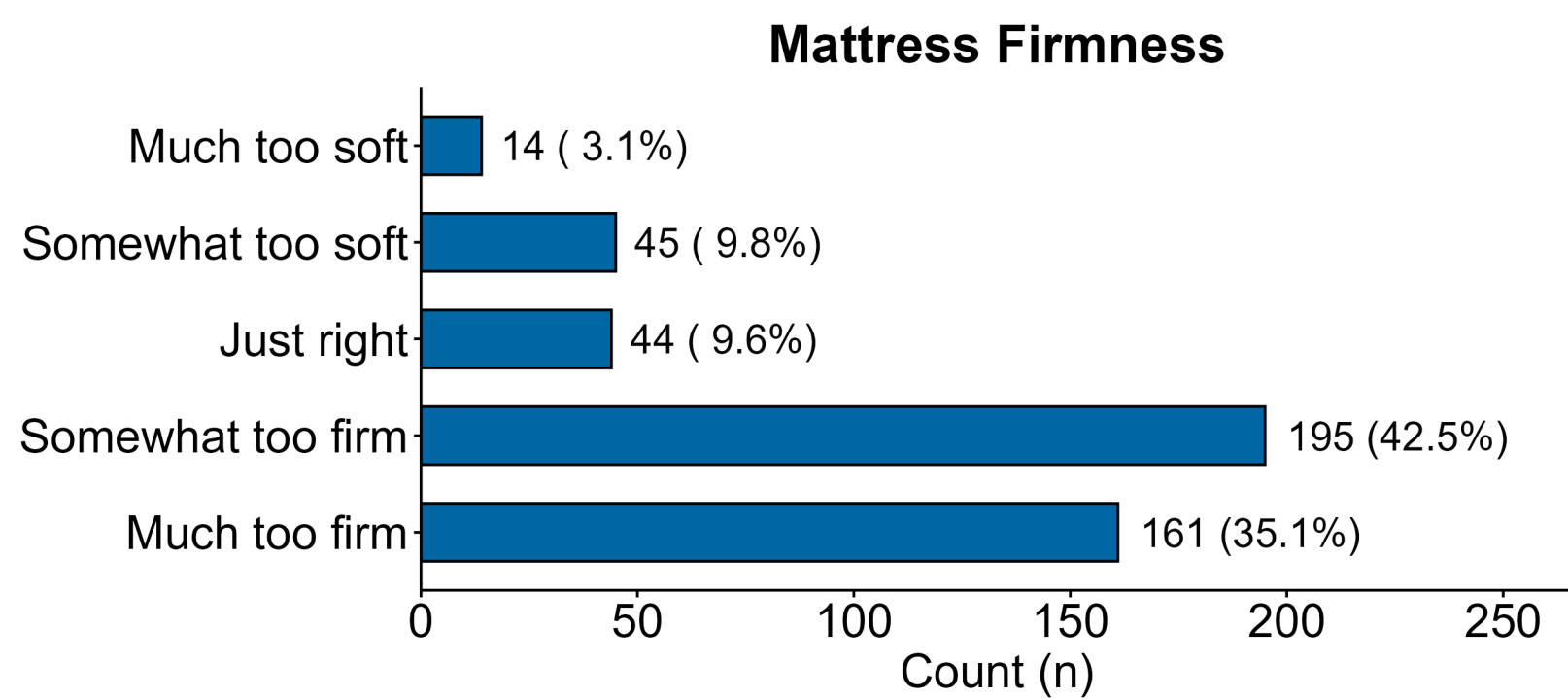
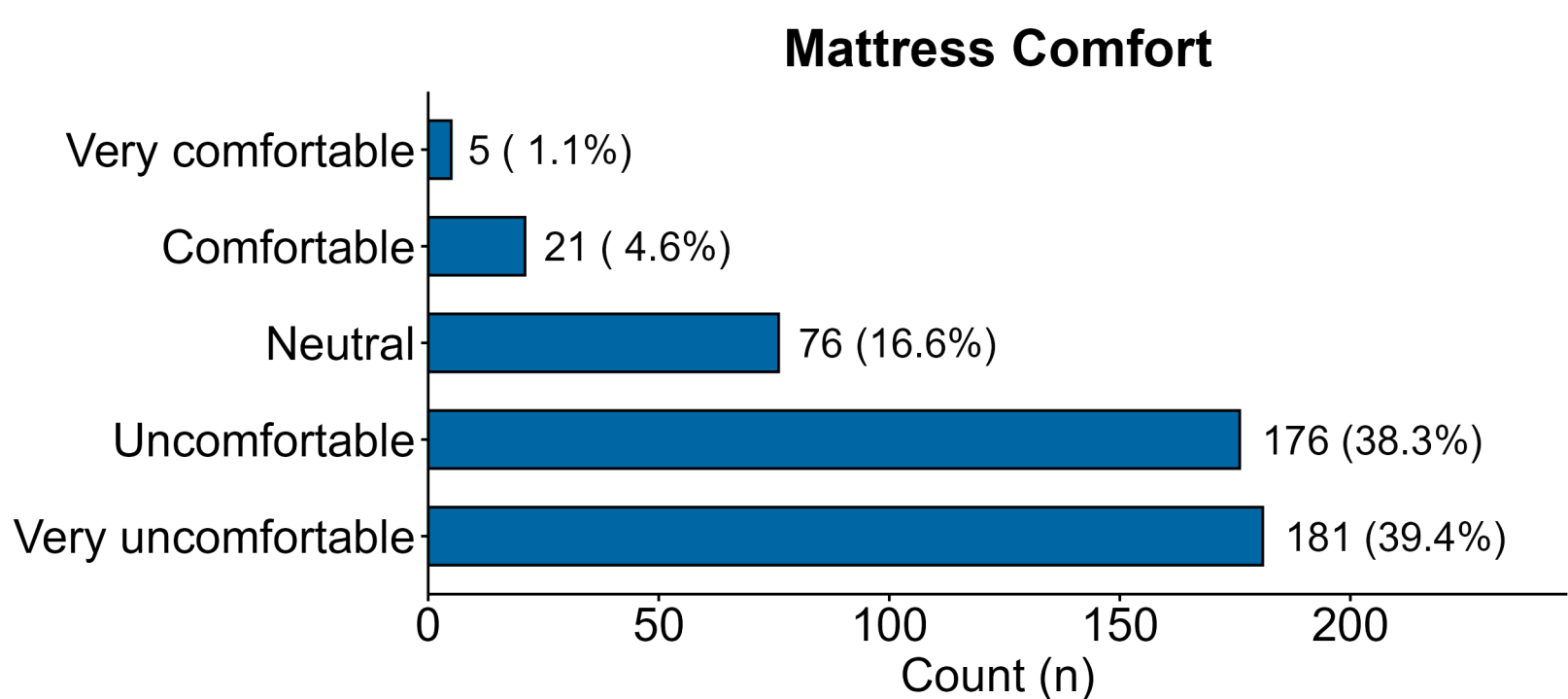
- Previous operational surveys indicated that shipboard mattresses are frequently reported as uncomfortable and interfere with the ability of Sailors to obtain high-quality sleep, with implications for readiness
- Based on those findings, the U.S. Government Accountability Office (GAO) recently included mattress improvement as one of the priority recommendations to address Sailor fatigue and Navy readiness shortfalls
- U.S. Naval Surface Forces (SURFOR) then requested support from the Office of Naval Research (ONR) for improvements to shipboard mattresses
- In response, ONR developed a topic area through the small business technology transfer (STTR) program to design new shipboard mattresses
- Mattresses are a potentially modifiable element of the berthing environment, if designed with alternative materials that enhance comfort while still meeting required safety and dimensional standards
- Previous Navy surveys only asked Sailors general mattress-related questions and did not examine specific factors or preferences that could better inform the effort to develop new mattresses
- **Objective:** To address these limitations, we designed a new survey to capture more detailed information from Sailors on mattress-related factors and preferences, with the goal of informing ongoing efforts to develop next-generation shipboard mattresses that improve Sailors' sleep and readiness

