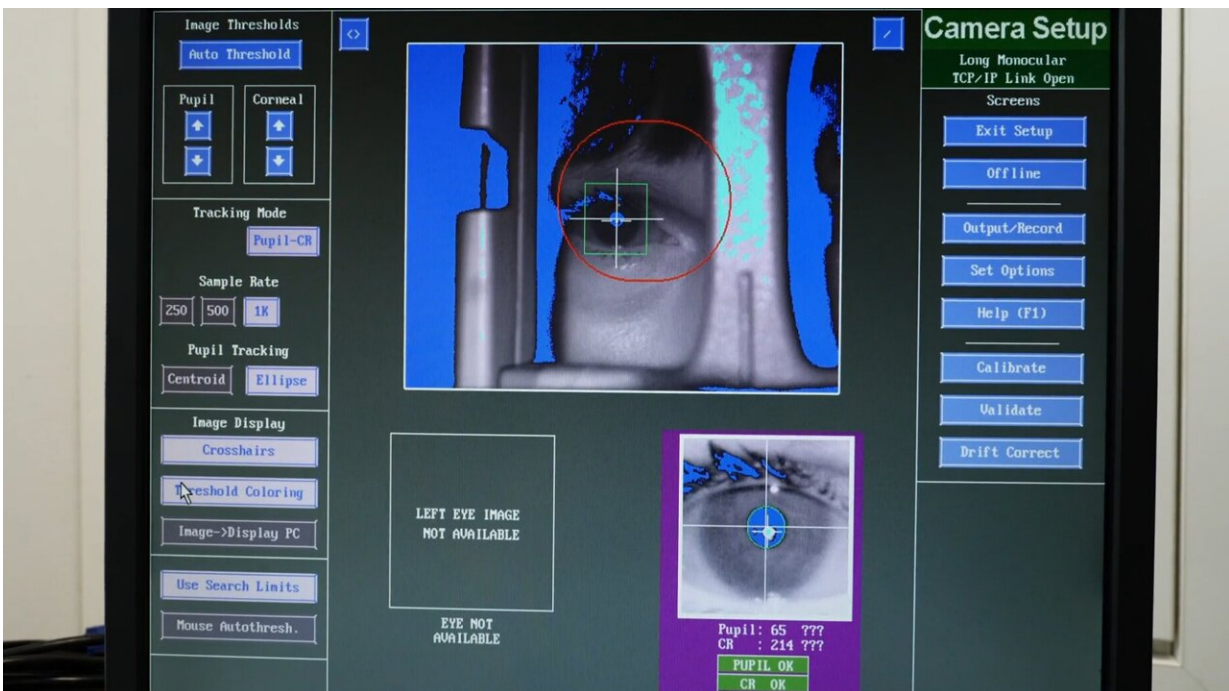


Study provides insights into depression via ophthalmology

January 12 2024, by Anke Schlee



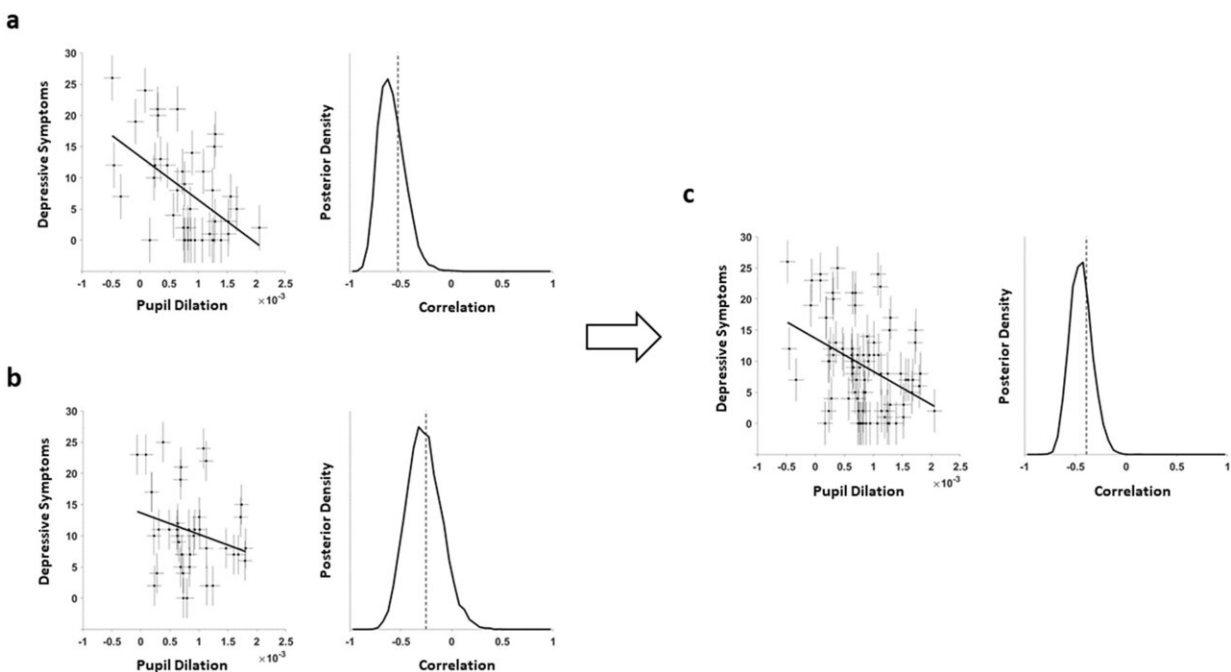
A high-speed camera provides information on pupil size. Credit: Martin Otter MPI Psychiatry

