

## Exercise-induced changes in basal ganglia volume and cognition in older adults.

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### Abstract

Physical activity has been demonstrated to diminish age-related brain volume shrinkage in several brain regions accompanied by a reduction of age-related decline in cognitive functions. Most studies investigated the impact of cardiovascular fitness or training. Other types of fitness or training are less well investigated. In addition, little is known about exercise effects on volume of the basal ganglia, which, however, are involved in motor activities and cognitive functioning. In the current study (1) we examined the relationships of individual cardiovascular and motor fitness levels with the volume of the basal ganglia (namely caudate, putamen, and globus pallidus) and selected cognitive functions (executive control, perceptual speed). (2) We investigated the effect of 12-month training interventions (cardiovascular and coordination training, control group stretching and relaxation) on the volume of the respective basal ganglia nuclei. Results revealed that motor fitness but not cardiovascular fitness was positively related with the volume of the putamen and the globus pallidus. Additionally, a moderating effect of the volume of the basal ganglia (as a whole, but also separately for putamen and globus pallidus) on the relationship between motor fitness and executive function was revealed. Coordination training increased caudate and globus pallidus volume. We provide evidence that coordinative exercise seems to be a favorable leisure activity for older adults that has the potential to improve volume of the basal ganglia.

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