More evidence that musical training protects the brain

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Credit: Wikipedia.

Scientists have found some of the strongest evidence yet that musical training in younger years can prevent the decay in speech listening skills in later life.

According to a new Canadian study led by the Rotman Research Institute (RRI) at Baycrest Health Sciences, older adults who had musical training in their youth were 20% faster in identifying speech sounds than their non-musician peers on speech identification tests, a benefit that has already been observed in young people with musical training.

The findings are published in *The Journal of Neuroscience*.

Among the different cognitive functions that can diminish with age is the ability to comprehend speech. Interestingly, this difficulty can persist in the absence of any measurable hearing loss. Previous research has confirmed that the brain's central auditory system which supports the ability to parse, sequence and identify acoustic features of speech - weakens in later years.

Starting formal lessons on a musical instrument prior to age 14 and continuing intense training for up to a decade appears to enhance key areas in the brain that support speech recognition. The Rotman study found "robust" evidence that this brain benefit is maintained even in the older population.

"Musical activities are an engaging form of cognitive brain training and we are now seeing robust evidence of brain plasticity from musical training not just in younger brains, but in older brains too," said Gavin Bidelman, who led the study as a post-doctoral fellow at the RRI and is now an assistant professor at the University of Memphis.

"In our study we were able to predict how well older people classify or identify speech using EEG imaging. We saw a brain-behaviour response that was two to three times better in the older musicians compared to non-musicians peers. In other words, old musicians' brains provide a much more detailed, clean and accurate depiction of the speech signal, which is likely why they are much more sensitive and better at understanding speech."

Bidelman received a GRAMMY Foundation research grant to conduct the study and partnered with senior scientist Claude Alain, assistant director of Baycrest's RRI and a leading authority in the study of age-related differences in auditory cortical activity.

The latest findings add to mounting evidence that musical training not

only gives young developing brains a cognitive boost, but those neural enhancements extend across the lifespan into old age when the brain needs it most to counteract cognitive decline. The findings also underscore the importance of music instruction in schools and in rehabilitative programs for older adults.

In this study, 20 healthy older adults (aged 55-75) - 10 musicians and 10 non-musicians - put on headphones in a controlled lab setting and were asked to identify random speech sounds. Some of the sounds were single vowel sounds such as an "ooo" or an "ahhh", others more ambiguous as a mix of two sounds that posed a greater challenge to their auditory processing abilities for categorizing the speech sound correctly.

During the testing cycles, researchers recorded the neural activity of each participant using electroencephalography (EEG). This brain imaging technique measures to a very precise degree the exact timing of the electrical activity which occurs in the brain in response to external stimuli. This is displayed as waveforms on a computer screen. Researchers use this technology to study how the brain makes sense of our complex acoustical environment and how aging impacts cognitive functions.

According to Bidelman and Alain's published paper, the older musicians' brain responses showed "more efficient and robust neurophysiological processing of speech at multiple tiers of auditory processing, paralleling enhancements reported in younger musicians."

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