

Project MARTHA: Seafarer Sleepiness and Fatigue

Professor Claire Pekcan

Emeritus Professor Mike Barnett

IUMI webinar, 11-12 October 2017

What is your biggest concern with crew safety and health in relation to your claim records?



Distinguishing Sleepiness from Fatigue

Short-term Sleepiness

vs

Longer-term Fatigue

- Healthy individuals
- Rapid onset
- Short duration
- Single cause
- Short-term effect on daily activities

- May cause health disorders (physical and mental)
- Insidious onset
- Persists over time
- Multi-factor causes
- Significantly affects behaviour and wellbeing

Chronic health effects of fatigue

- Sleeping disorders
 - Insomnia
 - Sleep apnoea/hypopnoea
 - Delayed/advanced sleep phase syndrome
- **Cardiovascular disorders**
 - Myocardial infarction
 - Stroke
 - Hypertension
- **Metabolic disorders**
 - Metabolic syndrome
 - Hyperlipemia
 - Diabetes
 - Obesity
- Gastrointestinal disorders
 - Peptic ulcer
 - Irritable bowel syndrome
- Common infections
- Mental disorders
 - Depression
- Cancer
- Multiple sclerosis



Source: “*Risk factors for Fatigue in seafarers*” (In press: *Maritime Psychology*, Springer)
Jepsen, J.R., Zhao, Z., Pekcan, C.H.
Barnett, M.L. van Leeuwen, W..



The Partners:

The Stress
Research
Institute



MARTHA: The Research Plan – Europe*

2014

2015 - 2016

Surveys

Questionnaires distributed to 4 companies:
Total: nearly 1000 questionnaires

Interviews with seafarers and managers in both China and Europe

Study 1 (2014):

Observation study of Masters and selected crew for a tour of duty (3-4 months)

- KSS and MFI readings, sleep and stress levels through weekly diaries
- Actiwatches
- Hours of work and voyage data



Study 2 (2015):

Repeat of Study 1 on European vessels

Analysis of results of 110 seafarers of different ranks

FRMS workshops, and developing fatigue training, prediction and reporting interventions

Analysis

Analysis of results from Study 1 and 2

Development and dissemination of findings

Final reports and publications

* Interviews, questionnaires and Study 1 conducted in both Europe and China , but Study 2 only with European companies

Interviews with seafarers and managers

EUROPE

| | Company "A" | Company "B" | TOTALS |
|----------------|----------------|----------------|--------|
| Questionnaires | 314 | 140 | 454 |
| Interviews | 5 | 9 | 14 |

CHINA

| | Company "D" | Company "T" | TOTALS |
|----------------|----------------|----------------|--------|
| Questionnaires | 230 | 253 | 483 |
| Interviews | 20 | 17 | 37 |

TOTAL = 937 questionnaires and 51 in-depth interviews

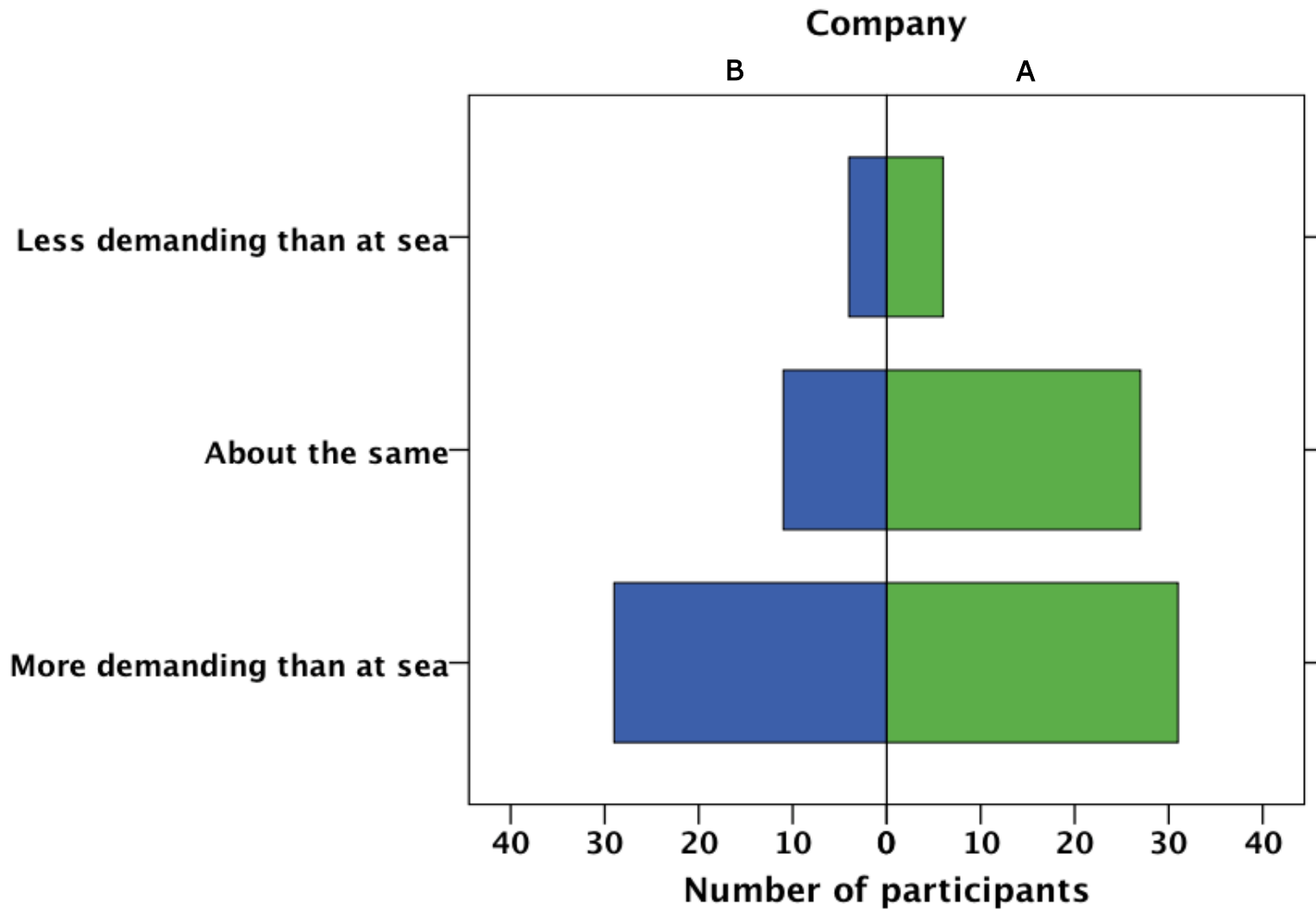
A comparison of age and experience levels between European and Chinese seafarers.

