Study group

Heli Järnefelt; Kati Karhula; Julia Anttilainen; Irmeli Pehkonen; Mikko Nykänen; Kia Gluschkoff; Christer Hublin; Mikael Sallinen

and Hilkka Ylisassi

Introduction

- **Shift work is associated with sleep problems and impaired alertness** which, consequently, can decrease safety at work (e.g., Knott et al. 2020).

- Alertness at work can be supported both by developing organizational and individual methods (Sallinen & Hublin, 2015).

- There are digital tools developed for these purposes. However, **it is not known how well organizations can implement these tools and which factors affect the implementation**.

©Finnish Institute of Occupational Health

Research design and goals

- A mixed-method participatory implementation-evaluation research

- Goal was **to study implementation** (especially acceptability and feasibility) **of two digital tools developed to support sleep and alertness in shift work**

- **Identifying factors which facilitate or hinder the implementation**

The VIRE-tool

- The VIRE-tool is used for **predicting the risk of sleepiness** in different shifts with results visualized with four-color traffic lights

- Available in 🇫🇮 , 🇸🇪 , and 🇬🇧 at http://vire.arturcloud.com/

Portin Productions Ab

©Finnish Institute of Occupational Health

Digital sleep coaching

- **Based on self-help CBT-I material for shift workers** (Jarnefelt et al., 2020; Järnefelt & Spiegelhalder, 2022). Included videos, reading materials and instructions, writing tasks and audios **to support good sleep and alertness of shift workers**.

- **Two coaching options**:
- Insomnia Severity Index <8 points -> **short coaching** (one hour)
- Insomnia Severity Index ≥8 points -> **extended coaching** (four hours)

Short coaching included:
- meaning of and factors affecting alertness and sleep
- sleep and alertness hygiene instructions

Extended coaching included also:
- sleep scheduling in different shifts and good sleeping habits
- cognitive methods to handle e.g. worrying, thought racing and attitudes to sleep

Participants and methods

Two bus companies
- Company A (11 depots, 1 050 bus drivers)
- Company B (2 depots, 200 bus drivers)

Methods and participants
- **Teams workshops for appraising implementation:** representatives of management or HR personnel, safety representatives of bus drivers, shift planners and representatives of occupational health services (OHS)
- **Using and appraising the VIRE-tool by questionnaires**: shift planners
- **Participating and appraising the sleep coaching tool by questionnaires:** bus drivers
- **Working hour data**

Results

Sleep and alertness symptoms of bus drivers based on questionnaires (n=30)

	Percentage of drivers
Insomnia Severity Index: mild insomnia moderate insomnia	40* 20
Shift work disorder features (SS-Q)	40*
Difficulties staying alert while driving	83
Afraid of having an accident while sleepy	50*
Dozing of while driving	20

* Significant change
at 9-month folllow-up

Questionnaire results of VIRE-implementation (n=6 and 8)

