

Operator Fatigue Towards Multidimensional Risk Assessment



UNIVERSITY
OF HULL

Dr Stefi McMaster & Jenny Hill, Senior Human Factors Consultant



What is Fatigue?

Physical Fatigue

Mental Fatigue

Sleep-related
fatigue

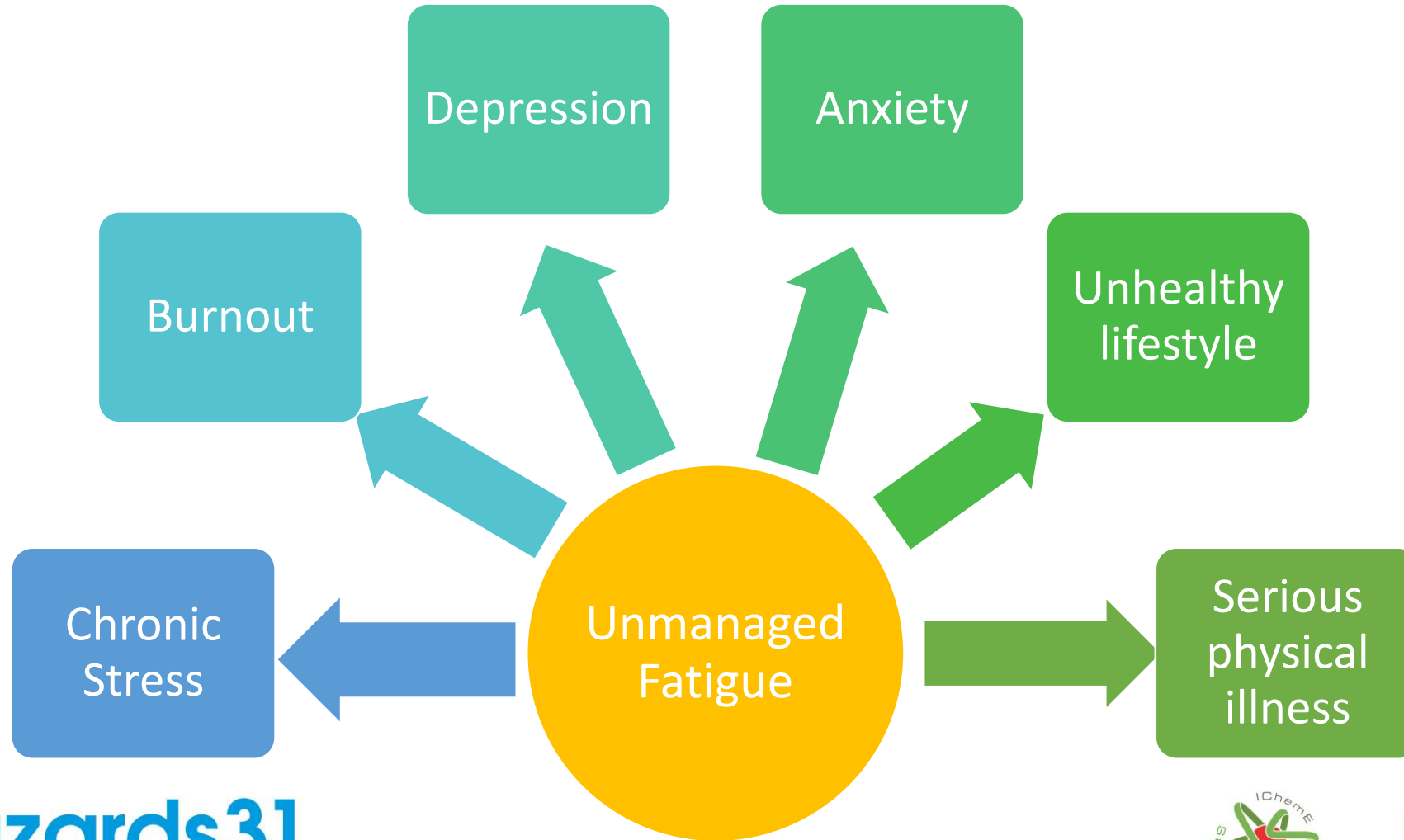
Fatigue is the subjective experience of tiredness and aversion to further expansion of effort. It results in impaired cognitive processing and the tendency to gravitate towards lower effort strategies.



