



# Modelling watch keeper sleep and fatigue in the maritime industry

Wessel M.A. van Leeuwen<sup>1</sup>, Claire Pekcan<sup>2</sup>, Mike Barnett<sup>2</sup>, Marc Williams<sup>3</sup>, Göran Kecklund<sup>4</sup>

<sup>1</sup> Stress Research Institute, Stockholm University, Stockholm, Sweden, <sup>2</sup> Warsash Maritime Academy, Southampton Solent University, Southampton, UK, <sup>4</sup> UK Maritime and Coastguard Agency, Southampton, UK

## Introduction

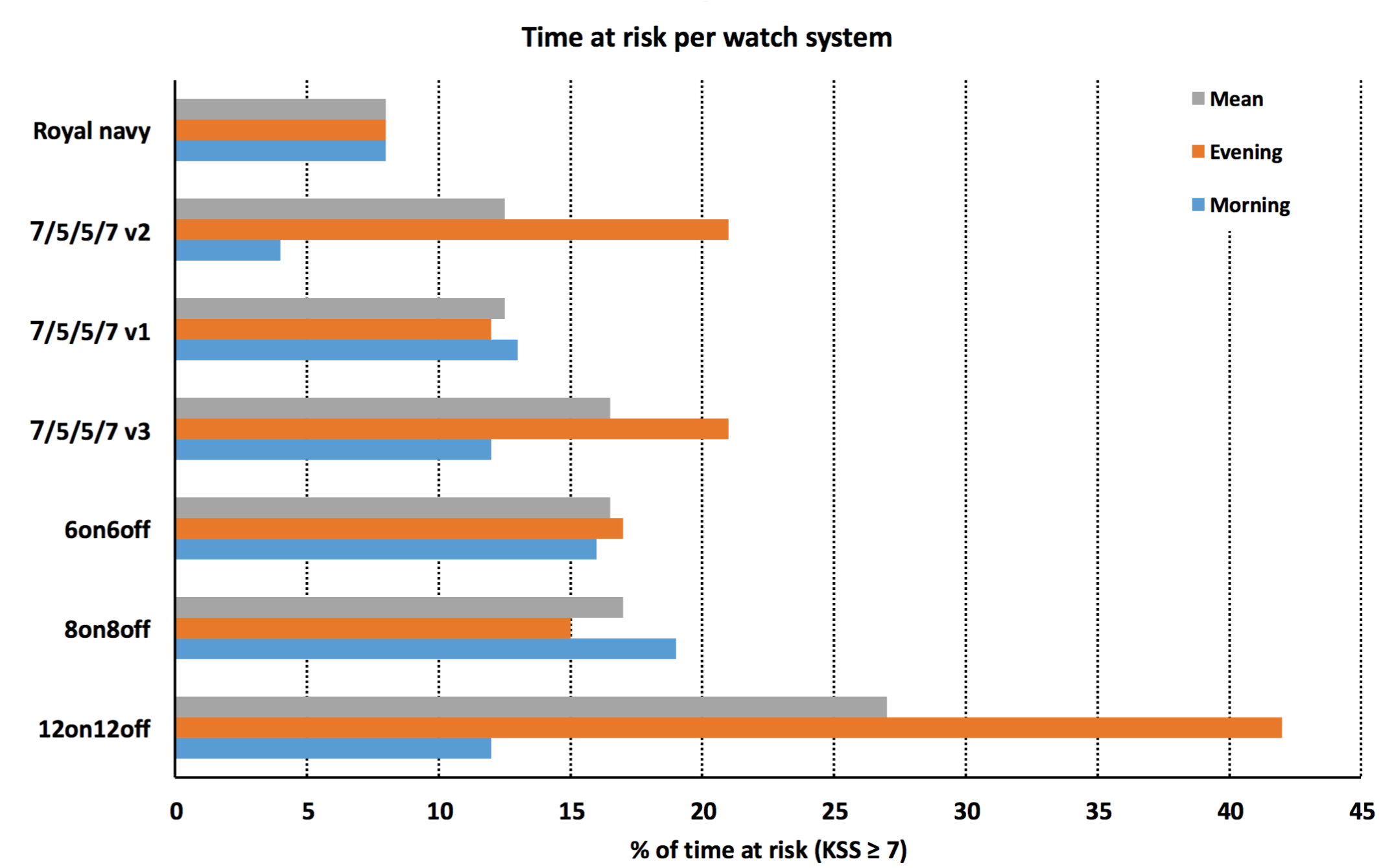
