

5-12-2017

Music as the Architect for Speech and Language: A Systematic Review

Savannah Vance
Grand Valley State University

Follow this and additional works at: <https://scholarworks.gvsu.edu/honorsprojects>



Part of the [Music Commons](#), and the [Reading and Language Commons](#)

ScholarWorks Citation

Vance, Savannah, "Music as the Architect for Speech and Language: A Systematic Review" (2017).
Honors Projects. 594.
<https://scholarworks.gvsu.edu/honorsprojects/594>

This Open Access is brought to you for free and open access by the Undergraduate Research and Creative Practice at ScholarWorks@GVSU. It has been accepted for inclusion in Honors Projects by an authorized administrator of ScholarWorks@GVSU. For more information, please contact scholarworks@gvsu.edu.

Music as the Architect for Speech and Language: A Systematic Review

Savannah Vance

Grand Valley State University

Introduction

It is hypothesized that before the complexity of speech and language developed, much of human communication was based on basic forms similar to music and gesture (Hamilton, 2010). Differences in pitch and tone in conjunction with expressive gestures were used in conveying excitement, fear, danger, or happiness. Today, music is used as a way to express emotions when spoken words are just not enough. As a result, many have begun to see the significant relationship between the use of music and language in human development as a whole. Specifically, some speech-language pathologists (SLPs) are learning to accept music in speech and language therapy in order to facilitate development in overall communication (Smith, 2011).

Music and language are both vital components in personal expression and individuality. Music allows for individuals to adhere to specific elements of genres in order to reflect their inner emotions and personal stories. Music is an international language that crosses all barriers and is a potential way to reach out to people of any background who struggle to express themselves as a result of communication impairments (Bolton, 2012). According to the American Music Therapy Association (2011), music and language share 5 characteristics: (1) they are universal and specific to humans, (2) both have pitch, timbre, rhythm, and durational features, (3) spontaneous speech and spontaneous singing within infants develop around the same time, (4) auditory, visual, and vocal uses are built on structure and rules, and (5) distinct forms of music and language exist and vary across cultures.

The utilization of music in speech and language therapy can aid treatment of various types of communication disorders and impairments including individuals with strokes, traumatic brain injury, autism, language/intellectual/hearing impairments, childhood apraxia of speech, dementia, cleft palate, aphasia, neurodegenerative disorders (e.g. Parkinson's), voice disorders,

and stuttering (Peters, 2000). Music is a fairly new approach to treatment in speech and language therapy but research evidence of its effectiveness is emerging. Preliminary reports suggest that its effectiveness can be powerful in habilitation and rehabilitation of speech and language.

Music in speech and language therapy is used for a variety of reasons in order to improve overall communication in children, adolescents, and adults. Therapeutic music exercises may focus on increasing breath and muscle control, stimulating vocalization, developing receptive and/or expressive language skills, improving articulation, improving speech rate and fluency and correcting or managing voice disorders (Peters, 2000). Most importantly, proponents of the use of music in speech and language therapy suggest that music is meant to rejuvenate the joy in communicating by increasing self-confidence, emotional expression and social interaction (Peters, 2000).

The clinical question in the following systematic review is: What level of evidence exists to support the use of music in facilitating speech and language habilitation and rehabilitation for individuals with communication disorders? The purpose of this systematic review is to examine the available evidence supporting the effects of music on speech and language performance for children, adolescents, and adults with communication disorders. It will analyze and evaluate the literature pertaining to characteristics of music that may influence speech and language acquisition and the role music can play in improving communication skills.

Methods

The systematic review was conducted by searching for articles from various areas of online research including the American Speech Language and Hearing Association (ASHA) Wire, Google Scholar, and the Grand Valley State University Library database. The following

keywords were used to search the databases: *music, speech and language, children, adolescents, adults, speech and language intervention, and communication disorders.*

Inclusion and Exclusion Criteria

All articles, blogs, peer-reviewed journal manuscripts and books published from 2007-2016 were included in the review if they discussed individuals with communication disorders, included both music therapy and speech and language intervention, were published in English language, included human subjects, and were full text articles. Manuscripts were excluded from the review if they included subjects not diagnosed with communication disorders, or used music therapy for treatments not related to communication disorders.

Titles, keywords, abstracts, methods, results, and discussions were all thoroughly screened and reviewed by the first author for potential relevance to the topic. Systematic reviews and grey literature pertaining to music and speech and language intervention were utilized in the research process because of the lack of global research done on this topic. Through this process, sources were eliminated that did not meet the criteria for inclusion, yielding a total of 15 sources.

