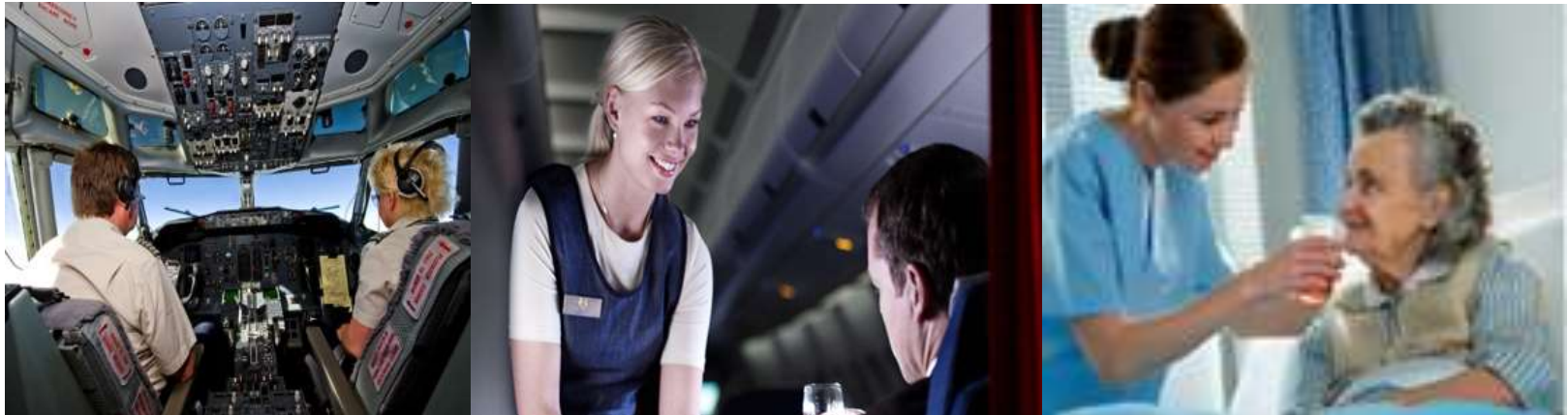


Compressed work hours - risk of fatigue-related errors and cardiovascular health?