Poor fatigue management can lead to major consequences



Poor fatigue management can lead to major consequences



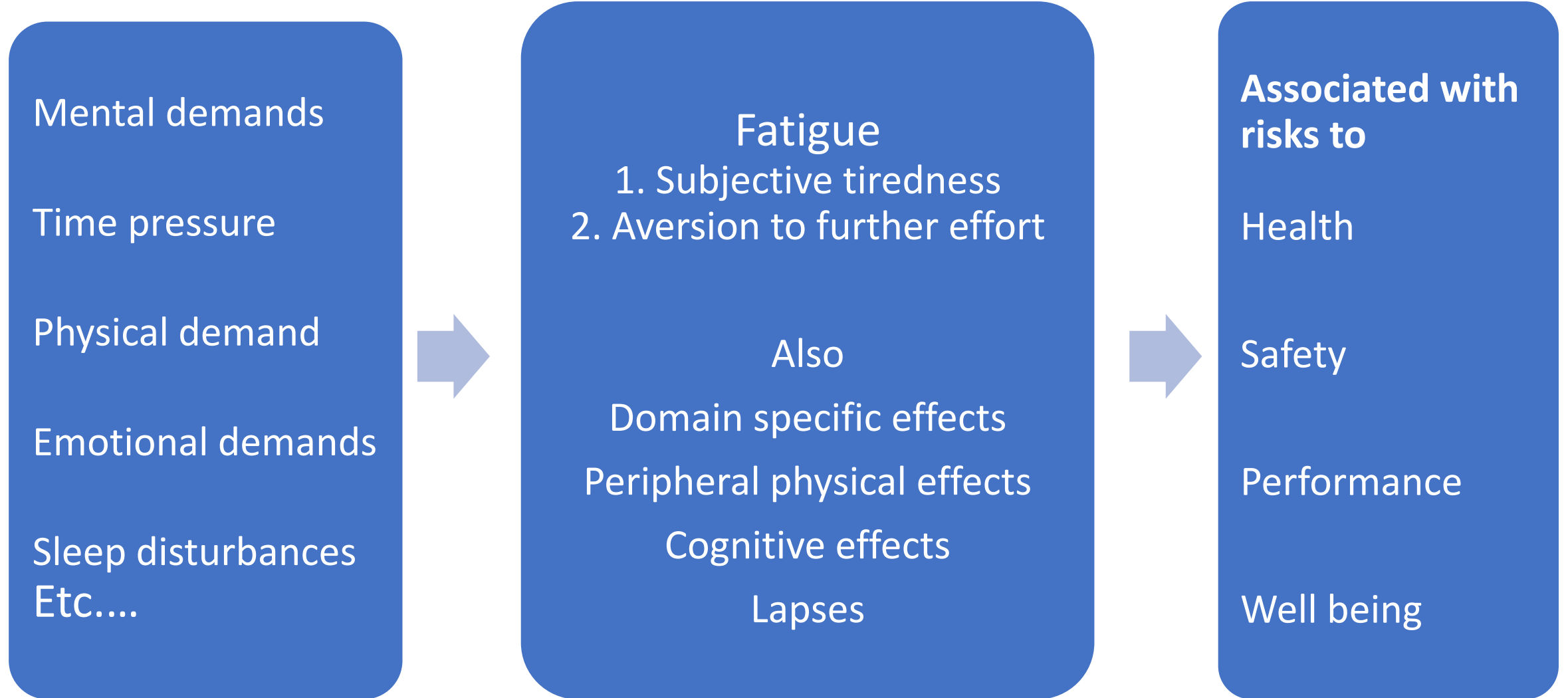
Existing approaches to Fatigue risk management

Unidimensional approach

- Fatigue Risk Management Systems- dominant models from aviation
- Very strong emphasis on fatigue as a consequence on sleep
- Do not tend to address the **multiple sources** of fatigue



Complex state with many causes and effects



3-year research program- Fatigue in the Wind Industry

OSW work combines uniquely complex challenges

- Marine transit
 - Heavy physical work
 - Climbing / lifting
 - Mental work
- +
- Environmental stressors
 - Psychosocial stressors



3-year research program- Fatigue in the Wind Industry

Mixed-methods study investigating...