| | Companies | Age | Av years at sea |
|--------|-----------|-----|-----------------|
| Europe | “B” | 39 | 14.6 |
| | “A” | 38 | 13.1 |
| China | “D” | 33 | 7.5 |
| | “T” | 36 | 9.3 |

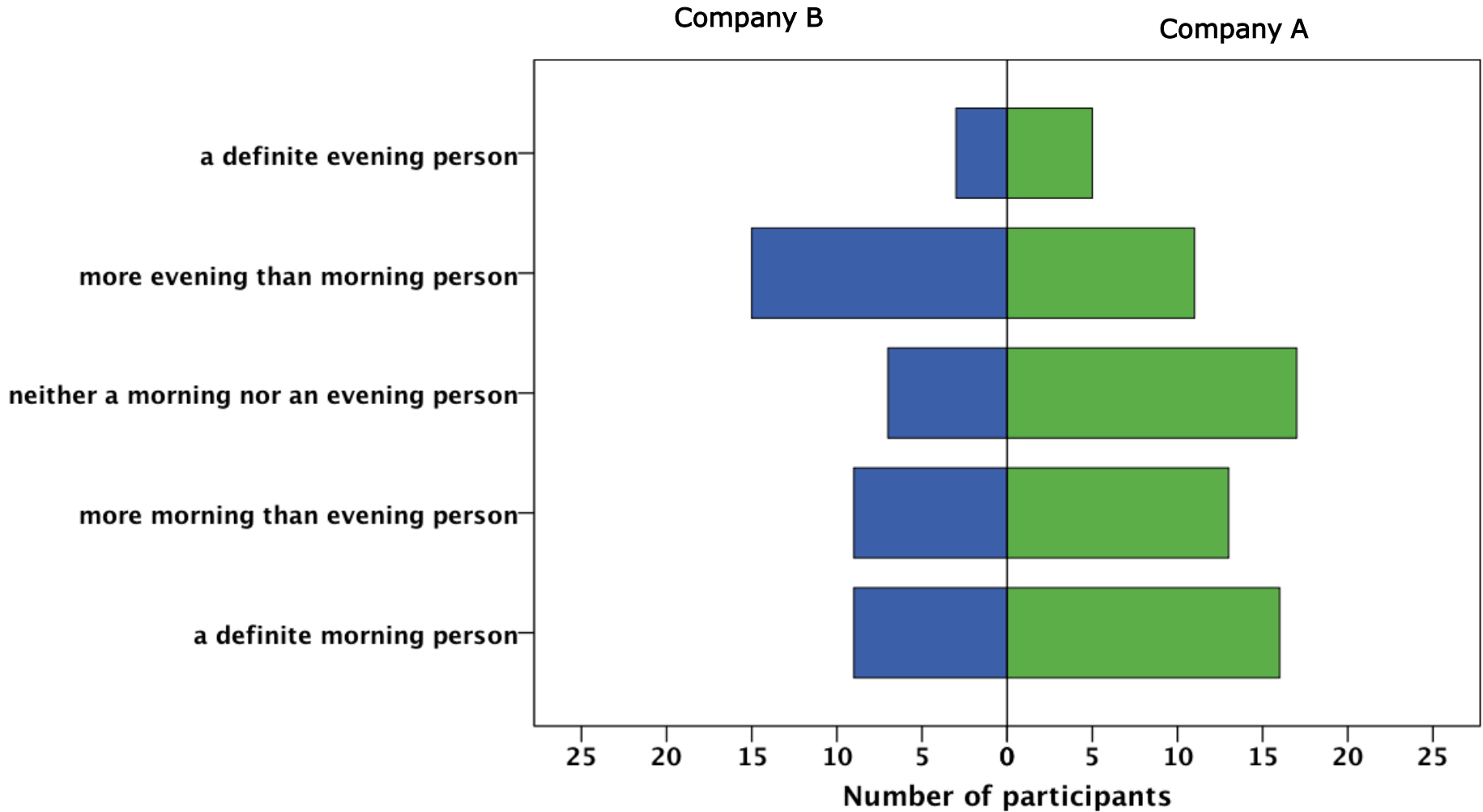
A comparison of perceptions of sleepiness, quality of sleep and stress between European and Chinese seafarers.

| | Cmpny's | Sleepiness at work | Quality of sleep | Stress at work |
|--------|---------|--------------------|------------------|----------------|
| Europe | "B" | 1.5 | 0.94 | 0.66 |
| | "A" | 1.3 | 0.92 | 0.75 |
| China | "D" | 1.9 | 1.3 | 1.5 |
| | "T" | 1.6 | 1.2 | 1.3 |

Workload whilst in port



Circadian type



What have we learned?

