

Memory consolidation in children with ADHD is improved by the exploration of an unrelated novel virtual environment

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Recent experiments have shown that learning can be shaped by unrelated salient events like reward, stress or novelty, if those events occur during a vulnerable phase of consolidation. According to the Behavioral Tagging (BT) theory, this memory modulation is grounded in an interaction between a synaptic tag set by the learning event and the synthesis of plasticity related proteins (PRPs) triggered by the salient event. In the case of novelty, this modulation is supposedly mediated an enhanced release of dopamine in the hippocampus triggered by the novel experience. This effect could potentially be used to compensate the learning difficulties often observed in children with attention deficit hyperactivity disorder (ADHD), who often exhibit a hypofunction of the dopaminergic system.

We therefore asked 30 children with ADHD and 30 healthy control children (age 9-15) to explore either a previously familiarized or a totally novel virtual environment 45 minutes after they learned a list of 20 words. When measured 24 hours later, long term memory of ADHD patients who explored a novel virtual environment showed improved consolidation, up to the level of the healthy control children. Contrary to previous studies, the beneficial effect of novelty was only present for patients and not for healthy control children, indicating an interaction between BT mechanisms and ADHD-specific neurobiology.