

Introduction

The SNAPSHOT Study is a large-scale and long-term study that seeks to measure: **S**leep, **N**etworks, **A**ffect, **P**erformance, **S**tress, and **H**ealth using **O**bjective **T**echniques.

This study investigates (1) how daily behaviors influence sleep, stress, mood, and other wellbeing-related factors (2) how accurately we can recognize/predict stress, mood and wellbeing (3) how interactions in a social network influence sleep behaviors.

In this poster, we present the influence of sleep regularity on subjective wellbeing related measures.

Sleep regularity is another index to evaluate sleep wake patterns which are not evaluated with conventional sleep surveys such as Pittsburg Sleep Quality Index. Irregular sleep-wake schedules are commonplace in modern society. Recent studies have suggested the importance of sleep regularity in addition to sleep duration in multiple aspects of health [Clerx, 2014, Clerx, 2015, Bei, 2015].

Methods

Participants

114 undergraduate students at one university (age: 18-25, male: 76) ~30-day experiment

Measurement

1) Actigraphy (MotionLogger (AMI))

- Sleep/nap timing and duration

2) Surveys

Morning/evening diaries

- Sleep timing and duration
- Self-reported Wellbeing (alertness, happiness, sluggishness, healthiness and calmness)

Pre/post-study surveys

- Physical and mental health (The 12-Item Short Form Survey (SF-12))
- Stress (Perceived Stress Scale (PSS))

Influence of Sleep Regularity on Self-reported Mental Health and Wellbeing

Sleep/wake onsets were determined using a combination of wrist actigraphy and sleep diaries. In addition to bed time, wake time and duration, BWH's team defined and computed sleep regularity as a value of 0 - 1 based on the likelihood of sleep/wake state being the same time-points 24 hours apart.

$$\text{Sleep regularity index} = \frac{1 + \frac{1}{T-\tau} \int_0^{T-\tau} s(t)s(t+\tau) dt}{2}, \text{ where } s(t)=1 \text{ during wake and } s(t)=-1 \text{ during sleep.}$$

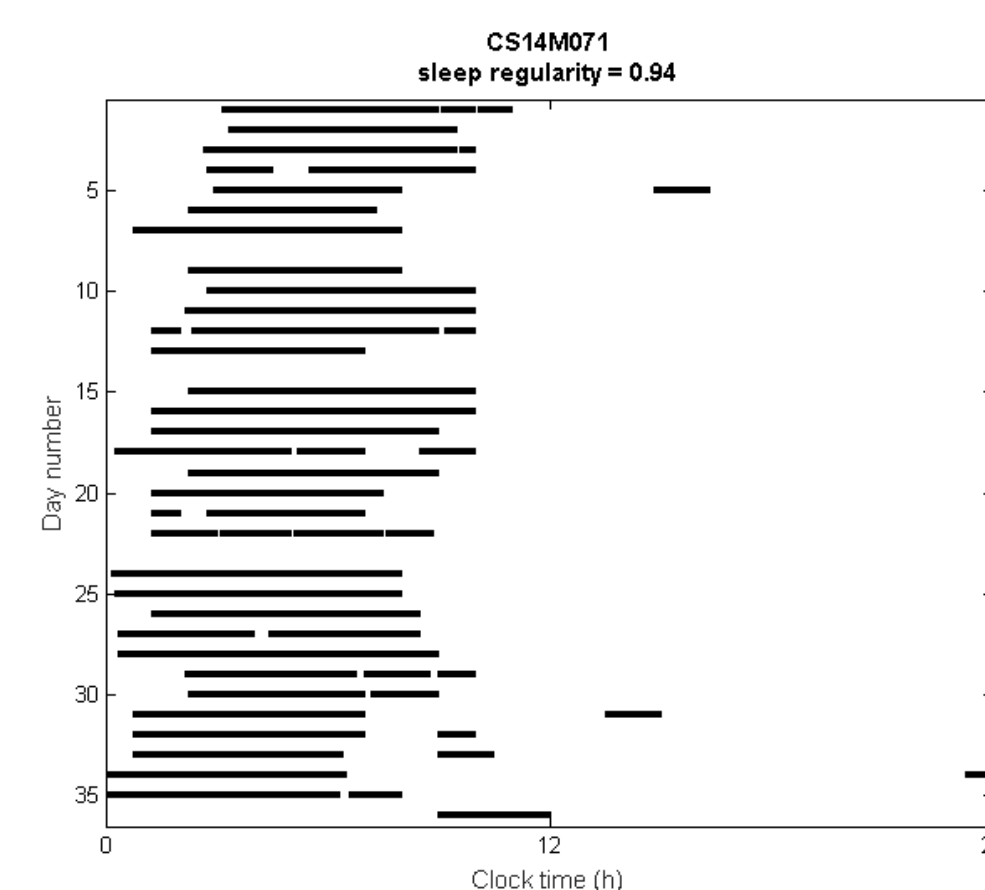
Suppose data are collected for $y=[0, T]$. Choose $T=24$.