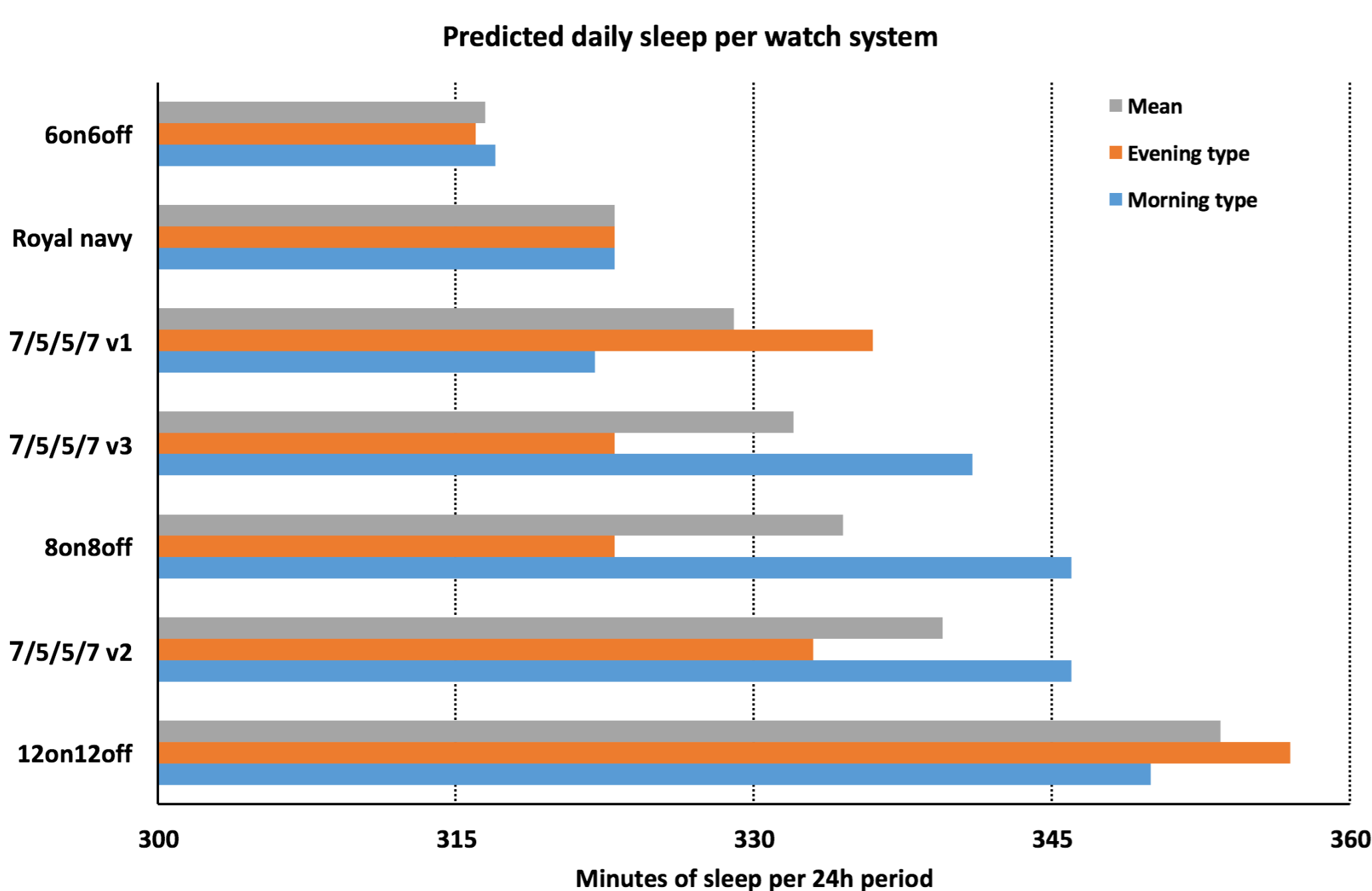
Operating on a 24/7 basis has made the maritime industry invent a wide variety of watch keeping systems over the past centuries. These are either two-watch systems (2 teams sharing the work under a 24h period) or three-watch system (3 teams sharing it). This study aims to identify which systems are associated with the lowest amount of fatigue risk and the highest amount of sleep that can possibly be obtained.

