

ADHD FOUNDATIONS · 1.3

ADHD in the Brain: Dopamine, Noradrenaline and Executive Function

How ADHD shows up in the brain, in plain English: the dopamine and noradrenaline signalling that underpins attention, planning and impulse control, and what this means for medication.

FOR

Adults and parents

AUDIENCE AGE

All ages

REVIEWED

17 May 2026

PART OF

The NeuroFX resource library

IN SUMMARY

ADHD in the Brain: Dopamine, Noradrenaline and Executive Function

What ADHD looks like in the brain

- **A difference in regulation.** The brain's self-regulation systems work differently in ADHD. The most consistent research finding is altered dopamine and noradrenaline signalling in the prefrontal cortex and the networks connected to it.
- **Effort is part of the picture, but not the cause.** These systems do not work less hard. They work less reliably, particularly when a task lacks novelty, urgency, challenge or personal interest.
- **There is no brain scan that diagnoses ADHD.** Imaging studies show population-level differences, but ADHD is diagnosed clinically through a structured interview, developmental history and standardised assessment.

What this means day to day

- **Attention follows interest.** Tasks that feel novel, urgent or personally meaningful can absorb hours of focus. Tasks that feel dull but necessary can be almost impossible to start, even when someone genuinely wants to do them.
- **Working memory often slips.** Why you walked into the room, the third step of an instruction, the name you just heard. Information that should hold often does not.
- **Emotions can hit faster and harder.** Emotional regulation is part of executive function. Frustration and overwhelm can feel disproportionate, and that is part of the clinical picture, not a character flaw.
- **Mind-wandering intrudes on focus.** The brain's default mode network is harder to switch off during focused work, which produces drift and the familiar feeling of losing track of time on something dull.
- **Willpower alone tends to fail.** Strategies that rely on effort alone tend to fail after a few weeks. Strategies that build in structure, interest, deadlines or external accountability tend to hold up over time.

How we can help

- **Medication helps many people who respond.** Stimulants increase dopamine and noradrenaline availability in the prefrontal cortex. Most people who respond describe boring, necessary tasks becoming more possible, rather than feeling stimulated or buzzing.
- **Treatment covers more than medication.** A good plan covers understanding the condition, environmental adjustments, support for any co-occurring anxiety or low mood, and medication where appropriate.
- **NeuroFX assessment and prescribing.** Private ADHD assessment and prescribing for adults and for children aged 6 and upwards, with shared-care handover to NHS GPs where the local ICB accepts it.

WHEN TO SPEAK TO A PROFESSIONAL

If difficulties with attention, planning and impulse control are persistent, cross more than one area of life and started in childhood, it is worth a clinical conversation. Speak to your GP, or come direct to NeuroFX for a private route. Seek same-day support via 111 (or 999 in an emergency) for any mental health crisis.

SOURCES

Faraone et al. 2021 (Neurosci Biobehav Rev); Volkow et al. 2009 (JAMA); Arnsten 2006; Hoogman et al. 2017 (Lancet Psychiatry); NICE NG87

NEXT STEPS

Speak to NeuroFX

Private ADHD and autism assessment for adults and children aged 6 and upwards.
CQC-registered. Bedford Consulting Rooms, 4 Goldington Road, Bedford MK40 3NF.

neurofx.co.uk · info@neurofx.co.uk · 0333 533 3303