

The Impact of Musical Training on Linguistic Skills in Children: A Review

Andrew Hong

Blair Academy, USA

ABSTRACT

This paper evaluates the idea of musical education and its benefits on children at the elementary school age. Music has been and will continue to be a part of people's lives, so it is important to investigate bringing it to the field of education. This article discusses the effects of musical education on children's linguistic skills. It also, if applicable, seeks to find throughlines and common threads between curricula that achieve successful results with children to isolate the important factors that make music more beneficial. Musical education was found to improve phonological awareness abilities in children, most commonly 4-6 years old, and a wide variety of musical curriculums were further found to have a positive impact on children's linguistic skills.

Introduction

The argument that music has the ability to make children 'smarter' has permeated the modern era. The most prominent form that this idea has taken is the so-called 'Mozart Effect', according to which Rauscher et al. (1993) made the claim that listening to Mozart could increase a person's score on an IQ test by up to 10 points. This study sparked a rise in the industry of products, such as toys, towards 'smart babies' aiming to improve their IQ permanently. Although only temporary effects could be reproduced in studies (Hetland, 2000; Rauscher et al 1993), the idea of exposing children to music at a young age has been studied since.

In particular, the use of music for educational purposes has been a prominent theme of literature, aiming to help educate the next generation in a more effective way. Music has been frequently associated with linguistics, the study of language, and a wide literature (specific papers will be discussed in the main body of this review) on the topic of musical training aiding in language development has appeared in the last two decades. This paper will report on the various studies in the literature of music and linguistics, and will explore the following research questions:

1. How effective is musical training at strengthening children's linguistic skills/capability?
2. If effective, are there any additional benefits from combining music and language in the curriculum?

This literature review aims to analyze the wealth of existing research surrounding musical education and linguistic skills in children. This paper will first analyze the literature on music and linguistics to determine if musical training can strengthen a child's linguistic skills, and then determine which attributes make a curriculum suited for the goal of strengthening linguistic skills in children. Through the analysis of a wide range of studies, this review aims to present a greater understanding of whether musical education is able to aid in linguistic skills, reading proficiency, and other such domains. Understanding the complex relationship between musical training and linguistic skills in children could open new doors and allow for a more innovative curriculum that can enhance the learning of the next generation of students.

Effects of Musical Training On Children

Numerous studies on the topic of musical training affecting children continually update the literature on music and linguistic skills. Overall, studies found on the topic trend towards the argument that music training in children is heavily correlated or directly causal towards stronger linguistic skills.

At the most basic level, practicing music within the classroom as early as preschool age has positive effects on communication skills and processing information. Two studies that are covered in this paper support the effects on communication skills (Yazejian and Peisner-Feinberg 2009) and processing information (Roden et al., 2014). One study on preschool children demonstrated that children who underwent musical training for 1 hour per week for 6 months displayed stronger communication skills as rated by their teacher, although they showed no improvement statistically in phonological awareness (Yazejian and Peisner-Feinberg 2009). Phonological awareness is an umbrella term for the ability to process and identify the parts of speech/language that constitute words (Milankov et al., 2021). An additional study on children aged 7-8 displayed results of faster improvements in processing information than their non-musically trained peers when trained musically for 45 minutes a week for 18 months (Roden et al., 2014). In contrast to peers who took natural science training, however, the musically-trained children underperformed in visual attention tests, suggesting that musical training does not strengthen all aspects of a child's learning development and that natural science training offers different benefits than musical training (ibid). Both studies provide more complex results than the general literature; however, both studies are currently the exception to the norm.

Correlational Studies

Alternative studies conducted yielded more compelling results. Chobert et al. (2011) tested musician children, aged 9 years old, against non-musician peers for both their passive and active processing of speech, in which musician children's active processing of speech sounds was heightened in comparison. A separate study conducted on 4-5-year-old children showed that musical skills were heavily correlated with both phonological awareness and reading ability (Anvari et al., 2002). Lamb and Gregory (1993) examined children's ability to detect changes in pitch and found that pitch discrimination was shown to correlate to reading skills, as phonemic sound discrimination (distinct sounds like the 'B' in Bat) and musical sound discrimination skills were shown to heavily correlate with reading skills. Although the studies shown cannot prove a causal effect, they nevertheless support the claim that children who have been exposed to musical training are able to read and communicate more skillfully.

