The multivariate relationship between sleep quality, mental health, personality, and the brain with emotion regulation

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INTRODUCTION

- The two most studied emotion regulation (ER) strategies [1]:
  1) **Suppression** (inhibition of emotion expression) is associated with mental disorders (=maladaptive) [1].
  2) **Reappraisal** (reinterpretation of emotional stimulus) relates to mental well-being and successful regulation (=adaptive) [1].
- ER utilization is differently associated with various domains such as mental health [2], personality [3], sleep quality [4], as well as brain structure [5] and function [6].
- Previous research mostly isolated and/or based on sub-groups or experimental designs like sleep deprivation [4].

➢ Regularized canonical correlation analysis (rCCA) on the enhanced Nathan Kline institute - Rockland sample (eNKI).
  ➢ Multivariate relationship.
  ➢ In general population.

METHODS

- N = 192
- age range = 39-72
- mean age = 58.49 ± 9.29
- 140 females

Emotion Regulation (emotion regulation questionnaire)

Sleep Quality (Pittsburgh sleep quality index)

Personality Traits (NEO-five-factor inventory-3)

Mental Health (revised Beck's depression inventory, state-trait anxiety inventory)

Brain
- Function (fractional amplitude of low-frequency fluctuations, regional homogeneity)
- Structure (grey matter volume)

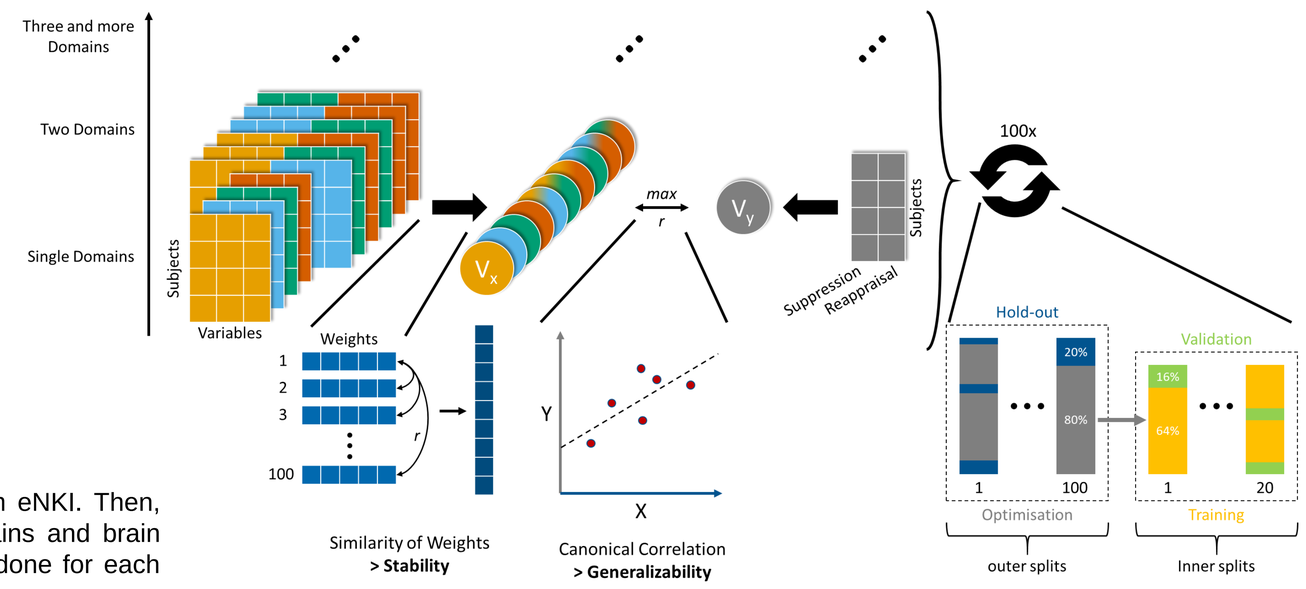

Figure 1: Method illustration. First, domains of interest and fitting participants were extracted from eNKI. Then, different combinations of the domains were used in rCCAs, from only a single domain to all domains and brain measures. Due to the large feature space of the brain measures each analysis including brain was done for each measure separately.