## Methods

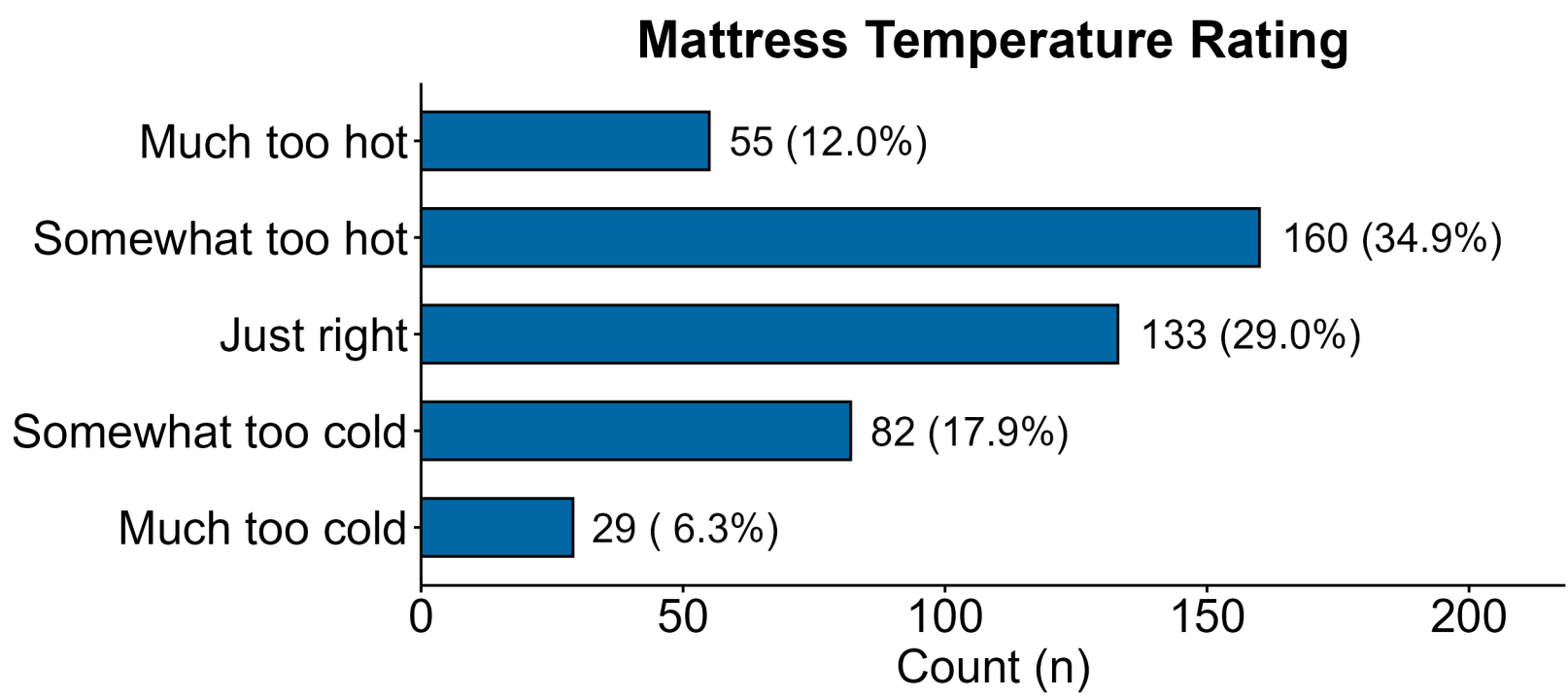
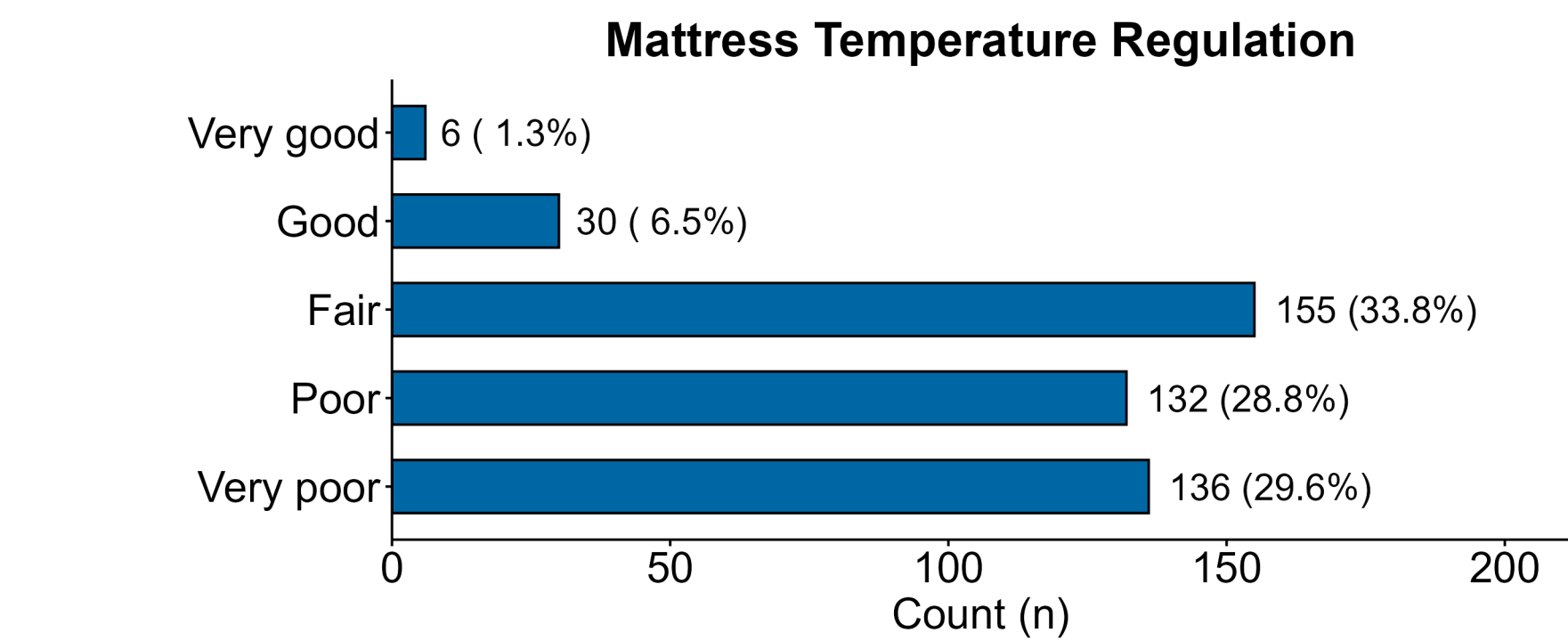
- This survey was developed by researchers from NHRC with funding and input from ONR and additional input from SURFOR
- The survey is open only to active duty SURFOR Sailors and is voluntary and anonymous; total survey completion time is ~5–10 min
- Data collection started in July 2025 and remains active for additional participants
- Results reflect data from all responses received through 27 April 2026 (n=459 participants)
- Enrollment and survey completion are conducted online through a Qualtrics weblink (Qualtrics, LLC) and was approved by NHRC and the Navy Survey Office
- The survey contains items for Sailors to assess their experiences with current shipboard mattresses and preferences for improving mattresses to enhance their bodily comfort, sleep quality, and readiness