Some results from the analysis of Weekly Diaries and Actigraphy*

*With acknowledgements to Dr Anne P Hillstrom
and Gemma Hanson of

University of Southampton, Centre for Vision and Cognition

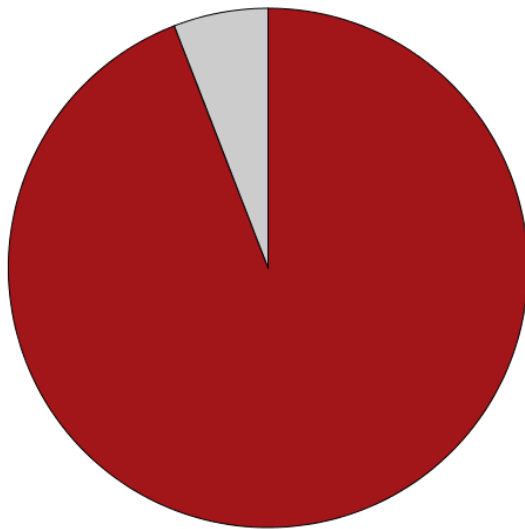
Who on board suffers most from fatigue?



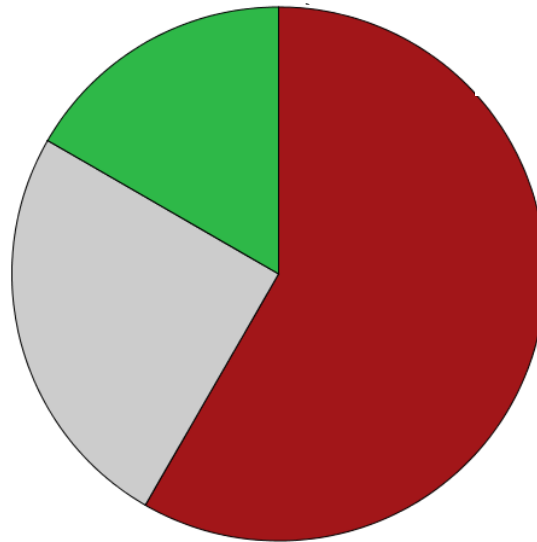
Fatigue: is it higher or lower at the end of a voyage?

A closer look at the 3 ranks (Third officer, Captain, AB) for which there is the highest number (i.e.: $n > 10$)

