Hippocampal Volume and Memory in Youth

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In this study, our aim was to explore the relationship between hippocampal volume and memory in youth. While similar studies have been conducted with whole hippocampal volumes, this experiment makes use of new technology that has allowed for automated segmentation of the hippocampus into its individual subfields. In addition, establishing this relationship in typically developing youth is a necessary step towards exploring differences in patient populations. T1-weighted scans were obtained on a 3 Tesla magnetic resonance imaging (MRI) machine for youth 7-17 years old (n=37). The subjects were administered a verbal list-learning task and a spatial location memory task, both of which had immediate and delayed recall portions. Age did not correlate with total hippocampal (p=0.97) or subfield volumes (all p > 0.62) but did correlate with several measures of spatial memory performance (all p < 0.033). Males had significantly larger total hippocampal volume, subfield volumes, and intracranial volume (ICV) than females (all p > 0.025); but there was no significant effect of gender on memory task performance (all p > 0.36). In a hierarchical linear regression controlling for age, gender, and ICV, larger total hippocampal volume was associated with better delayed verbal retrieval (p = 0.01). In hierarchical linear regressions controlling for age, gender, and total hippocampal volume we found that larger CA2-3 subfield volumes were associated with better immediate spatial recall (p = 0.036) and larger right CA2-3 volumes were associated with better delayed spatial recall (p = 0.036). While conflicting results have suggested different relationships between hippocampal volume and memory in youth, our findings support a “bigger is better” hypothesis, where larger volumes are associated with increased memory performance. Our results introduce information gained from subfield segmentation to existing knowledge and provide a basis for examining a patient population.