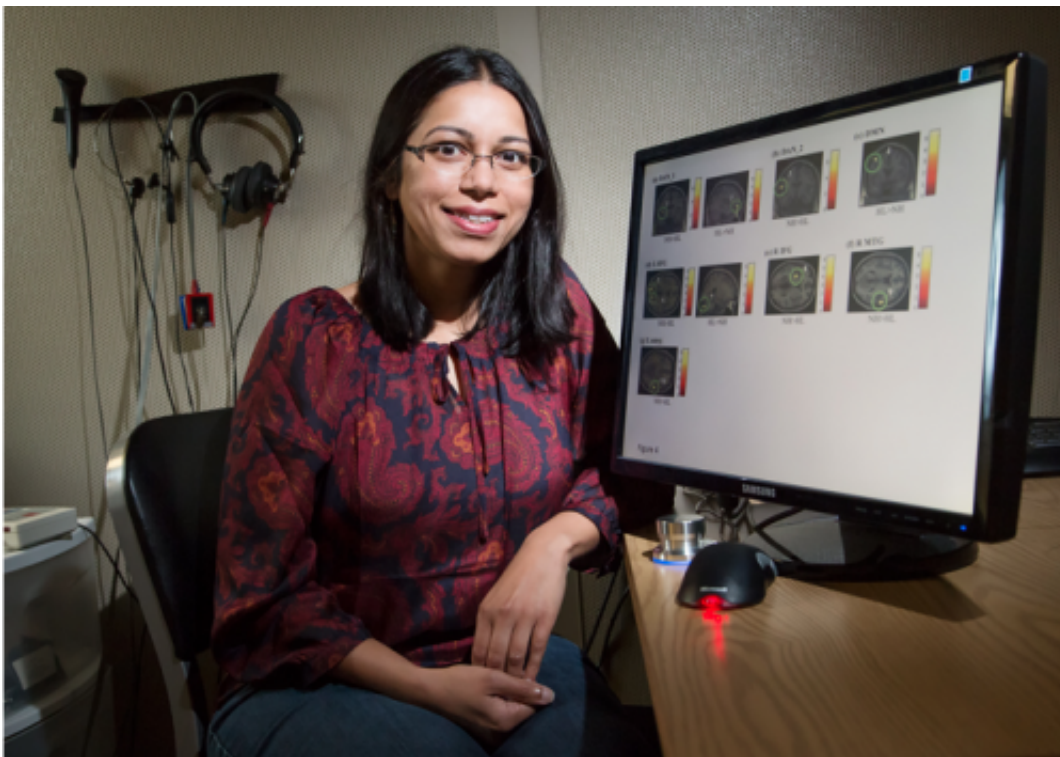


People with tinnitus process emotions differently from their peers, researchers report

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University of Illinois speech and hearing science professor Fatima Husain and her colleagues found that tinnitus, a condition in which a person hears a ringing sound despite the lack of an actual sound, is associated with emotional processing in a different part of the brain than in those without the condition. Credit: L. Brian Stauffer

(Medical Xpress)—Patients with persistent ringing in the ears – a condition known as tinnitus – process emotions differently in the brain from those with normal hearing, researchers report in the journal *Brain Research*.

Tinnitus afflicts 50 million people in the United States, according to the American Tinnitus Association, and causes those with the condition to hear noises that aren't really there. These phantom sounds are not speech, but rather whooshing noises, train whistles, cricket noises or whines. Their severity often varies day to day.

University of Illinois speech and hearing science professor Fatima Husain, who led the study, said previous studies showed that tinnitus is associated with increased stress, anxiety, irritability and depression, all of which are affiliated with the [brain](#)'s emotional processing systems.

"Obviously, when you hear annoying noises constantly that you can't control, it may affect your emotional processing systems," Husain said. "But when I looked at experimental work done on tinnitus and emotional processing, especially brain imaging work, there hadn't been much research published."

She decided to use functional magnetic resonance imaging (fMRI) brain scans to better understand how tinnitus affects the brain's ability to process emotions. These scans show the areas of the brain that are active in response to stimulation, based upon blood flow to those areas.

Three groups of participants were used in the study: people with mild-to-moderate [hearing loss](#) and mild tinnitus; people with mild-to-moderate hearing loss without tinnitus; and a control group of age-matched people without hearing loss or tinnitus. Each person was put in an fMRI machine and listened to a standardized set of 30 pleasant, 30 unpleasant and 30 emotionally neutral sounds (for example, a baby laughing, a

woman screaming and a water bottle opening). The participants pressed a button to categorize each sound as pleasant, unpleasant or neutral.

The tinnitus and normal-hearing groups responded more quickly to emotion-inducing sounds than to neutral sounds, while patients with hearing loss had a similar response time to each category of sound. Overall, the tinnitus group's reaction times were slower than the reaction times of those with normal hearing.

Activity in the amygdala, a brain region associated with emotional processing, was lower in the tinnitus and hearing-loss patients than in people with normal hearing. Tinnitus patients also showed more activity than normal-hearing people in two other brain regions associated with emotion, the parahippocampus and the insula. The findings surprised Husain.

"We thought that because people with tinnitus constantly hear a bothersome, unpleasant stimulus, they would have an even higher amount of activity in the amygdala when hearing these sounds, but it was lesser," she said. "Because they've had to adjust to the sound, some plasticity in the brain has occurred. They have had to reduce this amygdala activity and reroute it to other parts of the brain because the amygdala cannot be active all the time due to this annoying sound."

Because of the sheer number of people who suffer from tinnitus in the United States, a group that includes many combat veterans, Husain hopes her group's future research will be able to increase tinnitus patients' quality of life.

"It's a communication issue and a quality-of-life issue," she said. "We want to know how we can get better in the clinical realm. Audiologists and clinicians are aware that [tinnitus](#) affects emotional aspects, too, and we want to make them aware that these effects are occurring so they can

better help their patients."

More information: "Alterations of the emotional processing system may underlie preserved rapid reaction time in tinnitus,"

[www.sciencedirect.com/science/ ... ii/S0006899314005228](http://www.sciencedirect.com/science/.../ii/S0006899314005228)

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