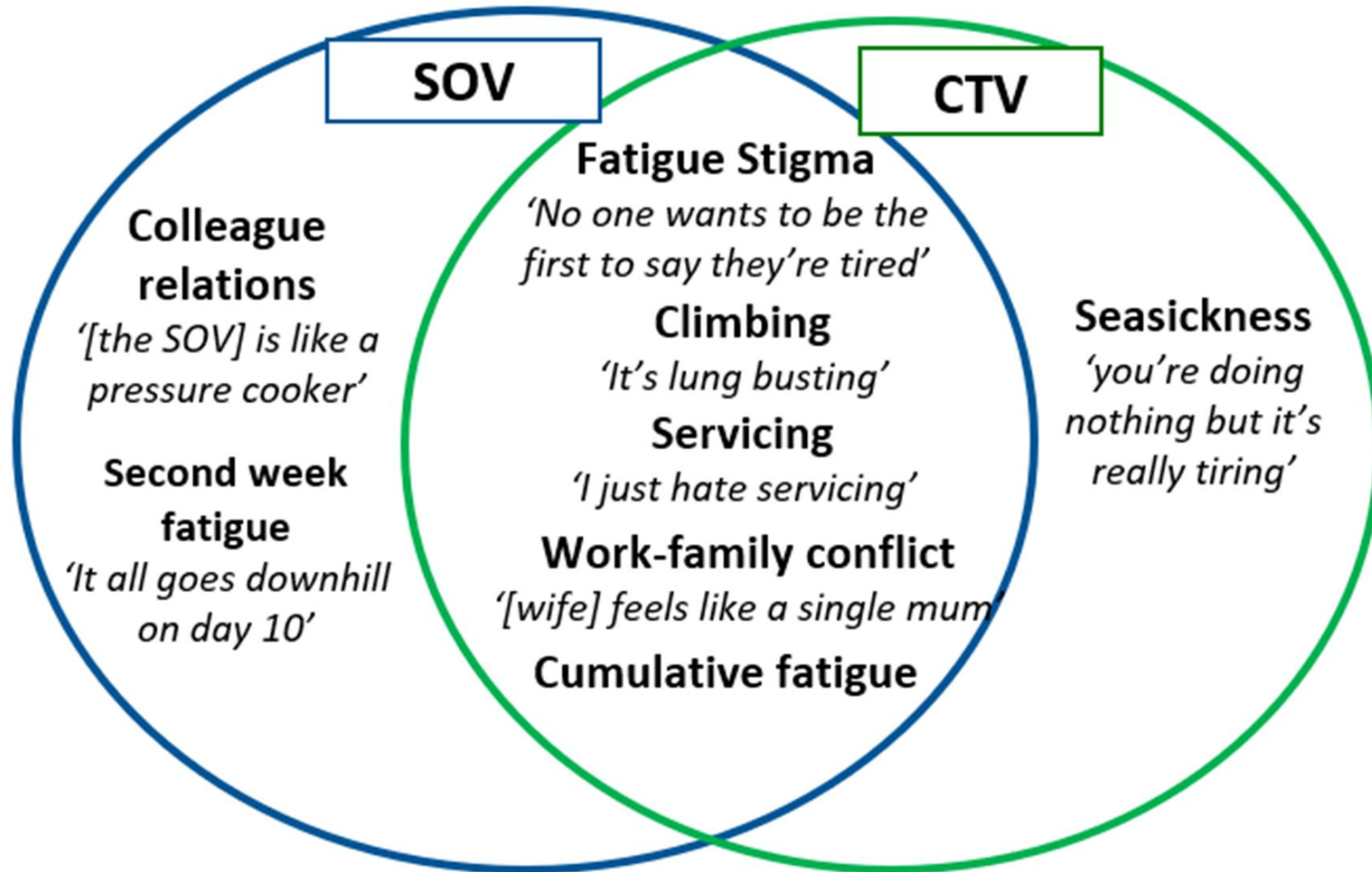
- Perception of fatigue
- Major fatigue-related risks
- How do patterns of risks and outcomes manifest in a real-world setting?
- Comparison between two OSW work environments