21.11.2019

Elisabeth Goffeng, STAMI

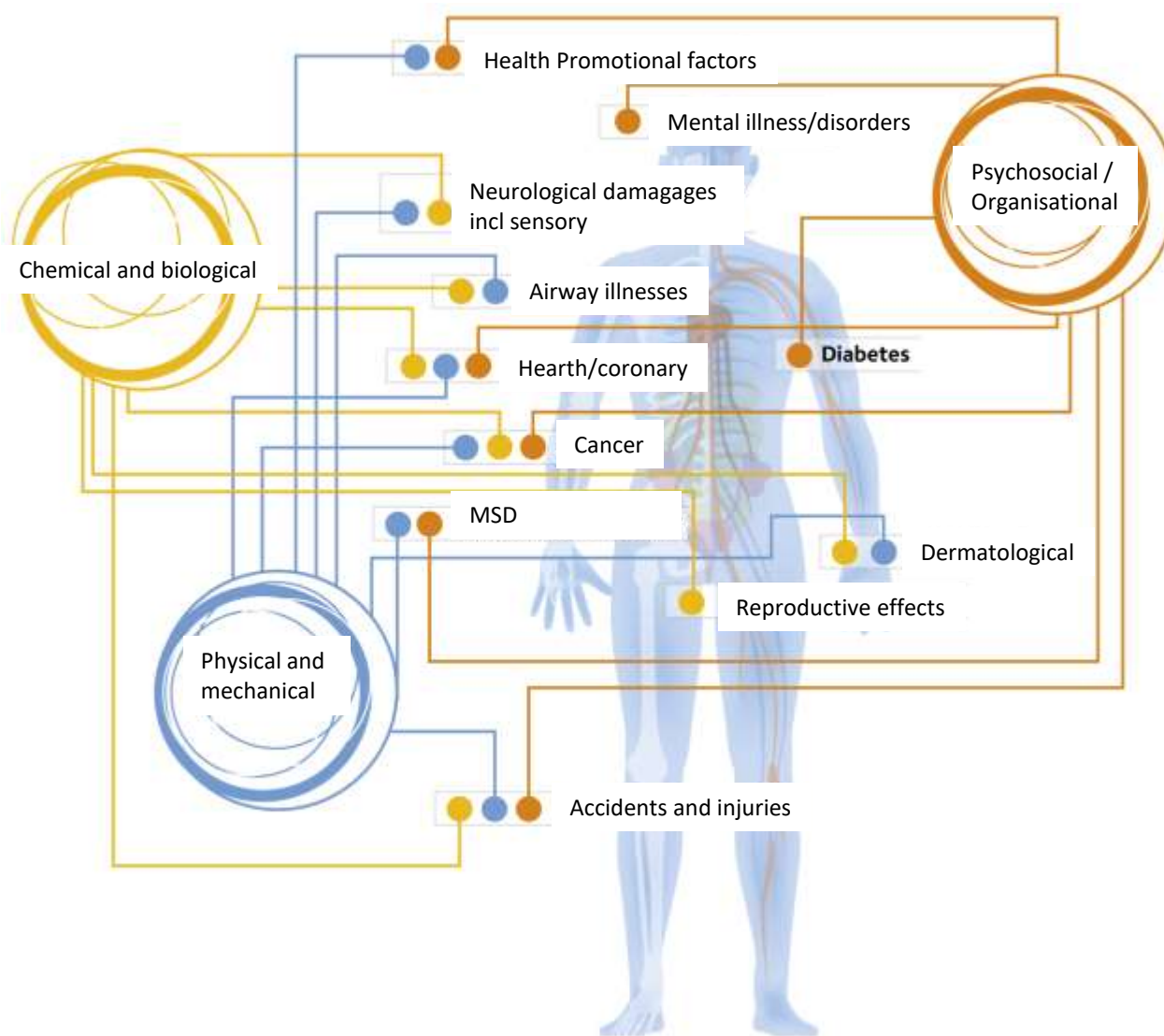


STAMI

STAMI is the National Institute of Occupational Health in Norway

STAMI is a research institute funded by the Ministry of Labour and Social Affairs.

Health Impacts



PARTICIPANTS (N=102)



Nurses (n=43)

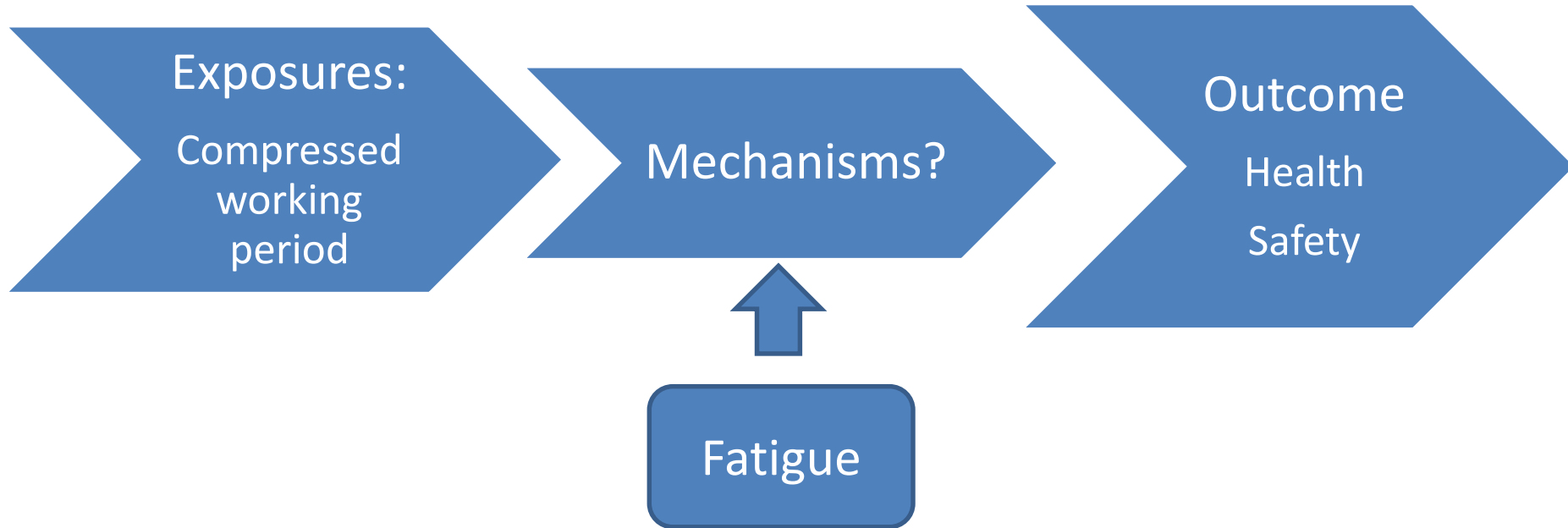


Cabin crew in Scandinavian Airlines (n=41)



Commercial Airline Pilots (n=18)

OBJECTIVES



FATIGUE

- Awareness of fatigue in aviation
- EU-OPS require a Fatigue Risk Management System
- Increasing awareness of fatigue in health care
- Real life studies of fatigue-related errors are few

DATA

- Questionnaires
- Logbooks
 - Fatigue score during workdays
 - Sleep duration and quality
 - Work load
 - Health issues
- HRV-measurements
- Neurobehavioral tests

FATIGUE

(Samn-Pirelli fatigue rating)

Circle what best describe how you felt:

