Procedural Memory Consolidation in Attention-Deficit/Hyperactivity Disorder Is Promoted by Scheduling of Practice to Evening Hours

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In young adults without attention-deficit/hyperactivity disorder (ADHD) training on a novel movement sequence results not only in large within-session (online) gains in task performance but also in additional (delayed, off-line) gains in the performance, expressed after an interval of sleep. In contrast, young people with ADHD, given an identical practice, were shown to improve online but expressed much smaller delayed gains overnight. As delayed gains in performance are taken to reflect procedural (“how to”) memory consolidation processes, this may explain skill learning deficits in persons with ADHD. However, motor training is usually provided in morning sessions, and, given that persons with ADHD are often evening types, chronobiological constraints may constitute a hidden factor. Here, we tested the hypothesis that evening training, compared to morning training, would result in larger overnight consolidation gains following practice on a novel motor task in young women with ADHD. Participants with (N = 25) and without (N = 24) ADHD were given training on a finger opposition sequence tapping task, either in the morning or at evening. Performance was assessed before and immediately after training, overnight, and at 2 weeks post-training. Individuals with ADHD reported a general preference for evening hours. Evening training was equally effective in participants with and without ADHD, both groups showing robust consolidation gains in task performance overnight. However, the ability to express delayed gains overnight was significantly reduced in participants with ADHD if trained in the morning. Typical peers were as effective in expressing overnight consolidation phase gains irrespective of the time-of-day wherein the training session was afforded. Nevertheless, even after morning training, participants with ADHD fully retained the gains acquired within the first 24 h over an interval of about 2 weeks. Our results suggest that procedural memory consolidation processes are extant and effective in ADHD, but require that specific biobehavioral conditions be met. The affordance of training in the evening hours can relax some of the constraints on these processes in ADHD. The current results are in line with the notion that the control of what is to be retained in procedural memory is atypical or more stringent in ADHD.