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# Music as Medicine

A Review and Historical Perspective

Talin Babikian, PhD, ABPP, Lonnie Zeltzer, MD, Vartan Tachdjian, MD, Lindsay Henry, MA, Elan Javanfard, MA, Lara Tucci, MA, Mary Goodarzi, MA, and Raffi Tachdjian, MD, MPH

## Abstract

Music is one of the oldest tools in medicine, with a long-standing history across time and cultures. Music has been used in not only medical, including pain, management but also to facilitate mental health and well-being, and music's reach has ranged from practical to spiritual/cultural realms. This article provides a historical account of music in medicine and provides a brief summary of current understanding of neural underpinnings of musical perception and experience.

## Introduction

The history of music as medicine is as old as medicine itself, cutting across time, languages, and cultures. Beyond being a source of entertainment—and certainly beyond the performance or active musical experience itself—music has the far reaching and long-lasting effects of restoring both mind and body. In his *Theory of Moral Sentiments* (1759), Adam Smith described music as comprising building blocks of innate sympathy and as a creative activity of the human mind or body that surpasses learned languages, customs, and beliefs that typically separate cultures and their histories. Smith also stated that music unifies humanity by helping build connections among people and in our societies.<sup>1</sup>

Music as a building block is probably rooted in nature's innate biologic and physiologic rhythms and their role in maintaining cycles that are vital to sustaining both human and nonhuman life. Music is hardwired and present in infancy, with even newborns demonstrating an ability to discriminate and show interests in songs and musical instruments.<sup>2</sup> A simple study designed to show the quantifiable effects of music on nature demonstrated that, compared to no music at all, in vitro human cancer cells show differential growth rates in the presence of music, growing more slowly when exposed to more melodic sounds and growing faster in the presence of hard rock music.<sup>3</sup>

Despite the recognition of the therapeutic effects of music throughout millennia, the profession of music therapy and

its clinical applications are in their infancy. According to the World Federation of Music Therapy (WFMT):

Music therapy is the professional use of music and its elements as an intervention in medical, educational, and everyday environments with . . . [people] . . . who seek to optimize their quality of life and improve their physical, social, communicative, emotional, intellectual, and spiritual health and wellbeing. Research, practice, education, and clinical training in music therapy are based on professional standards according to cultural, social, and political contexts.<sup>4</sup>

Like any other form of therapy, music therapy is an active and creative partnership between a skilled musician/clinician who can facilitate responsive therapy to meet certain goals, whether they are physiologic, emotional, or psychologic.<sup>2</sup> The sections below summarize the history of music as medicine and provide a summary of current understanding of the neural underpinnings of processing and perception of music and its therapeutic benefits. Although this review takes a somewhat reductionist approach in highlighting the healing benefits of music, it is important to note that, beyond such an empirical approach, music can serve as an organizing metaphor for clinical medicine by contributing to human well-being using skill and mutual relational engagement.<sup>5</sup>

## Historical Perspectives

Since the dawn of time, music has been associated with communication, emotional expression, and healing. Back in Biblical times, David was said to have played the harp to rid King Saul of a bad spirit. In fact, the four major traditions of the literary history of medicine in the world parallel the history of music as medicine.<sup>6-8</sup> These include the Greco-Roman, Arab, Indian subcontinent, and Chinese traditions, although in many of these, music therapy has belonged in the realm of philosophic, cultural, and religious spheres rather than that of clinical practice.<sup>6</sup>

In the sixth century BC, Pythagoras—considered by some people to be the father of music therapy—used music as a vehicle to treat bodily and psychologic ailments systematically. Around 400 BC, Hippocrates—the father of Greek medicine—was known to play music for his patients, while Aristotle described music as a force that purified the emotions.<sup>9</sup> This interest in music was sustained later in Europe in the philosophic and musicological literature of Plato, who is credited with the theoretical conceptualization that music therapy works by attuning the soul to the cosmos,<sup>10</sup> a concept that was reiterated by the Turco-Persian psychologist and music theorist al-Farabi (known as Alpharabius in Europe), in his *Meanings of the Intellect*.<sup>11</sup>