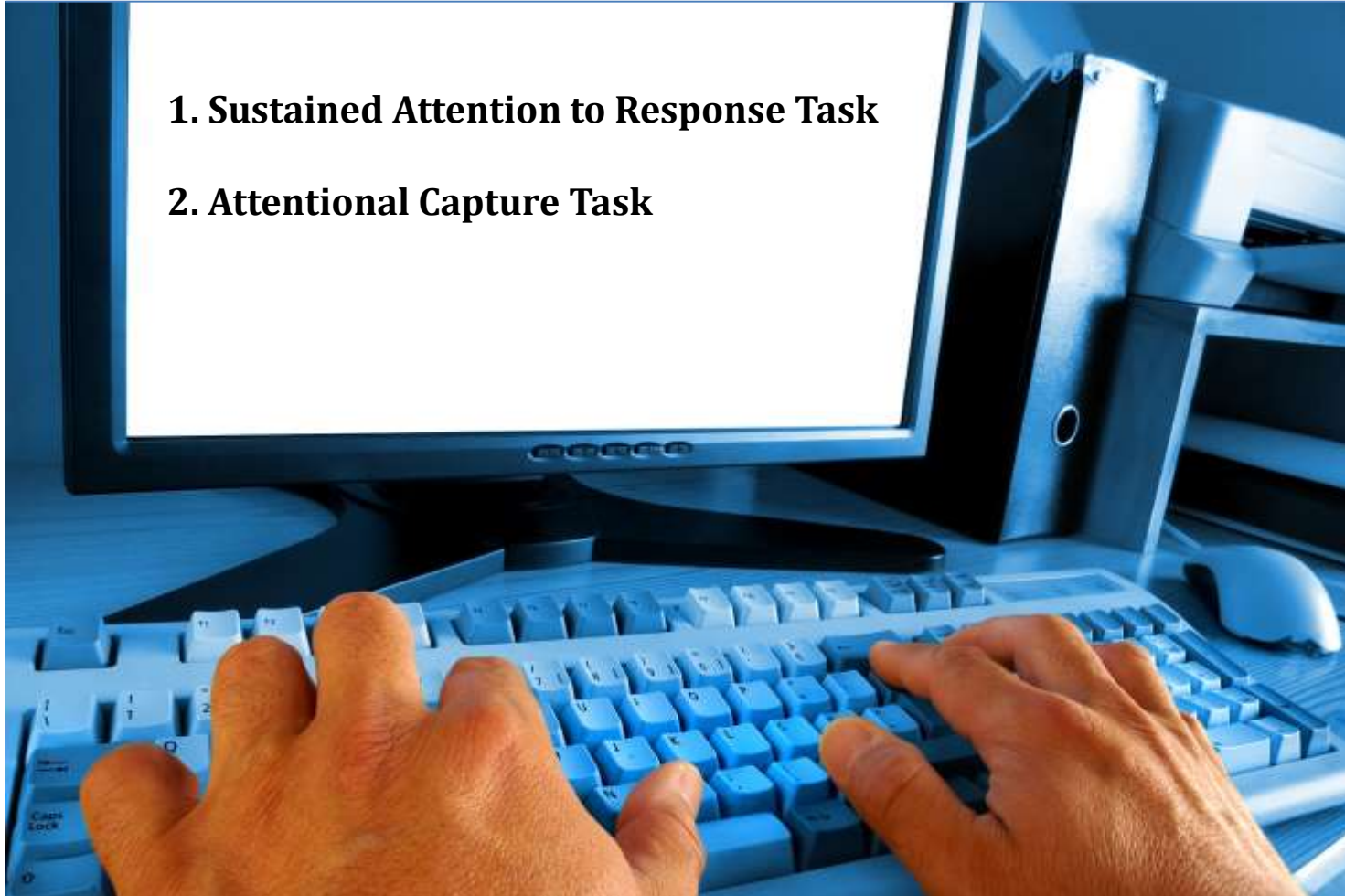
1. Fully alert, wide awake
 2. Lively, responsive, not at peak
 3. OK, somewhat fresh
 4. A little tired, less than fresh
 5. Moderately tired, let down
 6. Very tired, difficulty concentrate
 7. Completely exhausted
-

