Exploring Hippocampal Structural Differences in Habitual vs Non-habitual Nappers During Early Childhood

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Introduction

- During sleep, memories become less vulnerable to interference, partially due to a "transfer" of memories from hippocampus to cortex
- Children between 3-5 years old are phasing out of napping AND show marked improvement in episodic memory
    - Hippocampus supports memory development, but effects vary with age
    - Research shows habitual nappers perform worse than non-nappers on a memory task when they miss their afternoon nap
- Both sleep and the hippocampus support memory in early childhood, but research examining relations between sleep and the hippocampus during this age is limited

PURPOSE: The present study examined differences in hippocampal volume between habitual and non-habitual nappers.

HYPOTHESIS: There will be differences in hippocampal volume based on nap status.

Method

- N = 21, M_{age} = 4.49 years

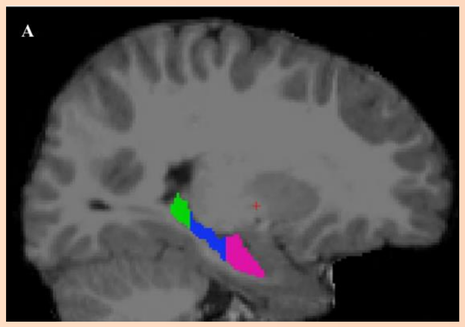
8 nappers

13 non-nappers

Variables:

- Nap status, based on –
    - Nap transition questionnaire
    - Daily sleep diary
    - Child Sleep Habits Questionnaire
    - Parent interview
- Structural T1-weighted MRI scan

- Bi-lateral analyses – compare hippocampal volumes between groups
    - Compare total hippocampus as well as **subregions of head, body, and tail**
- Lateral analyses – investigated lateralized differences if any subregions were significant or approached significance ($p < .10$)



Results

- Preliminary Analyses: compared nap groups for possible confounds – sex, age, and ICV
    - All variables were **nonsignificant**, so none were controlled for
- T-test revealed marginal differences between groups in bi-lateral hippocampal tail volumes – approached significance ($p = .08$)
    - Additional analysis for left and right hippocampus
- **Significant differences in left hippocampal tail ($p < .01$)**

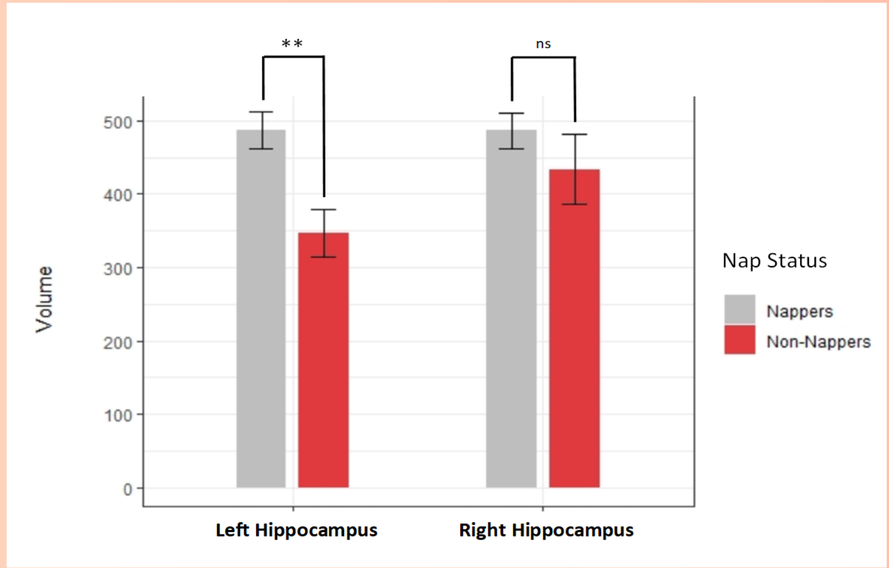


Figure 1: Comparing hippocampal tail volumes between left and right hemispheres in nappers versus non-nappers

Discussion

- Nappers had larger left hippocampal tail volumes than non-nappers
- Suggests hippocampal volume differences between groups
- Limitations - small effect size, small sample size, and the nature of the hippocampus
    - Small effects common in hippocampal volume analyses
- Future directions – sleep and memory components, subfields of the hippocampus, and function of the hippocampus

Main Takeaway

- **Results indicate there are differences in hippocampal structures between napping and non-napping developing children**
- Important to consider in the context of sleep and memory
- One step closer to understanding the function of the hippocampus