

How music class can spark language development

16 December 2014



Steinway & Sons Grand Piano Iron Plates and Strings.
Credit: David Maiolo / Wikipedia.

Music training has well-known benefits for the developing brain, especially for at-risk children. But youngsters who sit passively in a music class may be missing out, according to new Northwestern University research.

In a study designed to test whether the level of engagement matters, researchers found that children who regularly attended [music](#) classes and actively participated showed larger improvements in how the [brain](#) processes speech and reading scores than their less-involved peers after two years.

The research, which appears online on Dec. 16 in the open-access journal *Frontiers in Psychology*, also showed that the neural benefits stemming from participation occurred in the same areas of the brain that are traditionally weak in children from disadvantaged backgrounds.

"Even in a group of highly motivated students, small variations in music engagement—attendance and class participation—predicted the strength of neural processing after [music training](#)," said study lead author Nina Kraus, the Hugh Knowles professor of communication sciences in the School

of Communication and of neurobiology and physiology in the Weinberg College of Arts and Sciences at Northwestern.

The type of music class may also be important, the researchers found. The neural processing of students who played instruments in class improved more than the children who attended the music appreciation group, according to the study.

"Our results support the importance of active experience and meaningful engagement with sound to stimulate changes in the brain," said Kraus, director of Northwestern's Auditory Neuroscience Laboratory.

The data was collected as part of a multi-year collaboration with The Harmony Project, a non-profit that has provided music education and instruments to disadvantaged children in Los Angeles for more than a decade.

Rather than using an active control group, the researchers looked for differences within the group of children participating in Harmony Project classes.

Unlike most music studies, which often estimate brain activity using paper and pencil tests, Kraus directly assessed the brain by strategically placing electrode wires with button sensors on the students' heads to capture the brain's responses.

Northwestern and the Harmony Project joined forces several years ago after Harmony's founder, Margaret Martin, approached Kraus seeking scientific evidence behind the striking academic success of the students. Despite a dropout rate of 50 percent or more in their neighborhoods, 93 percent of Harmony Project seniors have gone on to college since 2008.

Previous Northwestern findings based on Harmony Project data have shown that two years of music

training - but not one - improved the brains' ability to distinguish similar-sounding syllables, a skill linked to literacy. Provided by Northwestern University

"Music, then, can't be thought of as a quick fix," said Kraus.

That previous research, published in September in the *Journal of Neuroscience*, indicated that the community music program can literally 'remodel' a child's brain in a way that improves sound processing and was the first direct evidence that the music training has a biological effect on children's developing nervous systems.

Children from families of lower socioeconomic status process sound less efficiently, in part because of noisier environments and also due to linguistic deprivation—or not hearing enough complex words, sentences and concepts. This puts them at increased risk of academic failure or dropping out of school, said Kraus.

"Think of 'neural noise' as like static on the radio, with the announcer's voice coming in faintly," said Kraus.

Music training may be one way to boost how the brain processes sound to remove the interference, said Kraus.

"Speech processing efficiency is closely linked to reading, since reading requires the ability to segment speech strings into individual sound units," said Kraus.

"A poor reader's brain often processes speech suboptimally."

"What we do and how we engage with sound has an effect on our nervous system," said Kraus.

"Spending time learning to play a musical instrument can have a profound effect on how your nervous system works."

More information: *Frontiers in Psychology*, journal.frontiersin.org/Journal/psychology.2014.01403/full

APA citation: How music class can spark language development (2014, December 16) retrieved 16 May 2021 from <https://medicalxpress.com/news/2014-12-music-class-language.html>

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