

BUSINESS INSIDER

Betsy DeVos backs a technique claiming to cure ADHD without medication — but the science is questionable



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I was sitting on a black leather chair watching two polar bears have sex on a tv screen when it happened for the first time: I made the image in front of me shrink — with my mind.

I'm not Matilda, nor do I possess any superpowers (short of the ability to polish off an entire quart of Breyer's Cookies N' Cream in one sitting). But in that moment, I was able to control the screen through a process called neurofeedback.

The set-up essentially involves a basic EEG machine, which is hooked up to a video screen or set of speakers that respond to your brain's electrical activity (yep, your brain is electric). That real-time feedback can, in theory, teach you how to control your brain waves.

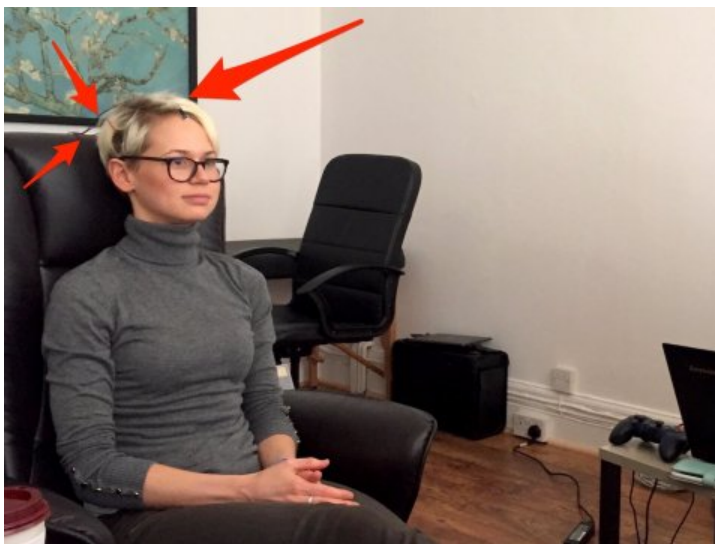
During my visit to a neurofeedback facility run by a company called BrainTrainUK, psychologist Zuzana Radacovska explained the technology by pretending she'd just caught a glimpse of herself in a mirror and noticed she was hunching over.

"Imagine yourself standing like this and you don't realize it because you're just tired. Then suddenly you see yourself in the mirror, oops, you know, and you straighten up. This is similar. But in a good way, it's happening in the deeper structures of the brain, so it doesn't require so much conscious effort."

As the company's founder, Stuart Black, put it: "We're giving the brain little hints and rewards in terms of which way we'd like it to go."

Advocates say this training can make a healthy person smarter, an ill person less depressed, or even treat ADHD — all without medication or side-effects. President Trump's education secretary Betsy DeVos has invested **roughly \$15 million** in the technology.

As part of my demo, tiny sensors were attached to my scalp, and I watched a 30-minute clip from David Attenborough's "Frozen Planet" series — the one where lonely polar bears find each other in the middle of a desolate Antarctic winter and, you know. As Attenborough began to describe the bears' lucky encounter, I let out a slight cackle. Immediately, the screen in front of me shrank, then faded into a sea of grayish pixels.



Erin during a neurofeedback demo at London's BrainTrainUK.

Erin Brodwin / Business Insider

"Oops," I said.

Our electric brains

To many observers in 1920s Germany, Hans Berger was the picture of boring. When he wasn't repeating the same lectures he gave every year at the university in Jena where he taught psychiatry, he was quiet, tense, and brooding. One student [wrote that Berger's](#) "days resembled one another like two drops of water."

So it came as a surprise when, several years later, Berger invented [the world's first electroencephalogram](#) (EEG), a piece of technology that revolutionized the fields of neuroscience and psychology by measuring the activity of the brain. What Berger didn't know — and what no scientist could prove for the next four decades — was that people could learn to control this activity, and even change it.

Today, thanks to scientists' use of EEGs to diagnose and monitor a number of brain conditions, we know that most of our brain's electrical activity [falls somewhere within a range of roughly 1 to 20 Hertz](#) (Hz). Neuroscientists [divide this activity into four ranges, or bands](#). Each level corresponds to a specific type of alertness — at the lowest, called delta, you're literally asleep; at the highest, called beta, you're focused and attentive. In the middle are alpha and theta.