Qualitative
Interviews

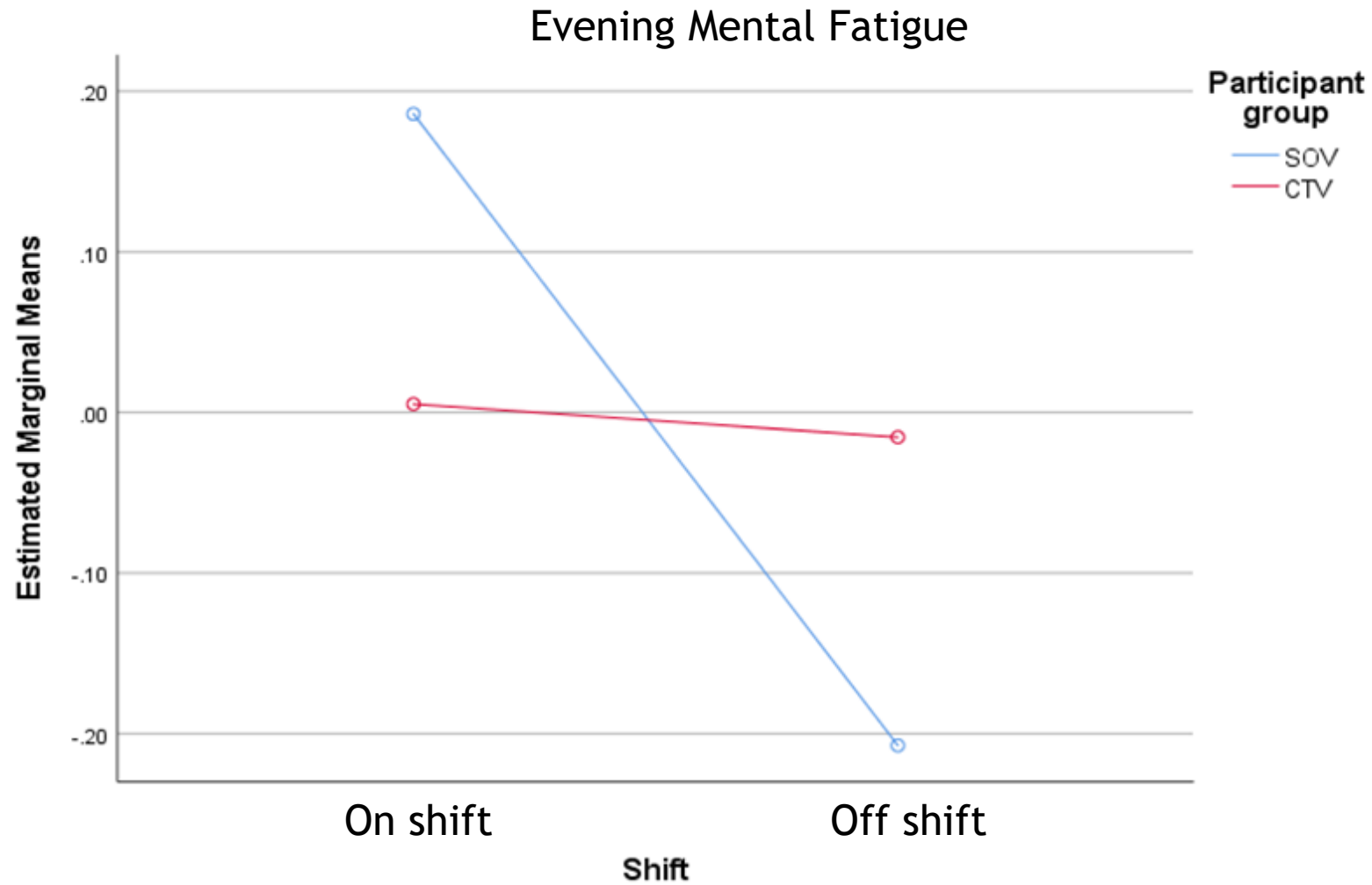


Quantitative
dairy study &
sleep analysis