The shift planners evaluated the **implementation of the VIRE-tool on average as moderate**.
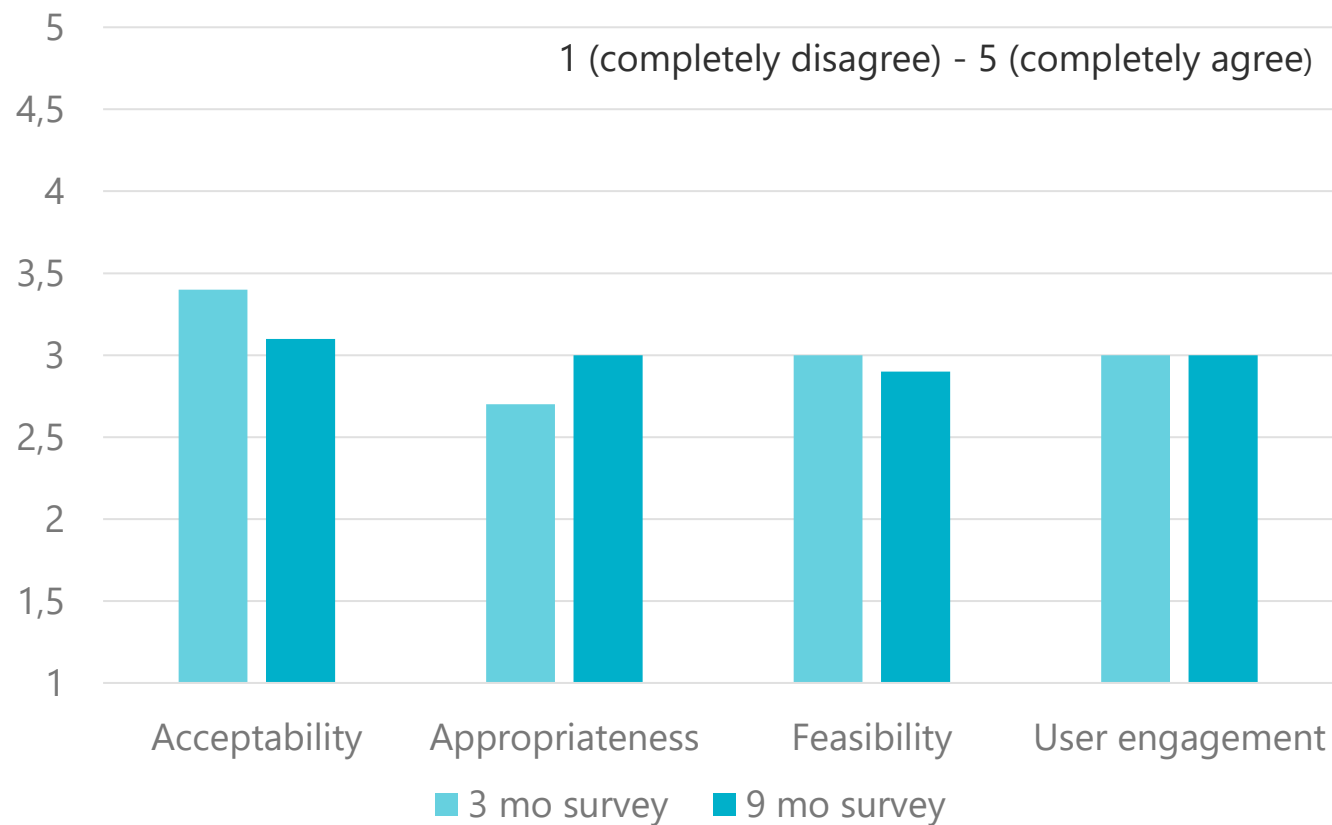
1 (completely disagree) - 5 (completely agree)

Legend: ■ 3 mo survey ■ 9 mo survey

Categories: Acceptability, Appropriateness, Feasibility, User engagement

[1] Acceptability of Intervention Measure (Weiner et al., 2017)
[2] Intervention Appropriateness (Weiner et al., 2017)
[3] Feasibility of Intervention Measure (Weiner et al., 2017)
[4] User Engagement Scale (O´Brien et al., 2018)

Questionnaire results of sleep coaching implementation (n=16)

The bus drivers evaluated the **implementation of the sleep coaching on average as good**.

1 (completely disagree) - 5 (completely agree)

