Music Therapy for Communication in Children with Autism Spectrum Disorder

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Abstract

Music therapy is a clinical intervention that helps improve verbal and nonverbal communication skills in children with autism spectrum disorder (ASD) Important aspects of communication for children at a young age include early vocalizations, prelinguistic communication skills, joint attention and eye contact. Children with ASD often struggle with these aspects of communication at a young age, which may cause difficulty in developing language as they grow older. Children with ASD are more attentive to auditory stimuli so they often feel more connected to music and can understand language more efficiently through music. Music and language have overlapping characteristics such as tempo and pitch, which is why music is very effective intervention for improving language skills in children with ASD. There are many different approaches to music therapy for children with ASD, each using music, melody, pitch and rhythm to activate different parts of the brain to work on the child's developmental communication skills.

Keywords: Autism spectrum disorder, music therapy, communication

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Introduction

Music therapy is an extremely important intervention that improves prelinguistic communication skills, early vocalizations, social interactions and joint attention in children with autism spectrum disorder (ASD). Since music and language have overlapping characteristics such as pitch and tempo, music is often a medium for children with ASD to better understand language (Johnston, 2018). Music activates low-functioning areas of the brain in individuals with ASD such as Broca's area and the corpus collosum, which are highly associated with the production and perception of language (Sharma et al., 2018). Music therapy is a necessary intervention for improving verbal and non-verbal communication in children with ASD, but it should be applied before the child is five years old in order to be most effective.

Autism spectrum disorder is generally characterized as a developmental condition that impacts an individual's ability to communicate and interact with those around them (Janzen & Thaut, 2018). ASD is characterized by two factors; "persistent deficits in social communication and social interaction, and repetitive/stereotyped behaviors…" (Janzen & Thaut, 2018, p. 1). Music has had clinical application throughout history, both for developmental and therapeutic processes for children with ASD, specifically focusing on verbal and nonverbal communication. Around 30% to 50% of children with ASD do not develop verbal speech skills throughout their lives but may use speech in different ways (Vries et al., 2015). Music therapy is considered "'the clinical and evidence-based use of music interventions to accomplish individualized goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program'" (Crane, 2016, p. 112). Healthy neurodevelopment in children with ASD can be supported through the use of clinical application of music.

Many researchers often believe that music therapy will not improve communication skills in children with ASD. The main reason is that music therapy is extremely time consuming. Especially as an early intervention, parents must implement music therapy techniques outside of the therapy session .This means that parents need to learn the musical interventions on their own, as well as find the time to work separately with their child. Many families expect immediate results from different therapeutic interventions, but music does not work as a quick fix. Music therapy helps children under the age of five set a foundation that they can later build on and use to develop further communication skills. Since many families do not see results quickly, they feel discouraged and determine music therapy is not the best option for their child. Another huge reason why families do not use music therapy is because many health insurance providers do not cover music therapy, so costs to the families are extremely high (Outcomes, Benefits and Drawbacks of Music Therapy, 2019).

According to Crane, music therapists often focus on communication, social, and emotional skills when working with children with ASD. These three sets of skills are the major deficits for individuals with ASD according to the DSM-5. Music therapy has many different techniques in which the "the top four musical techniques utilized were singing (98.6%), instrument play (98.6%), movement (84%), and improvisation (75.3%)" (Crane, 2016, p. 113). Using these techniques have improved both receptive and expressive communication in children with ASD because music is a strong motivator for children to respond verbally and non-verbally respond. Listening to music and playing an instrument have helped children with ASD learn to identify, locate, and track sounds as they move. Rhythm has been used to influence speech patterns and pacing in children with ASD, so they are able to develop quicker responses and more fluid conversations (Crane, 2016).