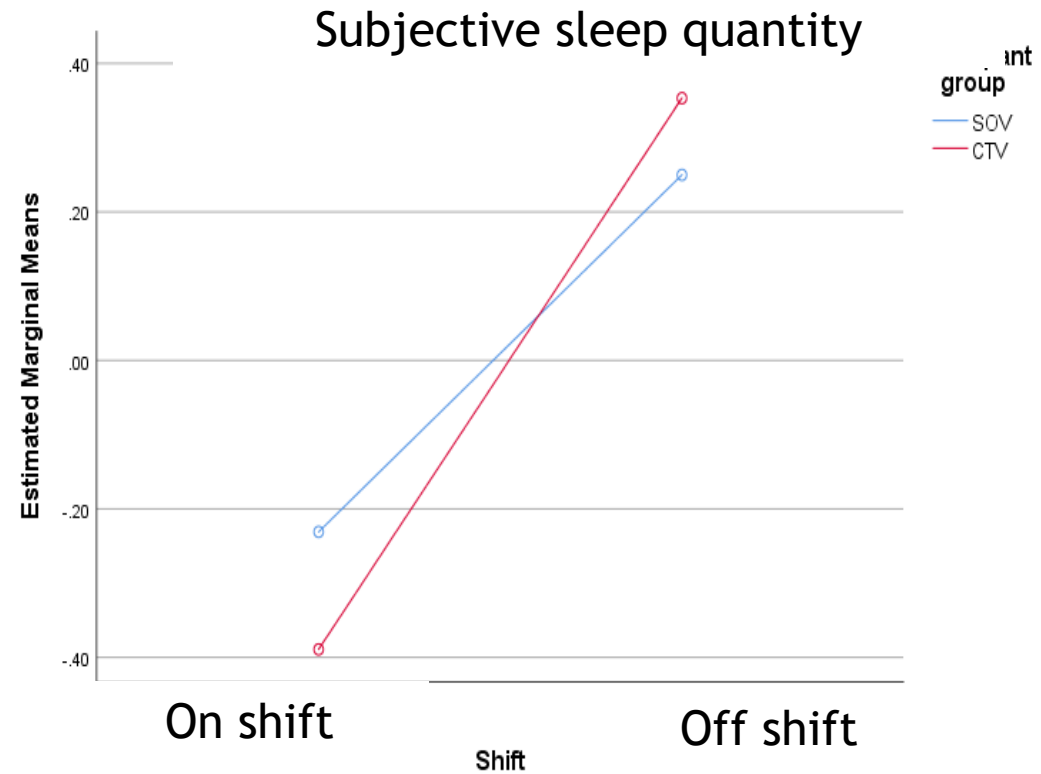
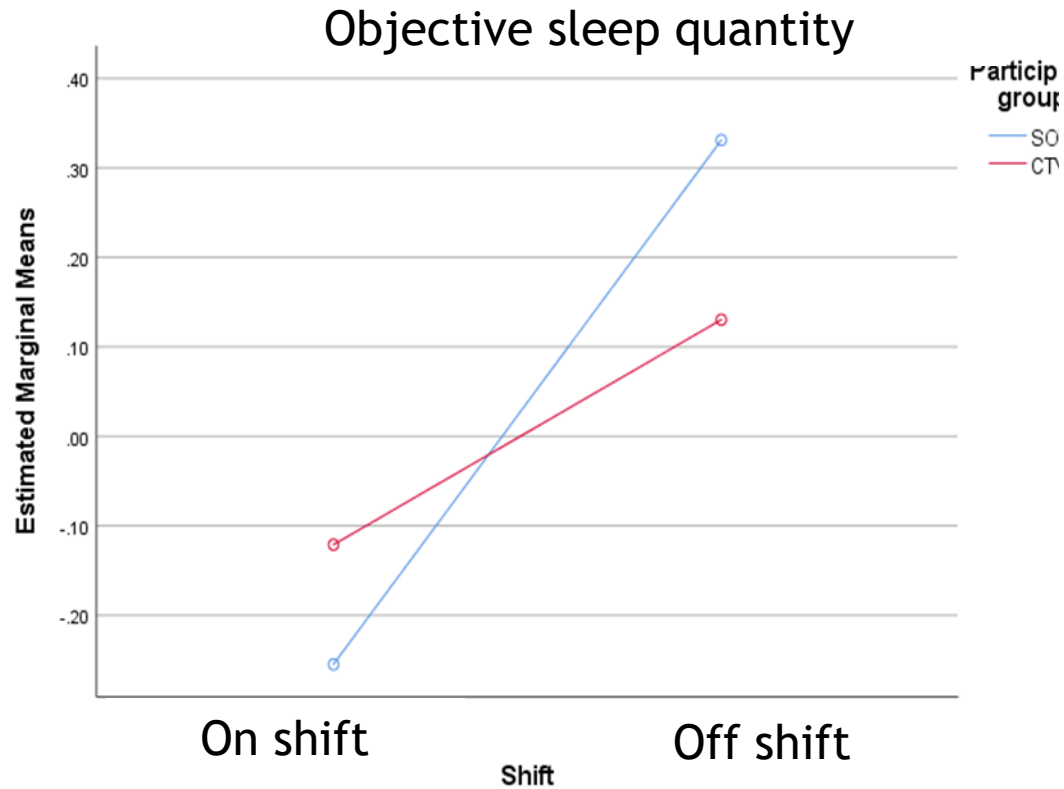
Qualitative Findings