HEART RATE VARIABILITY (HRV) ACCELEROMETER

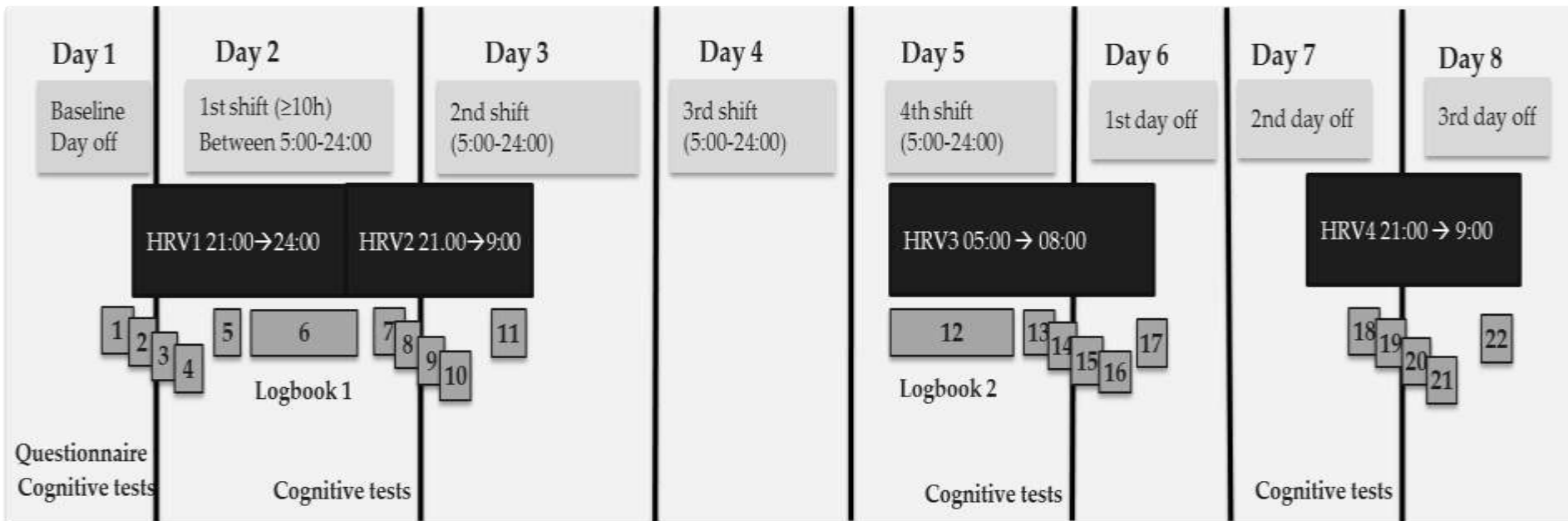


Computer-based neurobehavioral tests

1. Sustained Attention to Response Task
2. Attentional Capture Task



FLOWCHART DATA COLLECTION



SELF-REPORTED TIREDNESS*

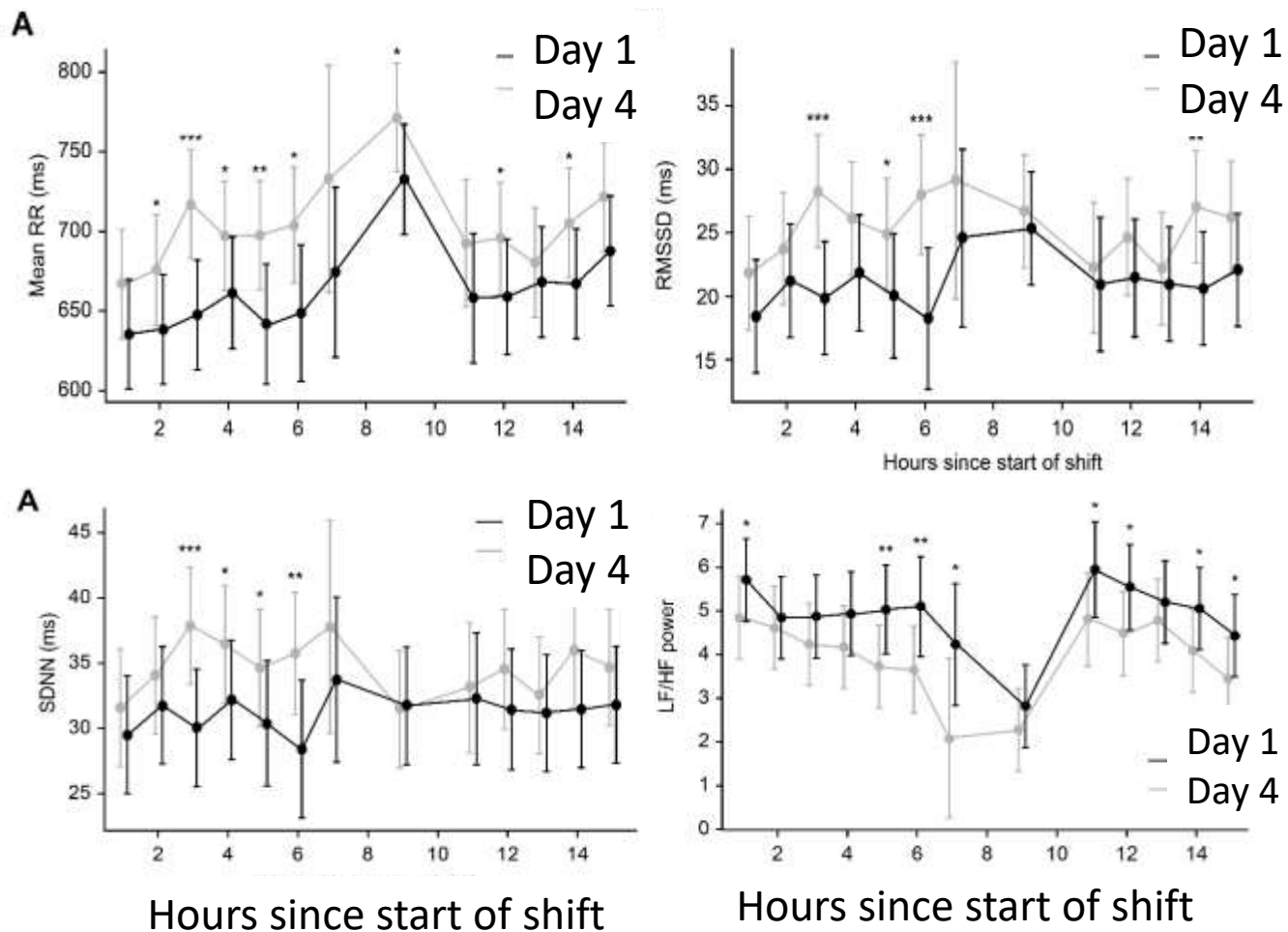
	Nurses (N=43)	Cabin crew (N=26)	Pilots (N=12)
DAY 1			
Start	1.8	2.2	2.3
After 8 h	2.2	3.5	3.3
End	3.0	4.4	4.3
DAY 4			
Start	1.9	2.4	2.3
After 8 h	2.1	3.7	3.4
End	3.1	4.4	4.0