Results

Analysis of the results yielded nine descriptive sources: four textbook chapters, four popular media sources, and one peer-reviewed article. Five peer-reviewed experimental and non-experimental sources were also analyzed. For more information on each specific source, please refer to Table 1 in Appendix A. According to ASHA (2004), steps in the process of evidence-based practice include assessing the level of evidence of individual sources. For this systematic review, 10 of the 15 sources fall under level IV on the hierarchy of level of evidence because they are descriptive sources that consider clinical expertise of respected authorities in the speech-

language pathology profession. Two sources fall under level III on the hierarchy of evidence because they are well-designed non-experimental studies (i.e. case studies). The final three experimental sources fall under level IIb on the hierarchy of evidence because they are classified as well-designed quasi-experimental studies.

Studies for each age group were relatively equal in regards to the number of sources found as well as the level of evidence of each source. For infants and children, four peer-reviewed experimental studies fall under either level III or level IIb on the hierarchy of level of evidence and three sources fall under level IV on the hierarchy of level of evidence. For adults, one peer-reviewed experimental study falls under level III and six descriptive sources fall under level IV on the hierarchy of level of evidence.

Infants and children

For infants and children, the use of simple melodies and repetitive rhythms demonstrates positive effects in early intervention for speech and language therapy. Findings of the current research suggest that incorporating music during the critical stages of speech and language development through early intervention strategies has potential to improve speech processing and overall cognitive development in infants and young children with possible or diagnosed speech and language disorders.

The study conducted by Christina Zhao (2016) evaluated the effects of music-play in the enhancement of infants' speech processing abilities. Thirty-nine infants in groups of two or three participated with their parents in a dozen 15-minute sessions over a month. Twenty babies were assigned to the music set-up, in which they learned a waltz (triple-meter) music pattern through guidance from their parents in tapping out the beat. The rest of the participants played in sessions with toy cars, blocks and other objects that did not involve music. Brain activity was measured

using magnetoencephalography. Results of the study found stronger neural responses to music and speech patterns in infants nine months of age who attended music-play sessions with their parents, compared to those who had play sessions in social environments without music. Zhao suggested that “experiencing a rhythmic pattern in music can also improve the ability to detect and make predictions about rhythmic patterns in speech”, which can facilitate global cognitive development (2016, para. 3).

In addition, the study conducted by LaGasse (2013) examined the use of Melodic Intonation Therapy (MIT) for functional speech production in children with developmental apraxia of speech (DAS). Participants included two male children between the ages of 5 and 6 years that spoke English as a primary language in the home. A variety of pre-test and post-test measurements of articulation were used in assessing each child’s articulation, phonological abilities, and phonological processes before continuing with treatment. Treatments were administered in an alternating manner (e.g. speech therapy was administered one session, the next was an MIT treatment session). Treatment sessions continued for 40 minutes per week for four weeks. Results demonstrated some improvements in speech when the child was actively engaged in the MIT. Unfortunately, MIT does not contain any motivational or rewarding aspects for the children, which lowered both of the children’s desire to continue with treatment. The results of the study suggest that music and speech therapy can be effective if the children are willing to participate. Specifically, MIT must be modified for each individual client depending on the needs of the child and the goals for treatment.

Reschke and Alaine (2011) found that the use of music in speech and language therapy for children with autism could improve behavior, self-care and independence, outdoor play, and the generalization of communication skills (p. 6). Sandiford, Mainess & Daher (2013) conducted

one of the very first studies that evaluated the efficacy of Melodic Based Communication Therapy (MBCT) and compared it to traditional speech and language therapy for eliciting speech in nonverbal children with autism. Participants included 12 nonverbal children with autism ages 5 through 7 randomly assigned to one of two treatment groups, speech therapy (ST) or MBCT. Results of the study demonstrated promising positive effects of music-based interventions for children with autism. Individuals in the MBCT group showed greater overall gains in verbal and imitative attempts at speech as well as a significant improvement in number of words spoken at home. Results of the study support what previous research has shown about children with autism: they demonstrate right hemisphere strengths, ironically where melody and rhythm are housed in the brain. Therefore, it is not surprising that the participants preferred and responded so well to the treatment tasks relating to music and rhythm.

