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## Music, Our Human Superpower

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# ACADEMIA | Letters

## *Music, Our Human Superpower*

Kristin Lems

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Whether heard through a kitchen radio, earbuds as we walk or jog, through a Bluetooth in a car, at an outdoor festival, at key rites of passage, or as ear candy in our dentist's office, music provides the soundtrack of our lives. It is a cornerstone of our individual and group cultural identities, and it is nothing short of a Superpower!

Research about music pervades every discipline because music touches every area of life. Studies revealing the salutary effects of music can be found not only in music educator research, but in research in psychology, speech and hearing, child development, neuroscience, and increasingly, health and wellness, aging, rehabilitation and recovery. Since my focus is especially in the areas of language and literacy, I research the positive effects of music on reading, writing, and learning languages - and of this, there is no shortage. In this brief Academia article, I share what I'd like to call an "homage-with-references" to our great Superpower, which - as the recent animated movie *Soul* attests - gives so much meaning to life, for so many.

All human cultures have music, and they always have. In fact, music appears to have preceded the emergence of homo sapiens! Flutes have been found around the campfires at Neanderthal cave sites (Leutwyler, 2001). Musical rites of passage, and folk music, which are handed down from generation to generation through oral transmission, not only express, preserve and celebrate our languages and cultures, but also preserve precious knowledge about the environment. Although folksongs seem to be simple, they hold great meaning. They can be considered a "rich library of ethnobiological knowledge and biocultural memory, embedding important social, physical, emotional, and spiritual ties to local ecologies" (Fernandez-Llamazares & Lepofsky, 2019, p. 337).

Now that new imaging tools allow us to safely examine the brain, we can see the myriad ways in which music acts upon us. Neuroimaging technology, such as PET scans, fMRI,

and MEG scans, allow researchers to see what areas of the brain are activated by music. We can see that making music, or even listening to music, “lights up” vast areas of the brain. These areas include Broca’s area, which is connected to pattern recognition for both music and language, the corpus callosum, the visual cortex (“the mind’s eye”), memory areas, and even the all-important limbic system, which processes emotions (Moreno, 2009). Summarizing the cascade of activity music stimulates in the brain, Gottfried Schlaug of the Harvard Medical School says, “I would challenge everybody to come up with another activity that engages as much real estate in the brain as music-making does” (in Cole, 2011, p. 29).

In addition, music is primal and pleasurable. Music and song are so inseparable from language that researchers consider that “an awareness of music is critical to a baby’s language development and even helps to cement the bond between infant and mother” (Deutsch, 2010, p. 37). Deutsch further explains, “The boundary between speech and song can be very fragile” (Ibid.). The melodious, exaggerated speech mothers and other caretakers use with infants, often referred to as “motherese,” offers up-close contact between the infant and the mother’s mouth, face, and voice. This melodic “singsong” speech not only helps the infant bond with the mother, but also helps infants recognize the rhythmic and intonational patterns of their native language. In one experiment, infants enrolled in interactive music classes showed greater ability to be calmed than infants in a control group (Gerry et al., 2012). Compared to equivalently matched infants, the infants in these classes were also better at pointing at objects out of reach and waving goodbye. In addition to bonding and calming, music also makes learning more pleasurable, because, as Mithen (2005) suggests, it makes “fewer cognitive demands” on us than language, which communicates messages (23).

As young children experience their first social situations outside the home, such as child-care, nursery school and preschool settings, music and song play a critical role, which we can see from studies across several cultures. Degé, Kubicek, and Schwarzer (2015) found that for preschool children, both receptive and productive musical skills were good predictors of several reading skills, including phonological awareness, working memory, and rapid word retrieval. A weekly, low-cost, music-focused community preschool in Finland enhanced children’s linguistic proficiency in phoneme processing and vocabulary, compared to children in a dance-centered school or a control group (Linnavalli et al., 2018). In a carefully controlled small study, children exposed to song-based activities in a preschool increased their receptive (though not active) vocabulary in a new language (Coyle & Gomez Garcia, 2014). Musical play in daycare settings can also stimulate involvement by parents and caregivers, such as the Australian study in which a “preschool choir” at a daycare center in a neighborhood with low-income families resulted in many family members being involved with their children’s activities, and bringing music into the home (Acker et al., 2012).