Music interventions are extremely important for developing pre-verbal communication skills such as pitch, timbre, rhythm, and melody. Pre-verbal communication skills "are used to communicate feelings of hunger, need for sleep, etc. and will eventually be extended to speech as the child underdoes cognitive processes associated with communication development" (Johnston, 2018, p. 4). By developing pre-verbal communication skills, children are able to develop characteristics needed for language such as imitating a person's actions and using them on their own. Imitating other individuals is extremely important in nonverbal communication. Imitation of facial expressions and gestures allows the other person in the conversation to read the child's body language and see if they are engaged. Even without verbal communication, nonverbal gestures such as head tilting when confused may help the therapist or those around them understand that the child is confused and needs further explanation on the task. Music therapy is an extremely important intervention for children with ASD because children will often imitate instruments, such as grunting at the same tone and rhythm as an instrument. The therapist will then sing the words in tune with the instrument the child is imitating, and the child often verbalizes the words that were previously sung to them with the instrument. By repeating these words, the child begins to understand what the word is and may be able to use it in context later on while verbally communicating with others (Johnston, 2018).

Early Intervention

The application of clinical intervention for children with ASD is extremely important because early intervention allows children to have better outcomes when intervention begins before age five. Early intervention has "appeared to reduce the debilitating impact of autism and that young children with autism" (Møller, 2002, p. 195), which is why it is so important to implement music therapy before the age of five. Children with ASD often have difficulty with both verbal and nonverbal communication skills and early intervention allows these children to developmentally improve in adaptive, cognitive and social skills, as well as improve their overall quality of life. According to Hume et al., over 70% of families report that their child with ASD has made progress in their experiences with early intervention programs (Hume et al., 2005). Many believe that speech-language pathology (SLP) is the most important intervention for improving communication for children with ASD and although SLP is a very important intervention, children with ASD connect better with music and can make faster progress through music therapy. Music therapy is different than all other therapeutic methods for communication in children with ASD because it allows "children with ASD to engage and nurture their capacity for flexibility, creativity, variability and tolerance change, in order to balance the more structured and behaviourally driven education…" (Møller, 2002, p. 11). According to Møller, children with ASD need a balance between education, including SLP, and creativity and enjoyment. Music therapy includes both education and creativity in order to maximize the child's capabilities (Møller, 2002).

Auditory Stimuli

Children with ASD often have a preference for musical auditory stimuli when presented over other stimuli, which is why it is such an important intervention for communication in children with ASD. In a study examining the effects of music on memory, children with ASD when presented with words sung musically and words spoken rhythmically were able to imitate the words sung much quicker. Children were also more focused while the words were sung musically than when the words were rhythmically spoken to them (Simpson & Keen, 2011). The reason music therapy is such a key intervention to improve communication for children with ASD is because children enjoy music and it is a nonintimidating way to "promote eye contact, turn taking, singing, imitation, music making, and interpersonal synchrony could be used to promote social communication…" (Srinivasan et al., 2015, p. 52). Musical therapies that focus on rhythm have showed significant improvements in both verbal and gestural communication skill (Srinivasan et al., 2015). According to Srinivasan et al., using musical interventions has shown to decrease negative behaviors such as aggression and tantrums in children with ASD. By decreasing negative behaviors, children stay more focused throughout the music therapy sessions and enjoy the sessions which keeps children more interested and engaged in learning. By staying focused and engaged, children with ASD begin to develop communication skills faster (Srinivasan et al., 2015).

Music can be a form of communication for children with ASD that struggle to verbally and/or nonverbally communicate by becoming a medium that is easier to understand. Although music can help develop both verbal and nonverbal communication skills, children with ASD can also use music as a form of nonverbal communication. Many times, children with ASD struggle to understand their emotions, so using music can be a form of communication for their emotions

because "'the greatest power of music as a healing agent comes from the fact that it is a form of nonverbal communication" (Silverman, 2008, p. 7). The reason children with ASD often use music as effective form of communication is because children usually enjoy it and it is very predictable for them, when everything else may seem so unpredictable. Individuals with ASD respond more appropriately according to their age to music than speech, as they are more attentive to auditory stimuli than visual stimuli (Silverman, 2008).