Mkhitar Heratsi—the father of Armenian medicine and author of the *Treatment of Fevers*—published one of the most thorough pieces on fever-causing diseases in 1184, as well as the importance of treating the whole patient. He highlighted the role of music in healing by prescribing, “as much as possible, let the patient listen to much songs of the singers (troubadours), the sound of the strings and pleasant melodies.”<sup>12,13</sup>

Musical healing was discussed more actively and respected in early Islam, in which the use of music as therapy was beyond being merely philosophic in nature. Music took on a more practical and secular role, with a presence in hospitals for “insane” patients. The excitement and leadership support of intellectual and scientific enlightenment resulted in the translation of a large volume of Greek works into Arabic and Syrian, resulting in the development of medicine and music as scientific areas that were subject to systematic investigation with both theoretical and practical applications being highlighted.<sup>6</sup> However, in India, theory was more the norm than practice, often reflecting on the power of music to change nature. Similarly, in Chinese medicine, although music was thought to possess a “quasi-magical transformative power,” it was considered to affect nature, not disease.<sup>10</sup>

In the early modern period in Europe, Robert Burton, in his *The Anatomy of Melancholy*, wrote of music as the remedy for despair, with an ability to drive away the Devil himself. To a fiddler’s pipe, he attributed the ability to “make a melancholy man merry, and him that was merry much merrier than before, a lover more enamoured, a religious man more devout.”<sup>14</sup> Also in Europe, references in French Renaissance poetry included the power of the lyre over nature and Christ’s ability to calm the storm (“*serine l’orage*”)<sup>15</sup> and heal affairs of the heart or “lovesickness.”<sup>16</sup> There were also references to the elaborate and ritualistic music and dance used to cure the bite of the tarantula spider in southern Italy; the remnants of these practices are still present in parts of modern Italy in festivals and other cultural activities.<sup>17,18</sup>

In more contemporary times, music has been used to heal and build connectivity during times of destruction, such as the first two genocides of the twentieth century. During World War I, Komitas Vartabed (1869–1935 AD)—one of the first members of the International Music Society—emphasized the power of healing through music. Despite his virtuoso voice, he lost his sanity and became mute in

his last two decades in Paris’ Salpêtrière Hospital asylum, after enduring the atrocities committed upon him and his family by the Ottoman Turks during the Armenian genocide.<sup>19</sup> In Theresienstadt, a Nazi concentration camp for middle-class Jews in the Czech Republic during World War II, conductor Rafael Schächter formed a chorus within the camp as therapy for the downtrodden by performing works by Giuseppe Verdi.<sup>20</sup>

Although the use of music in medicine has a longstanding history as highlighted above, only recently has its therapeutic utility been systematically collected and researched based on clinical practice.<sup>21</sup> Because of this relatively sudden burst in support and interest, the profession of music therapy has never been “safer” than it is now. As chronic and degenerative pathologies have slowly replaced more acute and infective diseases, clinical medicine has integrated the human relationship into the scientific and problem-solving model.<sup>22</sup>

There are a growing number of music therapy training programs in the country, with The Certification Board for Music Therapists functioning as the governing entity that provides certification for qualified care providers. The American Music Therapy Association also has a number of fact sheets and resources on the applications of music therapy with various educational and clinical settings.

## The Brain on Music: What We Know from Imaging Studies

Advances in behavioral, electrophysiologic, and neuroimaging applications—including functional magnetic resonance imaging,<sup>23–26</sup> positron electron tomography<sup>27</sup> and electroencephalography,<sup>28,29</sup>—have allowed us to pave the way to understand the link between music and medicine better and study this link using the same methodological rigor as any other clinical practice in modern medicine.<sup>30</sup> This has allowed us to evaluate the structural and functional correlates of the cognitive neuroscience of music more closely. This evaluation has shown that brain regions responsible for the same reward/motivation, emotion, and arousal centers of the brain responsible for euphoria-inducing experiences—including food, sex, and certain drugs that are abused—are very similar to regions of the brain perceiving and processing musical experiences. Although the science of musical experiences from a cognitive level is still in its infancy, and a detailed review of these studies is beyond the scope of this article, a few relevant findings are summarized below.