In a 1966 presentation at Stanford University, psychologist Joe Kamiya said he'd discovered how to [coax people into keeping their brains in a certain state](#). Kamiya focused on the alpha state of 8-12 Hz, since it had been linked with the heightened relaxation and focus, which typically accompany creativity and problem-solving. He claimed that he could use positive reinforcement to "train" his participants to raise or lower the frequency of their brain waves so as to [stay in the alpha range](#).

Not everyone agreed with Kamiya's findings ([some researchers disputed](#) the fact that he'd "trained" people to change their brain waves), but the presentation unleashed an avalanche of research into what he called neurofeedback. That work continues today, and while the science is nowhere near settled, advocates say there are reasons to be hopeful.

One of those advocates is Betsy DeVos.



Hans Berger.

[Wikimedia Commons](#)



Donald Trump and education secretary Betsy DeVos.

AP Photo/Carolyn Kaster, File

DeVos maintains a [\\$5 to \\$25 million stake](#) in a neurofeedback [company called Neurocore](#), according to documents filed with the Office of Government Ethics and reported previously by the New York Times. That makes DeVos and her husband, Richard DeVos Jr., the company's chief investors.

Neurocore estimates that its nine centers in Michigan and Florida have treated some 100,000 clients, many of whom have ADHD, autism, or other serious learning disorders. The founder of Neurocore, Dr. Tim Royer, once served as the Chief Pediatric Psychologist at the Helen DeVos Children's Hospital, where the DeVos family still has a [financial stake](#). Richard DeVos Sr., who [owns the NBA's Orlando Magic](#), is one of Neurocore's most prominent clients.

Betsy DeVos served on Neurocore's board until January 2017, when her investment [raised questions among some senators](#) about potential conflicts of interest.

The promise of brain training for people ‘at wits end’

Of the approximately [6.4 million American children](#) with attention deficit hyperactive disorder (ADHD), some [85% take stimulant drugs like Adderall](#). (Another [8 million American adults](#) have the disorder, but estimates of their rates of drug use are less clear).

Studies suggest that treating ADHD with stimulant drugs improves symptoms in about 70% of adults and 70% to 80% of children, but there is a risk of [side effects](#) that range from minor to debilitating. These include headaches, insomnia, nervousness, weight loss, and in some cases even heart problems. Some people who have been treating their ADHD with stimulants for years say even more serious issues can arise, from anxiety and panic to social isolation. Often, it can feel as though they're managing two different personalities — one on the medication and

one off of it. That's not mention the other 20% to 30% of people for whom medication either isn't an option or doesn't help.



Unsplash / Joshua Earle

The goal of neurofeedback training in people with ADHD is to pinpoint where the brain was misbehaving and re-balance its activity patterns, says Michelle McIntyre, a former Neurocore employee. Some [new and very preliminary](#) studies using fMRI to measure brain activity in people with ADHD who have done neurofeedback are just beginning to suggest that this is actually what is going on.

"The people who come [to Neurocore] are already at their wits end and struggling because nothing's working," says McIntyre, who worked at Neurocore for four years as an intern, a technician, and a sales representative. During her time as a technician, McIntyre saw many patients — about half of them children, half adults — with attention issues. Many had previously been diagnosed with ADHD by a physician and were having a rough time finding any treatment that helped alleviate their symptoms.

"Ultimately what we're trying to do is relieve the symptoms that brought the physician to that diagnosis," she says. "Ultimately what we're trying to do is balance the brain."

[David Rabiner](#), a Duke University professor of neuroscience who practices neurofeedback, maintains that the scientific evidence leans more strongly in favor of conventional, medication-based treatments for people with ADHD than it does for neurofeedback. While there has been an [outpouring of recent research](#) on neurofeedback in people with ADHD, the largest and strongest studies remain undecided on whether or not it works. And the studies that *do* say it works have mixed conclusions about how well.

Two large and promising recent meta-analyses (reviews of studies) examined neurofeedback and ADHD in children. While both concluded that the treatment helped reduce children's ADHD symptoms, one said it was ["probably efficacious"](#) while the other said it was ["efficacious and specific."](#) In the first case, that phrasing corresponds to a level three out of five (3/5) on a scale created to evaluate biofeedback methods (zero is the weakest and five is the strongest). In the second case, the researchers gave it a five out of five (5/5).

A few years after those studies were published, another equally large review came to the [opposite conclusion, finding that](#) the "evidence ... currently fails to support neurofeedback as an effective treatment for ADHD."

'I saw and lived a miracle'

Despite mixed scientific research, some people see neurofeedback as nothing short of a godsend.

