

WELLNESS TEAM CULTURE

Evidence-based wellness, leadership, and team dynamics

RESEARCH BRIEF · THE EVIDENCE, PLAINLY

Your Brain Fills Up

ISSUE 87 · JULY 28, 2026 · COGNITIVE FATIGUE

Mental fatigue is not only a feeling. After hours of demanding cognitive work, the chemistry of the brain region that governs self-control measurably changes, and those changes push decisions toward the easy, immediate option. The effect is biological, it builds across the day, and it is not a measure of your character.

WHAT WAS ACTUALLY STUDIED

01 **Wiehler, Branzoli, Adanyeguh, Mochel & Pessiglione (2022), Current Biology**

TIER 2 · IMAGING STUDY

Two groups spent a full workday on computer tasks, one demanding and one easier, while magnetic resonance spectroscopy measured metabolites in the lateral prefrontal cortex across the day. The study tracked whether hard cognitive work changed brain chemistry, and whether that change lined up with a shift toward immediate, low-effort choices.

02 **Steward, Looi & Chib (2025), Journal of Neuroscience**

TIER 2 · IMAGING STUDY

A functional MRI experiment with 28 healthy adults performing a working-memory task designed to induce cognitive fatigue, then choosing between low-effort and higher-effort, higher-reward options. The measure was activity and connectivity in the dorsolateral prefrontal cortex and the right insula as fatigue built.

03 **Pessiglione, Blain, Wiehler & Naik (2025), Trends in Cognitive Sciences**

TIER 1 · REVIEW

A review of the experimental evidence on cognitive fatigue, drawing self-report, behavior, economic choice, and brain data into a single model (called MetaMotiF) of why fatigue emerges with time on task and how it steers behavior.

WHAT THEY FOUND

Hard thinking changes the chemistry of the control room. When one group pushed through a full day of demanding tasks, glutamate steadily accumulated in their lateral prefrontal cortex, the region that governs cognitive control and restraint. The group doing easier versions showed no such buildup (Wiehler et al.). Glutamate is a normal, essential signaling chemical that drains and recycles when work is spaced out. Pushed hard for hours, it collects at the synapse, where high levels interfere with the very circuit needed to keep making effortful choices.

The behavior followed the chemistry. As the demanding day wore on, those participants shifted toward immediate, low-effort rewards over larger delayed ones (Wiehler et al.). A 2025 functional MRI study found the same tilt and mapped where it happens. As fatigue built during a working-memory task, the dorsolateral prefrontal cortex and the right insula ramped up together, and that rising activity tracked people choosing the lower-effort option (Steward et al.).

2X

more than double the baseline activity in the brain's control and fatigue hubs, the dorsolateral prefrontal cortex and the right insula, when cognitive fatigue set in during a working-memory task (Steward et al.).

A 2025 review pulled the threads together. Across self-report, behavior, economic choice, and brain data, the pattern points one way. Fatigue arises from metabolic changes in cognitive-control regions after heavy use, and those changes make effortful choices harder to sustain, tilting behavior toward whatever is easy and immediate (Pessiglione et al.). Mental fatigue, in other words, is a biological event with a behavioral signature, not a lapse in willpower.

WHERE THE EVIDENCE STANDS

Three sources, one throughline.

One study catches the chemistry: a byproduct of hard mental work builds up in the prefrontal control region across the day (Wiehler et al.). One catches the circuit: as fatigue rises, the control and fatigue hubs of the brain surge together and behavior tilts toward the low-effort option (Steward et al.). And a review ties them into a single account, in which fatigue is a metabolic change in the regions that run self-control, and that change quietly makes restraint harder (Pessiglione et al.). Read together, they reframe the evening slide. It is not a shortage of willpower. It is a control system that has been running hard and now needs to clear.

That is the shift. The move is not to push harder into the same conditions that produced the fatigue. It is to design the day around it. Do the highest-stakes thinking before the buildup, keep hard decisions out of the depleted hours, and give the system real breaks so it can recover.

WHAT THIS DOES NOT PROVE

Both experiments are small and controlled. The chemistry study measured a modest number of participants across two groups over a single day, and magnetic resonance spectroscopy is an indirect window on brain chemistry (Wiehler et al.). The imaging study followed 28 healthy young adults doing one type of laboratory task, and functional MRI measures blood flow, not neurons directly (Steward et al.). Both teams note the findings need testing against more people and more real-world tasks before the size of the effect can be assumed to generalize.

The account is also still developing. The review proposes a model that fits the current evidence well, but it is a synthesis of a young literature, not a settled law (Pessiglione et al.). None of this is diagnostic. This is education, not medical advice. Persistent, heavy fatigue that does not lift with rest can have medical or mental-health causes, and a clinician is the right next step if that is what you are facing.

WHAT IT MEANS FOR YOU

If your discipline reliably gives out by evening, the frame may be the problem, not your character. Treating late-day slips as willpower failures leads to the one move that backfires, which is pushing harder into the exact conditions that built the fatigue. The alternative is design. Put your highest-stakes thinking and hardest decisions in the first third of the day, before the buildup sets in. Keep money, big purchases, and difficult conversations out of the depleted evening hours, or settle them in advance. Space demanding work with real breaks, not a switch from a spreadsheet to your phone, so the clearing

process can run. Hold less in working memory by writing things down. And when the late-day pull toward the easy option arrives, read it as a signal that the system is full, not a verdict on who you are. The newsletter lays out the five moves. The research above is why they work.

GO TO THE SOURCE

TIER 2 · IMAGING Wiehler, A., Branzoli, F., Adanyeguh, I., Mochel, F., & Pessiglione, M. (2022). Current Biology, 32(16), 3564-3575.e5. [www.cell.com/current-biology/fulltext/S0960-9822\(22\)01111-3](http://www.cell.com/current-biology/fulltext/S0960-9822(22)01111-3)

TIER 2 · IMAGING Steward, G., Looi, V., & Chib, V. S. (2025). Journal of Neuroscience, JN-RM-1612-24. www.jneurosci.org/content/early/2025/05/08/JNEUROSCI.1612-24.2025

TIER 1 · REVIEW Pessiglione, M., Blain, B., Wiehler, A., & Naik, S. (2025). Trends in Cognitive Sciences, 29(8), 730-749. doi.org/10.1016/j.tics.2025.02.005

Tier 1 means peer-reviewed primary research or meta-analysis, the strongest evidence. Tier 2 means an expert framework or smaller study that traces to peer-reviewed work. We grade every source so you can see the weight behind each claim.

Pegasus Realm publishes Wellness Team Culture and the practice resources behind it.

Education, not medical advice.