When children enter school, musical aptitude, training, and exposure influence their ease in learning to read and write. Although many factors contribute to successfully learning to read and write, and some are unrelated to classroom performance, at least two foundational skills can be correlated with music skills: phonological awareness (PA), and rapid automatized naming (RAN). Phonological awareness is the ability to hear and manipulate the sounds in spoken words, and rapid automatized naming is the ability to efficiently retrieve and produce the sounds of written words. Without these skills, reading words is too ambiguous, or too slow, to allow readers to be able to construct meaning. Musical training and aptitude positively affect both. Researchers found that Mandarin-speaking children ages four and five who had piano lessons showed improved speech perception, and this in turn impacted their learning to read (Nan et al., 2018). Because Mandarin is a tonal language, hearing the tones is an integral part of learning the language, even beyond phonological awareness.

Rhythm is another musical skill affecting literacy. The Auditory Neuroscience Laboratory at Northwestern University has conducted several high impact studies that indicate that children's ability to perceive and produce rhythms plays a key role "as a precursor to reading in children between the ages of five and eight" (Auditory Neuroscience Newsletter, 2020, p. 3). Interestingly, children in the studies who had trouble tapping to a regular beat also had trouble with rapid automatized naming (RAN), and children who had trouble replicating a varied rhythm pattern had trouble with phonological awareness (PA). The finding that perceiving and producing rhythm contributes to literacy may suggest a new direction in teaching phonics, which has been focused on phonemes and onsets and rimes, and less on rhythm.

Posner, Rothbart, Sheese, and Kieras (2008) proposed a framework to help explain the powerful relationship between the arts and learning, drawing on extensive research in arts education. According to the authors, curiosity about an art form creates motivation, and this heightened motivation, in turn, leads to heightened attention. When learners experience a heightened state of attention, sometimes called "entrainment," because they are intrigued by an art form, they are more likely to experience new learning (Posner et al., 2008). This virtuous cycle occurs because of the fascination people experience from exposure to the arts.

Music lessons and training correlate with higher academic achievement and outcomes, even when social class and wealth are factored in. We can attribute this partly to the focus of attention that a person needs to practice and learn a piece of music, or an individual part of a larger piece, whether a person is singing in a choir or playing an instrument. When musicians practice their part in an ensemble, they are practicing a skill that has a strong relationship with another skill: the ability to understand speech in background noise. Because classrooms are noisy and distracting, students' ability to hear speech in noise actually has a significant impact on their ability to achieve academically. In recent exciting developments, Northwestern

researchers have shown that high school students in several low income communities who received only two years of group band and orchestra classes showed dramatic improvement in their grades and in college admissions (Tierney et al., 2013) in addition to numerous other benefits (Kraus & White-Schwoch, 2020; Lems, 2002). The finding shows that children whose families cannot afford private music lessons can still obtain tremendous benefits from high school group musical training.

Additional research reveals that older adults who had early musical training are better able to detect speech-in-noise, such as hearing a friend at a table in a noisy restaurant, even decades later. This results in better access to socializing in the senior years (Parbery-Clark et al., 2012).

Music training and participation foster growth in nonacademic areas as well. In one study, music was added to the core curriculum in an Australian elementary school with English language learners who had low socioeconomic status. The curriculum included singing together and gave each child a chance to try out several musical instruments, play musical games, and receive much positive verbal feedback as they did this. The researcher analyzed videos and took ethnographic notes and demonstrated that the children showed dramatic improvement in social skills, control of emotions, and a sense of well-being and resilience (Heyworth 2013). In another study with at-risk Latino adolescents in the U.S. (Ho et al., 2011), students drummed together during the lunch hour in a counselor-led setting and called out positive messages they had written. Compared to students in a control group, students in the drumming group had less depression and a dramatic reduction in behavior-related problems after only 12 weeks.

Choruses help many older adults to overcome isolation. Even before the pandemic, research by the organization Chorus America revealed that singing in a chorus made members feel “more optimistic, mindful, and resilient” (Grunewald Associates LLC and Chorus America, 2019, p. 4). This belief was even stronger among low- or middle- income chorus members, and those with more limited formal education (Ibid.). Older choir members reported many additional benefits, including feeling less “left out”, due to their choral activities (p. 5).

At the present moment, many rich musical experiences need to take place in isolated settings, or through Zoom, until the pandemic abates. However, choirs are finding new ways to meet and sing together online, music lessons are still occurring, and musical performances are held, albeit not before live audiences. Although the palpable excitement of making music in the same physical space is not possible, in some ways, the ability to learn and share music has been enhanced. We can eliminate travel time, attend events far from our home, and work with teachers, conductors, and coaches who are geographically distant.

In whatever way the magical elixir of music plays out in your own life, you can freely enjoy – and create, and share the melodies, rhythms, and harmonies of this most ancient, rich,

and infinitely renewable human endowment.

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