What is the impact of prelim examinations on sleeping patterns in school children?

Tynecastle High School
4thinking

Overview and Aim

We all sleep, and we all need sleep. Importantly, we all feel and recognise the differences between a good sleep and having had a bad sleep. Increasingly, sleep is recognised as having important influences on health and well-being. This includes the effects that sleep can have on learning and therefore on performance in important student events such as examinations. This is the motivation that led to the project - Sleep Normality Observation Research Environment or SNORE. Our aim was to answer the research question: What is the impact of examinations on sleeping patterns in school children? In total 17 secondary school students contributed to the research and work commenced August 2022, finishing January 2024. The team included students from S2, S4 and S5, in addition to a Lead Teacher, STEM Ambassador and an external Methodology Advisor (Data Analysis). We also gratefully acknowledge support from Edinburgh and Oxford Universities, The Sleep Charity, and The Sleep Foundation.

Method

An experiment to collect quantitative and qualitative data was designed, with two iterations. The first tested hardware and other instruments. The second trial involved two conditions, “doing exams” and “no exams” as a control (within participant design). Pulse rates (quantitative) were collected from sleepers. Qualitative measures took the form of questionnaires and a sleep diary that was completed after each of three nights of sleep measurements. The sleep diary questions were prepared using available questionnaires that are well tested. Off-the-shelf wearable sensors (wristbands, watches, rings) could have been used but this was prohibitively expensive. We designed and built a wearable sensor to collect the pulse data - a glove with an infrared sensor embedded in one finger. Wireless transmitted the data to a BBC Micro:bit.

Fig 1: SNORE Glove

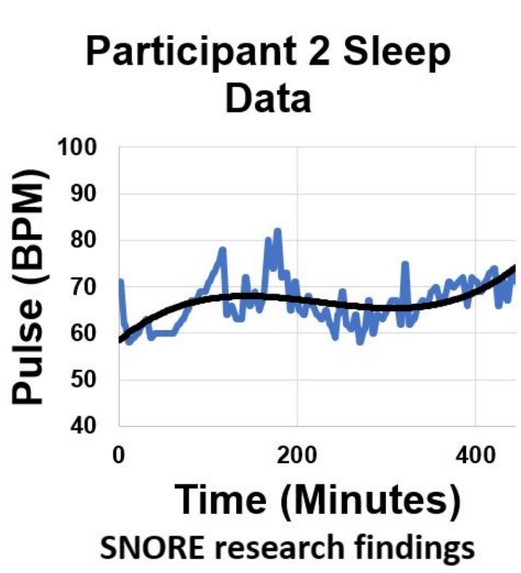

Fig 2: Pulse rate with a model trendline indicating exhaustion

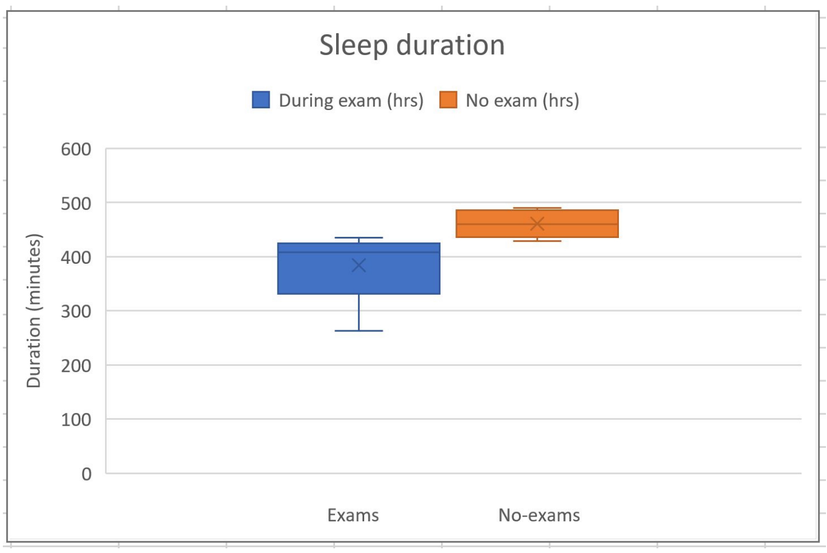

Fig 3: Comparison of sleep duration during exams and no exams.

Results

Published sleep research often fits trendline models to pulse data and form a basis for interpretation. During examinations, the most frequently observed trendlines point to high metabolic rates with associated “grogginess” early morning. This suggests late activities and food consumption as compared to no examinations. There is a noted absence of relaxed trendlines across the data and none are observed during examinations. The Resting Heart Rate during sleep increases during the examination period pointing to stress and anxiety or general poor sleep hygiene. The qualitative results show a trend towards interrupted sleep and generally higher variance during examinations and later times for going to sleep and this is statistically confirmed. The same outcome is seen when comparing how long students sleep. During examinations sleep periods are shorter. However, the time taken to fall asleep remains stable regardless of examinations.

Conclusions

The studies support the conclusion that examinations have a negative impact on sleep. The results also indicate that further analysis and studies are needed to refine these outcomes.

Evaluation

The project has been a very positive experience for all involved due to relevance and timeliness. Many obstacles were overcome, and all would have welcomed an opportunity to do the project again based on experience. The work has been disseminated in local and national media and the school invited to be one of 10 UK schools to present at the Science on Stage Festival in Finland, 2024.

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