The Mozart Effect: Music Exercises the Brain

By Dennis A. Colucci, AuD, MA

Human brains are predisposed by design to the information processing elicited by music. (Roederer JG. *The Physics and Psychophysics of Music.* New York, NY: Springer; 2008.)

Music, through its complex spectral and temporal patterns and activities, helps wire the brain and bind the senses, affecting our perceptual experience (*Nat Rev Neurosci* 2010;11[8]:599-605). We know that music training can change the brain's anatomical structures, as demonstrated in functional magnetic resonance imaging (fMRI) of musicians (*Ann N Y Acad Sci* 2012;1252:116-123).

Music also elicits endorphins, soothing the limbic system and making us feel good. As rapper Ludacris recently said, "When music is good, you lose yourself in the moment…." Most importantly, music creates higher-level cortical excitation, requiring information management that exercises the brain and leads to learning.

BEATLES VS RAT PACK

The demonstration of the so-called Mozart effect—an improvement in short-term spatial-temporal learning with music training—was the beginning of the new revolution in music therapy. (Tomatis AA. *The Conscious Ear: My Life of Transformation Through Listening.* Paris, France: Station Hill Press; 1991.)

Subsequently, modern music therapy and training have been shown to treat a variety of disorders, including auditory hallucinations (*Eur Rev Med Pharmacol Sci* 2012;16[suppl 4]: 64-65), dyslexia, attention deficit hyperactivity disorder, autism (*J Music Ther* 2014;doi:10.1093/jmt/thu012), depression, anxiety, stress, and dementia (*Gerontologist* 2014;54[4]: 634-650), and to combat aging (*HJ* March 2013, p. 52) and treat tinnitus (*Int J Clin Exp Med* 2013;6[7]:589-593).

The therapeutic use of music and music training has been shown to improve auditory discrimination and working memory in children with cochlear implants (*Int J Audiol* 2014;53[3]:182-191) and hearing in noise in older adults with hearing loss (*HJ* March 2013, p. 52), and to reduce the cascading effects of aging and hearing loss on cognition (*HJ* April 2010, p. 58; *HJ* April 2014, p. 48).

Traditional auditory training takes months or even years to create measureable functional or neurophysiological changes. In the general population, the primary desired changes include improvements in neural timing, processing speed, pitch discrimination and intensity detection, auditory working memory, auditory attention, speech-in-noise understanding, and auditory scene analysis and cognition.

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For hearing aid users, it's easy to listen on a regular basis to music that's familiar and comfortable, with and without vocals, and even to sing along.

Since processing speed and the ability to follow melody typically are skills that need to be honed, the listener should start with the tempo of a ballad, like country or contemporary music (4-4 time). Tempo can be increased over time as the patient becomes more familiar with amplified listening.

Patients should choose music they know to reconnect with feel-good memories. While baby boomers might like Carole King, Marvin Gaye, or the Beatles, their parents may be more interested in hearing the Rat Pack. The music should be kept at a comfortable volume so as not to put the input microphone into overdrive and create distortion (*HJ* September 2010, pp. 27-30).

When listening to a home stereo at typical volume with adequate bass, the patient may not need a music program. However, when music is too harsh or tinny, or has pitch distortion, a modified program should be properly adjusted for music rather than speech (bit.ly/HJ-Music).

Music is well-defined, freely available over a lifetime, and easy to use, and it is a rewarding way to help patients improve auditory and cognitive abilities. For seniors, music may be the only auditory training they receive, and, as an added benefit, it can reduce the effects of sound isolation and combat central presbycusis.

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