In a clinical methods paper, Geist, McCarthy, Rodgers-Smith and Porter (2008) suggested that simple melodies and tempos, such as nursery rhymes and folk songs, work best as treatment for children with communication disorders. The SLPs and music therapists may collaborate in order to teach oral motor speech movement, receptive and expressive language concepts, phonological awareness, social language skills, and building vocabulary, grammar, and speech fluency in children (Geist et. al, 2008). Using repetitive melodies with simple harmonic structure including “Hello” songs, “Wheels on the Bus” and “Brown Bear, Brown Bear What do you see” makes it easier for children to learn and generalize to speaking situations in the classroom, at home, and interacting with their peers. In addition, folk songs and nursery rhymes are excellent for teaching one-on-one or in the classroom because they are not only exciting for children but their peers, as well. Drumming to the various tempos and beats of numerous folk songs allow for greater opportunities of social interaction and sensory integration that keep the

child engaged through the entire session and best of all, bring the fun into therapy (Geist et. al, 2008). It is extremely important for children to learn to socialize with their peers because it is the most crucial part of communication (Geist et. al, 2008).

Adolescents and adults

For adolescents and adults, music in speech and language therapy is heavily determined by the individual's preference in music. Previous research findings suggest that much of the music adolescents prefer include pop, alternative, and punk rock music, or a variation of these genres (McFerran, 2010). Many adolescents who need speech and language therapy describe feelings of depression, shame and embarrassment because their speech is different from their peers (McFerran, 2010) They may be teased in class or at home despite the many efforts the parents and teachers do in order to stop or reduce those negative behaviors. As a result, music that is responsive and acknowledging (e.g. pop, alternative, and punk rock) of the hardships of first loves and heartbreaks, being different, resenting mainstream society, etc., is favored among adolescents. To summarize the findings of this study, McFerran observed that when working with adolescents, SLPs must take into account these feelings and attitudes towards their disorder and how the SLP can incorporate the client's favorite types of music into expressing those emotions and using that as motivation to continue therapy. The SLP and music therapist can utilize the aesthetics of popular songs favored by the client in order to work on social interaction with peers or simply improving self-confidence (McFerran, 2010, p. 80).

The simplicity of pop songs may also help adolescents with other aspects of communication including building receptive and expressive language skills and improving speech fluency. The narratives in popular rock, punk, or alternative songs may be used to help adolescents identify elements of the story behind the song and learn to express those emotions

the song depicts by identifying similar elements in other songs (McFerran, 2010). The dynamic vocal range and simple instrumentation of slower ballads may help adolescents and adults with voice disorders that have issues with pitch and voice inflections, such as inappropriate loudness or functional aphonia and dysphonia (McFerran, 2010).

It has also been shown that for advanced stutterers, singing helps to alleviate the pressures from stuttering and therefore increase fluency (Holly, 2013). Singing provides increased phonation duration, intonation, and a shared auditory-motor pathway with speech. Pop music contains a simple and constant rhythm that is inherently predictable, which helps to cue what is coming next. For people who stutter, this time cue is theorized to be a crucial component for improving fluency. Because of the structured and predictable rhythm when singing pop music, it may help to provide cues that facilitate the timing and coordination for speech production (Holly, 2013). Since conversation is always changing, the role of memorization and recall of the aesthetics of songs helps to relieve stress and anxiety to produce spontaneous speech.

According to Vega (2013) and Cohen (2013), popular music that is recognizable and nostalgic has been shown to improve natural speech and language patterns and facilitate recovery for those who have neurogenic communication deficits, typically in older adult patients. Neurogenic communication disorders typically result from neurological damage including stroke, traumatic brain injury, or a chronic neurodegenerative condition (e.g. Parkinson's Disease). SLPs often treat patients who express symptoms of a neurogenic disorder that effect articulation, voicing, and fluency (Cohen, 2013). Symptoms of neurogenic communication disorders have been shown to disappear or minimize when the right music, rhythmic cue, or element of music is displayed therefore allowing certain functions to be enabled (Cohen, 2013).

Both Vega and Cohen discuss the effectiveness of music therapy, specifically MIT, in treating individuals with a TBI or neurogenic communication disorder. MIT attempts to capitalize on preserved singing abilities while engaging the language-capable regions in the undamaged right hemisphere. Specifically, three aspects of spoken prosody, including pitch variation in a spoken phrase, tempo or rhythm of a phrase, and points of stress for emphasis, form a basis of melodic intonation. All three elements are exaggerated in order to emphasize the prosodic structure of speech. Popular music that is recognizable and nostalgic has been shown to improve natural speech and language patterns for those who have suffered from stroke or traumatic brain injury, typically in geriatric patients (Vega, 2013). Symptoms of aphasia or other neurological trauma have been shown to disappear or minimize when the right music, rhythmic cues, or element of music is displayed therefore allowing certain functions to be enabled (Vega, 2013). It is possible that music provides an auditory cue that stimulates some key brain pathways involved in motor initiation and control. As a result, it may reinforce and train those areas into action so that those neural pathways are rewired for speech.

