

Restoring reality: Training improves brain activation and behavior in schizophrenia

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A pioneering new study finds that a specific type of computerized cognitive training can lead to significant neural and behavioral improvements in individuals with schizophrenia. The research, published by Cell Press in the February 23 issue of the journal *Neuron*, reveals that 16 weeks of intensive cognitive training is also associated with improved social functioning several months later and may have far-reaching implications for improving the quality of life for patients suffering from neuropsychiatric illness.

Schizophrenia is a debilitating [psychiatric illness](#) that is associated with severe clinical symptoms, such as hallucinations and delusions, as well as substantial social and cognitive deficits.

"Schizophrenia patients struggle with 'reality monitoring,' the ability to separate the inner world from the outer reality," states senior author, Dr. Sophia Vinogradov. "Although there are drugs that reduce the clinical symptoms of schizophrenia, current medications do not improve cognitive deficits. In addition, conventional psychotherapy has not proven to be successful, and there is a pressing need for new [therapeutic strategies](#)."

In the current study, scientists from the University of California, San Francisco, took a unique approach to enhancing behavior and [brain activation](#) in individuals with schizophrenia. "We predicted that in order to improve complex cognitive functions in neuropsychiatric illness, we must initially target impairments in lower-level perceptual processes, as well as higher-order [working memory](#) and social cognitive processes," explains senior study author, Dr. Srikantan Nagarajan.

The first author, Dr. Karuna Subramaniam, who conducted the study and analyzed the data, found that when compared with pretraining assessments, [schizophrenia patients](#) who received 80 hours of computerized training (over 16 weeks) exhibited improvements in their ability to perform complex

reality-monitoring tasks, which were associated with increased activation of the medial prefrontal cortex (mPFC). The mPFC is a critical brain region that supports successful reality-monitoring processes. "We found that the level of mPFC activation was also linked with better social functioning six months after training," says Dr. Subramaniam. "In contrast, patients in a control group who played computer games for 80 hours did not show any improvements, demonstrating that the behavioral and neural improvements were specific to the computerized training patient group."

"Our study is the first to demonstrate that neuroscience-informed cognitive training can lead to more 'normal' brain-behavior associations in patients with schizophrenia, which in turn predict better social functioning months later," concludes Dr. Vinogradov. "These findings raise the exciting likelihood that the neural impairments in schizophrenia-and undoubtedly other neuropsychiatric illnesses-are not immutably fixed, but instead may be amenable to well-designed interventions that target restoration of neural system functioning."

More information: Subramaniam et al.:

"Computerized cognitive training restores neural activity within the reality monitoring network in schizophrenia." [DOI:10.1016/j.neuron.2011.12.024](https://doi.org/10.1016/j.neuron.2011.12.024)

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