Mike Moore is one of those people. His youngest son was diagnosed with ADD at 13. He barely graduated high school and ranked in the bottom 5% of his class. A friend once told Moore that his son would never be successful.

Shortly after his son's 18th birthday, Moore took him to a neurofeedback practitioner in San Marcos, Texas, where he completed about 40 training sessions.

"My son learned to focus during those treatments," says Moore.

A few years later, Moore's son graduated from college with a degree in business administration and went into the contracting business, where he worked on water treatment plants across the state. One day when he was hiring supervisors for a new project, a friendly face showed up for an interview: It was the friend who'd said he'd never be successful.

"I recently heard from one of the supervisors in that company that he had the opportunity to work with a bunch of geniuses in that company and my son was one of them," Moore says.

Another neurofeedback devotee is Sam Barclay, a freelance science journalist in California's Bay Area. After struggling with chronic, debilitating migraines for a year and a half and trying dozens of medications, Barclay's Stanford physician eventually referred to a neurofeedback practitioner.

At her first appointment, the practitioners ran a series of tests, including something called a [LoRETA](#) (short for low-resolution brain electromagnetic tomography), which involved placing a cap on Barclay's head to create a 3D map of her brain. According to Barclay, they found that her brain wasn't producing alpha waves — the ones Joe Kamiya claimed to produce in his patients in 1966. Instead, it was producing lots of beta waves — the short, rapid-fire waves linked with sharp focus but also distractibility.

"So what I had was a brain that was permanently fatigued. That explained why I was feeling completely trashed all the time, why I was having brain fog, and a lot of my migraine symptoms," Barclay says.

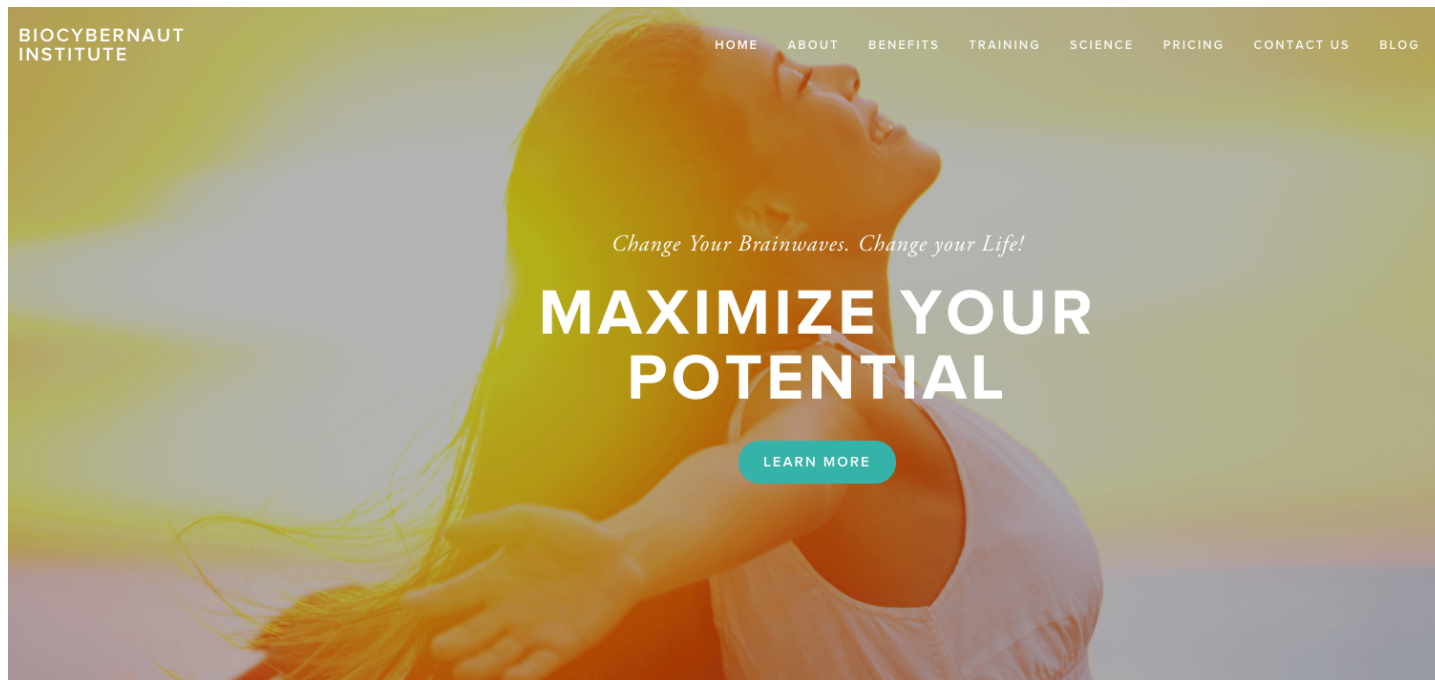
Since then, Barclay has been doing the training twice a week and says her migraines have gone from life-disrupting to manageable. But migraine headaches remain an applications of neurofeedback for which the science is far from conclusive, though [some limited research suggests](#) it might be helpful.