Early studies focused on neural localization of various musical qualities, such as pitch, melody, and harmony.<sup>31</sup> Later, brain patterns in perception of music in musicians versus nonmusicians were explored, with more-recent research focused on higher-order cognitive processing of different aspects of musical experiences.<sup>31</sup> Neuroscience research in the last decade has focused on two brain regions as being key for processing musical information: the auditory cortex (which receives sound input) and the somatosensory cortex in the temporal lobe (which is responsible for representation of fingertips).<sup>32,33</sup>

Other seminal work<sup>34</sup> has consistently linked the cerebellum, basal ganglia, supplementary motor areas, and prefrontal and premotor cortices to musical performance. More-recent research, using novel imaging technology, has highlighted the relevance of the mirror neuron system in the shared emotional experience derived from music.<sup>31</sup> Music listening alone activates more brain regions than any other known cerebral activity, drawing on structures from the brainstem all the way up to the frontal cortex.<sup>31</sup> Clearly, there are broad neural networks ranging from emotional perception to motor/somatosensory functioning that are key in the various processes involved in musical perception.

## Discussion

Music is probably one of the oldest tools in medicine and has recently received considerable attention, allowing music to be studied with the same methodological rigor as conventional interventions. In pain management, music provides distraction and cognitive imagery to aid relaxation. Music also reduces pain perception by blocking pain impulses to the brain at the spinal cord and releasing endorphins, which simply help people feel good. Therapeutic music can also help restore lost abilities, such as memory deficits in dementia, or speech and motor deficits following a brain injury or stroke.

One of the fastest growing clinical applications of music therapy is with children with autism spectrum or other developmental disorders, helping improve self-expression, as well as social and shared communication, and perhaps reaching even less-measurable goals, such as improving self-esteem and quality of life. It is known from neuroimaging research that brain circuitry involved in perception and processing of music overlaps closely with areas of the brain regulating emotions, arousal, pleasure, and cognition. To a great extent, this explains how music can be used as a tool to influence and regulate these fundamental human functions.

As a result of very rapid advancements in technology, our access to music and the environments in which we listen to music have changed dramatically. In the last few centuries, we have progressed from listening to pieces of music during live performances, only to hear a given piece once or twice in a lifetime perhaps, to having access to a vast array of music instantaneously.<sup>35</sup> As adults, we are said to be exposed to some form of music, although not actively, for ~40% of our waking lives,<sup>35</sup> with this rate being up to 80% in toddler years.<sup>36</sup>

Although there is a relatively small evidence base for using musical interventions to promote health and well-being, support for music's clinical application is growing rapidly. Music is considered to be promising and one of the most universal modes of therapy because of its low cost, ease of administration, minimal-to-no risk of adverse effects, as well as applicability to a range of clinical populations and age groups. As music's effectiveness is measured and studied, attention should be given to identifying measurable therapeutic goals, using adequately powered studies of methodological rigor (with use of appropriate control groups) to establish quantifiable measures of music's efficacy.

## More Information Online

**World Federation of Music Therapy (WFMT)**  
Web site: [www.wfmt.info/WFMT/Home.html](http://www.wfmt.info/WFMT/Home.html)

Founded in Genoa, Italy, the WFMT is an international nonprofit organization that develops and promotes music therapy throughout the world as an art and science. The organization is involved in information exchanges, collaborations, and more.

**American Music Therapy Association (AMTA)**  
Web site: [www.musictherapy.org](http://www.musictherapy.org)

The AMTA works to advance public awareness of the benefits of music therapy and increase access to music therapy services.

**The Certification Board for Music Therapists (CBMT)**  
Web site: [www.cbmt.org](http://www.cbmt.org)

The CBMT is the only organization to certify music therapists to practice music therapy nationally. The organization has an MT-BC program that is fully accredited by the National Commission for Certifying Agencies.

## Conclusion

With computer and data inundation isolating subsequent generations increasingly, music therapy remains a healing tool, now with a growing evidence base, for fostering social interaction and well-being. Music is universal but it is also highly individualistic and empowering. Kusek and Leonhard stated: "When people are touched by music, it often results in real bodily sensations, in 'real' and tangible experiences that are way beyond the logic of simply processing information."<sup>37</sup> Although pinpointing the precise healing mechanisms of music remains elusive, we all recognize its powerful influence on ourselves and on others when it undoubtedly occurs.