RESULTS

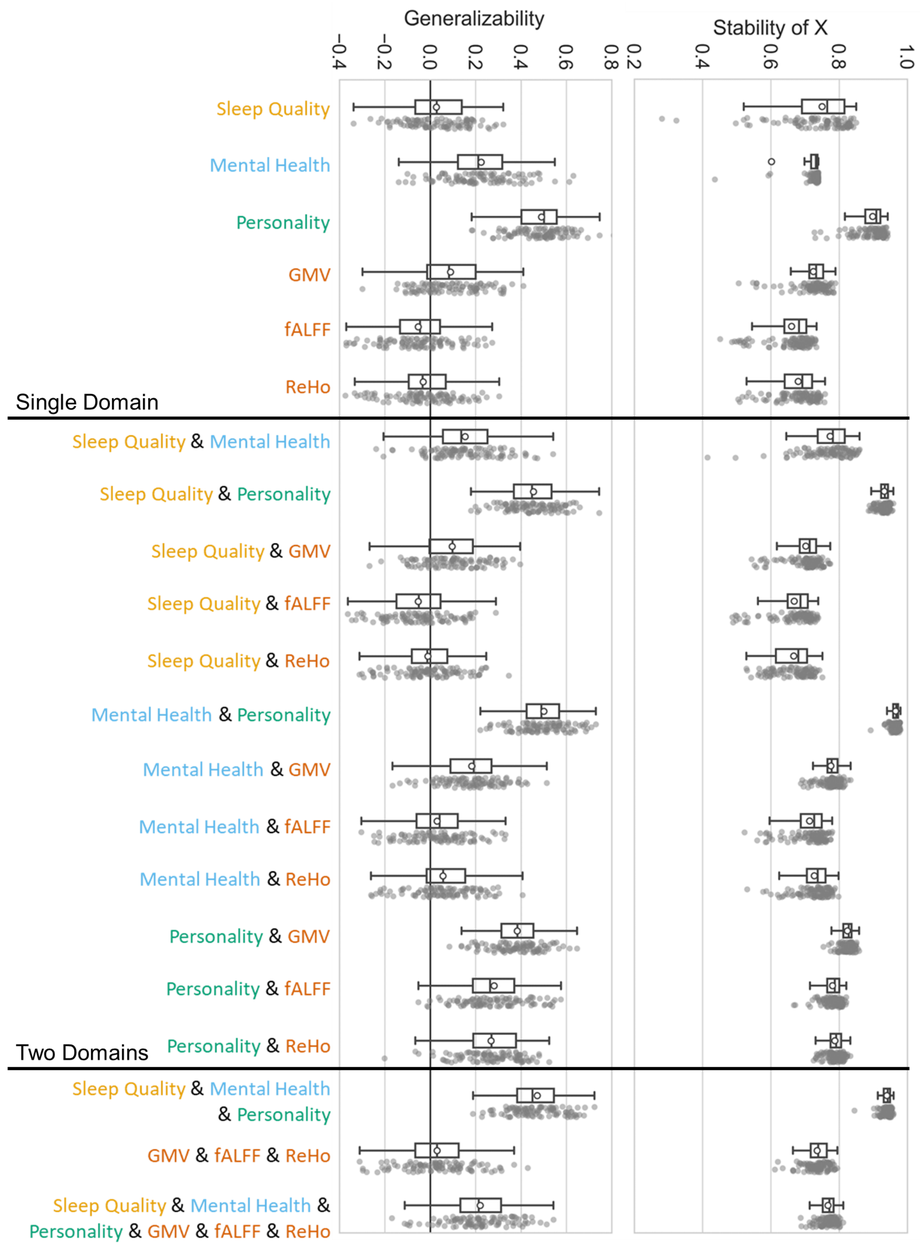

Figure 2: Generalizability and stability of the different rCCA models. Shown are the first associative effects. Abbreviations: fALFF: fractional amplitude of low-frequency fluctuations, GMV: grey matter volume; ReHo: regional homogeneity.