The Auditory-Motor Mapping Training (AMMT) is a music-based intervention used with children that have ASD that facilitates speech by using music and rhythm. In AMMT, the therapist would use a high frequency word while singing and simultaneously tap on a drum the same rhythm and pitch. By using AMMT, nonverbal children with ASD improved in articulation both their words and phrases (Standiford et al., 2012). AMMT is more effective for more verbal children with ASD rather than those who are completely nonverbal. Children with ASD increased consonants and vowels correct per stimulus while going through AMMT, which greatly improves specifically verbal communication and spoken language in children with ASD (Chenausky et al., 2017).

Melodic Based Communication Therapy

Another efficient musical intervention that is essential for improving verbal communication in children with ASD is the Melodic Based Communication Therapy (MBCT). The use of MBCT specifically targets verbal output by using musical strengths the child already has. MBCT is different than most musical interventions because it uses pre-recorded instruments. To apply this therapy, the therapist chooses 25 different target words for the child. The child with ASD is able to listen to the word in a CD recording, then listen to a recording of the word set into a melody, clap to the rhythm of the melody, independently clap the rhythm, sing the word while

clapping and then sing the word independently. In comparison to children who receive speech therapy, the children who underwent MBCT had quicker overall progress of verbal and imitative attempts, which is why musical interventions for children with ASD is necessary for improving communication (Sandiford et al., 2012).

Activation of the Brain using Music Therapy

Through music therapy, areas of the brain such as Broca's area and the corpus collosum are activated, which is important because these areas of the brain are low functioning in children with ASD. "Music therapy may be particularly efficacious in ASD due to its distinct ability to potentially change both the structure and functional connectivity of the cortex" (Sharma et al., 2018, p. 97). Listening to and engaging in music allows "for the modulation of the underlying neuroanatomical and neurophysiologic abnormalities in ASD" (Sharma et al., 2018, p. 100), which improves speech and social skills. By improving speech, children with ASD can begin to develop language, can learn to speak about their emotions, and learn to improve interactions with others, which also improves their communication between them and others (Sharma et al., 2018). Children with ASD typically have an under-activated part of the brain, called Broca's area. Broca's area is important in speech production and language so children who have a low-functioning Broca's area often have difficulty with speech and language development. Music activates Broca's area in children with ASD, which allows individuals to be more engaged with music stimuli than spoken words. Activation of the Broca's area allows children to understand language while listening to music, improving their communication and social interactions with those around them (Janzen & Thaut, 2018). The activation of Broca's area through the use of music is also important because speech production is related to activity in Broca's area. Motor movement of the tongue for speech production is dependent on Broca's area. Music improves the

movement of the tongue in order to help both the physical and mental aspects of speech production (Wan et al., 2010).

The corpus callosum is often impaired in children with ASD and the use of music therapy activates the corpus collosum, promoting better language skills. The corpus collosum joins both the left and right hemispheres of the brain and allows information to be transferred between both of the hemispheres. By strengthening the corpus collosum, there is an increase in fibers which allows for information to transfer between hemispheres better. This is important to communication because the left side of the brain houses language, while the right side of the brain houses creativity and more complex information. By allowing the right and left hemispheres of the brain to transfer information more effectively, both sides of the brain can be used to connect language and comprehension of complex information to improve expressive and receptive language. Music exposure before the age of seven has proved to strengthen the corpus collosum in children with ASD (Sandiford et al., 2012).

Early Vocalizations and Prelinguistic Forms of Communication

Music therapy is a very impactful intervention for children with ASD because it helps improve early vocalizations and prelinguistic forms of communication since both language and music share characteristics. The connection between music and language allow music to be a way to promote a child's social and communication skills. For children with ASD, prelinguistic forms of communications at a young age are extremely important to develop language and social interactions at an older age. "Music activities seem to promote a wide range of preverbal skills, including early vocalizations for young children (such as babbling, vocal play, and melodic utterances)" (Vaiouli & Andreou, 2018, p. 327). Promoting early vocalization skills through music is vital because these skills are the foundation needed in order to develop language and

communication skills at an older age. The characteristics that music and early vocalizations share are "pitch, rhythm, tempo, dynamics, and the use of time" (Vaiouli & Andreou, 2018, p. 327), which is why music promotes early vocalization skills. These overlapping characteristics between music and language also impact "prelinguistic forms of communication (such as eye contact, imitation, turn-taking and pointing)" (Vaiouli & Andreou, 2018, p. 327). Prelinguistic forms of communication are also extremely important in the development of language. These skills teach children how make eye contact to keep interest of the other person in the conversation, learn new concepts and words by imitating, to take turns during conversations and pointing as a nonverbal communication skill. By using music to develop prelinguistic forms of communication, children with ASD have a better foundation for social communication between others.