## Disclosure Statement

No competing financial interests exist for any of the authors. ■

## References

1. Dissanayake E. Root, leaf, blossom, or bole: Concerning the origin and adaptive function in music. In: Malloch C, Trevarthen S, eds. *Communicating Musicality: Exploring the Basis of Human Companionship*. Oxford: Oxford University Press, 2009:17–30.
2. Trevarthen C. Communicative musicality: The human impulse to create and share music. In: Hargreaves D, Meil D, MacDonald R, eds. *Musical Imaginations: Multidisciplinary Perspectives on Creativity, Performance, and Perception*. Oxford: Oxford University Press, 2012:261–284.
3. Sharma HM, Kauffman EM, Stephens RE. Effect of different sounds on growth of human cancer cell lines in vitro. *Altern Ther Clin Pract* 1996;3:25–32.
4. World Federation of Music Therapy (WFMT). *Announcing WFMT's NEW Definition of Music Therapy*. 2011. Online document at: [www.musictherapyworld.net/WFMT/President\\_presents...\\_files/President\\_presents...5-2011.pdf](http://www.musictherapyworld.net/WFMT/President_presents..._files/President_presents...5-2011.pdf) Accessed August 29, 2013.

5. Evans HM. Medicine and music: Three relations considered. *J Med Humanit* 2007;28:135-148.
6. Shiloah A. Jewish and Muslim traditions of music therapy. In: Horden P, ed. *Music as Medicine*. Burlington, VT: Ashgate Publishing, 2000:69-83.
7. Davison K. Historical aspects of mood disorders. *Psychiatry* 2006;5:115-118.
8. Licht S. *Music in Medicine*. Boston: New England Conservatory of Music, 1946.
9. Antrim DK. Music therapy. In: *The Music Quarterly*. Oxford: Oxford University Press, 2006.
10. Horden P. Commentary on Part I, with a note on China. In: *Music as Medicine*. Horden P, ed. Burlington, VT: Ashgate Publishing, 2000:44-50.
11. Haque A. Psychology from Islamic perspective: Contributions of early Muslim scholars and challenges to contemporary Muslim psychologists. *J Religion Health* 2004;43:357-377.
12. Heratsi M. *Treatment of Fevers*. Venice: San Lazaro Printing, 1832.
13. Gdzoyan AS. *Mkhitar Heratsi, 10th Century Physician*. Yerevan: Hayastan Printing, 1968.
14. Burton R. *The Anatomy of Melancholy: What It Is, with All the Kinds, Causes, Symptoms, Prognostics, and Several Cures of It*. New York: New York Review Books, 2011.
15. Heather P. Curing man and the cosmos: The power of music in French Renaissance poetry. Horden P, ed. In: *Music as Medicine*. Burlington, VT: Ashgate Publishing, 2000:195-212.
16. Austern LP. Musical treatments for lovesickness: The early modern heritage. In: Horden P, ed. *Music as Medicine*. Burlington, VT: Ashgate Publishing, 2000:213-245.
17. Gentilcore D. Ritualized illness and music therapy: Views of Tarantism in the Kingdom of Naples. In: Horden P, ed. *Music as Medicine*. Burlington, VT: Ashgate Publishing, 2000:255-272.
18. Ludtke K. Tarantism in Contemporary Italy: The Tarantula's dance reviewed and revived. In: *Music as Medicine*. Horden P, ed. Burlington, VT: Ashgate Publishing, 2000:292-313.
19. Komitas. *Komitas: Essays and articles; The musicological treatises of Komitas Vardapet*. Constantinople: Drazark Press, 2001.
20. *Voices of the Holocaust*. David P. Boder Interviews Friedrich Schlaefrig. Paris, France, August 23, 1946. Online document at: [http://voices.iit.edu/inter-view?doc=schlaefrigF&display=schlaefrigF\\_en](http://voices.iit.edu/inter-view?doc=schlaefrigF&display=schlaefrigF_en) Accessed August 29, 2013.
21. Tyler HM. The music therapy profession in modern Britain. In: Horden P, ed. *Music as Medicine*. Burlington, VT: Ashgate Publishing, 2000:375-393.
22. Lippi D, Roberti di Sarsina P, D'Elios JP. Music and medicine. *J Multidiscip Healthc* 2010;3:137-141.
23. Demorest SM, Morrison SJ, Stambaugh LA, et al. An fMRI investigation of the cultural specificity of music memory. *Soc Cogn Affect Neurosci* 2010;5:282-291.