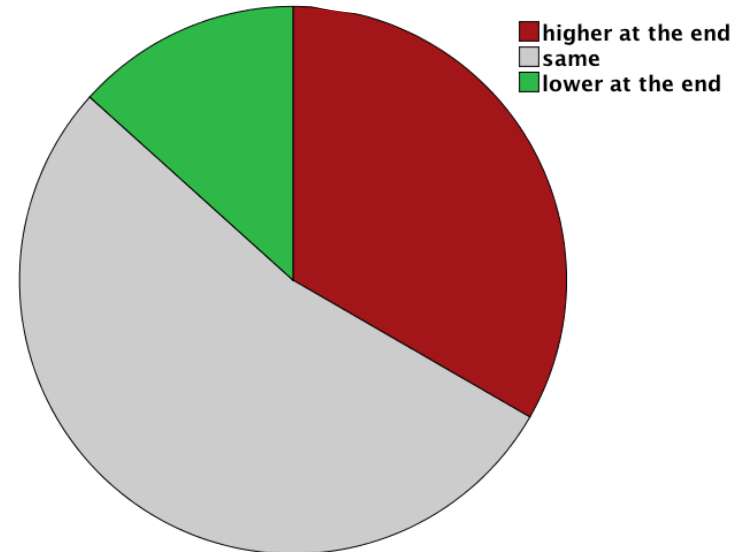
Captain



Third Officer

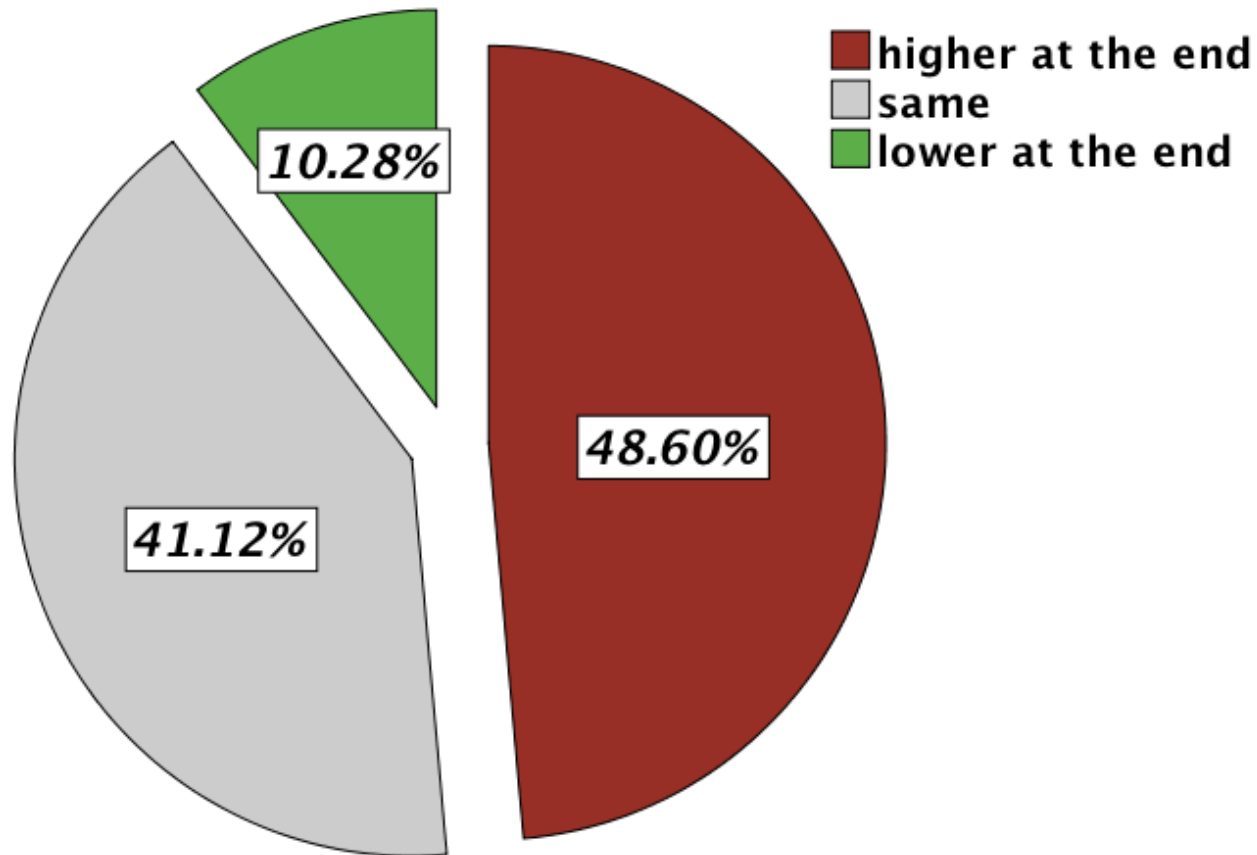


AB



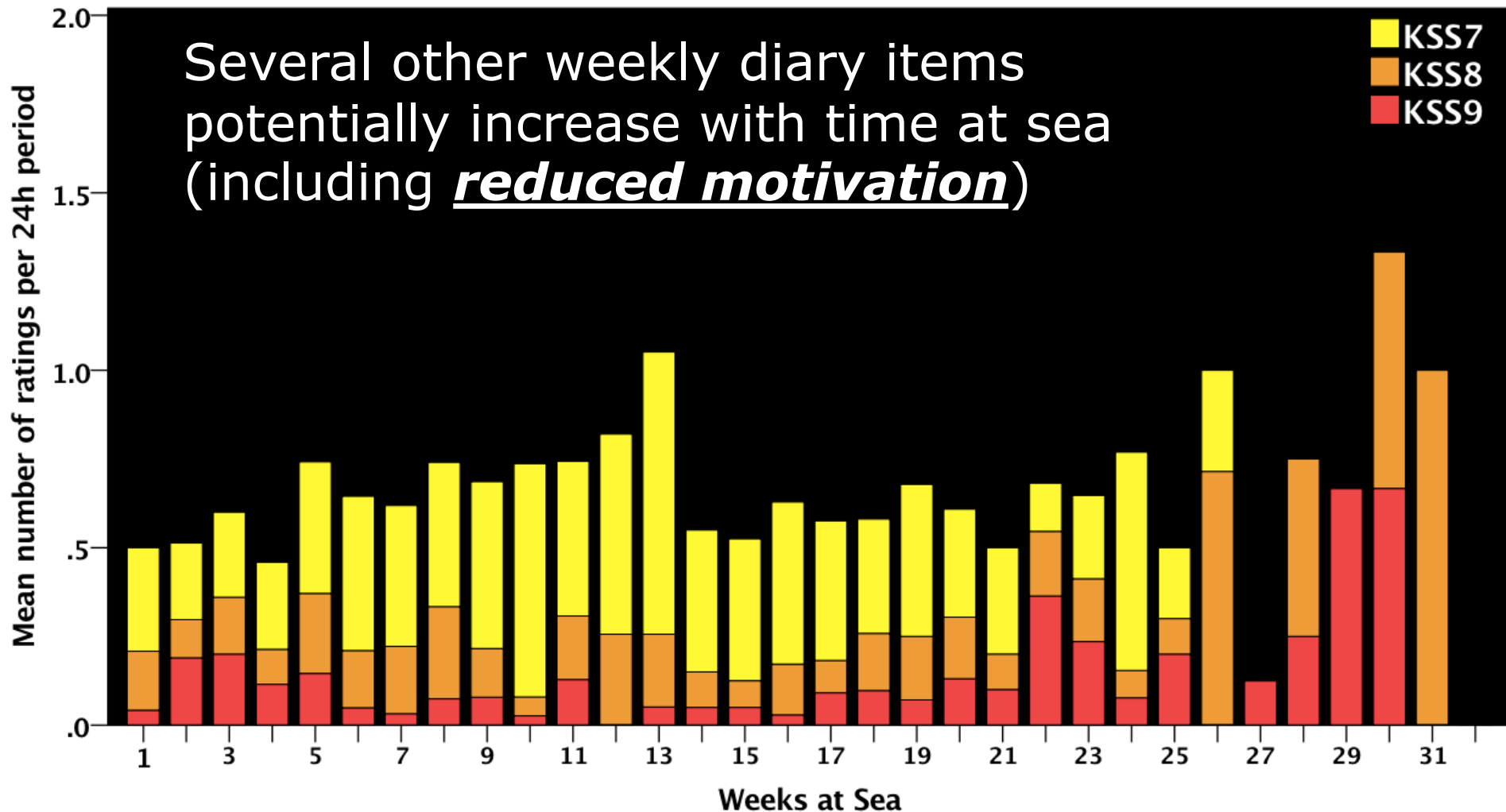
■ higher at the end
■ same
■ lower at the end

Is Stress higher or lower at the end of a voyage?



