Components of motor deficiencies in ADHD and possible interventions.

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Abstract

There is a growing body of evidence pointing at several types of motor abnormalities found in ADHD. In this article we review findings stemming from different paradigms, and suggest an interweaving approach to the different stages involved in the motor regulation process. We start by reviewing various aspects of motor abnormalities found in ADHD and related brain mechanisms. Then, we classify reported motor impairments associated with ADHD, into four classes of motor stages: Attention to the task, motion preparation, motion execution and motion monitoring. Motor abnormalities and corresponding neural activations are analyzed in the context of each of the four identified motor patterns, along with the interactions among them and with other systems. Given the specifications and models of the role of the four motor impairments in ADHD, we ask what treatments correspond to the identified motor impairments. We analyze therapeutic interventions targeting motor difficulties most commonly experienced among individuals with ADHD; first, Neurofeedback training and EMG-biofeedback. As some of the identified components of attention, planning and monitoring have been shown to be linked to abnormal oscillation patterns in the brain, we examine neurofeedback interventions aimed to address these types of oscillations: Theta/beta frequency training and SCP neurofeedback targeted at elevating the CNV component. Additionally we discuss EMG-Biofeedback interventions targeted at feedback on motor activity. Further we review physical activity and motor interventions aimed at improving motor difficulties, associated with ADHD. These kinds of interventions are shown to be helpful not only in aspects of physical ability, but also in enhancing cognition and executive functioning.