Longitudinal Studies

While the studies previously mentioned in this paper have discussed how children who were musically oriented performed better in tasks such as phonological awareness, other studies make the argument that the process of learning music is what strengthens linguistic skills. A study conducted on children, aged 8 years old, who took music classes for 6 months instead of painting classes demonstrated stronger abilities in reading and pitch discrimination in speech (Moreno et al., 2008). Another study on 8-year-old children found that after 12 months of musical training, children could process and perceive parts of speech more fluently (Chobert, et al., 2014). Specifically, the children demonstrated improvements in their ability to process syllabic duration and Voice-Onset-Time, which is the timing difference between the end of a consonant sound and the start of the vocal vibrations for the vowel that comes after (ibid).

Longitudinal studies focused on children at kindergarten age showed promising results as well. A study conducted on 5-6-year-old children, focused on if low-cost music preschool activities could improve children's linguistic skills (Linnavalli et al., 2018). They found that the children's phoneme processing and vocabulary skills were stronger after 2 years of music playschool (ibid). Likewise, a study conducted over the

course of a year found that children who were taught musical training in kindergarten (ages 4-6) made significantly greater gains in their ability to differentiate the constituent parts of a word than children who were not taught musical training (Gromko, 2005). An additional study took the argument one step further by finding that children at kindergarten ages who took more music classes gained more benefits than peers who took fewer music classes (Moritz et al., 2012). Overall, the studies examined strongly suggest the argument that taking more music classes as a child results in a stronger foundation of linguistic skills, with phonemic and phonological skills, in particular, being stronger among children who take music classes for at least 6 months.

In conclusion, the studies discussed trend in the direction of the argument that musical training can grow a child’s linguistic skills. Most of the studies obtained results in line with phonological awareness (to reiterate, the ability to utilize and understand the spoken aspects of words and phrases). Music classes seem to be able to strengthen a child’s rhythm ability via exposure to BPM, or Beats Per Minute (i.e., the strict tempo of a song), which, in turn, leads to benefits in phonological awareness (Moritz et al., 2012). All in all, children’s learning would benefit from the addition of music into a school curriculum.

Other Languages

So far, this paper has only analyzed sources that have been undertaken on children who have English as one of their primary languages. However, studies conducted on children whose first language is other than English suggest similar benefits. For example, a study done in Quebec, Canada, found that French-speaking children who took music lessons improved their phonological awareness and verbal memory of French (Bolduc and Lefebvre, 2012). Additionally, Herrera et al. (2010) tested preschool children for their phonological awareness and naming speed in Spanish with and without phonological training and musical training. The study found that the children who received musical & phonological training outperformed those who received only phonological training, suggesting that musical training gives benefits even while incorporating phonological training (ibid). Finally, a study done on Mandarin Chinese tone identification found that musicians outperformed non-musicians in differentiating between the 4 pitched tones typical of Mandarin Chinese (Han et al., 2019). In particular, the study suggests that musical skill aids in identifying Mandarin tones (ibid). Overall, the studies examined suggest that the benefits of musical training lie within overall linguistic skills, not just those particular to English and its grammar structure.

Music/Language Curricula

In the literature on musical-linguistic training, fewer studies have been conducted on the topic of a music-focused curriculum. The studies done on the topic generally have been conducted from the 2000s to the early 2010s. Table 1 breaks down relevant studies with positive outcomes into prominent features, allowing characteristics of their curriculums to be isolated and compared.

