

Smartphone app may revolutionize mental health treatment

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Mental illness accounts for 90 percent of all reported suicides and places the largest burden of any disease on social and economic infrastructures worldwide, according to the World Health Organization. There is a dire need for support services to assist clinicians in the evaluation and treatment of those suffering from mental illness.

New technology developed by researchers at Tel Aviv University is poised to transform the way in which patients with mental illnesses are monitored and treated by clinicians. Dr. Uri Nevo, research team engineer Keren Sela, and scientists from TAU's Faculty of Engineering and Sagol School of Neuroscience have developed a new smartphone-

based system that detects changes in patients' [behavioral patterns](#), and then transmits them to professionals in real time. It has the potential to greatly improve the response time and efficacy of clinical psychiatrists. By facilitating patient observation through smartphones, the technology also affords patients much-needed independence from hospitals, clinicians—and even family members.

Research on the application was presented in March at the Israel Society for Biological Psychiatry's annual conference. The project won funding from the Israeli Ministry of Economy and was recently chosen as one of four finalist start-up initiatives featured at Israel's leading Entrepreneurship and Innovation 8200 Accelerator Program. The team is currently in talks with other medical centers in Israel and overseas to expand clinical trials.

Using tools already "in the hand"

"The diagnosis of [mental health](#) disease is based only on behavioral patterns," said Dr. Nevo. "In some cases, a patient is discharged from the hospital into a vacuum, with no idea how to monitor his or her new state of mind. Because most people own smartphones today, we thought, 'Why not harness the smartphone, a reservoir of daily activities, to monitor behavioral patterns?'"

"Bipolar disorder, for example, starts with a manic episode," said Dr. Nevo. "A patient who usually makes five or ten calls a day might suddenly start making dozens of calls a day. How much they talk, text, how many places they visit, when they go to bed and for how long—these are all indicators of mental health and provide important insights to clinicians who want to catch a disorder before it is full blown."

Researchers conducted two Helsinki-approved [clinical trials](#) with the

cooperation and direction of leading psychiatrists from Geha Mental Health Center and Be'er Ya'acov Mental Health Center. In the trials, the application was installed on the smartphones of 20 patients suffering from bipolar, unipolar/depressive, or schizo-affective disorders, as well as on the phones of 20 healthy participants. Over the course of six months, the app acquired data from patients' phones and sent the information to distant computers, where advanced algorithms analyzed the data to detect changes in patients' sleep, communication, mobility, and vocal patterns. The researchers further developed a visualization system that displayed the summarized information to psychiatrists, providing them with instant insight into the behavioral trends of their patients.

Preserving patient privacy

According to Dr. Nevo, a patient using the app has full control over who has access to the behavioral patterns recorded and analyzed by it. "We take great care to protect the patient's privacy," said Dr. Nevo. "The content of calls and texts is completely ignored and never acquired or recorded, and any identifying parameters of the patient or of his contacts, are irreversibly masked and are obviously not used."

Psychiatrists in the trials reported that the system has already positively affected their interaction with [patients](#), offering a useful objective "window" into the patient's daily routine. One patient who was involved in the clinical trial for only a brief period recently suffered a hospitalization. "If I had kept the app on my phone, you would have immediately noticed the unusual number of phone calls I was making, and this hospitalization could have been prevented," he told his psychiatrist.

"We have a way to go until such a system will be proven effective and adopted by the psychiatric community," said Dr. Nevo. "However,

psychiatrists, as well as U.S. federal policymakers in the field, agree that such tools are necessary to improve psychiatric practice."

Provided by Tel Aviv University

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