

ADHD's biggest mystery may not be attention at all but a hidden brain fuel problem driving everything

April 28 2026, by Christine Xuan Müller



Credit: Image generated by the editorial team using AI for illustrative purposes.

The number of people in Europe diagnosed with attention deficit hyperactivity disorder (ADHD) has continued to rise steadily, not only

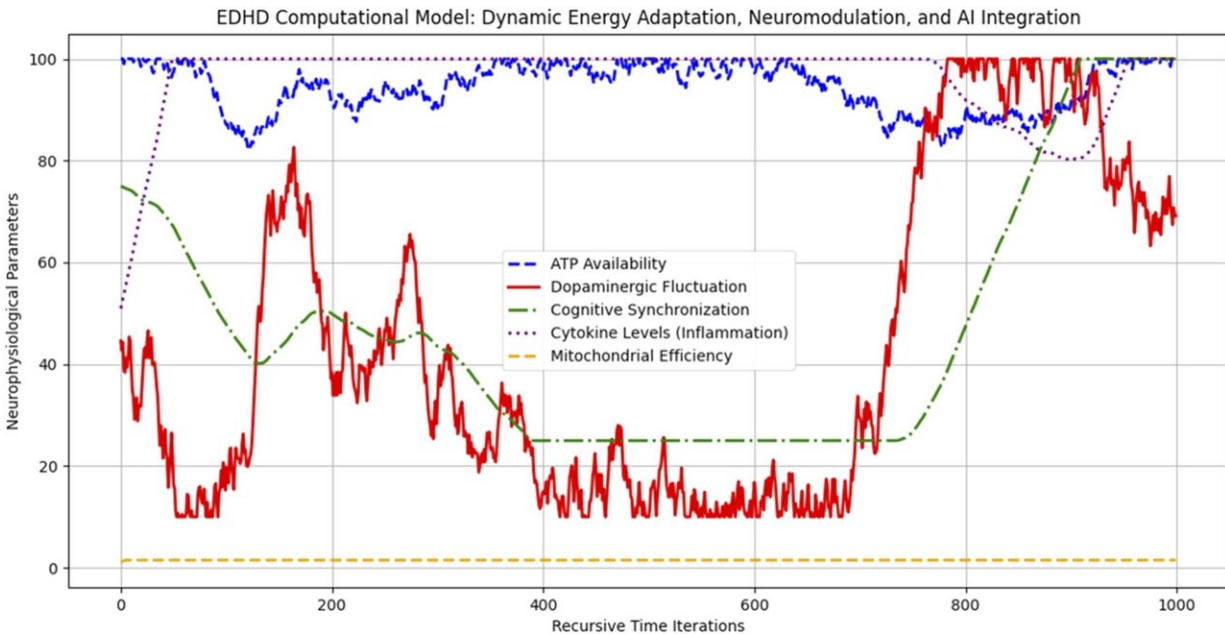
among children, but increasingly among adults and women. Despite this, it is still not clear why individuals with the symptoms of ADHD experience sudden lapses in cognitive performance. A recent study proposes a model that provides new neurobiological explanations. ADHD may be less about a deficit of attention and more about a metabolic contingency that provides sufficient neural energy.

Neurobiologist Mohammad Dawood Rahimi of Freie Universität Berlin [presented](#) his model of energy deficit hyperactivity disorder (EDHD) in the journal *Neuroscience & Biobehavioral Reviews*. His approach explores how the disorder stems from an unstable energy supply for the brain. Through the EDHD framework, Rahimi aims to destigmatize the disorder by shifting the focus from behavioral willpower to biological capacity.

Shifting perspectives: From attention deficit to energy regulation

The [EDHD model](#) brings fluctuations in neuro-energetic supply to the forefront. According to the model, people with ADHD do not fundamentally lack the machinery for attention; rather, the energy required to fuel high-demand cognitive networks is unstable. This dynamic explains why those with ADHD can perform complex tasks with intense hyperfocus while finding mundane tasks cognitively exhausting.

"The model sheds new light on a disorder studied for decades," says Rahimi from the Cognitive Neuroscience Division at Freie Universität Berlin. By viewing [executive functions](#) as energetically expensive resources, the model explains why performance fluctuates so drastically based on the brain's current metabolic state.



Computational simulation of EDHD dynamics under load-dependent energetic constraints. Credit: *Neuroscience & Biobehavioral Reviews* (2026). DOI: 10.1016/j.neubiorev.2026.106616

Why does performance fluctuate?

A hallmark of ADHD is the extreme variability in performance. Many people with ADHD report entering states of highly concentrated activity for hours when engaged in stimulating tasks, yet struggle with monotone instructions, even simple ones. The EDHD model explains this as a result of energy regulation: Stimulating tasks momentarily optimize the brain's energy allocation. Conversely, mundane tasks deplete limited reserves without providing the arousal feedback needed to maintain metabolic supply. Performance capacity is therefore contingent on the energetic context of the task.

Rahimi argues that [mitochondrial function](#) and related metabolism play central roles. High-demand areas responsible for planning and self-regulation do not receive the sustained energy required to function. Rahimi notes, "EDHD is a theoretical framework, not a clinical diagnostic tool. The objective is to synthesize findings from neuroscience, mitochondrial biology, and computer modeling into a systemic framework that explains these neuro-energetic phenomena."

Rest and bioenergetics as key factors

Maintaining attention depends heavily on [metabolic recovery](#). Sleep, strategic breaks, and biological cycles determine how much cognitive energy is available. Without these regeneration phases, even simple tasks become overwhelming. This reframes restlessness and impulsiveness as compensatory strategies to stimulate arousal and stabilize energy levels.

In this sense, ADHD shifts away from questions of discipline and toward the management of biological resources. The study highlights the importance of sleep, nutrition, and metabolic health in future holistic treatment strategies.

More information: Mohammad Dawood Rahimi, Energy deficit hyperactivity disorder (EDHD): A neurobiological energy dysregulation model for ADHD, *Neuroscience & Biobehavioral Reviews* (2026). [DOI: 10.1016/j.neubiorev.2026.106616](https://doi.org/10.1016/j.neubiorev.2026.106616)

Provided by Free University of Berlin

Citation: ADHD's biggest mystery may not be attention at all but a hidden brain fuel problem driving everything (2026, April 28) retrieved 28 April 2026 from <https://sciencex.com/news/2026-04-adhd-biggest-mystery-attention-hidden.html>

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