Table 1. A table breaking down differing characteristics of curricula for comparison

Study:	Age Group (years)	Type of Study (Length)	Level of Rigor	Linguistic outcome	Classroom learning outcome
Linnavalli et al, 2018	5-6	Longitudinal - 2 years	Once a week, 45 minutes; playschool	Positive; improvements made in phoneme processing	Not tested

Bolduc and Lefebvre, 2012	Kindergarten (5-6)	Longitudinal - 10 weeks	Once a week, 40 minutes; Nursery rhymes with musical activities	Positive; Statistically significant gains in phonological awareness	Not tested
Chobert et al., 2014	8-10 (starting age 8 years old, ending the study at 10)	Longitudinal - 2 years; 12 school months	Twice a week, 45 minutes each - then once a week, 45 minutes; specific training utilizing singing and percussive instruments - Kodály and Orff methods	Positive; Significant gains in vowel frequency, vowel duration, and voice onset time (VOT); all fall under phonological awareness	Not tested
Lowe, 2002	Second grade (ages 7-8)	Longitudinal - 1 month	3 times a week, 45 minutes each; playful but constructive activities	Not tested	Children showed the ability to identify connections, concepts, and structures in both music and language
Standley and Hughes, 1997	4-5	Longitudinal - 7.5 weeks	Twice a week, 30 minutes each; musical activities based off of deep research and deliberation	Not tested	“music significantly enhanced print concepts and prewriting skills of the children.”
Register, 2001	4-5	Longitudinal - 1 School year	Twice a week, 30 minutes each; music activities were based on material taught, school structure	Not tested	Positive; children showed an enhanced ability to learn reading/writing concepts

Jordan-DeCarbo and Galliford, 2011	3-5	Longitudinal - 20 weeks	Once a week, 30 minutes; playful but constructive activities	Woodcock-Johnson Tests of Cognitive Ability– Revised (WJ-R); children made significant gains in 4 out of 5 linguistic skills measured	Not tested
Fisher, 2001	Kindergarten (5-6)	Longitudinal - 2 years	Daily; Literacy block of 3 hours, music as a tool to teach reading, writing, and wordplay	Positive; improved spoken language skills and phoneme segmentation	Not tested
Moritz et al., 2013	Kindergarten (5-6)	Longitudinal - 1 year	Experimental: Daily, 45 minutes; basic musical rhythms and melodies (Kodály) Control: Once a week, 35 minutes; lessons by the textbook - singing, dance, and learning about instruments	Positive; experimental group, who took more music, improved more in phonological skills than the control group, who took less music	Not tested

Several of the studies outlined in Table 1 found statistically significant results as early as 10 hours of music-focused curriculum over a month’s span (Lowe, 2002; Standley and Hughes, 1997). Two studies found that musical training for short periods of time can have positive effects on phonological awareness (Bolduc and Lefebvre, 2012; Lowe, 2002). Additionally, studies conducted for longer periods also positively affected phonological awareness (Chobert et al., 2014; Fisher, 2001). Lastly, one study found that children who spent more time on musical activities improved their linguistic skills than children who spent comparatively less time on musical activities (Moritz et al., 2013).

Music has also been shown to enhance children's ability to learn reading and writing concepts faster, although this topic is much less focused on. One of the studies analyzed found that music when used as a teaching tool to help children learn prewriting and reading skills, found that the children did learn faster with music as an aid to the teacher (Standley and Hughes, 1997). Later, Register (2001) repeated the previous study to verify Standley and Hughes (1997) and found similar results.

Certain key traits within the curriculums were found to have a positive impact on the learning process of children, such as the level of rigor and the amount of time spent learning. Studies conducted on the topic all share the approach of weekly sessions. However, as can be observed in Table 1, studies split on testing children's capacity for learning over a short period of time, such as 1-3 months, to learning over a year or more's worth of curriculum. While differing lengths of time spent interacting with music seem to reap similar benefits for both groups, effect

sizes would be needed to compare if the longer studies reaped more benefits. In addition to the topic of weekly sessions, studies such as Linnavalli et al. (2018) and Bolduc and Lefebvre (2012) use music as a way to interact with phonological skills, while studies such as Standley and Hughes (1997) and Lowe (2002) use music as a teaching tool to engage the students more thoroughly in the subjects taught. Studies also were found to lean towards a comparatively lower level of rigor when conducting music classes. For example, Linnavalli et al. (2018) found that low-rigor playschool involving music can retain benefits on phonological awareness despite low rigor. Finally, the students most often engaging with music in the studies analyzed are of kindergarten age, most often at age 5.