Joint Attention

Even if a child with ASD does not seem to be responding to the music, it still acts as a medium that can be used to help children engage with others over time. Music intervention is a very important aspect in improving communication for children with ASD because when accompanied by music, children are more responsive to instruction and serve as a bridge for nonverbal children by establishing joint attention. Joint attention is an extremely important skill to develop at a young age because joint attention "is the process of engaging another person's attention to share in the experience of observing in early childhood'" (Scholtens, 2019, para. 3). Joint attention is an important aspect of nonverbal communication because it is the interaction between a child with ASD and adults, responding to bids and initiating bids for joint attention. "'Music is an effective motivator for eliciting attention, particularly joint attention, in children

with ASD'" (Scholtens, 2019, para. 6). By eliciting joint attention, children with ASD can promoted interactive communication and social experiences (Scholtens, 2019).

Three types of song that can elicit joint attention are "(1) call-and-response (e.g, 'Over in the Meadow'), (2) songs that require fill-in-the-blank responses (e.g., 'B-I-N-G-O'), and (3) songs that elicit exclamatory phrases (such as the refrain 'I can't eat my soup!' from the book *Soup Opera*)" (Scholtens, 2019, para. 13). Songs that are call-and-response have a pattern and predictable responses that are naturally affirming (Scholtens, 2019). Call-and-response songs also allow children to develop imitation and sentence structure in order to improve language development skills later in life (Crane, 2016). Fill-in-the-blank songs are also predictable and allow children to feel more comfortable communicating because it removes anxiety from making the required response. For children with ASD, songs that elicit exclamatory phrases have a flatter affect in while children respond with vocal inflections and facial expressions, which are important aspects of language. Any songs that require interactions from the children promote turn-taking opportunities for children with ASD, which is an extremely important aspect of communication and social skills. Using the child's name in songs like "'Brian stole the cookies!" (Scholtens, 2019, para. 14) holds them accountable for participating and allow the child natural ways for communication because they are the subject in the songs. The use of familiar songs provides children the opportunity to communicate. By using familiar songs with children, they use eye contact, body language, and verbal responses to get the attention of others (Scholtens, 2019). Children with ASD can also learn appropriate application of words and phrases by using purposefully written song lyrics (Crane, 2016).

Another important type of song used for children with ASD are nursery-rhyme songs because they are common cultural material. Even though they are considered to be songs for

extremely young children, it has been shown that "simple music (with limited pitch range, stepwise melodic contour, diatonic scale, notes changing only on the beat, simple harmonic structure of no more than three chords) versus more complex music (i.e., music with more than an octave range, intervallic leaps, syncopated and dotted rhythms, and hormonic structure of more than three chords" (Scholtens, 2019, para. 16) are more effective in eliciting joint attention in children with ASD. The instruments used in simple music also create structure through the music, allowing the children with ASD to focus on that instrument and participate in joint attention with the therapist (Scholtens, 2019).

Improvisational Music

Improvisational music therapy (IMT) for children with ASD is a client-led relationship-based developmental approach in order to improve focus of attention and turn-taking while communicating. During IMT, "the therapist may improvise music that generally follows the child's focus of attention and interests in order to establish a relationship while fostering engagement, relatedness, and communication" (Carpente, 2017, p. 161). IMT is an extremely useful clinical application of music, as it has been shown to be more effective engaging children with ASD than other interventions because "children with ASD are generally found to have impaired perception of linguistic and social auditory stimuli" (Carpente, 2017, p. 161), but have superior musical perception than most people. According to Carpente, musical interventions are a necessary intervention for improving communication in children with ASD because music is predictable. The predictability of music provides flexibility and social engagement in order to create new relationships with those around them.