We defined regular/irregular sleepers in two ways to check robustness of results:

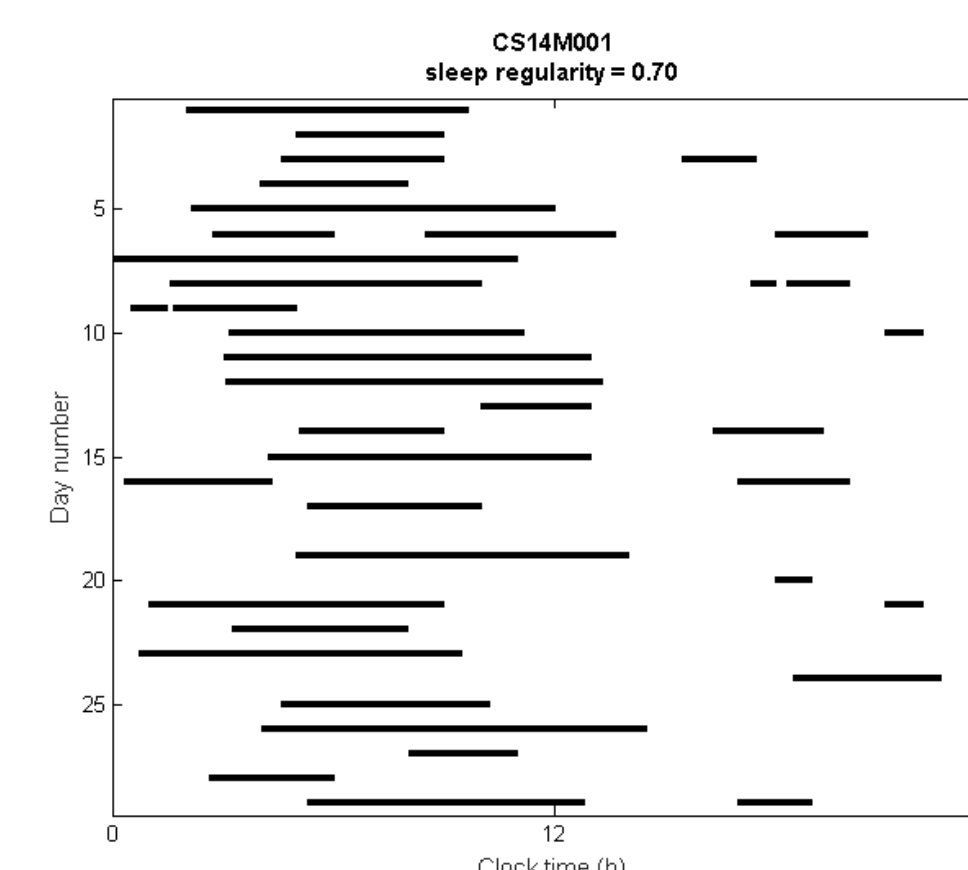
(1) The 40% top and bottom regularity scores; (2) Above or below the average regularity.

We used coarsened exact matching for estimating casual effects and controlled covariates (gender, average sleep duration, pre-study PSS). We controlled for long/short sleep duration with thresholds of 6 and 7 hours based on previous studies to test if results were sensitive to these values.

T-tests or Mann-Whitney U tests (for non-Gaussian distributions) were used to compare the regular and irregular sleepers.



Regular Sleepers



Irregular Sleepers



p < 0.05
Even after controlling
for pre-study PSS



43.9 **Mental Health**

37.3

46.0 **Morning Alertness**

41.2

61.6 **Morning Energy**

48.8

Conclusions

Sleep irregularity appears to be associated with lower self-reported mental health and wellbeing (low energy and alertness in the morning), even when controlling for sleep duration and stress.

This work underlines the necessity of considering sleep regularity, in addition to sleep duration, as a potential important factor for mental health and wellbeing.

Acknowledgments

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