Ideal Curriculum

An ideal musical curriculum for children at the kindergarten age should take advantage of a multitude of different strategies. Moritz et al. (2013) found that more musical activity has a more beneficial effect on children than less music, so daily sessions of a musical curriculum for kindergarteners would create an ideal growth pace. Furthermore, an optimal curriculum should use specific methods and techniques that involve children exploring music for themselves to practice the rhythm abilities that Moritz et al. (2013) found to connect with phonological awareness. Some examples of said methods are the Kodály method, which stresses singing as its primary teaching tool (Dunbar and Cooper, 2020), and the Orff method, which stresses a variety of musical activities such as singing, dancing, and utilizing percussion instruments (Long, 2013).¹

Conclusion

In conclusion, music in education is able to improve children's linguistic skills across the board, though, most prominently, musical training has been shown to improve phonological awareness. Through strengthening rhythm ability, children have also been shown to be able to improve their phonological awareness skills (see Moritz et al., 2013), demonstrating the effectiveness of music in the curriculum.

Additionally, musical curriculums are able to gain results through low levels of rigor and weekly sessions, although the effects of additional musical training with higher levels of rigor are lacking in evidence. Thus, future research should compare effect sizes to determine if studies that ran for longer had more positive effects on children's phonological skills and to determine the effects of music on children older than the studies examined in this paper. Additionally, all studies examined consider incorporating music into teaching reading and writing but overlook complex skills such as math.

¹ 1: The studies Dunbar and Cooper (2020) and Long (2013) are used for discussion of the Kodály and Orff methods only.

While musical training for children can be important for strengthening linguistic skills, it should not replace teaching linguistic skills with more standard methods. Instead, integrating music into the curriculum of a school system could offer complementary benefits to linguistic development, fostering a more synergistic outcome for the next generation of students.

Acknowledgments

I would like to thank my advisor for the valuable insight provided to me on this topic.

References

- Anvari, S. H., Trainor, L. J., Woodside, J., and Levy, B. A. (2002). Relations among musical skills, phonological processing, and early reading ability in preschool children. *Journal of Experimental Child Psychology*, 83(2), 111–130. [https://doi.org/10.1016/S0022-0965\(02\)00124-8](https://doi.org/10.1016/S0022-0965(02)00124-8)
- Bolduc, J., Lefebvre, P., (2012). Using Nursery Rhymes to Foster Phonological and Musical Processing Skills in Kindergarteners. *Creative Education*, 3(4), 495-502. <https://doi.org/10.4236/ce.2012.34075>
- Chobert, J., François, C., Velay, J., Besson, J. (2014). Twelve Months of Active Musical Training in 8- to 10-Year-Old Children Enhances the Preattentive Processing of Syllabic Duration and Voice Onset Time. *Cerebral Cortex*, 24(4), 956–967, <https://doi.org/10.1093/cercor/bhs377>
- Chobert, J., Marie, C., François, C., Schön, D., & Besson, M. (2011). Enhanced passive and active processing of syllables in musician children. *Journal of Cognitive Neuroscience*, 23(12), 3874–3887. https://doi.org/10.1162/jocn_a_00088
- Dunbar, L., & Cooper, S. (2020). Speaking the Same Language: How the Kodály Method Promotes Disciplinary Literacy. *General Music Today*, 34(1), 14–20. <https://doi.org/10.1177/1048371320909804>
- Fisher, D. (2001). Early Language Learning With and Without Music. *Reading Horizons: A Journal of Literacy and Language Arts*, 42(1). Retrieved from https://scholarworks.wmich.edu/reading_horizons/vol42/iss1/8
- Gromko, J. E. (2005). The Effect of Music Instruction on Phonemic Awareness in Beginning Readers. *Journal of Research in Music Education*, 53(3), 199–209. <https://doi.org/10.1177/002242940505300302>
- Han, Y., Goudbeek, M., Mos, M., Swerts, M. (2019). Mandarin Tone Identification by Tone-Naïve Musicians and Non-musicians in Auditory-Visual and Auditory-Only Conditions. *Frontiers in Communication*, 4. <https://doi.org/10.3389/fcomm.2019.00070>
- Hetland, L. (2000). Learning to Make Music Enhances Spatial Reasoning. *Journal of Aesthetic Education*, 34(3/4), 179–238. <https://doi.org/10.2307/3333643>
- Jordan-DeCarbo, J., Galliford, J. (Burton, S. L., Taggart, C. C.)(2011). The Effect of an Age-Appropriate Music Curriculum on Motor and Linguistic and Nonlinguistic Skills of Children Three to Five Years of Age.