*Average values

HRV among nurses

- Fluctuations in HRV parameters **were observed** during work, leisure time and sleep
- Increased cardiovascular strain was **found** during the first **versus the last day** of the work period

HRV among nurses (n=43)



HRV among cabin crew



Significant increased cardiovascular strain the fourth compared to the first work day.

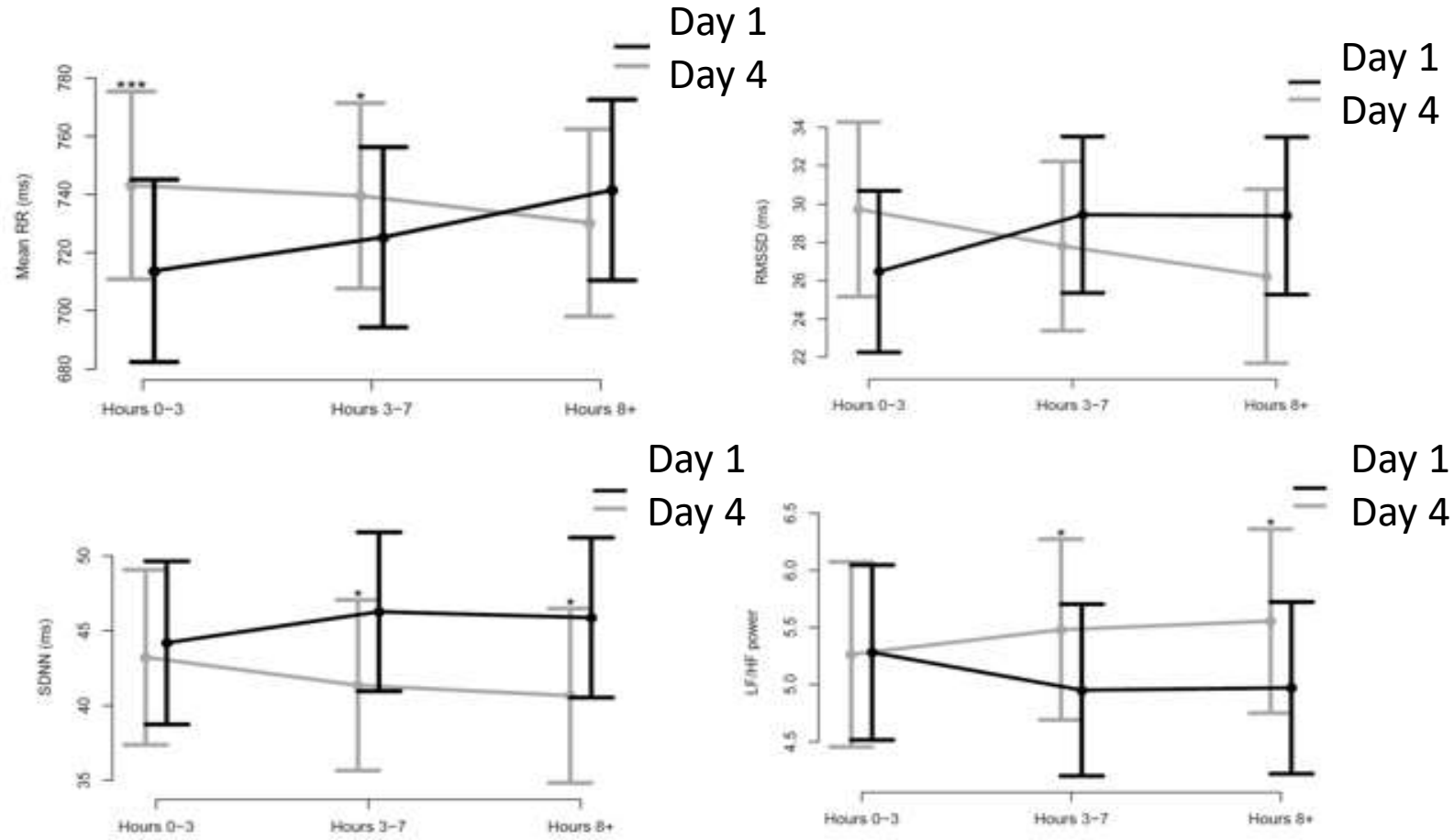
The duration of breaks during the workdays was associated with reduced cardiovascular strain