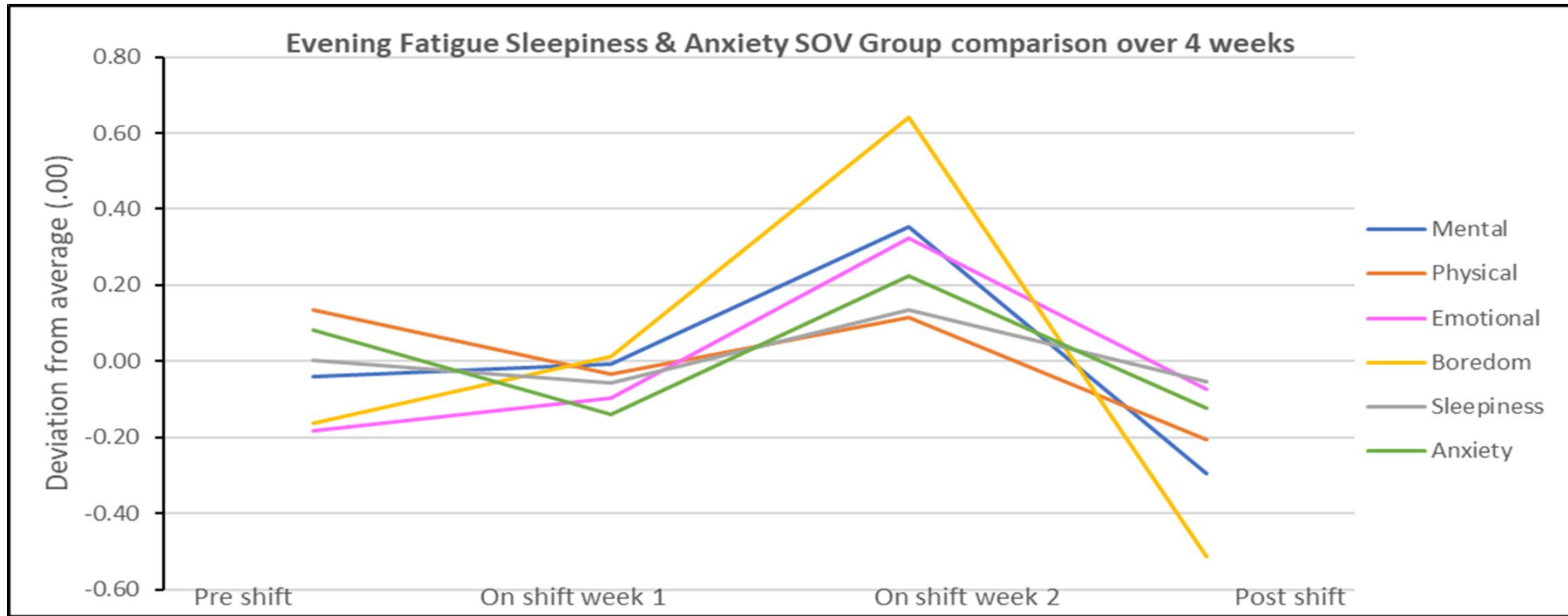
Quantitative Findings



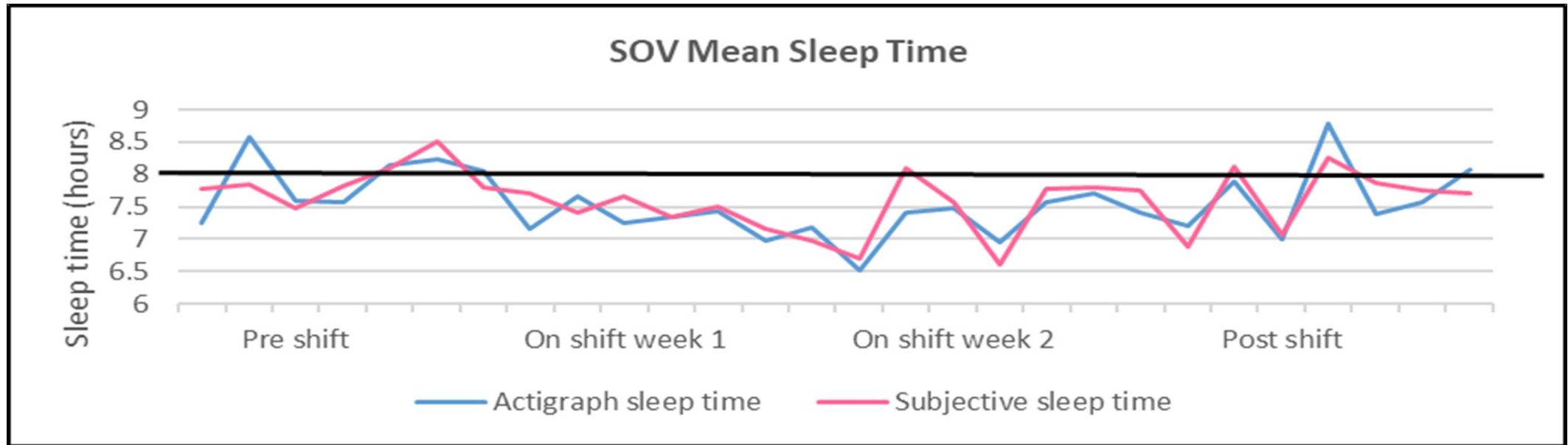
Quantitative Findings



Quantitative Findings



Quantitative Findings



Conclusions

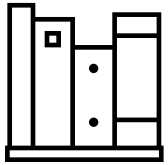
- Findings highlighted the **multidimensional** and **cumulative** nature of fatigue.
- They suggest an increased risk for employees working in the SOV environment due to the longer time that they spend on-shift.
- They illustrate a need for interventions focusing on **organisational culture** and **proactive fatigue risk management planning**.

Understanding Fatigue in Onshore Facilities

- What are we already doing?
- Why is the research important?
- Moving forward.



How Do We Manage Fatigue?



Standards, legislation and guidelines, e.g.:

- Working Time Directive
- HSE, IOGP and EI guidance
- COMAH CA Human Factors Operational Delivery Guide



Performance monitoring

- Overtime
- Sickness
- Reporting



Investigations

- Root cause analysis

Why is the Research Important?