## Results

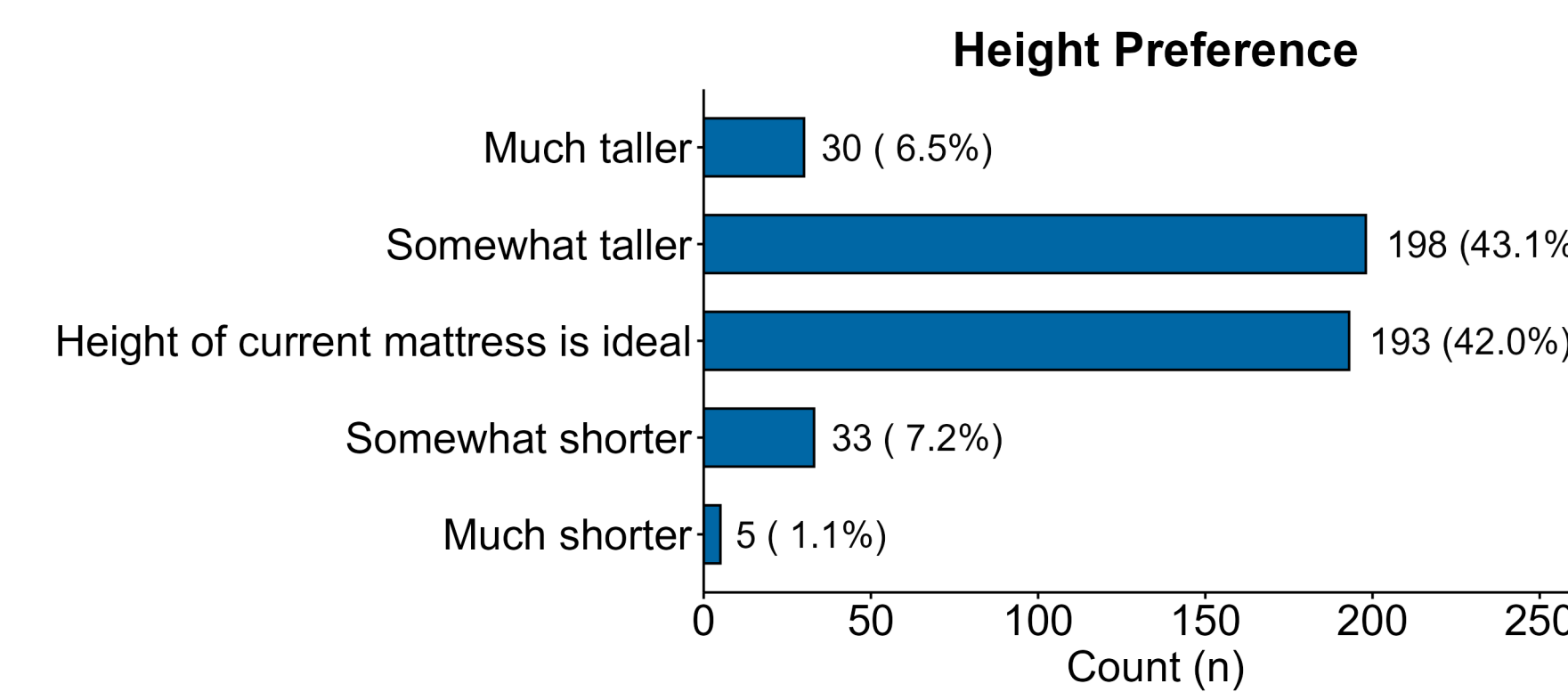
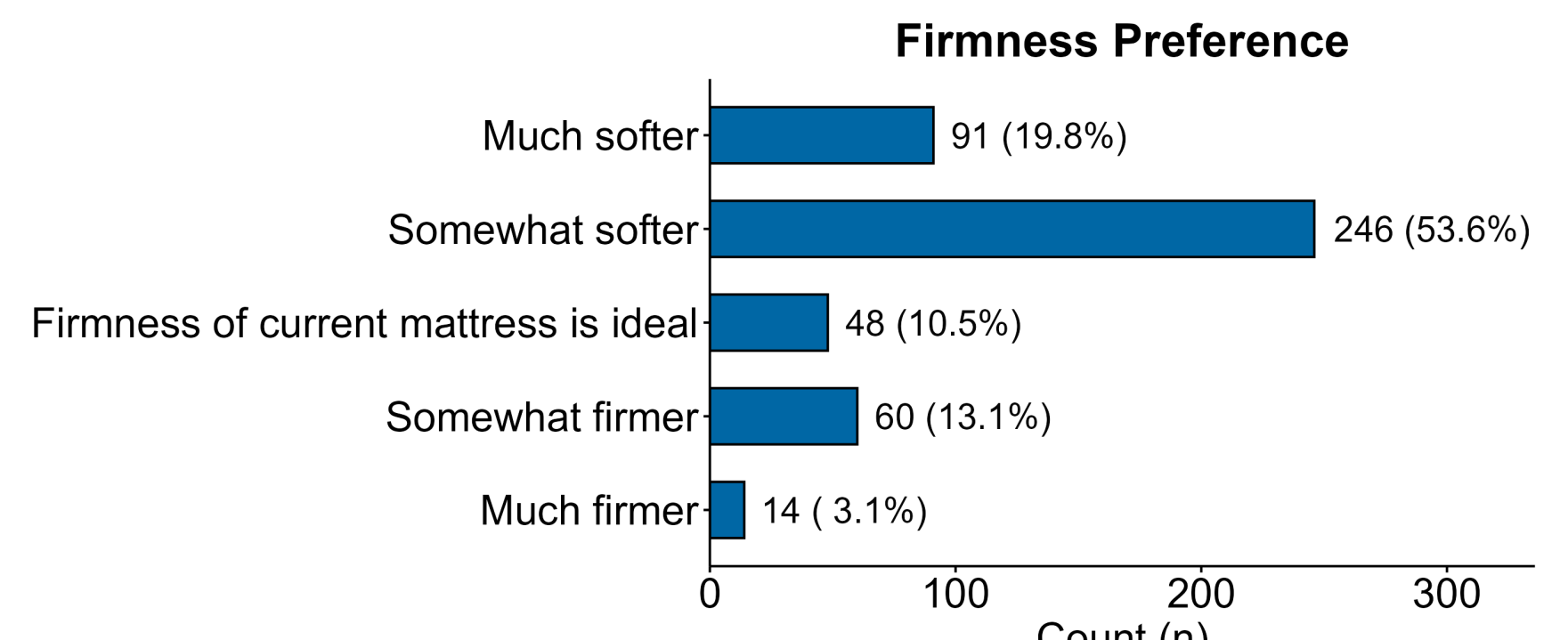
### Physical Mattress Ratings



