Title: Subjective Experience of Sleep is Largely Unrelated to Objective Sleep Measures

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Abstract: 1.17

Introduction: In recent years, public interest in sleep has grown substantially, accompanied by a concomitant rise in consumer-level wearable devices that allow for accessible and affordable sleep monitoring. While the technology underlying these devices is reasonable at detecting sleep quantity, some claim to determine sleep “quality.” The subjective quality of sleep can impact functional performance, morbidity, and mortality, and understanding its underlying mechanisms and correlates can contribute to sleep-related treatments and clinical phenomenology. We, therefore, tested whether the fundamental signal (accelerometry-based sleep/wake detection) from these devices is useful in determining subjective sleep quality (SSQ). Methods: 1141 healthy older (76.5±5.77 years), community-dwelling men, enrolled in the Osteoporotic Fractures in Men Study (MrOS), participated in an overnight sleep study during which sleep was monitored with actigraphy (ACG; wrist-worn accelerometry) and polysomnography (PSG), including electrocardiography. SSQ was determined the next morning using 5-point Likert-like scales of sleep depth and restfulness. Functional principal component analysis (fPCA) was used to analyze the shapes of the raw movement patterns. Quantitative measures of sleep were calculated from ACG data with standard algorithms. Lasso and random forest regression models were used to examine the relationship of ACG-determined sleep variables, ACG fPCA, average heart rate (HR), HR variability (HRV), demographics, and psychological variables with SSQ. Results: ACG data, in combination with HR, HRV, demographic and psychological variables, have low predictive value of subjective sleep quality (R²=2.5%-16.2%, depending on the model). Conclusion: Accelerometry data, in combination with HR, demographic, and psychiatric variables, are not good predictors of SSQ in older men. Findings are consistent with previous conclusions that PSG sleep measures are not well correlated with SSQ. Development of actigraphy-based predictors could better our understanding of the mechanisms of the subjective experience of sleep, as well as improve both existing and novel treatment modalities in sleep medicine and beyond.