Sleepiness and Fatigue:

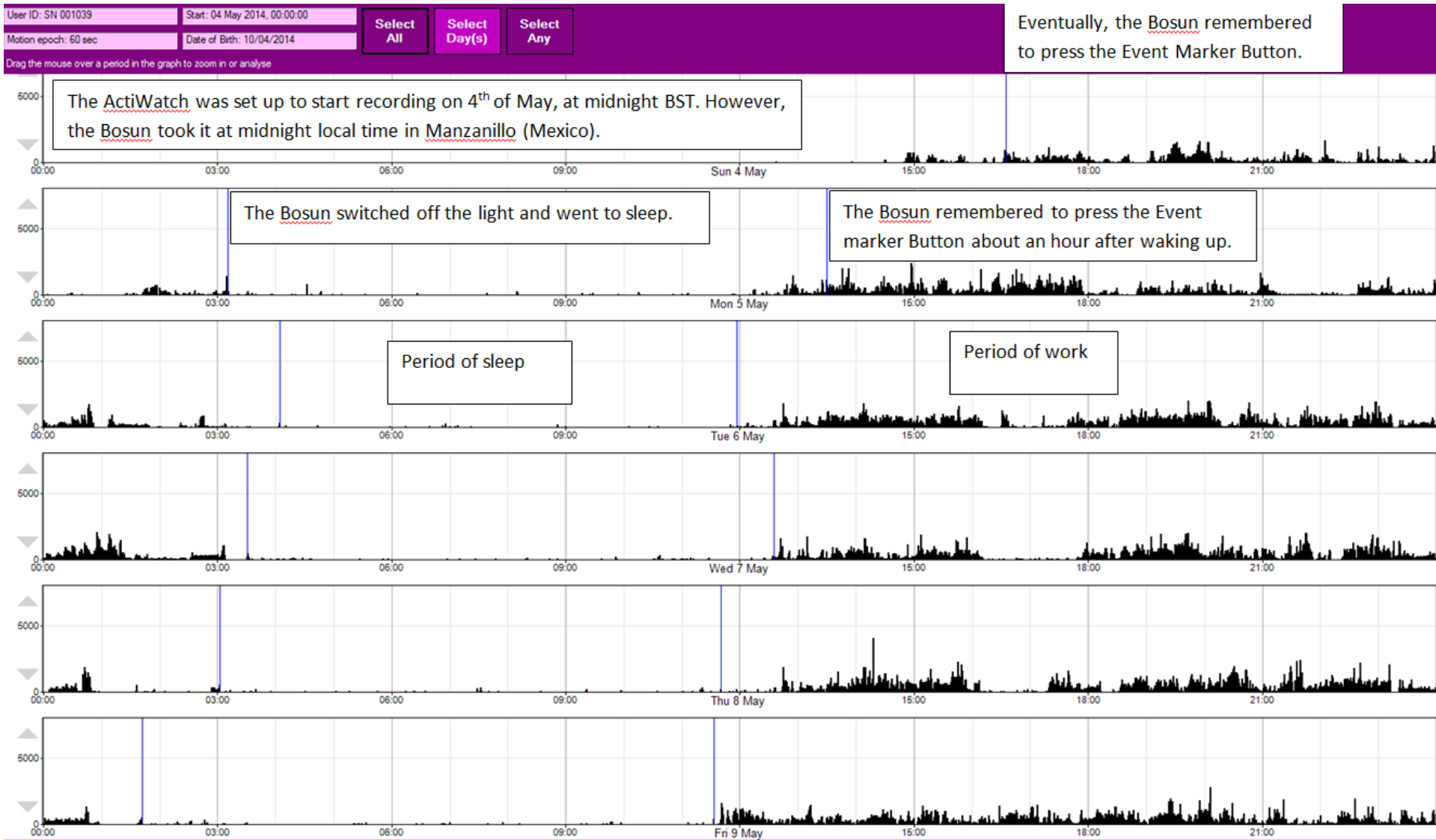
High levels of sleepiness at all times and increasing fatigue



Actigraphy and Amount of Sleep



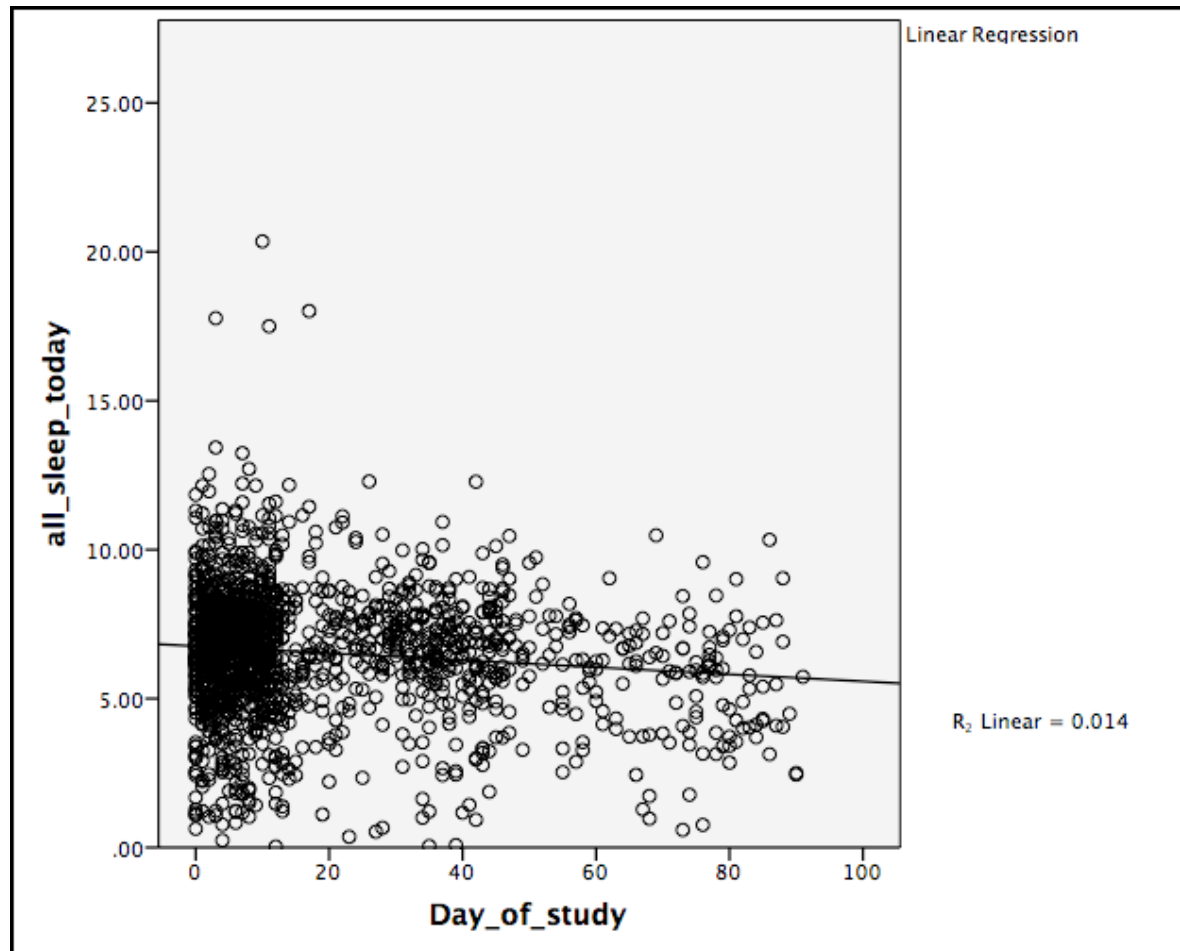
Example of Actiwatch data: A Bosun on Day work