For example, Cohen highlights that the ability to sing, or at least maintain a melody, not only facilitates speech fluency, but also “emphasizes deep breathing, controlled exhalation, and audible phonation [for improvement on] dysphonic and dysprosodic speech” for individuals with a neurogenic communication deficit (p.164). For individuals with TBI, “music therapy may help the patient improve in orientation, attention to task, and memory” (Vega, 2013, p. 150). Playing musical instruments or simply drumming to a beat can restore motor and coordination skills. Most importantly, group music therapy sessions allow for patients to express their emotions and engage in socialization with others who have acquired a communication disorder. (Vega, 2013, p. 151).

In a study conducted by Lim and colleagues (2013), the therapeutic effect of neurologic music therapy (NMT) and speech language therapy (SLT) was demonstrated through improvement of the aphasia quotient (AQ) in post-stroke patients with aphasia. It is theorized that NMT operates by stimulating the speaking pathway in the left cerebral hemisphere or the singing pathway in the right side of both cerebral hemispheres. Initiating pathways in both cerebral hemispheres has been shown to play a role in executing vocal cord production and controlling sensorimotor functions in both speaking and singing.

Functionality of language was assessed using the Korean version-Western Aphasia Battery before and after therapy. NMT consisted of therapeutic singing and melodic intonation therapy, and SLT consisted of language-oriented therapy. Results showed significant improvements in the aphasic quotient, specifically in repetition and naming, after NMT in AQ. There were significant improvements in language ability in the NMT group of subacute stroke patients. However, there was no significant improvement in the SLT group of subacute stroke patients. The research suggests that music and singing can present more opportunities for distinguishing phonemes using rhythmic characteristics such as intonation, tone, and syllable accent. However, the study demonstrates significant limitations that make it difficult to make definite conclusions about the differences in effects between NMT and SLT.

Discussion

The results of the systematic review demonstrate that much of the evidence for the utilization of music in speech and language therapy is about 68% descriptive and 31% experimental. Five peer-reviewed articles provided some evidence of music-based therapies used in treatment of communication disorders. However, much of the anecdotal and descriptive information is theoretical and provides suggestions and possible strategies for implementing

music in speech and language therapy. Nonetheless, this information should not be disregarded. This systematic review falls under level VI on the hierarchy of evidence because it utilizes different expert opinions that validate the potential use of music in speech and language habilitation and rehabilitation for individuals of all ages with communication disorders.

Despite the evidence, limitations to this systematic review are still relevant to the efficacy of the results. First, many of the studies were not done in the United States, which may make the results of the studies less generalizable to U.S. populations. Other limitations in some reviewed articles include having a small sample size for the study or large age ranges between participants, further affecting the generalizability of the results. Because Non-English publications were not included, it is possible that crucial information was missed that was relevant to music in speech and language habilitation and/or rehabilitation, thus making it less globally generalizable.

In addition, much of the information was only exploratory evidence to the use of music in speech and language therapy and did not provide sufficient evidence for its use, thus affecting the validity of the results. Most importantly, the time frame in which the information was collected, analyzed, and evaluated over one semester (i.e. 16 weeks) was not significant enough in order to provide a strong level of evidence for the use of music in speech and language therapy, therefore the results of the systematic review could potentially be less reliable.

Nevertheless, the systematic review demonstrates that the use of music in speech and language therapy could provide another useful strategy in improving performance in communication. Music may provide a comfortable environment for individuals of all ages to relate to one another based on similar life experiences and personal expression. Early efforts to examine the use of music in speech and language therapy, suggest that using music in speech and language therapy may help to improve the patient's overall self-esteem by addressing those

feelings that were so hard to put into spoken words. Once a client's self esteem improves, no matter their age, speech and language therapy may continue to progress until the client's wants and needs are met to the fullest extent.

Conclusion

In conclusion, results of the systematic review suggest potential positive effects of the use of music in speech and language therapy. Music in speech and language therapy may improve communication for individuals for those with speech and language disorders as well as overall quality of life. The current results ultimately suggest that more scientifically-rigorous research needs to be conducted on the specific effects of music on the habilitation and rehabilitation for speech, language, and communication abilities for all ages.

