Procedural learning in Tourette syndrome, ADHD, and comorbid Tourette-ADHD: Evidence from a probabilistic sequence learning task

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Abstract

Procedural memory, which is rooted in the basal ganglia, plays an important role in the implicit learning of motor and cognitive skills. Few studies have examined procedural learning in either Tourette syndrome (TS) or Attention Deficit Hyperactivity Disorder (ADHD), despite basal ganglia abnormalities in both of these neurodevelopmental disorders. We aimed to assess procedural learning in children with TS (n = 13), ADHD (n = 22), and comorbid TS-ADHD (n = 20), as well as in typically developing children (n = 21). Procedural learning was measured with a well-studied implicit probabilistic sequence learning task, the alternating serial reaction time task. All four groups showed evidence of sequence learning, and moreover did not differ from each other in sequence learning. This result, from the first study to examine procedural memory across TS, ADHD, and comorbid TS-ADHD, is consistent with previous findings of intact procedural learning of sequences in both TS and ADHD. In contrast, some studies have found impaired procedural learning of non-sequential probabilistic categories in TS. This suggests that sequence learning may be spared in TS and ADHD, while at least some other forms of learning in procedural memory are impaired, at least in TS. Our findings indicate that disorders associated with basal ganglia abnormalities do not necessarily show procedural learning deficits, and provide a possible path for more effective diagnostic tools, and educational and training programs.