From Biocybernaut to Neurocore

Practitioners across the world say neurofeedback can help boost human performance in a wide variety of ways — from curing serious issues like ADHD to making people smarter, more focused, or even better athletes.

One neurofeedback provider, called Biocybernaut, offers [exclusive week-long, \\$15,000 retreats](#) in Sedona, Arizona; Bavaria, Germany; and Victoria, British Columbia. Participants sit in darkened rooms for 12 to 14 hours a day, doing rotations of auditory and visual feedback designed to sharpen the mind. According to Biocybernaut's founder James Hardt, a week of the program will "expand your awareness more than 20 years of Zen meditation."

"It sounds like we're selling snake oil," says Biocybernaut trainer Alice Miller. "It does this, does that, it even butters your toast!" But it's true. We see it every single time. [Participants] leave and they say 'Oh my gosh how come nobody knows about this?'"



Biocybernaut's website.

Biocybernaut

Neurocore founder Tim Royer told [Michigan-based newspaper Rapid Growth](#) that although the organization was founded to help people lower stress levels, sleep better, and learn to focus, clients have also included people looking to achieve what the company refers to as "peak performance."

"More traditionally you would see ... people who might have been diagnosed with ADHD, or some type of sleep problem, but it could also be what we would refer to as peak performance individuals, which are people who just want to do better with their brain," Royer [told the Grand Rapids Business Journal](#) in 2014. "They realize their brain is important to what they do ... whether it is for academics, sports, or work."

Royer went on to found Neurocore Pro in 2015, which is geared specifically towards improving athletic performance. The company contracts with the NBA's Orlando Magic and maintains an on-site location in Orlando "where players and staff have access to brain optimization services at all hours of the day," according to the [Grand Rapids Business Journal](#).

However, the scientific research on neurofeedback's applications for healthy people is scant. Many studies have been very small, included only white males, and were not double-blind, meaning either the therapists or patients knew they were receiving the treatment, potentially contaminating the results. In addition, several of the most robust studies have been written by scientists who may have conflicts of interest — the researchers who authored some studies on neurofeedback and ADHD, for example, [received money](#) from companies that make drugs to treat ADHD.



Tobias Harris worked with Neurocore Pro while he was with the Orlando Magic.

Sam Greenwood/Getty

In a 2009 review, [David Vernon](#), a professor of psychology at Canterbury Christ Church in the UK, [concluded that](#) "the notion that alpha neurofeedback can enhance the mood of healthy individuals has yet to be firmly established."

Neurofeedback training also doesn't require a certification, and neither the FDA (nor any similar body in the UK) regulates the method. Michelle McIntyre, the former Neurocore employee, does not have a medical degree, but was told she was ready to apply and interpret the method after a 3-month training. Today, social workers perform Neurocore's assessments, not technicians, which is similar to the model at BrainTrainUK. Both companies also employ a medical doctor, but Neurocore's is not typically involved in day-to-day treatments or interactions with clients.

'The side effect of this is you're tired'

New studies on neurofeedback and ADHD continue to be published, however, including several [preliminary brain imaging studies](#) that came out this year.

During my own recent neurofeedback demo, I struggled to feel any of the treatment's immediate effects. The screen was changing shape and size before my eyes — romantic polar bears and all — but I didn't feel any different. I wasn't sure how I was making the screen get bigger or smaller, but I was aware that I could do *something* to cause it to shift.

Settling down at my laptop an hour after the demo, however, I found I couldn't stay awake. My eyelids felt heavy. A late-afternoon coffee had no effect. I felt as though I'd written a massive research paper and had no brain power left to make it through the day. Suddenly, I remembered something Sam Barclay, who'd received neurofeedback training for her migraines, told me.

"I'm frankly a little annoyed that they spent a year and half mucking around with me before they tried this," Barclay says of the doctors who gave her several different medications in an attempt to relieve her migraines. "The drugs had some nasty side effects. And the side effect of this is you're tired."

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