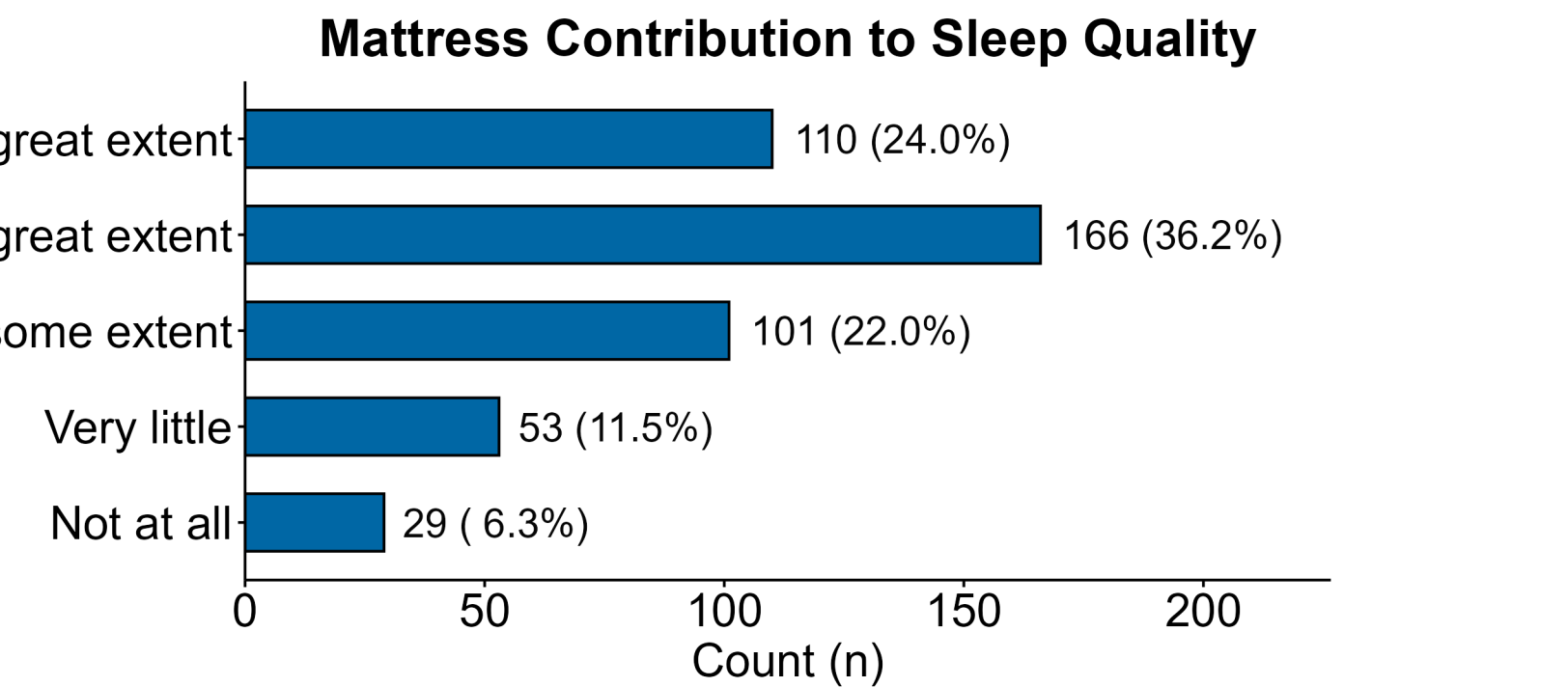
