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Kids with ADHD have trouble forming emotional memories, study finds

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A study's findings revolve around the brain's consolidation of emotional memories into long-term memory, which happens during sleep.
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In the search for answers about the vexing hold that attention-deficit hyperactivity disorder has on modern childhood, the role of sleep crops up repeatedly. There is strong evidence that children with ADHD experience sleep problems. Some experts also suggest that sleep disorders are actually misdiagnosed as ADHD.

But new German research suggests another link between sleep and ADHD, this time pointing to a key brain function that kids with ADHD appear to be missing out on even during a good night's sleep. They have more trouble than their peers in forming and keeping emotional memories – a deficit that could exacerbate emotional and behavioural problems during daytime hours.

Attention-deficit hyperactivity disorder is associated with symptoms including inattention, hyperactivity and impulsiveness. According to the Canadian ADHD Resource Alliance, the disorder affects 5 to 12 per cent of school-aged children. They also report that about 80 per cent of children with ADHD will continue to meet the diagnostic criteria in adolescence and more than 60 per cent will maintain some core symptoms into adulthood.

The role of emotional memories could be a powerful one. Patients with ADHD are considered more likely to display risky behaviour, for instance, and "are less affected in their behaviour by negative consequences," lead investigator Alexander Prehn-Kristensen writes. He and his colleagues wondered if brain activity during sleep might be a factor in this seeming inability to process high-impact experiences.

Prehn-Kristensen says others have looked at the relationship between "sleep quality, tiredness and cognitive performance" on daytime behaviour.

"Going somewhat further, we tried to show that not only the restorative function of sleep but also the memory-supporting function of sleep is altered in ADHD," Prehn-Kristensen, of the Center for Integrative Psychiatry at Christian-Albrechts University in Kiel, said in an e-mail interview.

The findings revolve around the brain's consolidation of emotional memories into long-term memory, one of the key processes that happen during sleep.

Previous studies have shown a benefit from sleep on emotional memory; Prehn-Kristensen says we tend to remember emotionally charged experiences and stimuli better than non-emotional ones.

In the new study, published on Wednesday in the journal PLOS One, 16 children, aged 9 to 12, who met the clinical criteria for ADHD were compared with 16 children and 20 adults aged 20 to 28, all determined not to have ADHD.

Researchers measured participants' brain activity during sleep and administered memory tests to all participants before and after a night of sleep. The memory tests involved a series of images expected to induce varying emotional responses.

Compared with their peers who forgot almost nothing, children with ADHD had trouble with the memory tests, a finding reinforced by electroencephalogram (EEG) measurements of the brain activity associated with this kind of memory performance.

Prehn-Kristensen says further research is required to understand whether brain functions – or a lack thereof – during sleep does exacerbate daytime emotional problems for kids with ADHD.

He also points out that while their measurements showed no sleep problems in the children with ADHD, the parents of the children reported mild sleep problems such as "higher bedtime resistance" or "difficulties with morning awakenings," which could potentially be related.

While the findings point to a difference in the brains of children with ADHD compared with healthy children, Prehn-Kristensen is careful to mention that ADHD is considered a delay in brain maturation "and some core symptoms can vanish over the time."

Interestingly, he and his colleagues found another age-related development: While adults in the study fared better than the children with ADHD, they were also outperformed by the healthy children.