

Research Project

MANIEX: Long-term effects of martial arts on neurophysiological indices of executive function in adolescents

Project funded by own resources

Project title MANIEX: Long-term effects of martial arts on neurophysiological indices of executive function in adolescents

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Project start 01.09.2018

Probable end 01.09.2019

Status Completed

Background: Executive functions (i.e. top-down mental processes for achieving internal goals) have become a prominent target of interventions due to their relationship with learning abilities, academic performance and mental health. Whereas previous studies investigating long-term effects of exercise on executive function have mainly focused on closed-skill sports, potential benefits of open-skill sports have largely been ignored. Within this sports category, martial arts are suggested to have a high potential for the elicitation of such cognitive enhancements.

Purpose: The study aims to examine the effects of a 12-week martial arts program on executive function in adolescents. Possible benefits are investigated on a neurocognitive level to gain insights on the subtle processes that may contribute to exercise-induced enhancements within this cognitive domain. Additionally, the association between changes in neurophysiological indices of executive function and gains in motor skills as well as aerobic fitness are examined.

Method: The study utilizes a randomized-controlled design, in which 56 adolescents are allocated to a martial arts group or a (wait-list) control group. Whereas the control group is encouraged to maintain their usual sports participation, a 12-week martial arts program with 2 sessions per week is prescribed to the other group. Prior to and after the intervention period, computer-based versions of the Go/NoGo task and the Change Detection task are administered. Simultaneously, event-related brain potentials (ERP) related to inhibitory processing (N200, P300) and working memory capacity (CDA) are recorded via electroencephalography. Participants' aerobic fitness and motor skills are also measured at both measurement time points. Moreover, intelligence, socioeconomic status and psychopathology are assessed as potential confounders. Multivariate and univariate analysis of variance are employed to examine the effects of martial arts on behavioral performance and neurocognition.

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