Acknowledgments

The student would like to thank Dr. Janine Bartley, Ph.D., CCC-SLP. for help in the final processing and editing of this paper.

Bibliography

- American Speech-Language-Hearing Association. (2004). *Evidence-based practice in communication disorders: an introduction* [Technical Report]. Retrieved from <http://www.asha.org/policy/tr2004-00001/>.
- Bolton, C. (2012). Using music and singing with speech and language therapy to improve clients' communication skills. Retrieved from http://www.wcmt.org.uk/sites/default/files/migrated-reports/995_1.pdf
- Cohen, N.S. (2013). Adults with neurogenic communication disorders. *Guidelines for music therapy practice in adult medical care*, 179-189. Gilsum, N.H.: Barcelona.
- Geist, K., McCarthy, J., Rodgers-Smith, A., & Porter, J. (2008). Integrating Music Therapy Services and Speech-Language Therapy Services for Children with Severe Communication Impairments: A Co-Treatment Model. *Journal Of Instructional Psychology*, 35(4), 311-316.
- Hamilton, J. (2010, August). Signing, singing, speaking: how language evolved. *National Public Radio*. Retrieved from <http://www.npr.org/templates/story/story.php?storyId=129155123>
- Holly, F. (2013). Singing without a stutter: music as a speech therapy tool - melodic intonation therapy as a treatment technique for stuttering [Blog Post]. *Speech stuttering techniques*. Retrieved from <https://www.speechbuddy.com/blog/speech-therapy-techniques/singing-without-a-stutter-music-as-a-speech-therapy-tool/>
- Lim, K.-B., Kim, Y.-K., Lee, H.-J., Yoo, J., Hwang, J. Y., Kim, J.-A., & Kim, S.-K. (2013). The Therapeutic Effect of Neurologic Music Therapy and Speech Language Therapy in Post-Stroke Aphasic Patients. *Annals of Rehabilitation Medicine*, 37(4), 556–562. <http://doi.org/10.5535/arm.2013.37.4.556>
- LaGasse, B. (2012). Evaluation of melodic intonation therapy for developmental apraxia of speech. *Music Therapy Perspectives*, 30(1), 49-55.
- McFerran, K. (2010). Song methods and teenagers. In *Adolescents, music and music therapy methods and techniques for clinicians, educators and students*, 3(2), 75-86. London: Jessica Kingsley.
- Peters, J. (2000). Music therapy for individuals who have communication disorders or impairments. In *Music Therapy an Introduction*, (2), 170-188. Springfield: Charles C Thomas Publisher.
- Reschke-Hernández, A. E.. (2011). History of music therapy treatment interventions for children with autism. *Journal of Music Therapy*, 48(2), 169-207.

- Sandiford, G. A., Mainess, K. J., & Daher, N. S. (2013). A pilot study on the efficacy of melodic based communication therapy for eliciting speech in nonverbal children with autism. *Journal of Autism and Developmental Disorders*, 43(6), 1298-307. doi:<http://dx.doi.org.ezproxy.gvsu.edu/10.1007/s10803-012-1672-z>
- Smith, R. (2011). Speech-language therapy and music therapy collaboration: the dos, the don'ts, and the why nots. *American Speech, Language and Hearing Association (ASHA)*. Retrieved from <http://blog.asha.org/2011/10/04/speech-language-therapy-and-music-therapy-collaboration-the-dos-the-donts-and-the-why-nots/>
- Vega, V.P.(2013). Adults with traumatic brain injury. *Guidelines for music therapy practice in adult medical care*,145-168. Gilsum, N.H.: Barcelona.
- Wilcox, C. (2012). Even a few years of music training benefits the brain. *Scientific American*. Retrieved from <http://blogs.scientificamerican.com/science-sushi/even-a-few-years-of-music-training-benefits-the-brain/>
- Zhao, T. C., & Kuhl, P. K. (2016). Musical intervention enhances infants' neural processing of temporal structure in music and speech. *Proceedings of the National Academy of Sciences*, 113(19), 5212-5217. doi:10.1073/pnas.1603984113