The number of hours of sleep was associated with reduced cardiovascular strain



HRV among cabin crew (n=41)



Pilots



Increasing trend of cardiovascular strain during the work period,

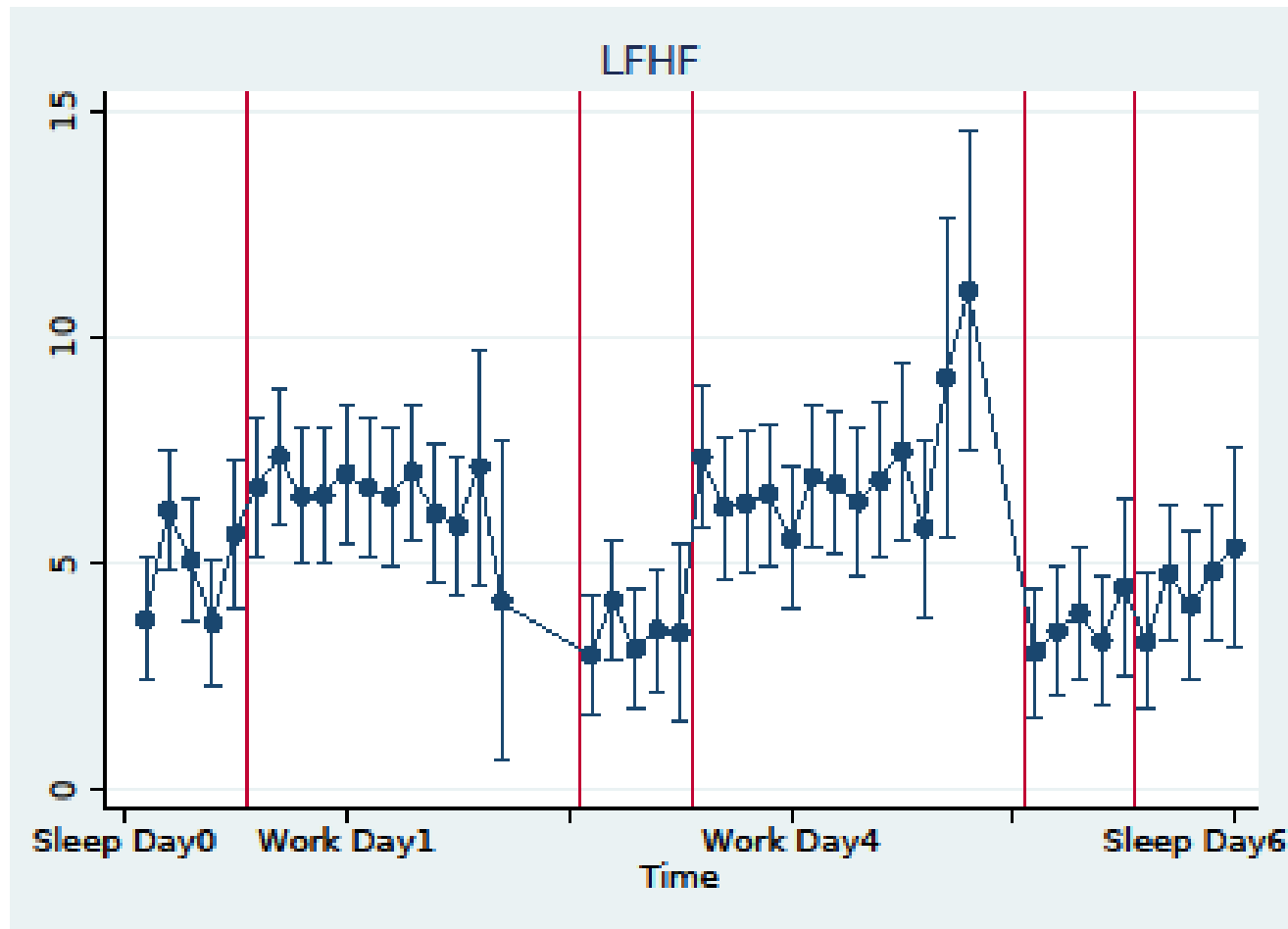


High workload and low decision latitude associated with increased cardiovascular strain

