AI-based voice analysis can accurately diagnose PTSD, study finds

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An artificial intelligence tool can help diagnose post-traumatic stress disorder in veterans by analyzing their voices, a new study found.

Medical researchers and engineers designed an AI tool that can distinguish, with 89% accuracy, between the voices of those with or without PTSD, according to their study published Monday in Depression and Anxiety. The findings open up the possibility of using the AI-based voice analysis tool to diagnose PTSD more rapidly or through telemedicine.

"Our findings suggest that speech-based characteristics can be used to diagnose this disease, and with further refinement and validation, may be employed in the clinic in the near future," senior study author Charles Marmar, M.D., from the department of psychiatry at NYU School of Medicine, said in a statement. A division of the U.S. Army supported the study.

The U.S. Department of Veterans Affairs reports that between 11% and 20% of veterans who served in operations in Iraq and Afghanistan have PTSD, while about 12% of Gulf War veterans have PTSD. Additionally, it is estimated that 30% of Vietnam veterans have had PTSD in their lifetimes.

The ability to improve PTSD diagnosis has wider implications, as more than 70% of adults worldwide experience a traumatic event at some point in their lives, with up to 12% of people in some struggling countries suffering from PTSD, according to the Sidran Institute.

According to researchers, the ability to accurately screen for and diagnose PTSD remains challenging. The diagnosis is usually based on clinical interviews or self-report measures. The gold standard for diagnosing the condition is the clinician-administered PTSD scale, a structured clinical interview to assess the frequency and severity of PTSD symptoms and related functional impairments. However, even that assessment is subject to biases. The interviews also require a lengthy visit to a clinician's office, which some patients may be unwilling or unable to do.

An objective test is lacking, according to the researchers, who developed a classifier of PTSD based on objective speech-marker features that discriminate PTSD cases from controls. The research team included psychiatrists from New York University School of Medicine, Steven and Alexandra Cohen Veterans Center for the Study of Post-Traumatic Stress and Traumatic Brain Injury and engineers from SRI International, the institute that also invented Apple's Siri feature.

For the study, researchers used speech samples from war zone-exposed veterans, 53 cases with PTSD and 78 controls, assessed with the clinician-administered PTSD Scale. Audio recordings of clinical interviews were used to obtain 40,526 speech features, which the team's AI program sifted through for patterns.

The program linked patterns of specific voice features with PTSD, including less clear speech and a lifeless, metallic tone, both of which had long been reported anecdotally as helpful in diagnosis.

The theory is that traumatic events change brain circuits that process emotion and muscle tone, which affects a person's voice, according to researchers.

"We believe that our panel of voice markers represents a rich, multidimensional set of features which with further validation holds promise for developing an objective, low cost, noninvasive, and, given the ubiquity of smartphones, widely accessible tool for assessing PTSD in veteran, military, and civilian contexts," the researchers said.

Other healthcare researchers are also exploring the use of voice analysis to detect and diagnose disease. A team at Mayo Clinic is exploring how to use AI-supported voice analysis as a noninvasive diagnostic tool to identify changes in tone or cadence that could potentially be predictive of an outcome, such as high blood pressure, stroke or heart attack.

The research team behind this latest study plans to train the AI voice tool with more data, further validate it on an independent sample and apply for government approval to use the tool clinically.