Scientists use high-tech brain stimulation to make people more hypnotizable

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How deeply someone can be hypnotized—known as hypnotizability—appears to be a stable trait that changes little throughout adulthood, much like personality and IQ. But now, for the

first time, Stanford Medicine researchers have demonstrated a way to temporarily heighten hypnotizablity—potentially allowing more people to access the benefits of hypnosis-based therapy.

In the new study, published Jan. 4 in *Nature Mental Health*, the researchers found that less than two minutes of electrical stimulation targeting a precise area of the brain could boost participants' hypnotizability for about one hour.

"We know hypnosis is an effective treatment for many different symptoms and disorders, in particular pain," said Afik Faerman, Ph.D., a postdoctoral scholar in psychiatry and lead author of the study. "But we also know that not everyone benefits equally from hypnosis."

Focused attention

Approximately two-thirds of adults are at least somewhat hypnotizable, and 15% are considered highly hypnotizable, meaning they score 9 or 10 on a standard 10-point measure of hypnotizability.

"Hypnosis is a state of highly focused attention, and higher hypnotizability improves the odds of your doing better with techniques using hypnosis," said David Spiegel, MD, a professor of psychiatry and behavioral sciences and a senior author of the study.

Spiegel, the Jack, Lulu, and Sam Willson Professor in Medicine, has devoted decades to studying hypnotherapy and using it to help patients control pain, lower stress, stop smoking and more. Several years ago, Spiegel led a team that used brain imaging to uncover the neurobiological basis of the practice.

They found that highly hypnotizable people had stronger functional connectivity between the left dorsolateral prefrontal cortex, which is

involved in information processing and decision making; and the dorsal anterior cingulate cortex, involved in detecting stimuli.

"It made sense that people who naturally coordinate activity between these two regions would be able to concentrate more intently," Spiegel said. "It's because you're coordinating what you are focusing on with the system that distracts you."

Shifting a stable trait

With these insights, Spiegel teamed up with Nolan Williams, MD, associate professor of psychiatry and behavioral sciences, who has pioneered non-invasive neurostimulation techniques to treat conditions such as depression, obsessive-compulsive disorder and suicidal ideation.

The hope was that neurostimulation could alter even a stable trait like hypnotizability.

In the new study, the researchers recruited 80 participants with fibromyalgia, a chronic pain condition that can be treated with hypnotherapy. They excluded those who were already highly hypnotizable.

Half of the participants received transcranial magnetic stimulation, in which paddles applied to the scalp deliver electrical pulses to the brain. Specifically, they received two 46-second applications that delivered 800 pulses of electricity to a precise location in the left dorsolateral prefrontal cortex. The exact locations depended on the unique structure and activity of each person's brain.

"A novel aspect of this trial is that we used the person's own brain networks, based on brain imaging, to target the right spot," said Williams, also a senior author of the study.

The other half of participants received a sham treatment with the same look and feel, but without electrical stimulation.

Hypnotizability was assessed by clinicians immediately before and after the treatments, with neither patients nor clinicians knowing who was in which group.

The researchers found that participants who received the neurostimulation showed a statistically significant increase in hypnotizability, scoring roughly one point higher. The sham group experienced no effect.

When the participants were assessed again one hour later, the effect had worn off and there was no longer a statistically significant difference between the two groups.

"We were pleasantly surprised that we were able to, with 92 seconds of stimulation, change a stable brain trait that people have been trying to change for 100 years," Williams said. "We finally cracked the code on how to do it."

The researchers plan to test whether different dosages of neurostimulation could enhance hypnotizability even more.

"It's unusual to be able to change hypnotizability," Spiegel said. A study of Stanford University students that began in the 1950s, for example, found that the trait remained relatively consistent when the students were tested 25 years later, as consistent as IQ over that time period. Recent research by Spiegel's lab also suggests that hypnotizability may have a genetic basis.

Bigger implications

Clinically, a transient bump in hypnotizability may be enough to allow more people living with chronic pain to choose hypnosis as an alternative to long-term opioid use. Spiegel will follow up with the study participants to see how they fare in hypnotherapy.

The new results could have implications beyond hypnosis. Faerman noted that neurostimulation may be able to temporarily shift other stable traits or enhance people's response to other forms of psychotherapy.

"As a clinical psychologist, my personal vision is that, in the future, patients come in, they go into a quick, non-invasive brain stimulation session, then they go in to see their psychologist," he said. "Their benefit from treatment could be much higher."

More information: Stanford Hypnosis Integrated with Functional Connectivity-targeted Transcranial Stimulation (SHIFT): a preregistered randomized controlled trial, *Nature Mental Health* DOI: 10.1038/s44220-023-00184-z
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