



Universität
Basel

Research Project

The impact of physical activity on stress reactivity and stress-induced changes in executive control and cerebral oxygenation in school-aged children

Third-party funded project

Project title The impact of physical activity on stress reactivity and stress-induced changes in executive control and cerebral oxygenation in school-aged children

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Deficits in executive function (i.e. top-down mental processes for achieving internal goals) are considered to be at the core of academic underperformance and emotional as well as social problems in Attention-Deficit/Hyperactivity Disorder (ADHD). Although pharmacological treatment with methylphenidate (MPH) reduces these deficits, it does not normalize the recipients in the long-term. Evidence, albeit limited, suggests that exercise may enhance the cognitive benefits of pharmacological treatment. Due to a unique combination of physical exertion, cognitive demands and promotion of discipline, martial arts particularly have the potential to be an effective additional component of ADHD therapy. However, possible benefits of martial arts have not yet been examined in children with ADHD. Purpose: The study aims to examine the effects of a 12-week judo training program on executive function and behavioral symptoms in children with ADHD. 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 children with ADHD are allocated to a martial arts group or a (wait-list) control group in a 1:1 ratio. Whereas the control group is encouraged to maintain their usual sports participation, a 12-week martial arts program with two 60-min sessions per week is prescribed to the martial arts 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 (P300 elicited from the Go/NoGo task) and working memory capacity (CDA elicited from the Change Detection task) are recorded via electroencephalography. Participants' behavioral symptoms, aerobic fitness and motor skills are also measured at both measurement time points. Moreover, intelligence, pubertal status, socioeconomic status and general physical activity levels are assessed as potential confounders. Practical relevance: The findings are expected to reveal novel insights into the effects of judo on executive function in children with ADHD undergoing treatment with methylphenidate. In the long-term, these insights may be used to further develop and evaluate this specific exercise type as additional treatment component.

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