Learning from young children research in early childhood music (pp 181-192). Lanham, Md.: Rowman & Littlefield Education

Lamb, S. J., Gregory, A. H. (1993). The Relationship between Music and Reading in Beginning Readers, *Educational Psychology*, 13(1), 19-27. <https://doi.org/10.1080/0144341930130103>

Linnavalli, T., Putkinen, V., Lipsanen, J., Huotilainen, M., & Tervaniemi, M. (2018). Music playschool enhances children's linguistic skills. *Scientific reports*, 8(1), 8767. <https://doi.org/10.1038/s41598-018-27126-5>

Long, A. (2013). *Involve Me: Using the Orff Approach within the Elementary Classroom*. 2013 Awards for Excellence in Student Research & Creative Activity - Documents, 4. Retrieved from http://thekeep.eiu.edu/lib_awards_2013_docs/4

Lowe, A. (2002). Toward integrating Music and other art forms into the language curriculum. *Research Studies in Music Education*, 18(1), 13–25. <https://doi.org/10.1177/1321103X020180010301>

Milankov, V., Golubović, S., Krstić, T., & Golubović, Š. (2021). Phonological Awareness as the Foundation of Reading Acquisition in Students Reading in Transparent Orthography. *International Journal of Environmental Research and Public Health*, 18(10), 5440. <https://doi.org/10.3390/ijerph18105440>

Moreno, S., Marques, C., Santos, A., Santos, M., Castro, S. L., Besson, M (2008). Musical Training Influences Linguistic Abilities in 8-Year-Old Children: More Evidence for Brain Plasticity. *Cerebral Cortex*, 19(3) 712–723. <https://doi.org/10.1093/cercor/bhn120>

Moritz, C., Yampolsky, S., Papadelis, G., Thomson, J., Wolf, M. (2013). Links Between Early Rhythm Skills, Musical Training, and Phonological Awareness. *Reading and Writing: An Interdisciplinary Journal*, 26(5), 739–769. <https://doi.org/10.1007/s11145-012-9389-0>

Peynircioglu, Z. F., Durgunoglu, A. Y., and Úney-Küsefog˘lu, B. (2002). Phonological Awareness and Musical Aptitude. *Journal of Research and Reading*, 25(1), 68–80. <https://doi.org/10.1111/1467-9817.00159>

Rauscher, F., Shaw, G. & Ky, C. (1993). Music and Spatial Task Performance. *Nature*, 365, 611. <https://doi.org/10.1038/365611a0>

Register D. (2001). The effects of an early intervention music curriculum on prereading/writing. *Journal of music therapy*, 38(3), 239–248. <https://doi.org/10.1093/jmt/38.3.239>

Roden, I., Könen, T., Bongard, S., Frankenberg, E., Friedrich, E. K., Kreutz, G. (2014). Effects of Music Training on Attention, Processing Speed and Cognitive Music Abilities—Findings from a Longitudinal Study. *Applied Cognitive Psychology*, 28(4), 545–557. <https://doi.org/10.1002/acp.3034>

Standley, J. M., Hughes, J. E. (1997). Evaluation of An Early Intervention Music Curriculum for Enhancing Prereading/Writing Skills. *Music Therapy Perspectives*, 15(2), 79–86. <https://doi.org/10.1093/mtp/15.2.79>

Yazejian, N., & Peisner-Feinberg, E. S. (2009). Effects of a Preschool Music and Movement Curriculum on Children's Language Skills. *NHSA Dialog: A Research-to-Practice Journal for the Early Intervention Field*, 12, 327-341. <https://doi.org/10.1080/15240750903075255>