Important new evidence about the way fatigue and stress levels change during a voyage, how they affect various ranks in different ways, and how they ultimately reduce motivation over the length of a tour of duty.

Captains were found to suffer the highest levels of stress and fatigue, and both the quantity and quality of sleep was found to deteriorate over long voyages.

Sleepiness levels vary a little during the voyage, suggesting there are opportunities for recovery, the report notes. However, overall, ‘there is a small but significant decrease in the amount of sleep in a 24-hour period over the course of time’.

Four shipping companies, together operating more than 150 ships, took part in the study. The vessels included product tankers running intensive services in NW Europe, containerships on liner routes between the Far East and Europe, and Asia and South America, bulk carriers trading worldwide, and tankers operating in Far Eastern waters.

The research was based on almost 1,000 questionnaires completed by seafarers and managers in Europe and China, as well as onboard diaries filled out by crew members over tours of duty as long as six months.

Detailed measurements were taken from volunteer seafarers who wore special watches recording their activity, along with readings of their sleep and stress levels. On average, officers reported 7.8 hours of sleep in every 24, compared with 8.4 for ratings.

The average number of normal weekly working hours recorded by all crew was 67 — although the study notes that these figures do not include overtime hours.

Questionsnaires and interviews with European and Chinese seafarers and managers revealed cultural differences in the interpretation of regulatory frameworks on hours of work and rest and the way in which organisational practices affect seafarer fatigue.

The research found that while European and Chinese seafarers may allocate different priorities to fatigue factors, they do share the same perceptions about the major factors that influence fatigue onboard.

They also found evidence of higher levels of fatigue and stress in seafarers from Chinese-managed companies than European-managed ones. ‘This suggests that differences in organisational factors are significant in affecting fatigue mitigation onboard,’ the report points out.

Data gathered from 100 seafarers during field studies revealed that 65% of all crew consider themselves to be more fatigued at the end of a voyage than at the beginning, irrespective of the actual length of the voyage.

Researchers found perceptions about fatigue and voyage length varied significantly according to rank and role. A majority of deck work crews, engineers and cooks reported that they were less fatigued or the same by the end of their tour. In contrast, a small majority of second and third deck officers reported that they felt more fatigued at the end of their tour than at the beginning, and a very large majority of masters said their fatigue levels were higher at the end of their tour of duty than at the beginning.

The results from the questionnaires showed that there were some differences between the ideal and actual sleep lengths for officers and ratings, although their perceptions of sleepiness, quality of sleep and levels of stress were quite similar to each other.

Almost 50% of seafarers said their stress levels were higher at the end of a voyage, 4% said they were lower and 46% said they were about the same.

Sleepiness was a factor in the grounding of the Antigua & Barbuda registered general cargo ship Danio in March 2017. Above, the ship reserve after the OOW fell asleep on the bridge and failed to correct the ship’s course.
were the same, and just over 50% said they were low.

The project team used two specific and validated measures of sleepiness and long-term fatigue to assess seafarers at different stages of their voyage. They found that the risk of falling asleep through tiredness on watch was present at all stages of the voyage — and very high levels of sleepiness were found to increase after six months onboard.

The project team held a series of workshops around the world to gather feedback on the findings and to consider the causes of fatigue at sea. Professor Mike Barnett, from Southampton Solent University and Captain Kuba Szymanski, secretary general of InterManager, said:

The results show the findings indicate that motivation decreases with time at sea. This is a significant finding because it offers an explanation for recent reports of casualties occurring on vessels where the crew, including the captain, have been onboard for longer than six months. It adds: ‘Reduced motivation may lead to complacency; individuals taking short cuts and “work arounds” and not following the correct procedures.’

Results from the ‘actiwatches’ worn by 70 seafarers onboard in the study provided data on the total amount of sleep gained and the quality of the sleep obtained. Important findings from this included the fact that both the amount of sleep and quality of sleep — as measured by wake bouts and fragmented sleep — decreased over time for all crew.

The results reveal that while captains and day workers get more sleep than watchkeepers, captains are more at risk of fatigue than others. Night watchkeepers (second officers) were found to get significantly less sleep than others and to be most at risk of falling asleep on duty.

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The result also outlines a number of other areas for potential future research. These include:

1. What is the optimum tour of duty length? Should there be a maximum shorter than the MLC requirement?
2. How long should recovery time between voyages be?
3. How does cognitive performance deteriorate over time due to fatigue and stress?

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SEAFARER FATIGUE

What can be done to combat the problem? Feedback gathered from seafarers and managers by the research team included the following suggestions:

Working conditions
Participants sought improvements in:
- Safe working practices
- Nutrition and good food onboard
- Hours of work and rest
- Stress caused through harassment and bullying

Vessel design and living environment
Participants sought improvements in:
- Area and location of accommodation
- Temperature
- Quality of accommodation spaces
- Smoking or change of mattresses
- Exercise facilities onboard
- Some use of the port in the Maritime Labour Convention, to apply to new vessels, and the report says that measures will be enhanced to be evaluated further as the requirements come into force.

Operational issues
Participants sought improvements in:
- Minimising of company reporting requirements in order to reduce bureaucracy
- Communication between ship and shore
- Logistics: port calls better organised and discussed
- Timings of inspections onboard by external parties
- Time management — for example, the timing of Notices of Readiness
- Recovery time during the voyage — for example, going ashore

Participants also recognised that there needs to be a cultural change in the industry’s attitude towards fatigue both onboard and ashore, ‘The response: “but it’s always been like this” was no longer seen as acceptable.’

Awareness and cultural change also apply to the agencies ashore who interact with ships and personnel — charterers, agents and port state officials — the report stresses.

The diagram shows the KSS scores over 7 days for 72 seafarers who completed them at different stages of the voyage. The scores were calculated using an anchoring mechanism, so they show comparable scores at various weeks into a voyage for each individual. Consequently, the KSS scores cover a whole voyage, from the start to the completion.

From previous research, a KSS score of 5 or less indicates falling asleep. The most significant results, which the diagram illustrates, are as follows:

1. The risk of falling asleep through tiredness presents at all stages of the voyage, making it a safety risk at all stages of the voyage.
2. Sleepy hours and sleepiness (KSS of 8 or 9) are apparent and increasing after six months onboard.

The Karolinska Sleepiness Scale

1. Extremely alert
2. Very alert
3. Alert
4. Quite alert
5. Neither alert nor sleepy
6. Some signs of sleepiness
7. Sleepy, no effort to stay awake
8. Sleepy, some effort to stay awake
9. Very sleepy, great effort to keep awake, fighting sleepy

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