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INTRODUCTION

Sleep is a critical part of child brain development as it underpins processes such as memory consolidation, synaptic refinement and neural connectivity. Hippocampal subfield volumes have shown to vary in relation with napping habits in children ages 4-6 years (Riggins & Spencer, 2020).

This study aims to investigate the relationship between sleep habits and hippocampal subfield volumes in children ages 3-5 years.

Hippocampal subfields • Internal circuits that make up the hippocampal head body and tail.

Cornu Ammonis (CA 1-4) Dentate Gyrus (DG) Subiculum

METHODS

Participants:

• 29 children ages 3-5 (M=4.33 years, SD= .62, 17 Females) Actigraphy, Sleep Diary, and Children's Sleep

Habit Questionaire :

- Average Naps/Week=(Nap days/Total days)*7
- Nap status was calculated as follows
- 17 nappers \geq 5 naps/week (M=4.24, SD=0.61)
- 12 non-nappers \leq 2 naps/week(M=4.45, SD=0.64)

MRI Analysis

• The scans that we are looking at are ultra-high resolution structural T2-weighted scans of the medial temporal lobe that aims to capture the hippocampus.

Segmentation:

- A child template was created using 20 scans from a separate dataset of children 4-8 years
- The child template is applied to the current dataset and ran through ASHS (Automated Segmentation of Hippocampal Subfields) using algorithm built by manual tracings.

SLEEP HABITS AND HIPPOCAMPAL SUBFIELD VOLUMES IN PRESCHOOL AGED CHIDREN





Volumes:

- The ASHS output which identified subfields within the head and body of the hippocampus.
- Volumes will then be extracted using 3dcalc and 3dROIstats in AFNI (Analysis of Functional Neuroimages); Cox, 1996.

RESULTS

We used ANCOVA (Analysis of Covariance) to explore differences in bilateral hippocampal subfield volumes between nappers and non-nappers, controlling for child sex.

520 420

Nappers and non-nappers showed significant differences in CA1 and CA2-4/DG volumes in the left hippocampal head.

Author links open overlay panelTracy Riggins; AbstractThe hippocampus is a structure that age-related differences in specialization along the longitudinal axis of this structure (i.e.; Bauer, P. J.; Cayre, M.; Daugherty, A. M.; Frisoni, G. B.; Giedd, J. N.; Hu, S.; Huttenlocher, P. R.; Insausti, R.; Joie, R. L.; Lee, J. K.; Lenroot, R. K.; Malykhin, N. V.; Poppenk, J.; Wang, H.; Weiss, A. P.; Yushkevich, P. A.; Benes, F. M.; Brown, T. T.; DeMaster, D.; Ding, S. L.; Drummey, A. B.; Fischl, B. Protracted Hippocampal Development Is Associated with Age-Related Improvements in Memory during Early Childhood. https://www.sciencedirect.com/science/article/pii/S1053811918301940?casa_token=91xGlkg7DJEAAAAA%3Ak0HQtc-jDY3DDbltM7JoWx_82lx33LkYmk0fjL-ElVOt06SJW3DehRByLJK2CSHDZDGPcaSOqoE#sec2 (accessed 2023-09-24).

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Nappers and non-nappers showed no significant differences in hippocampal subfield volumes in the body.

CONCLUSION & FUTURE DIRECTIONS

This age group exhibits increased memory performance with larger hippocampal volumes (Riggins & Spencer, 2020). Larger hippocampal volumes could be an indicator of mature brain development in children ages 4-6.





Future research will examine if nappers and non-nappers show difference in episodic memory using behavior measures.