MedicalXpress

You can see it in their eyes: Traumatic experiences leave mark on pupils, new study finds

July 15 2020

The pupils of people with post-traumatic stress disorder respond differently to those without the condition when they look at emotional images, a new study has found.

The study looked for traces of traumatic events in the eyes of patients with PTSD, which can occur following a distressing event and causes greater sensitivity, or hyperarousal, to everyday events and an inability to switch off and relax.

Researchers measured pupil size while participants were shown threatening images, such as vicious animals or weapons, as well as other images that showed neutral events, or even pleasant images.

They found the response of people with PTSD was markedly different, including to people who had been traumatised but did not have PTSD.

At first, the pupil failed to show the normal sharp constriction that is caused by any new visual stimulus, but then their pupils grew even larger to the emotional stimuli than for the other participants.

Professor Robert Snowden, from Cardiff University's School of Psychology, said: "The greater response to the threatening pictures in patients with PTSD was expected and is in line with the fact that people with PTSD are hypersensitive to their surroundings due to an overactive

sympathetic nervous system response.

"However, the lack of constriction is quite novel and suggests that they also have problems with their parasympathetic system—this is the one that helps the body to return to normal resting levels and recover from stressful events.

"The research suggests that these people are in a constant state of vigilance and react strongly to arousing images."

Another unexpected result was also found. The pupils of the patients with PTSD not only showed the exaggerated response to threatening stimuli, but also to stimuli that depicted "positive" images, such as exciting sports scenes.

Co-author Professor Nicola Gray, from Swansea University, said: "This shows that the hyper-response of the pupil is in response to any arousing stimulus, and not just threatening ones.

"This may allow us to use these positive pictures in therapy, rather than relying upon negative images that can be quite upsetting to the patient, and therefore make therapy more acceptable and bearable.

"The current COVID-19 pandemic is expected to produce a large increase in instances of PTSD from the traumatic events that have occurred. Clearly, better forms of therapy would be of a great help, but these ideas need testing before we can put them into clinical practice."

Lead author Dr. Aimee McKinnon, who conducted the research at Cardiff University but is now at Oxford University, said:"These findings allow us to understand that people with PTSD are automatically primed for threat and fear responses in any uncertain emotional context, and to consider what a burden this must be to them in everyday life.

"It also suggests that it is important for us to recognise that, in therapy, it is not just the fear-based stimuli that need deliberately re-appraising. If someone with PTSD is faced with any high-level of emotional stimulation, even if this is positive emotion, it can immediately trigger the threat system.

"Clinicians need to understand this impact of positive stimuli in order to support their service-users overcome the significant challenges they face."

Of the participants, 20 met diagnostic criteria for PTSD, 28 were trauma-exposed (but with no PTSD), and 17 were control subjects who reported no previous experience of trauma. The research was published in the journal *Biological Psychology*.

More information: Aimee I. Mckinnon et al. Enhanced emotional response to both negative and positive images in post-traumatic stress disorder: Evidence from pupillometry, *Biological Psychology* (2020). DOI: 10.1016/j.biopsycho.2020.107922

Provided by Cardiff University