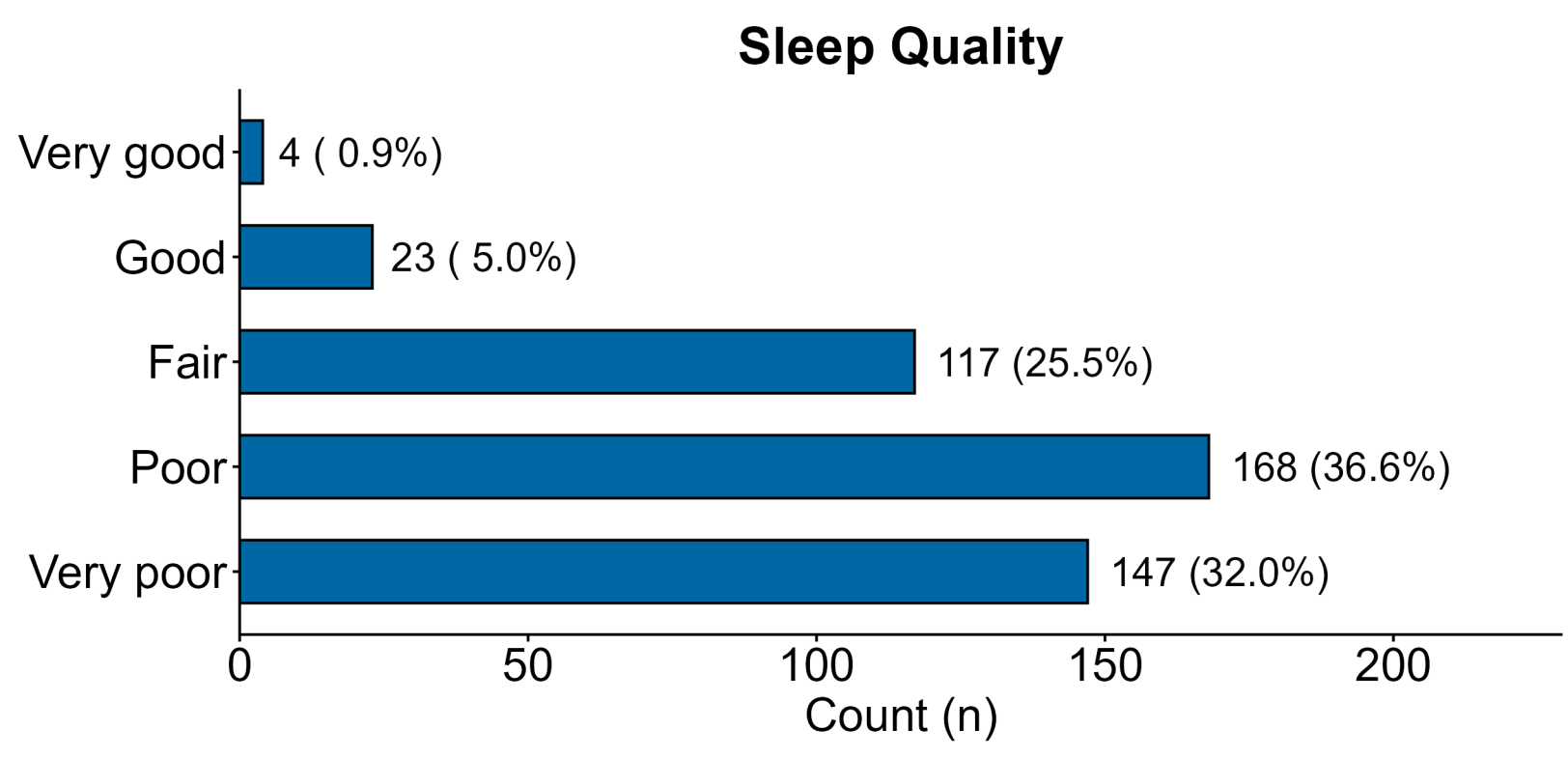
### Mattress Temperature Ratings



