

Banding Together to Predict Driver Fatigue: A Trial of Wearable Activity Monitoring Devices

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Abstract

Wearable technologies are emerging as innovative tools to help reduce fatigue-related crashes. A wristband product called Readiband monitors the wearer's activity level, and according to the band's manufacturer, can accurately predict when the wearer is likely to be fatigued and more susceptible to a road crash. A study of 25 volunteer drivers from two organisations revealed the devices were generally supported by participants, however their fatigue levels, as calculated by the Readiband, remained static. Furthermore, senior management representatives from both participating organisations did not support the uptake of the devices because of cost, privacy and efficacy concerns.

Objective

The objective of the study was to assess the potential road safety benefits of a commercially available wearable technology called Readiband, manufactured by a Canadian firm called Fatigue Science. The product is worn around the driver's wrist, and the device's algorithm uses the wearer's activity levels to calculate the wearer's current and predicted (for the following 18 hours) levels of fatigue. The wearer can monitor their risk level in real time via the product's smartphone app, and this information is also available to the wearer's employer. Unlike other fatigue detection technologies, the Readiband does not emit audible or visual warnings to the wearer, as the data is primarily intended to be monitored by the wearer's supervisor. The efficacy of the algorithm used by the Readiband, which converts bodily activity levels to sleep, was not tested during the trial.

Method

Twenty-five volunteer drivers were recruited from the NSW State Emergency Service and a Wollongong bus company. The participants' SAFETTM Average Alertness Scores were calculated by the band across the 52-day assessment period. According to the device's manufacturer, the SAFETTM score, which ranges from zero to 100, is a scientific measure of the effects of a lack of good and consistent sleep. Participants also completed an online post-trial survey, which included questions relating to the technology's ease of use, perceived value, reliability, and the extent of any changes in the participants' sleeping behaviour. The participants' senior management provided face-to-face verbal feedback, which included their willingness to adopt the technology within their organisations.

Results

The online surveys revealed that the participants generally found the bands to be comfortable and user-friendly, and felt the data accurately reflected their sleeping behaviour. They believed the band could help reduce driver fatigue in principle, and were willing to wear the band during and outside working hours if asked by their employer. The majority of participants, however, felt the bands did not improve their sleeping patterns.

The bands' activity data revealed that the average daily hours of sleep was marginally below the manufacturer's claimed optimum of seven to nine hours. The Average Alertness Score for the entire

group was within the ‘Optimal’ range, and it remained generally static across the assessment period, reflecting no general change in participant sleep behaviour.

Senior managers from both organisations did not support the adoption of the technology in their workplaces, for reasons related to cost, employee privacy, the lack of a perceived need for the technology and the efficacy of the device’s algorithm to convert activity data to sleep data.

Conclusions

The bands were generally accepted by the participants. However, no improvement in participants’ sleep patterns was detected. Furthermore, the participants’ senior management did not support the implementation of the technology because of concerns related to high cost, employee privacy, the lack of a perceived need for the technology and the efficacy of the device’s algorithm to convert activity data to sleep data. The technology may deliver road safety benefits in the future if these significant challenges can be addressed.