## Conclusion

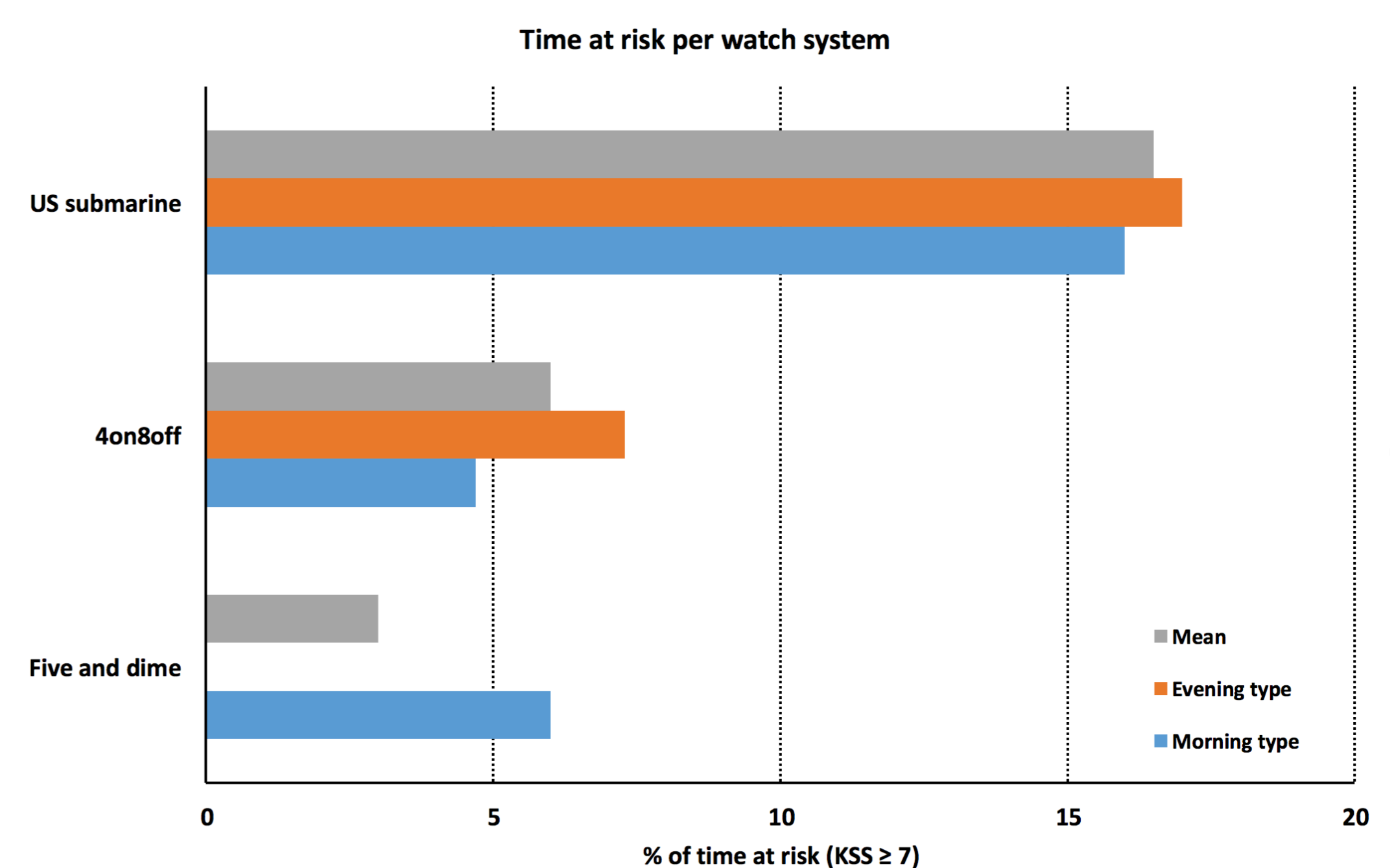
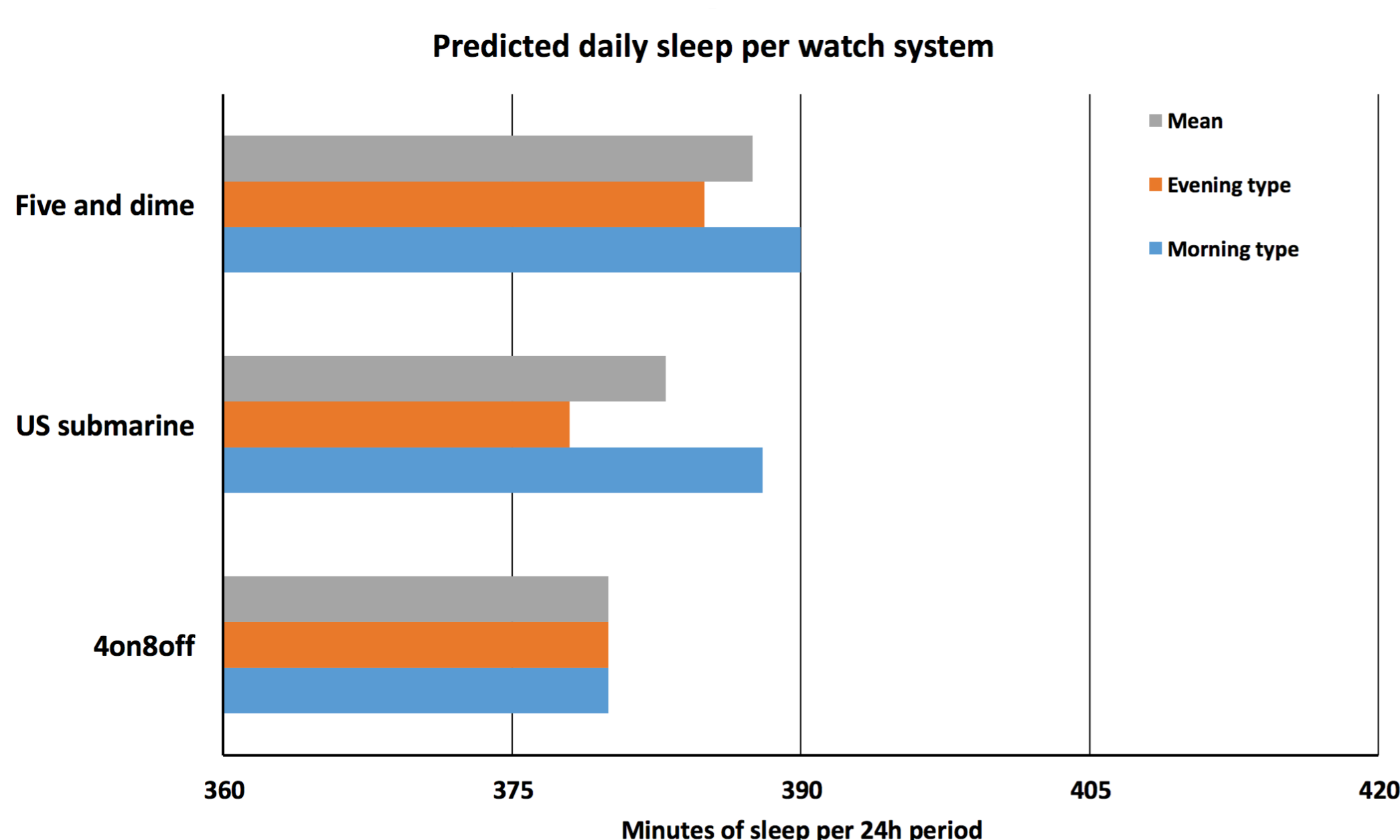
3-watch systems are to be preferred both from a sleep and a fatigue point of view. However, since these systems requiring 50% higher manning levels compared to 2-watch systems there are potentially less popular among shipping companies. Moreover, it is of special concern that the most popular 2-watch system (i.e., 6on6off) is among the worst ones.

## Results

**Two-watch systems.** Daily sleep (*left figure*) and time at risk (*right figure*):



**Three-watch systems.** Daily sleep (*left figure*) and time at risk (*right figure*):



## Method

Seven two-watch systems and three three-watch systems were modelled using the three process model of alertness regulation (TPMA). Key output variables were % of time on watch with a predicted score  $\geq 7$  on the Karolinska Sleepiness Scale (KSS), defined as time at risk, and the amount of model predicted daily sleep. Separate predictions were made for morning and evening types.

## CONTACT