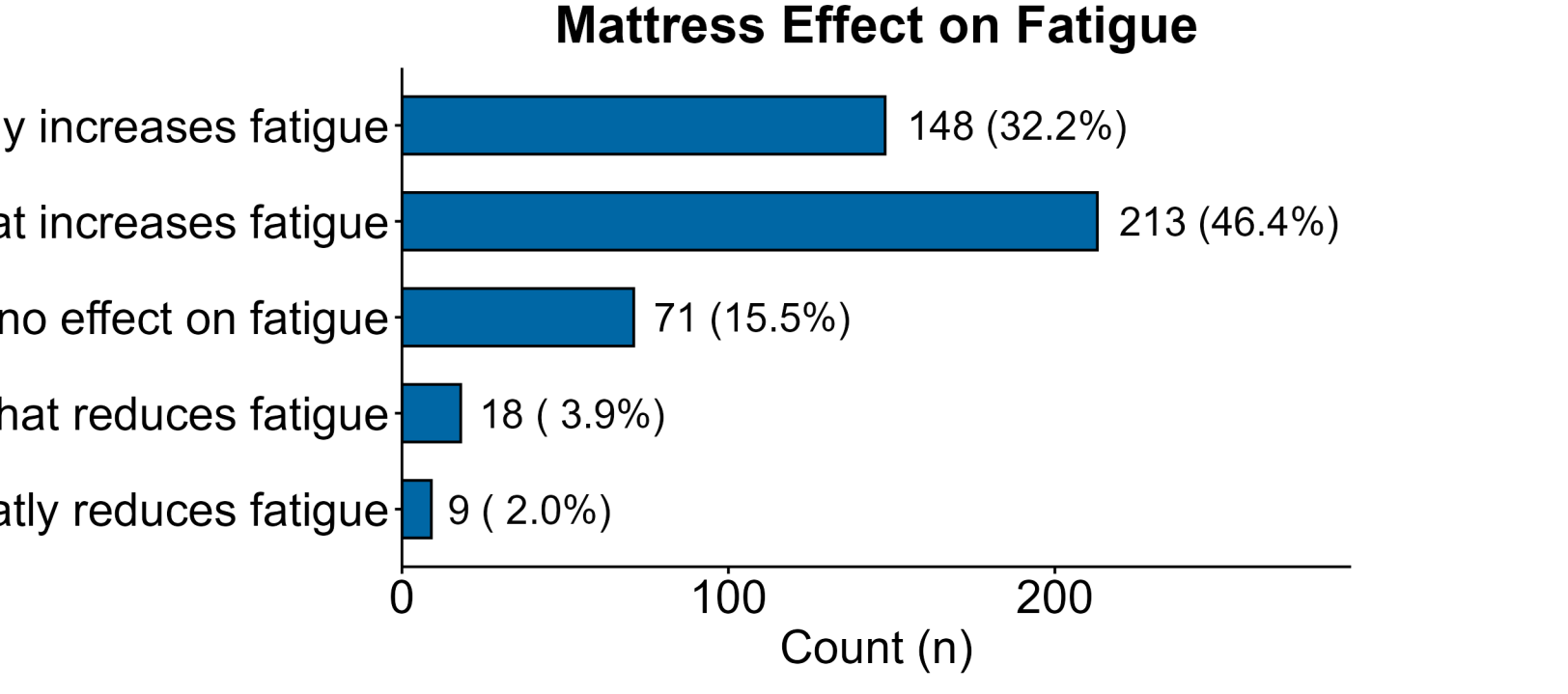
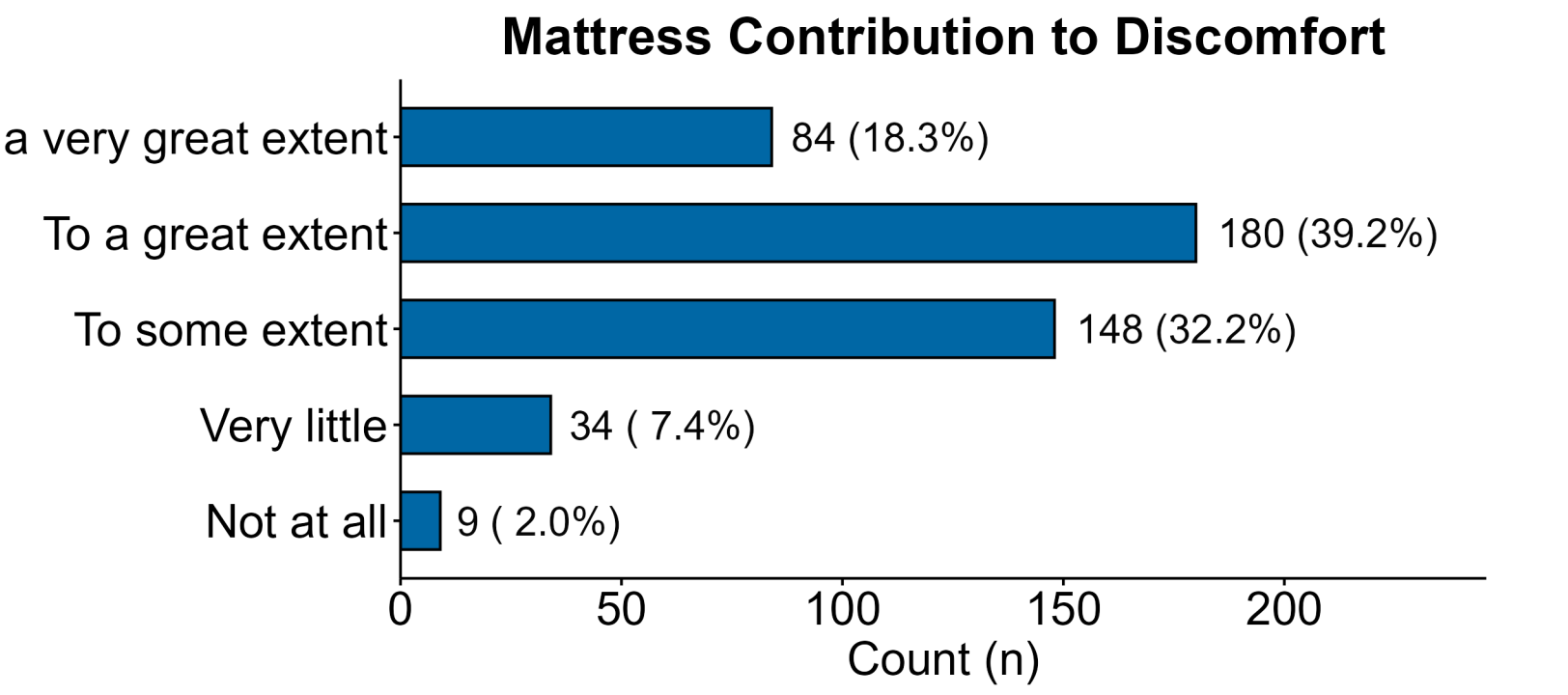
### Future Mattress Design Preferences