IMT includes three different phases implemented by the therapist including "phase 1: following the child's musical-emotional lead, phase 2: two-way purposeful musical play, and

phase 3: affect synchrony in musical play" (Carpente, 2017, p. 164). Phase 1 allows the therapist to observe the child and create musical experiences according to the child's natural inclinations and interests. This phase helps improve non-verbal communication in children with ASD by improving joint attention as well as back-and-forth interactions. In phase 2 of IMT, the therapist improvises music that offers a musical question or statement that elicits a musical response from the child. This phase also allows the child to have back-and-forth interactions with the therapist and allows the interaction to shift between child-led and therapist-led. Phase 3 provides the child opportunities to engage, interact and initiate interaction with the therapist by including different ranges of musical elements. Phase 3 allows the child to engage in long back-and-forth interactions, practice leading and following interactions, and allows the child to initiate and respond to different musical ideas. Before the clinical application of IMT, all children in the study classified as "deficient" in overall social communication and after the application of IMT, they all classified as "normal" in overall social communication (Carpente, 2017).

Using improvisational music increases social response behavior for children with ASD, which allows children to interact with others around them. Music is an important intervention for children with ASD to improve communication because it "allows individuals with autism to start a musical 'dialogue' or 'conversation' with the recreational therapist creating a reciprocal nonverbal bond" (Vries et al., 2015, p. 230). Children who learn to initiate conversations strengthen their bonds with their families and their therapists. By building a bond with their therapist, children with ASD are able to become creative and create interactive responses through creating sounds and melodies. Using music as a response, children with ASD increased eye contact and more often approached others more often. Making eye contact and approaching others are both vital aspects in nonverbal communication with others (Vries et al., 2015).

Family-Centered Music Therapy

Family-centered music therapy (FCMT) sessions are also a good musical intervention in order to improve communication in children with ASD. The techniques used in FCMT emphasize the child's mood, behavior and following their lead and interests. This "included songs, playing instruments, and movement to music" (Thompson, 2017, p. 438) to specifically improve social interactions between the child with ASD and their family members through music. Often, children with ASD are unable to verbally communicate with their family members but it is important that children are able to communicate with their parents in order to have a happy and safe environment. Many families that completed FCMT felt as interactions between them and their child improved because nonverbal communication improved such as gesturing, and even if the child did not verbally speak, they often sang along with their parents to songs which created a sense of bonding for the family. Creating a bond allows children to feel more comfortable, which increases the amount they verbally and nonverbally communicate and allows for better language development as they get older (Thompson, 2017).

Mutually Responsive Orientation

The Mutually Responsive Orientation (MRO) is a musical intervention in which the therapist models musical interactions, promoting "'a positive, mutually binding, and cooperative relationship between the parent and the child'" (Hernandez-Ruiz, 2018, p. 28). MRO includes bidirectional parent/child actions throughout musical therapy sessions allow children to facilitate harmonious communication. Creating this harmonious communication between the child their parent, the child wanted comfort from their parents, engaged in eye contact for nonverbal approval, and cooperated by initiating activities such as cleaning up instruments.. Through the parent and child's enjoyment of the music therapy, a positive environment is developed and

provides “a context that promoted mutually responsive parent-child interactions” (Hernandez-Ruiz, 2018, p. 28). Music therapy is the most important intervention for nonverbal communication skills and allows the child to work on emotional relationships with their parents.

Conclusion

Using music therapy as an intervention for children with ASD is necessary because it helps improve prelinguistic communication skills, early vocalizations, joint attention, and social interactions. Music and language both have overlapping characteristics so children with ASD can use music as a form of communication, as it activates many parts of the brain that are low functioning in children with ASD. Fifty percent of children with ASD never speak throughout their lifetime, but children who go through music therapy sessions often show better outcomes than children who do not (Vries et al., 2015). Music therapy is an impactful strategy that can be used for children with ASD in order to improve their communication skills if implemented at an early age.

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