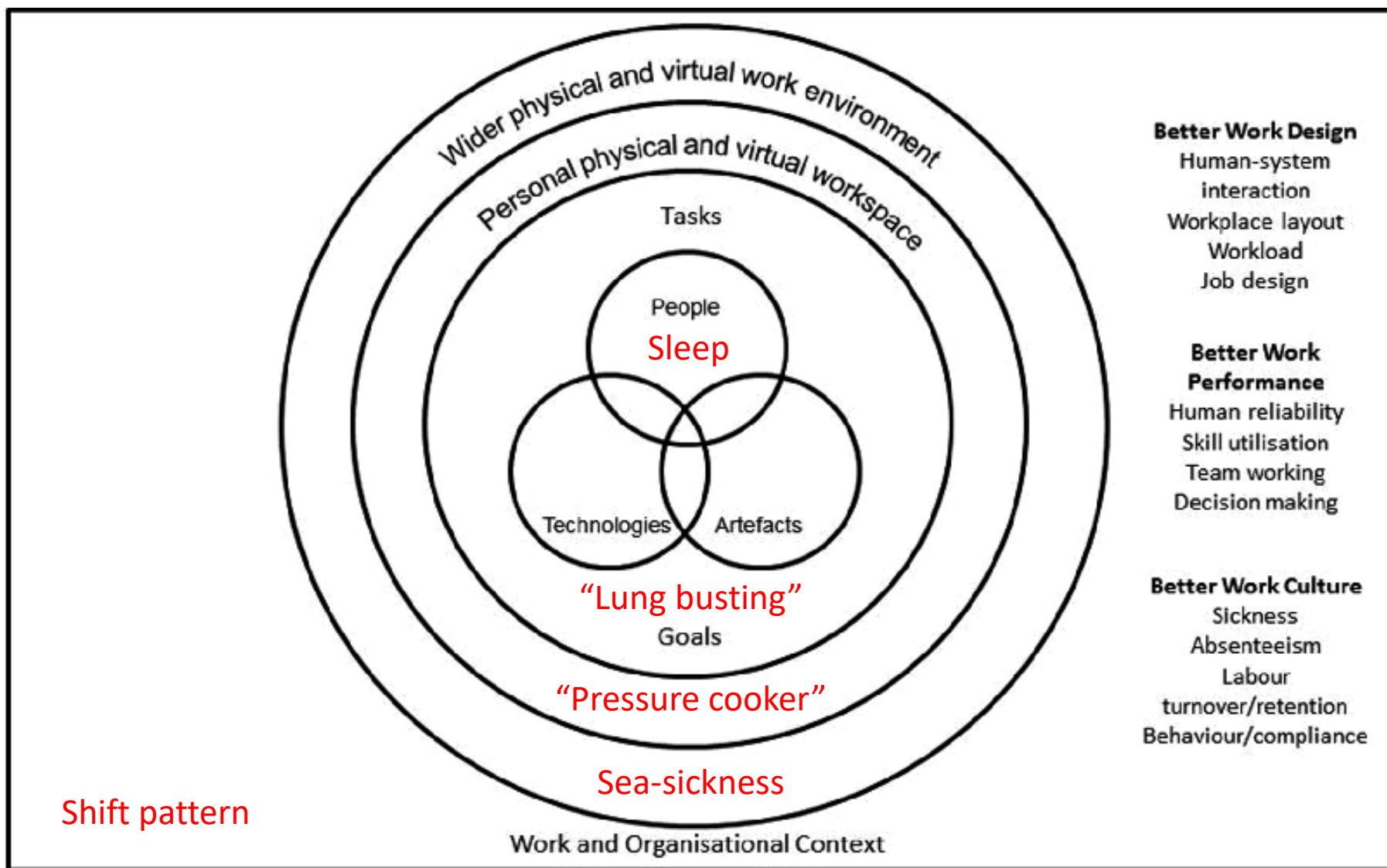
Sleep



Physical demand

Mental demand

Emotional demand



Wilson, J.R. & Sharples, S. (2015) Method in the Understanding of Human Factors. In J.R. Wilson & S. Sharples (Eds.) *Evaluation of Human Work: 4th Edition*. Boca Raton: Taylor & Francis.



Conclusions

- Fatigue is multidimensional
- Strong focus on sleep and shift patterns in management
- Potential to underestimate the hazard
- Increase understanding and develop an integrated system
- Improve the culture around fatigue