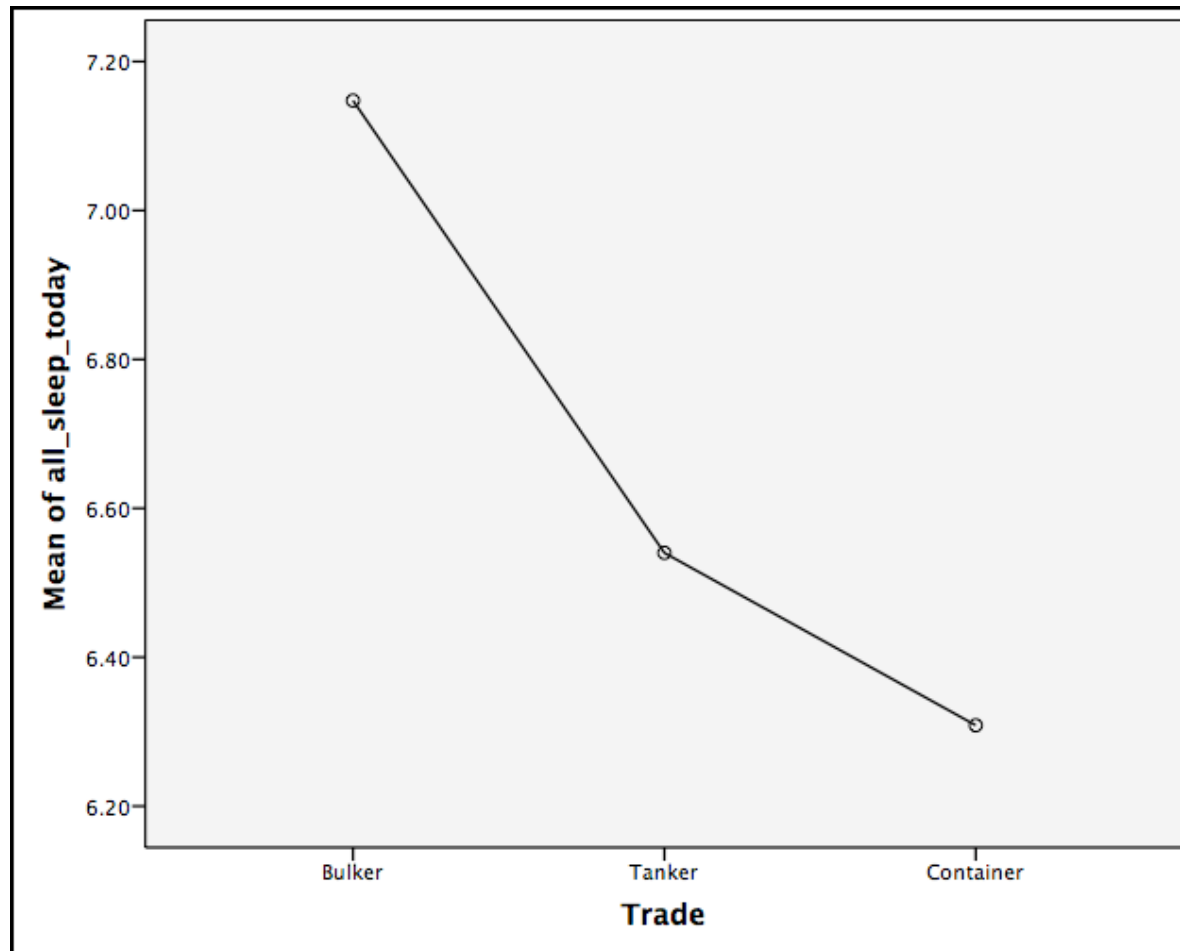
Actigraphy: Example of a Master – disturbed sleep?



