Is Habitual Nap Status Related to Hippocampal Volumes during Early Childhood?

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Introduction

• Research shows marked differences in memory performance between habitual nappers and non-nappers (Howard, Dorjee, & Spencer, 2013).

• Importantly, during the same developmental period when children transition out of their afternoon nap, the hippocampus demonstrates age-related changes in structure (Riggins et al 2015; Riggins et al., 2018).

• Previous research has demonstrated there are volumetric differences in hippocampal subfield volumes between nappers and non-nappers (Riggins & Spencer, in press).

• Purpose: To expand upon previous work assessing the role of hippocampal structure in memory differences between nappers and non-nappers by examining subregions

Methods

Participants

• Participants are part of an ongoing longitudinal study.

• N = 36 participants (M_age=4.28 years, 10 female).

Nap Status

• Nap status was determined via parent report on either a 2-week sleep diary, a parent questionnaire, or an over the phone interview.

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<tr>
<th>Nap Status</th>
<th>Nappers</th>
<th>Non-nappers</th>
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<tbody>
<tr>
<td>≥5 days/week</td>
<td>22</td>
<td>14</td>
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Structural MRI Data

• A T1-weighted structural MRI scan (9 mm³) was obtained using a Siemens 3T scanner with a 32-channel coil.

• Hippocampal volumes were extracted via Freesurfer v6.0 (Fischl, 2013) and refined using ASAT (Automated Segmentation Adapter tool, Wang et al., 2011).

• Hippocampal subregions (head, body, tail) were defined using standard anatomical landmarks (Dishman et al., 2013; Riggins et al., 2015).

Covariates

• There were no significant group differences in ICV (p = .26) or sex (p = .38).

• There were group differences in age (p = .001).

• ICV, sex, and age were used as covariates in all analyses.

Results: Bilateral Subregion Differences

An ANOVA revealed that bilateral hippocampal head volume was larger in non-nappers compared to habitual nappers controlling for age, ICV, and sex, F(1,30) = 5.04, p < .04.

Results: Lateromedial Differences in Hippocampal Head

Sperate ANOVAs revealed a marginal group difference in left, but not right hippocampal head volume, controlling for age, ICV, and sex, F(1,31) = 3.88, p < .06.

Discussion

• These results suggest hippocampal subregion volumes vary as a function of nap status. Specifically, non-nappers showed larger hippocampal head volumes compared to habitual nappers.

• This is consistent with previous findings that demonstrate differences in hippocampal subfield volumes between nappers and non-nappers (Riggins & Spencer, in press).

• Differences in hippocampal volumes may underlie previously reported differences in memory performance. Such effects may arise due to differences in sleep physiology.

• Future Directions: Future analyses will examine differences in memory and sleep spindle between nappers and non-nappers.

Take-Home Message

Children who have transitioned out of their afternoon nap have larger hippocampal head volumes compared to children who have not transitioned out of their afternoon nap.

References