Scientists from the Max Planck Institute of Psychiatry measured the pupillary reaction of participants while they were solving a task. In healthy participants, the pupils dilated during the task in anticipation of a reward, but this reaction was less pronounced in participants with depression.

"The reduced pupil reaction was particularly noticeable in [patients](#) who could no longer feel pleasure and reported a loss of energy," says Andy Brendler, first author of the study. This feeling of listlessness is one of the most common symptoms of depression.

"This finding helps us to understand the physiological mechanisms behind listlessness better," explains research group leader Victor Spoormaker. Among other things, the pupillary reaction is a marker for activity in the locus coeruleus, the [brain structure](#) with the highest concentration of noradrenergic neurons in the central nervous system.

Noradrenergic neurons react to the neurotransmitter norepinephrine, an essential component in the [stress response](#) and the upregulation of arousal, in other words, the activation of the nervous system. "The reduced pupillary response in patients with more listlessness indicates that the lack of activation of the [locus coeruleus](#) is an important physiological process that underlies the feeling of listlessness," says Spoormaker.



Correlation pupil dilation and number of symptoms for depressed patients. (a) original study; (b) replication study; and (c) combined samples. Estimation of the correlation between pupil dilation during reward anticipation and the number of depressive symptoms taking measurement uncertainty of each measurement into account (represented by vertical and horizontal error bars) including regression lines (a, b, and c, left panels). The Bayesian model estimated the true correlation while accounting for measurement uncertainty by sampling from a multivariate Gaussian distribution, leading to a posterior distribution that indicates the likelihood of the modelled correlation (a, b, and c, right panels). Credit: *Scientific Reports* (2024). DOI: 10.1038/s41598-023-48792-0

The study also found the pupil response to be weaker the more depressive symptoms participants had. This replicates the findings of a previous study by the same research group. The replicability of neuropsychiatric methods is more the exception than the rule and demonstrates the reliability of pupillometry as a method.

Pupillometry could be used as a supplementary method for diagnosis. It could also contribute to the development of individualized treatment strategies for depression. For example, if a patient shows a significantly reduced pupil response, antidepressants that act on the noradrenergic system could be more effective than other medications. The medication dosage could also be optimized based on the pupil's reaction.

Considering that an estimated 30% of depressive patients do not improve using the currently available medications, understanding the [physiological mechanisms](#) behind depression and fine-tuning diagnosis and treatment accordingly is urgently required.

The paper is [published](#) in the journal *Scientific Reports*.

More information: Andy Brendler et al, Assessing hypo-arousal during reward anticipation with pupillometry in patients with major depressive disorder: replication and correlations with anhedonia, *Scientific Reports* (2024). [DOI: 10.1038/s41598-023-48792-0](https://doi.org/10.1038/s41598-023-48792-0)

Provided by Max Planck Society

Citation: Study provides insights into depression via ophthalmology (2024, January 12) retrieved 27 April 2024 from

<https://medicalxpress.com/news/2024-01-insights-depression-ophthalmology.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.