Amount of Sleep over the Voyage



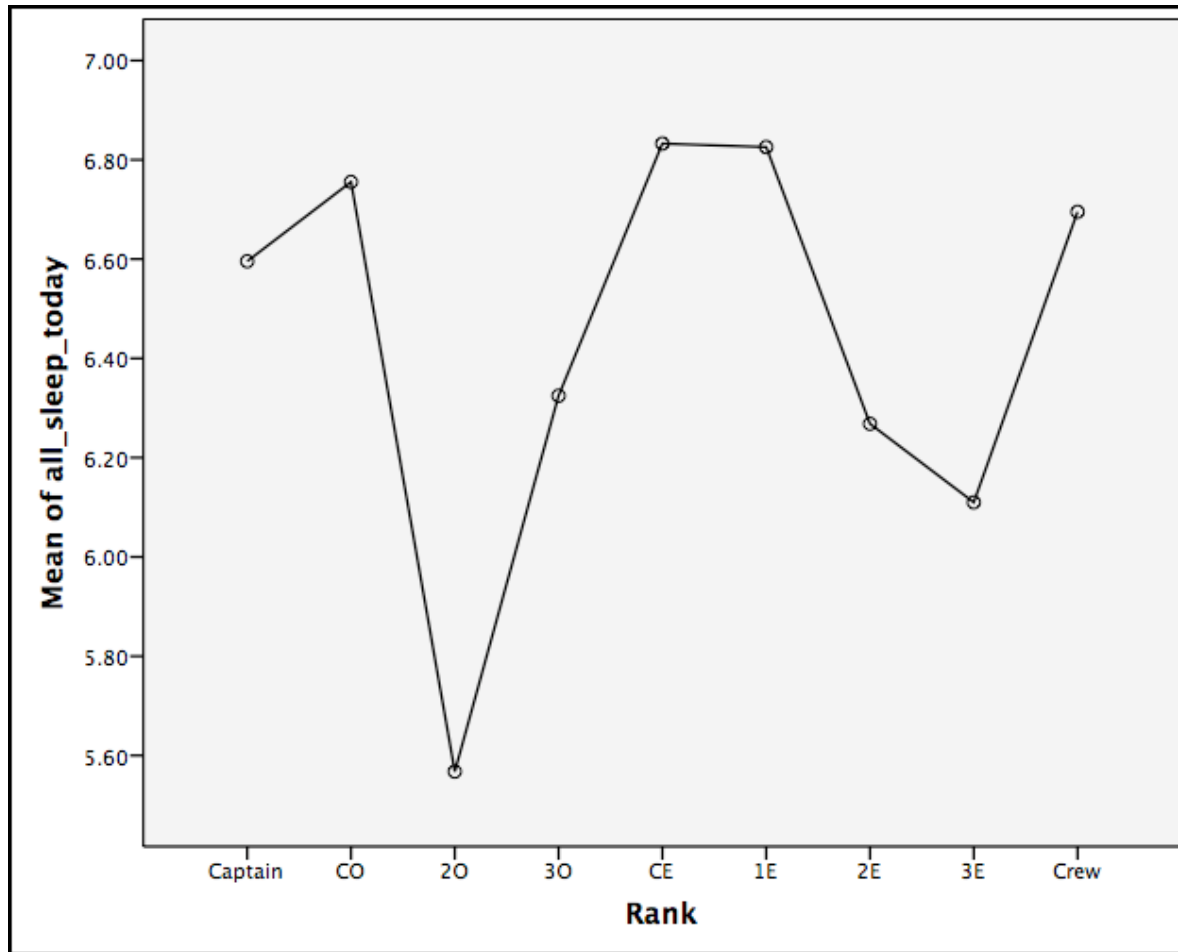
Average Amount of Sleep by Trade



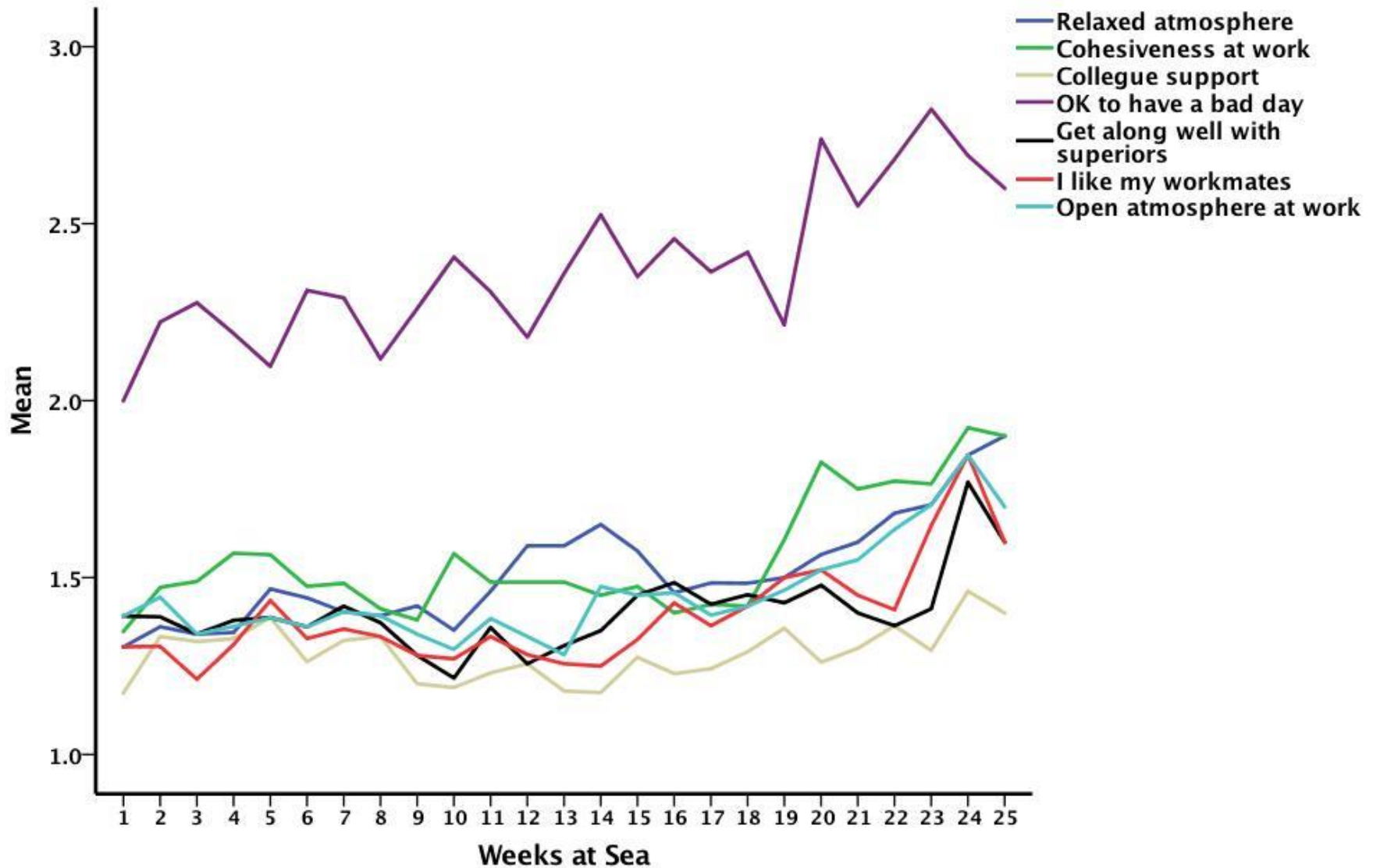
Who on board suffers most from lack of sleep?