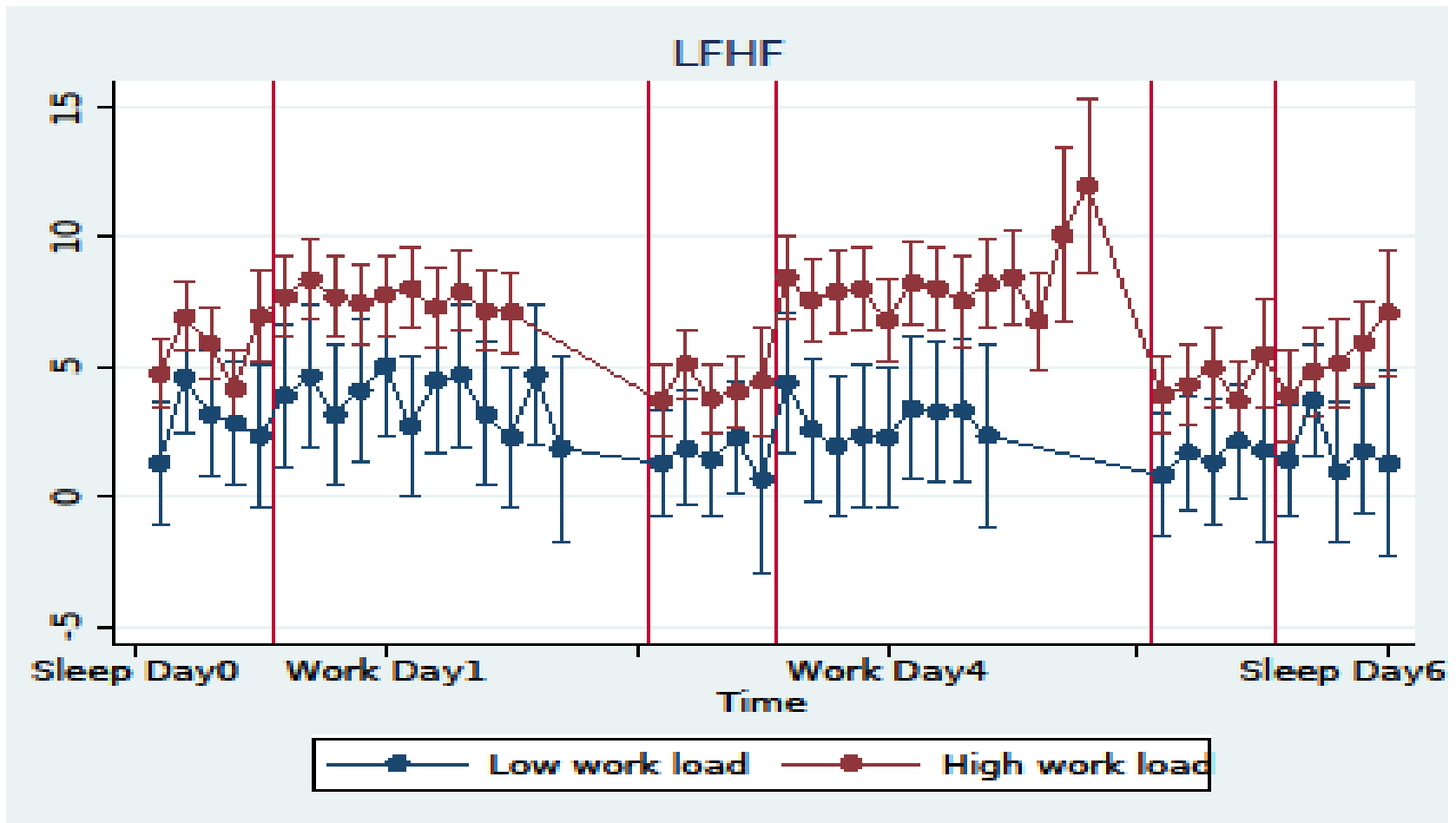
No associations between sleep duration and cardiovascular strain

