Structural changes in brains of Vedic Sanskrit reciters

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India’s Vedic pandits train from early adolescence orally memorizing and reciting Sanskrit texts. Pandit practice may induce brain structure changes: long-term specialized training has been correlated with grey-matter (GM) plasticity in professional musicians,¹ rock climbers,² and taxi drivers.³ We averaged and skull-stripped 2xMPRAGE T1 structural scans from 21 pandits and 21 matched controls, and used both FSL’s voxel based morphometry⁴ to evaluate between-group localized GM volume differences, and FreeSurfer’s⁵,⁶ cortical parcellation routines to evaluate between-group cortical thickness differences. Manual editing of skullstripped brain masks significantly improved results. We also inserted cortical thickness values into a modularity analysis⁶ correlating cross-regional thickness measures in each group. Results indicate intense recitation is related to massive reorganization of multiple systems. Cortical GM structural changes (pandits > controls, permutation test FWE corrected ) were identified in lateral temporal regions, anterior cingulate and inferior temporal and fusiform gyri, and subcortical GM differences in right hippocampus and putamen, and cerebellar Vermis VI, Left Crus I and II. Controls had greater subcortical GM volumes in left hippocampus-amygdala, bilateral thalamus and bilateral caudate, and greater gyrification in bilateral inferior parietal-occipital lobes. Modular-structure analysis of cross-individual cortical thickness correlations indicated greater partitioning in pandits, suggesting different organization of functional networks.

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