Sleep architecture, emotional reactivity, and emotion regulation

Jinxiao Zhang (jinx.zhang@stanford.edu)

Note: This registration document is created based on the "Prereg Challenge" registration form on Open Science Framework.

Study Information

Research questions

The overarching goal of the current study is to understand the relationship between sleep architecture, emotional reactivity, and emotion regulation. Based on previous research, the current study focuses on how rapid eye movement (REM) sleep and slow wave sleep (SWS) relate to emotional reactivity and emotion regulation. The research questions are:

1. Is REM sleep or SWS related to emotional reactivity?
2. Which sleep stage is more strongly related to emotional reactivity?
3. Is REM sleep or SWS related to emotion regulation?
4. Which sleep stage is more strongly related to emotion regulation?
5. Is sleep architecture related to emotion regulation while controlling for emotional reactivity.

Hypotheses

1. Both REM sleep and SWS are related to emotional reactivity. We have a non-directional prediction about the relationship between REM sleep and emotional reactivity. We predict a negative relationship between SWS and emotional reactivity.
2. REM sleep is more strongly related to emotional reactivity than SWS.
3. Both REM sleep and SWS are related to emotion regulation. We have a non-directional prediction about the relationship between REM sleep and emotion regulation. We predict a positive relationship between SWS and emotion regulation.
4. We have no directional hypothesis about which sleep stage (REM or SWS) is more strongly related to emotion regulation.
5. Sleep architecture (REM and SWS) is still related to emotion regulation while controlling for emotional reactivity.

Sampling Plan

Existing data

Registration following analysis of the data.

Explanation of existing data

The data collection has been completed. We have calculated the descriptive statistics of the measures of emotional reactivity and emotion regulation for another research study using the same dataset. We have not accessed any data of sleep architecture nor conducted any analyses related to the research questions of the current study.

Data collection procedures

Sample size

Our target sample size for analyses is 84 participants.

Sample size rationale

We used the software program G*Power to conduct a power analysis. In order to detect a medium-sized correlation (r = .3) with 80% power at the standard .05 alpha rate, 84 participants are needed.

Stopping rule

The data collection has stopped for the purpose of another bigger research study. We stopped recruiting new participants once at least 35 participants who are sleep bruxism positive and 35 participants who are sleep bruxism negative have been included. We ended up having 104 participants recruited regardless their state of sleep bruxism (positive, negative, or uncertain).

Variables

Manipulated variables

NA

Measured variables

Polysomnography (PSG). Polysomnography will be recorded for one whole night's sleep. The PSG data will be scored by an external registered polysomnography technician.

Emotion regulation Task. In each trial, a neutral or a low/medium/high negative emotional picture is presented. We will measure (a) self-reported valence and arousal ratings, (b) corrugator EMG reactivity, and (c) EEG late positive potential (LPP) amplitudes at P3, Pz, and P4 (referenced to linked mastoids).

Indices

Sleep stages. REM sleep will be quantified as the duration of REM sleep and the percentage of REM sleep in total sleep duration of the PSG night. SWS will be quantified as the duration of SWS and the percentage of SWS in total sleep duration of the PSG night.

Emotional reactivity. There are three conditions in the emotion regulation task, that is, *watch, reappraise, and distract*. Emotional reactivity will be measured as the average (a) self-reported valence and arousal ratings, (b) corrugator EMG reactivity, and (c) EEG late positive potential (LPP) amplitudes at P3, Pz, and P4 across the *watch* trials of low/medium/high negative emotional pictures.

Emotion regulation. Emotion regulation will be quantified as the reduction in emotional reactivity as measured by self-reported ratings, corrugator EMG reactivity, and LPP amplitudes from the *watch* condition to the *reappraise* or *distract* condition during trials of low/medium/high negative emotional pictures.

Design Plan

Study type

Observational Study - Data is collected from study subjects that are not randomly assigned to a treatment. This includes surveys, “natural experiments,” and regression discontinuity designs.

Blinding

No blinding is involved in this study.

Study design

Randomization

Analysis Plan

Statistical models

Transformations

Follow-up analyses

Inference criteria

Data exclusion

Missing data

Exploratory analysis