Press release: European Neuropsychopharmacology

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Researchers develop virtual reality-based system to improve psychiatric diagnosis

Researchers have developed a virtual reality-based system that shows promise in improving the differentiation between common mental health conditions, potentially paving the way for earlier and more personalised treatment. The work is published in the March edition of the peer-reviewed journal *European Neuropsychopharmacology*, with a subsequent (31 March) comment also being published in the same journal.

Accurate diagnosis remains one of the biggest challenges in psychiatry, with more than half of psychiatric patients changing their diagnosis within 10 years. Most psychiatric diagnoses rely on patients reporting their symptoms, but many mental health conditions share overlapping features. For example, apathy, hallucinations, and cognitive problems may be present in both schizophrenia and bipolar disorder, making it difficult to distinguish between the two. Misdiagnosis can lead to suboptimal treatment and poorer outcomes.

Now, a group of Danish scientists have combined virtual reality with physiological measurements (such as skin conductivity) to explore a more objective method for identifying different mental health conditions.

Lead researcher Professor Kamilla Miskowiak (University of Copenhagen) said, "This is an important step forward. Until now, diagnosis has largely depended on self-reporting of symptoms, but our findings suggest that virtual reality scenarios combined with physiological measures may help differentiate between similar conditions. This is an area where psychiatry has long faced difficulties."

The researchers recruited 100 participants, including individuals with bipolar disorder, borderline personality disorder, schizophrenia, and healthy controls. Participants were exposed to various immersive virtual reality scenarios designed to elicit emotional and physiological responses, such as a video of a crying baby, a discussion in a canteen, and a cramped elevator scenario. The researchers measured emotional responses and skin conductivity during these scenarios.

Their results indicate that these responses differed systematically between diagnostic groups, suggesting that this approach has the potential to enhance diagnostic accuracy. However, larger studies are needed to confirm these findings and to explore how such methods might be used in clinical practice.

Professor Miskowiak said, "*This study is part of the VIRDIS project, which aims to develop objective tools to support psychiatric diagnosis. Our initial findings are promising, but further large-scale research is needed to validate this approach and develop it into a practical clinical tool. We are now launching a follow-up study with*

300 participants and implementing machine learning methods to improve individual-level diagnostic predictions. Our long-term goal is to improve early and personalised treatment for patients with mental health disorders."

The *European Neuropsychopharmacology* paper has attracted attention since it was placed online, including a published commentary from Dr Sijia Liu at the Liaoning University of Traditional Chinese Medicine, Shenyang, China, stating:

"This study offers a groundbreaking approach to addressing the persistent challenges in psychiatric diagnosis and treatment by leveraging virtual reality (VR) technology. I suggest that future research should consider integrating artificial intelligence algorithms to analyse the extensive data generated from these VR scenarios. I believe this work holds significant promise for advancing our understanding and clinical practices in mental health care".

Illustration (left): researcher wearing virtual reality headset as used in the tests.

Illustration (below): crying baby, as seen on VR headset. The crying baby induces a stressful environment. The use of VR and other physiological measurements means that this stressful environment can be standardised and reproduced, giving optimal conditions for accurate diagnosis.

(credit to both photos; authors).

This project is a collaboration between the Copenhagen Mental Health Centre, Khora Virtual Reality and EXP360. This study was supported by the Ivan Nielsen Foundation.

Ends

Notes for Editors

Publication details:

(1) **Optimizing differential diagnostics and identifying transdiagnostic treatment targets using virtual reality**

Hanne Lie Kjærstad, Andreas Elleby Jespersen, Johanne Lilmose Bech, Sofie Weidemann, Anne Juul Bjertrup, Emilie Hestbæk Jacobsen, Sebastian Simonsen, Louise Birkedal Glenthøj, Merete Nordentoft, Kristian Reveles, Tine Wøbbe, Mads Lopes, Daniel Lyngholm, Kamilla Woznica Miskowiak·

Full paper available at: https://www.sciencedirect.com/science/article/pii/S0924977X2400765X

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https://doi.org/10.1016/j.euroneuro.2024.11.006

(2) **Commentary on the Article "Optimizing differential diagnostics and identifying transdiagnostic treatment targets using virtual reality"**
Sijia Liua, Xicai Lianga, Juntong Liub
In press at European Neuropsychopharmacology. PDF available from press officer.

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