No associations between duration of breaks and cardiovascular strain

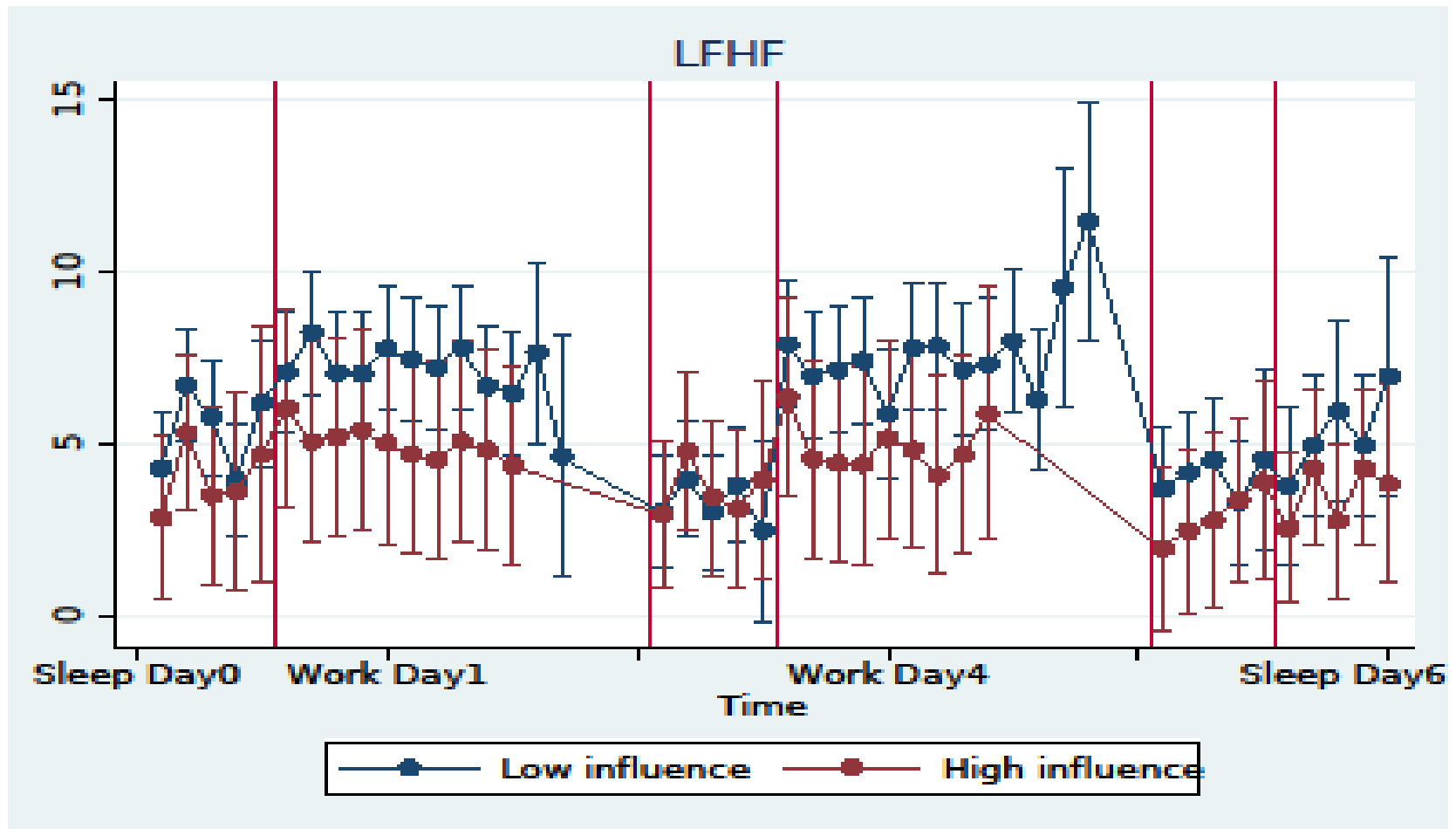
Fluctuations in the LF/HF parameter among the pilots during the four days of flight duty



LF/HF in pilots reporting of high vs low workload



LF/HF in pilots reporting of a high vs low influence on decisions



Neurobehavioral functioning

- While subjective fatigue during the **four workdays** fatigue score was **as** expected when planning the study, the overall objective measures of fatigue as measured by the **cognitive tests** did not reflect in any of the three groups.
- However, workload as measured by the number of take-offs and landings **significantly** influenced RT but not precision among **both** pilots and cabin crew.

CONCLUSIONS

- **Self reported fatigue**
 - **Increases** after an 8-hour work day
 - **Increases** significantly at the end of a long working day in both nurses, pilots and cabin crew
 - Higher among airline crew than among health care workers.
- **HRV measurements:** indications of higher cardiovascular strain the first compared to the last workday among nurses
- **Neurobehavioral tests:** No changes in overall objective performance **in any groups**
- **Reaction time:** Increased by each additional landing, among airline crew.

Conclusion continued

- The study underlines the complexity of the interplay between predictors of fatigue and cardiovascular health, such as work hours, work content, breaks, and sleep.

INVOLVED RESEARCH INSTITUTIONS

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