

Biological Impact of Musical Training in At-Risk Children

From an educational perspective, one of the highest priority objectives is to reduce the academic achievement gap that exists between children raised in high and low income environments—a gap that widens with each passing year as a child grows. There are very real, measureable differences in the brains of children raised in impoverished environments (1). In particular, the response to sound is less precise and less saliently above the neural noise floor. One method that has proven effective in reversing this poverty-induced handicap is engaging low-income youth in school- or community-based music programs. Such programs have met with success in motivating at-risk students to stay in school and to achieve gains in academic success (2). Past research on music's effect on molding the young mind has demonstrated gains in language abilities and in neural function; however, these findings tend to be restricted to children of relatively high socioeconomic status (SES) taking private one-on-one lessons. Would these gains in neural function would be achieved in a real-world, group music instruction setting in lower-SES children followed longitudinally? In separate projects in Chicago (high school-age) and Los Angeles (elementary school-age), we measured neural responses along with language and cognitive evaluations prior to and after two years of group music instruction. We found that after music training, musically-trained students increased or held steady in measures of language such as hearing sentences in noise and reading. And, our neural measure revealed an increase in quality of the brain's representation of speech (3,4). Taken together, our discovery of neural signatures of the impoverished brain and our longitudinal findings that the brain is positively impacted by group music lessons point to a cost effective way forward in closing the achievement gap in low-SES children.

See <http://www.brainvolts.northwestern.edu> 'friendly overview' neuroeducation supported by: NAMM, GRAMMY, Knowles Hearing Center

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2. The Harmony Project: www.harmony-project.org.
3. Tierney A, Krizman J, Skoe E, Johnston K, Kraus N. (2013) High school music classes enhance the neural processing of speech. *Frontiers in Educational Psychology*. 4:855.
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