Reference	Type of Source	Location of Source	Communication Disorder	Number of Participants (n)		Description of source
Bolton, C. (2012).	Research Study	Google Scholar	Strokes, brain injury, degenerative neurological conditions (e.g. Parkinson's Disease) and dementia	N/A	Descriptive	An examination of how Music Therapy and speech-language pathology work collaboratively in treating communication disorders and improving quality of life
Cohen, N.S. (2013).	Textbook Chapter	Guidelines for Music Therapy Practice in Adults Medical Care	Neurogenic Communication Disorders	N/A	Descriptive	The chapter discussed types of music therapy treatments that can be utilized in speech therapy for neurogenic communication disorders (NCD). It provided examples for the types of treatments and the importance of music therapy and speech therapy to collaborate in the treatment of NCD for adults.
Geist, K., McCarthy, J., Rodgers-Smith, A., & Porter, J. (2008).	Peer-reviewed article	Journal of Instructional Psychology	Severe speech, language, and cognitive impairments due to birth complications	2 children, male	Experimental	The article documented the process of collaborative treatment of music therapy and speech-language intervention for a child with severe speech and language impairments, specifically for augmentative and alternative communication (AAC). The music therapist and SLP determined that the child responded best to treatment with the use of music in therapy sessions. The study also demonstrated the clinical implications for incorporating music therapy into speech therapy for improving social interactions for children with severe speech and language impairments.
Holly, F. (2013).	Blog	American Speech Language and Hearing Association (ASHA)	Stuttering	N/A	Descriptive	A blog about how music can affect the brain and why singing can actually improve fluency for children who stutter or have some sort of voice/fluency disorder
Lim, Kil-Byung. (2013)	Peer-reviewed article	Annals of Rehabilitation Medicine	Post-stroke aphasia	21 adults, gender not identified	Experimental	Investigation of the effect of neurologic music therapy (NMT) and speech language therapy (SLT) on nonfluent aphasic stroke patients. Results indicated the NMT was successful in the significant improvement of language ability for subacute stroke patients; results for SLT showed no significant improvement.
LaGasse, B. (2012).	Peer-reviewed article	Music Therapy Perspectives	Developmental apraxia of speech	2 children, male, 5-6 years of age	Experimental	An article that evaluates the efficacy of Melodic Intonation Therapy (MIT) in the treatment of a child with developmental apraxia of speech. Two case studies were conducted and results were discussed. It provided strengths and limitation to the study as well as explained the effectiveness of MIT for children with DAS.
McFerran, K. (2010).	Textbook chapter	Adolescents, music and music therapy methods and techniques for clinicians, educators and students	N/A	N/A	Descriptive	This chapter specifically explained how to work with adolescents and their music preferences. The source provided information on how to utilize the client's music preference to incorporate into music therapy and other types of therapies that would help the adolescent with any communication or social issues

Peters, J.	Textbook Chapter	Music Therapy An Introduction	Any	N/A	Descriptive	A book that gives an overview on the profession of music therapy. The specific chapter discussed in the paper explains the basics of music therapy for individuals who have communication disorders or impairments.
Reschke-Hernández, Alaine E, MA, MT-BC. (2011).	Peer-reviewed article	Journal of Music Therapy	Autism	N/A	Descriptive	A systematic review on the history of music therapy treatment interventions for children with autism. It reviewed the efficacy of treatments from 1940-2009 and later suggests implications for future research in music therapy and music therapy treatment options for children with autism.
Sandiford, G. A., Mainess, K. J., & Daher, N. S. (2013)	Peer-reviewed article	Journal of Autism and Development Disorders	Autism	21 children, 5-7 years of age	Experimental	An article that compared the efficacy of Melodic Based Communication Therapy (MBCT) to traditional speech-language therapy for eliciting speech in non-verbal children with autism. Result indicated the positive effects of MBCT because the music provided increased motivation for the child to learn more words and communicate more with family and peers.
Smith, R. (2011).	Blog	American Speech Language and Hearing Association	N/A	N/A	Descriptive	A blog that explains the importance of collaboration of music therapy and speech-language therapy. It explains the similarities between music and speech, what music therapy is, and what a clinician should and should not do when collaborating with other music therapists.
Vega, V.P., (2013).	Textbook Chapter	Guidelines for Music Therapy Practice in Adults Medical Care	Traumatic Brain Injury	N/A	Descriptive	The chapter discussed types of music therapy treatments that can be utilized in speech therapy for traumatic brain injury. It provided examples for the types of treatments and the importance of music therapy and speech therapy to collaborate in the treatment of TBI for adults
Wilcox, C. (2012).	Article	Scientific American	N/A	N/A	Descriptive	An article that describes how music benefits cognitive functioning, especially for children who have been accustomed to it for longer periods of time.
Zhao, T. C., & Kuhl, P. K. (2016).	Peer-reviewed article	Proceedings of the National Academy of Sciences	N/A	39 infants	Experimental	An article that examined how music play intervention could enhance infants' speech processing abilities.