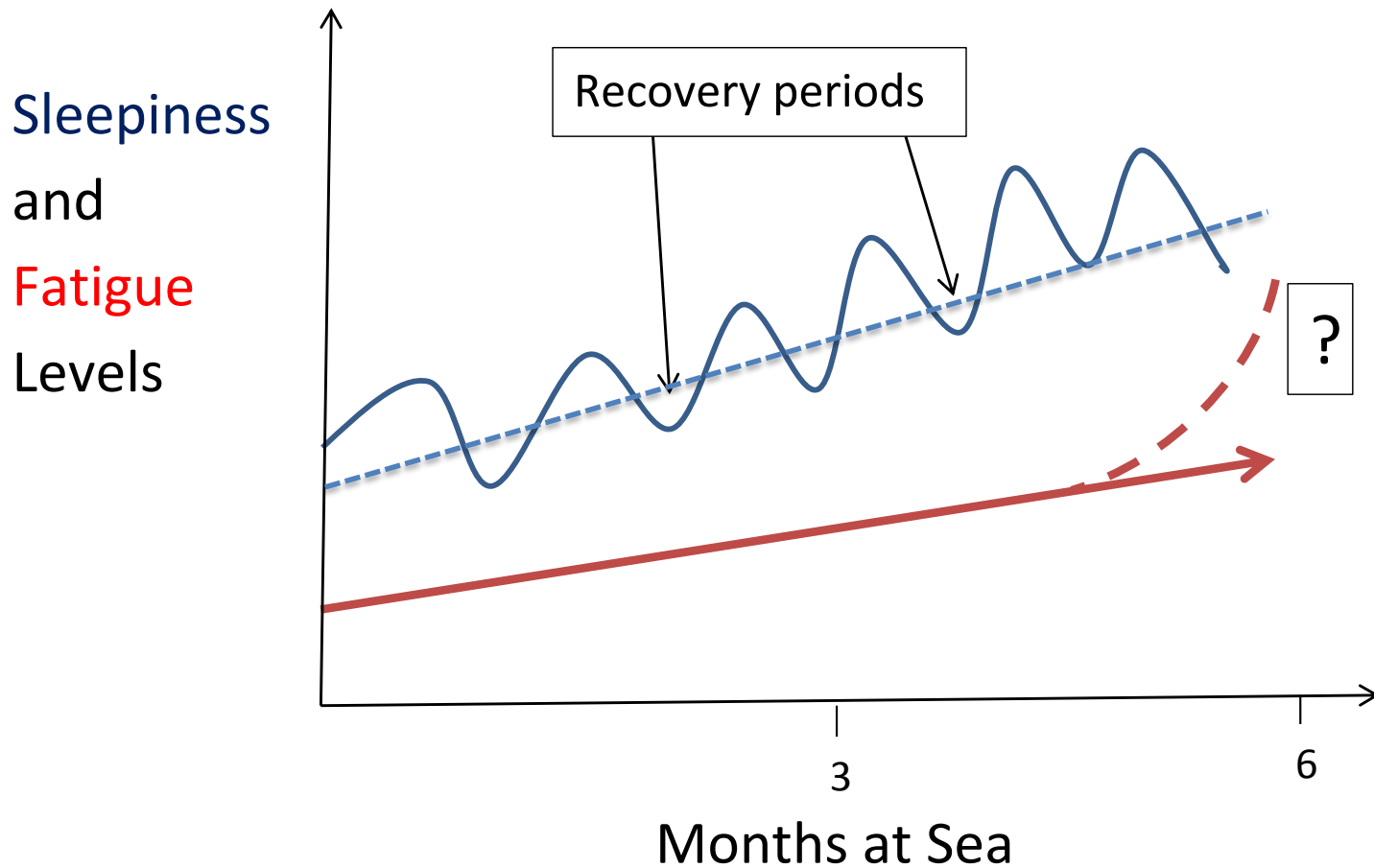
Average Amount of Sleep by Rank



Social Cohesion on board



A Summary of the MARTHA Findings



HIGH SEAS: Monitoring the Physical and Mental Health of Crew at a distance

- Shore-based team of health care professionals
- Data of individuals from wearable technologies
- Transmitted continually from ship to shore
- Monitoring physical **and mental** variables
- Confidential and ethical