24. Nan Y, Knosche TR, Zysset S, Friederici AD. Cross-cultural music phrase processing: An fMRI study. *Hum Brain Mapp* 2008;29:312-328.
25. Chen JL, Rae C, Watkins KE. Learning to play a melody: An fMRI study examining the formation of auditory-motor associations. *Neuroimage* 2012;59:1200-1208.
26. Caria A, Venuti P, de Falco S. Functional and dysfunctional brain circuits underlying emotional processing of music in autism spectrum disorders. *Cereb Cortex* 2011;21:2838-2849.
27. Blood AJ, Zatorre RJ. Intensely pleasurable responses to music correlate with activity in brain regions implicated in reward and emotion. *Proc Natl Acad Sci U S A* 2001;98:11818-11823.
28. Wu J, Zhang J, Liu C, et al. Graph theoretical analysis of EEG functional connectivity during music perception. *Brain Res* 2012;1483:71-81.
29. Schaefer RS, Desain P, Farquhar J. Shared processing of perception and imagery of music in decomposed EEG. *Neuroimage* 2013;70:317-326.
30. Vines BW. Recreating speech through singing for stroke patients with non-fluent aphasia. In: Hargreaves D, Meill D, MacDonald R, eds. *Musical Imaginations: Multidisciplinary Perspectives on Creativity, Performance, and Perceptions*. Oxford: Oxford University Press, 2012:296-312.
31. Molnar-Szakacs I, Assuied VG, Overy K. Shared affective motion experience (SAME) and creative, interactive music therapy. In: Hargreaves D, Meill D, MacDonald R, eds. *Musical Imaginations: Multidisciplinary Perspectives on Creativity, Performance, and Perception*. Oxford: Oxford University Press, 2012:313-331.
32. Elbert T, Pantev C, Wienbruch C, et al. Increased cortical representation of the fingers of the left hand in string players. *Science* 1995;270:305-307.
33. Pantev C, Oostenveld R, Engelien A, et al. Increased auditory cortical representation in musicians. *Nature* 1998;392:811-814.
34. Sergent J, Zuck E, Terriah S, MacDonald B. Distributed neural network underlying musical sight-reading and keyboard performance. *Science* 1992;257:106-109.
35. Hargreaves DJ, Hargreaves JJ, North AC. Imagination and creativity in music listening. In: Hargreaves D, Meill D, MacDonald R, eds. *Musical Imaginations: Multidisciplinary Perspectives on Creativity, Performance, and Perception*. Oxford: Oxford University Press, 2012:156-172.
36. Lamont AM. Toddlers' musical worlds: Musical engagement in 3.5 year olds. In: Baroni M, Adressi AR, Caterina R, Costa M, eds. *Abstracts of the 9th International Conference on Music Perception and Cognition*. Bologna: Bononis University Press, 2006:946-950.
37. Kusek D, Leonhard G. *The Future of Music*. Boston: Berklee Press, 2005.

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Talin Babikian, PhD, ABPP, is an assistant clinical professor in the department of psychiatry and biobehavioral sciences at the David Geffen School of Medicine at the University of California—Los Angeles (UCLA). She is also director of programs and research for the nonprofit, Children's Music Fund. Lonnie Zeltzer, MD, is the director of the UCLA children's pain and comfort care program and a distinguished professor of pediatrics, anesthesiology, psychiatry and biobehavioral sciences at the David Geffen School of Medicine. Vartan Tachdjian, MD, is a staff physician at the Community Health Centers of the Central Coast, in Santa Barbara, CA. Lindsay Henry, MA, is a graduate student of clinical psychology, and Lara Tucci, MA, is a doctoral student; both at Pepperdine University, Los Angeles. Elan Javanfard, MA, is a therapist at Didi Hirsch Mental Health Services, in Los Angeles. Mary Goodarzi, MA, is a graduate student in a PsyD clinical psychology program at the Wright Institute, in Berkeley, CA. Raffi Tachdjian, MD, MPH, is an assistant clinical professor for allergy and immunology, in the departments of medicine and pediatrics at the David Geffen School of Medicine and is a founder and the president of Children's Music Fund.

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