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DEVELOPMENT OF A CLINICALLY-VALIDATED QUESTIONNAIRE AND SCORING ALGORITHM DESIGNED TO IDENTIFY COMMON SLEEP PROBLEMS AMONG ADULTS

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Introduction: Although sleep is critical to maintaining health and quality of life, inadequate sleep duration and/or quality is common. It can be difficult to distinguish sleep problems that may be addressed through adjustments to lifestyle versus issues that may represent a more serious condition requiring medical intervention. SmartSleep Analyzer is a cloud-based questionnaire and scoring algorithm designed to categorize respondents according to likely sleep problems as follows: obstructive sleep apnea (OSA), snoring, trouble falling asleep or staying asleep, delayed sleep phase disorder (DSPD), shift work disorder (SWD), chronic sleep restriction (CSR), or no sleep problem. Primary, secondary, and tertiary categorizations are provided, where applicable. The objective of this study was to validate the questionnaire scoring algorithm categorization/s against a sleep physician assessment.
Methods: From 2,316 available records, 90 complete questionnaires were randomly selected for this analysis. The questionnaire scoring algorithm categorization was compared against the consensus assessment of three independent sleep physicians who each reviewed the answers to all questions before arriving at a diagnosis.
Results: The questionnaire respondents (70% female) were aged 42.2±14.5 years, had a mean BMI of 32.0±7.7 kg/m^2, and self-reported sleep duration of 6.5±1.4 hours/night. The primary, secondary, or tertiary categorization of the questionnaire scoring algorithm matched the primary consensus categorization of the physicians 90.6% of the time (95% confidence interval (CI): 82.6 to 95.7). When OSA and snoring were grouped, agreement increased to 98.9% (95% CI: 94.0 to 100). In all analyses undertaken, the accuracy of questionnaire scoring algorithm against the physicians exceeded the accuracy of the physicians when compared to each other.
Conclusion: These results demonstrate that our questionnaire and scoring algorithm performs well in identifying sleep problems that may impact adult respondents, using physician-review as the comparison standard.
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THE ACCURACY OF A NOVEL SLEEP RING DEVICE FOR ESTIMATING SLEEP ONSET WITH GOOD AND POOR SLEEPERS

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Introduction: THIM is a new ring-like sleep device that, if found to accurately measure sleep onset, could be used for a variety of clinical purposes. These include administering a brief but effective treatment for insomnia called Intensive Sleep Retraining, facilitating the optimal 10-minute power nap, and administering Multiple Sleep Latency Tests (MSLTs) outside of the sleep laboratory. This study assessed the accuracy of THIM for measuring sleep onset latency compared to polysomnography (PSG).
Methods: Twenty healthy individuals aged 23.6 years (*SD* = 4.89) underwent overnight PSG recording whilst using THIM on two nights in the sleep laboratory, one week apart. On each night, participants completed sleep onset trials for four hours whilst monitored via PSG. In these trials, participants attempted to fall asleep whilst responding to vibrations emitted from THIM. Once they failed to respond to two consecutive stimuli, THIM woke them with an intense vibration. Participants had a short break before attempting the next trial.
Results: On average, THIM overestimated sleep onset on the first night by 0.24 minutes (*SD* = 0.90). On the second night, THIM overestimated sleep onset by 0.82 minutes (*SD* = 1.31) and this discrepancy was not significantly different to that obtained on the first night, $p = .08$. The accuracy of THIM did not differ between good sleepers (Insomnia Severity Index (ISI) score < 7) or poor sleepers (ISI score 8-15), $p = .98$.
Conclusion: The findings suggest that THIM is accurate at estimating sleep onset latency for both good and poor sleepers. The next step is to test THIM outside of the laboratory environment. The goal is to develop an accurate yet practical device that can translate laboratory-based procedures to the home environment, to the benefit of patients and clinicians wanting to improve sleep.
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ACCURACY OF A COMMERCIAL WEARABLE IN DETECTING SLEEP STAGES COMPARED TO POLYSOMNOGRAPHY IN ADULTS: CONSIDERING SLEEP CLASSIFICATION METHODS AND EFFECTS OF EVENING ALCOHOL CONSUMPTION

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Introduction: Commercial wearable devices have shown the capability of collecting and processing multisensor information (motion, cardiac activity), claiming to be able to measure sleep-wake patterns and differentiate sleep stages. While using these devices, users should be aware of their accuracy, sources of measurement error and contextual factors that may affect their performance. Here, we evaluated the agreement between Fitbit Charge 2™ and PSG in adults, considering effects of two different sleep classification methods and pre-sleep alcohol consumption.
Methods: Laboratory-based synchronized recordings of device and PSG data were obtained from 14 healthy adults (42.6±9.7y; 6 women), who slept between one and three nights in the lab, for a total of 27 nights of data. On 10 of these nights, participants consumed alcohol (up to 4 standard drinks) in the 2 hours before bedtime. Device performance relative to PSG was evaluated using epoch-by-epoch and Bland-Altman analyses, with device data obtained from a data-management platform, Fitabase, via two methods: one that accounts for short wakes (SW, awakenings that last less than 180s) and one that does not (not-SW).
Results: SW and not-SW methods were similar in scoring (96.76% agreement across epochs), although the SW method had better accuracy for differentiating "light", "deep", and REM sleep; but produced more false positives in wake detection. The device (SW-method) classified epochs of wake, "light" (N1+N2), "deep" (N3) and REM sleep with 56%, 77%, 46%, and 62% sensitivity, respectively. Bland-Altman analysis showed that the device