Acceptability   Appropriateness   Feasibility   Engagement

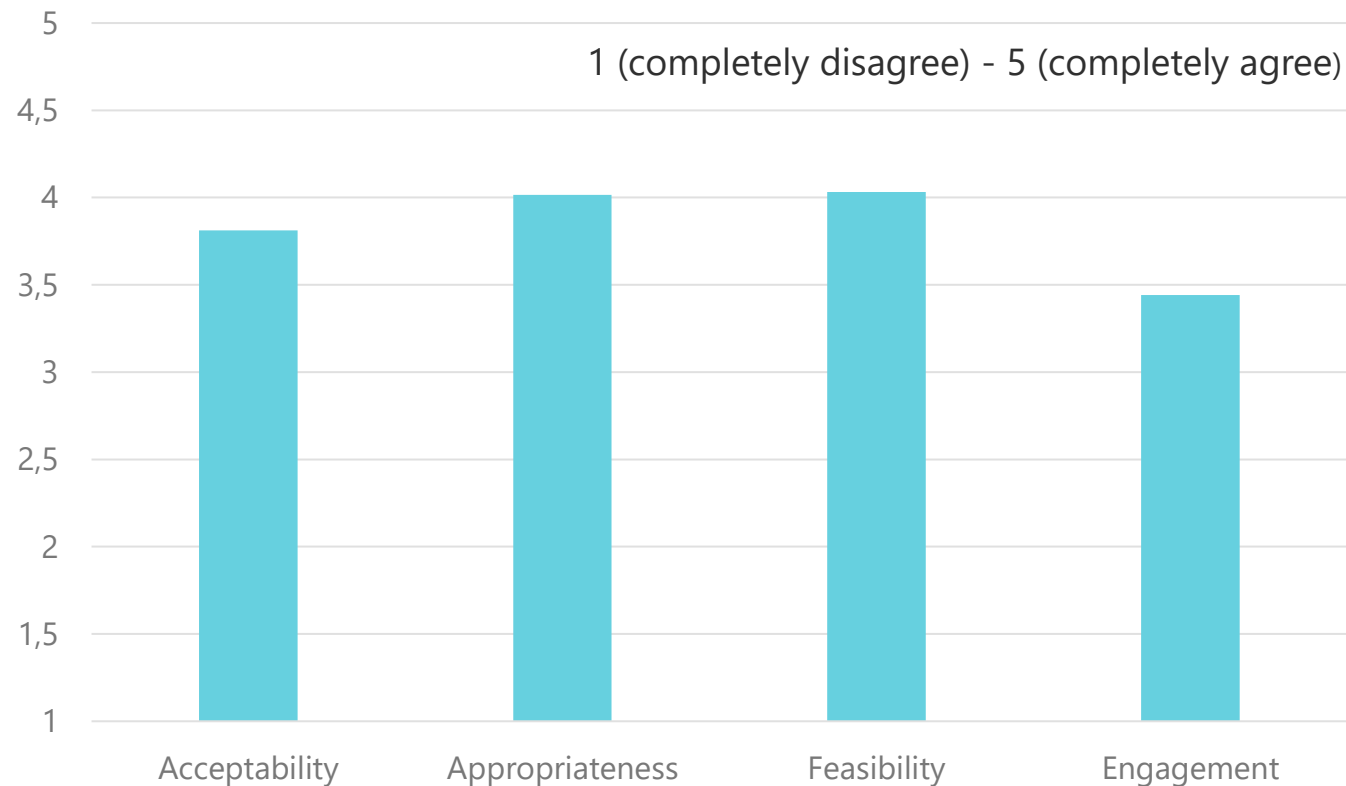[1] Acceptability of Intervention Measure (Weiner et al., 2017)
[2] Intervention Appropriateness (Weiner et al., 2017)
[3] Feasibility of Intervention Measure (Weiner et al., 2017)
[4] User Engagement Scale (O´Brien et al., 2018)

Qualitative analysis

- **The Teams-workshops** were audio-recorded and transcribed verbatim

- The **data** was **analyzed inductively using content analysis**

- **Consolidated Framework for Implementation Research** (CFIR; Damschroder et al. 2009) was used to examine **facilitating and hampering factors of implementation** from data:

  1) Intervention characteristics
  2) Outer setting
  3) Inner setting
  4) Characteristics of individuals
  5) The process of implementation

.

Summary of facilitating factors for implementation

Characteristics of methods:

- Good and interesting content
- Help to pay attention to alertness related issues
- Ease of usage
- Posibility to choose timetable and pace for the sleep coaching usage
- Confidentality of participation to sleep coaching

Companies and workers:

- Multichannel communication
- Support from manager to use VIRE-tool
- Considering alertness related issues important
- Belief of usefulness of tools
- Support from experts

Summary of factors needing development to support implementation (based on hampering factors)

Characteristics of the methods:

- <u>VIRE:</u> automatic integration of the VIRE analysis with the organization´s shift scheduling tools and the inclusion of drivers´ individual preferences and characteristics in the results
- <u>Sleep coaching:</u> adding language versions, diversifying the content, and making it into a phone application

Companies and workers:

- Possibility to participate sleep coaching during working hours
- Support and rewards from manager and employer to sleep coaching participation
- Peer support in sleep coaching
- Developing communication to change culture of how health and alertness related issues are considered
- Cooperation with OHS

Conclusions

- The working hours and the symptoms of the drivers showed that **sleep and alertness related issues are a key part of the occupational safety and health in transportation**.

- **The implementation** of the tools **was facilitated**, among other things, **by their content and ease of usage,** as well as **good communication and support within the company**.

- **Further development of the tools is necessary** to enable larger-scale utilization and dissemination. It is also important that **the management, employees, and stakeholders are widely involved in the implementation.**

- Small number of participants using the tools was the main limitation of the study.