### Sleep Quality Ratings



### Discomfort and Fatigue Ratings



### Demographic Associations

#### Significant (p<0.05) demographic associations with mattress ratings:

- **Age:** Older age was associated with worse ratings of sleep quality, mattress comfort, and a greater degree to which mattresses contribute to bodily discomfort
- **Sex:** Males rated mattresses as being hotter and providing worse temperature regulation than females
- **BMI:** Higher BMI was associated with worse ratings of sleep quality, mattress comfort, and temperature regulation

## Sample Demographics

| VARIABLE                |                 | PARTICIPANTS           |
|-------------------------|-----------------|------------------------|
| Sample Size             | All             | 459                    |
|                         | Males           | 357 (78%)              |
|                         | Females         | 102 (22%)              |
|                         | ≤ 25 years      | 154 (34%)              |
| Age                     | 26-30 years     | 104 (23%)              |
|                         | 31-35 years     | 92 (20%)               |
|                         | 36-40 years     | 84 (18%)               |
|                         | ≥ 41 years      | 25 (5%)                |
| Body Mass Index (kg/m²) | All             | 27.9 ± 4.6 (mean ± SD) |
| Paygrade                | E1-E3           | 57 (12%)               |
|                         | E4-E6           | 285 (62%)              |
|                         | E7-E9           | 51 (11%)               |
|                         | O1-O4           | 57 (12%)               |
|                         | O5-O6           | 3 (1%)                 |
|                         | WO1-CWO5 or LDO | 6 (1%)                 |

| VARIABLE   |                               | PARTICIPANTS |
|------------|-------------------------------|--------------|
| Ship Class | Destroyer (DDG)               | 272 (59%)    |
|            | Amphibious Assault (LHA, LHD) | 54 (12%)     |
|            | Littoral Combat (LCS)         | 37 (8%)      |
|            | Amphibious Transport (LPD)    | 34 (7%)      |
|            | Cruiser (CG)                  | 28 (6%)      |
|            | Amphibious Command (LCC)      | 24 (5%)      |
|            | Other Ship Classes            | 10 (2%)      |
| Department | Combat Systems                | 114 (25%)    |
|            | Weapons                       | 73 (16%)     |
|            | Operations                    | 72 (16%)     |
|            | Engineering                   | 70 (15%)     |
|            | Supply                        | 39 (9%)      |
|            | Medical/Dental                | 17 (4%)      |
|            | Administration                | 16 (4%)      |
|            | Other Departments             | 58 (13%)     |

## Conclusions

- Results from this novel survey corroborate Sailors' previously reported poor experiences with shipboard mattresses and provide actionable insights into specific factors that can be addressed to help improve mattresses, per GAO and SURFOR recommendations
- Sailors largely rate physical design features of their current shipboard mattresses negatively (e.g., uncomfortable, too firm, and poor at regulating body temperature)
- Most Sailors report poor sleep quality, and that mattresses contribute a great extent to their sleep quality ratings
- Sailors report that mattresses contribute significantly to their physical discomfort while sleeping and increase their fatigue
- Several demographic categories (age, sex, BMI) are associated with mattress ratings, suggesting that several design aspects of current shipboard mattresses affect Sailors differently
- To enhance their comfort and sleep while underway, most Sailors report wanting new mattresses designed to be softer, taller, and better at regulating body temperature than current shipboard mattresses

## Future Directions

- These novel Sailor-informed mattress ratings and design preferences will be provided to sponsors, Navy operational stakeholders, and commercial STTR vendors to support ongoing efforts in developing next-generation shipboard mattresses that help improve Sailor sleep and readiness

## Funding and Support

- This work was supported by the Office of Naval Research, Code 34
- We thank the study volunteers and our operational partners at Commander, Naval Surface Forces, U.S. Pacific Fleet (SURFPAC) for input on survey items, disseminating the online survey to Sailors, and review of the results