

STRUCTURAL BRAIN DIFFERENCES BETWEEN MUSICIANS AND NON-MUSICIANS

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Background and Aims

Musicians learn complex motor and auditory skills at an early age and practice these specialized skills - such as translating visually presented musical symbols into motor commands with auditory monitoring and performing fast and independent movements of fingers and hands - extensively (often for many hours per day) from childhood through their entire careers. Whether or not these specialized skills lead to or rely on pre-existing structural brain differences compared to non-musicians is not known.

Method

Three groups of subjects underwent high-resolution magnetic resonance imaging and were compared with each other on a voxel-by-voxel basis. All musicians were keyboard players. We classified professional musicians (keyboard players) as those whose main profession it was to be a musician (performer or teacher). They had a mean daily practice time of more than 2 hours. They were compared with amateur musicians with a mean daily practice time of about 1 hour, and non-musicians that were matched with regard to gender, handedness, and overall IQ with the two musician groups.

Results

We found gray matter volume differences in several motor as well as auditory and visual-spatial brain regions on both sides of the brain comparing professional musicians with matched amateur musicians and non-musicians.

Conclusions

These multi-regional differences might represent structural adaptations in response to long-term skill learning and repetitive rehearsal of these skills. This explanation would be supported by finding a strong association between structural differences, musician status, and practice intensity, as well as by a wealth of supporting animal data showing structural changes in response to long-term motor skill acquisition and practice.