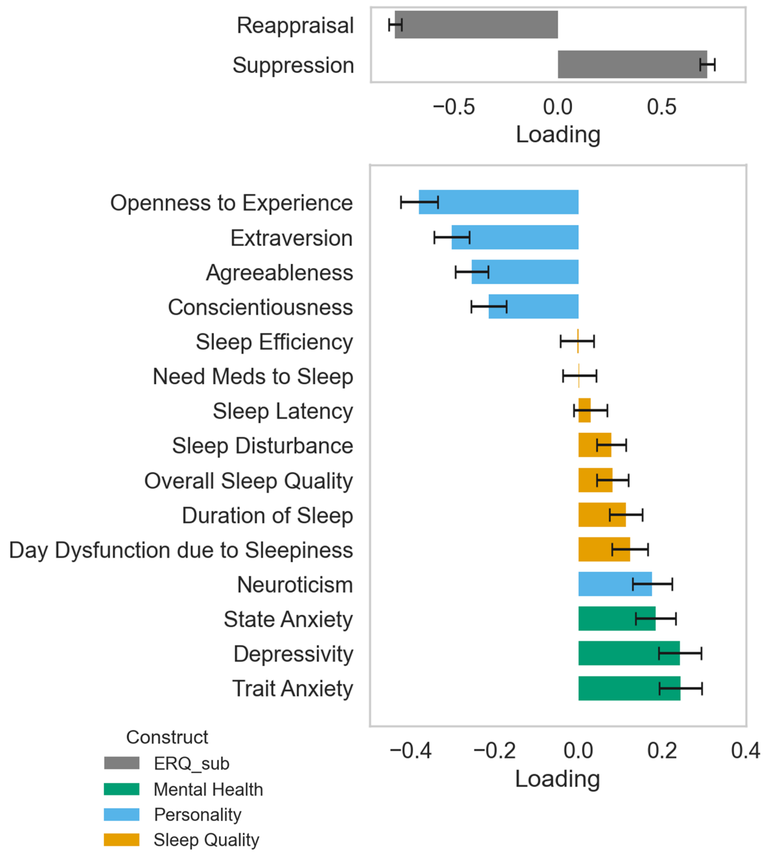

Figure 3: Behavioural loadings. Loadings of the first associative effect of the model including all domains and brain measures. Shown are the first associative effects.

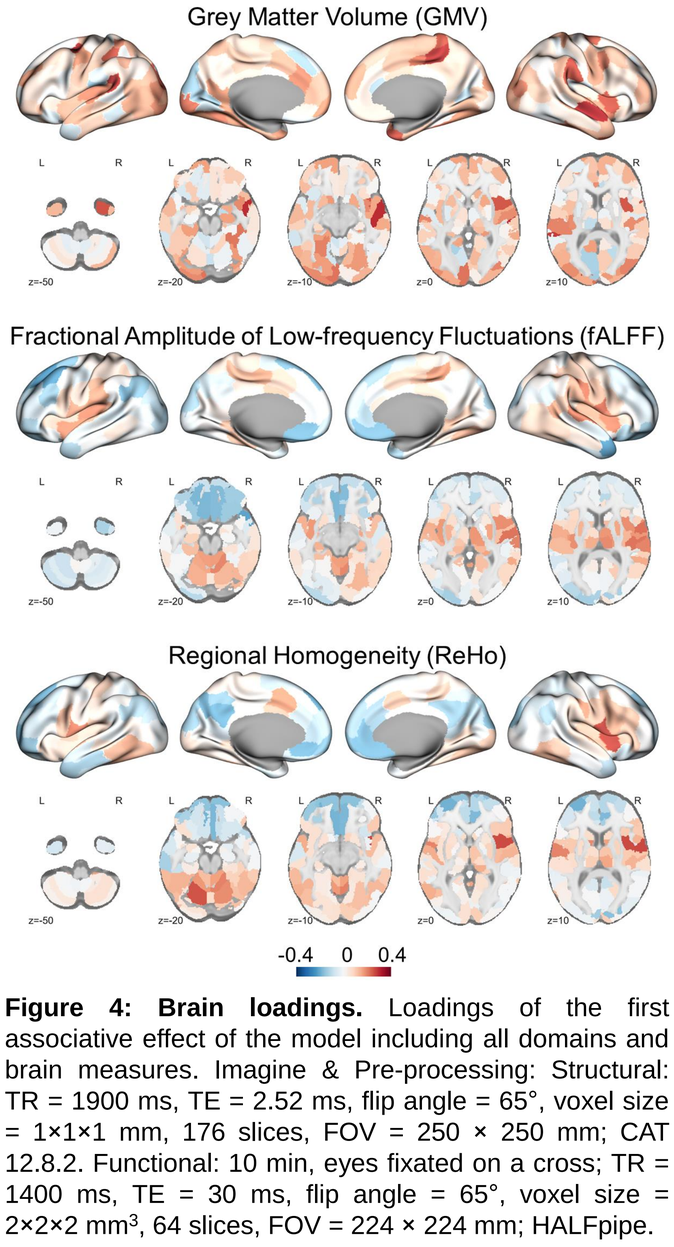

Figure 4: Brain loadings. Loadings of the first associative effect of the model including all domains and brain measures. Imagine & Pre-processing: Structural: TR = 1900 ms, TE = 2.52 ms, flip angle = 65°, voxel size = 1×1×1 mm, 176 slices, FOV = 250 × 250 mm; CAT 12.8.2. Functional: 10 min, eyes fixated on a cross; TR = 1400 ms, TE = 30 ms, flip angle = 65°, voxel size = 2×2×2 mm^3, 64 slices, FOV = 224 × 224 mm; HALFpipe.

- Generalizability is low for the sleep quality and brain single domain models.
- Adding brain measures to the behavioural models with good performance decrease their generalizability and stability.
- Anxiety and depressive symptoms as well as neuroticism are correlated with suppression and anticorrelated with reappraisal, while other personality traits show the opposite directionality.

CONCLUSION

- Mental health and personality traits are more strongly associated with the utilization of suppression and reappraisal, rather than sleep quality and brain features.
- The association follows a dimensionality in which the negative expression of a variable is correlated with suppression and anticorrelated with reappraisal supporting the classification as maladaptive and adaptive.

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