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How Music Therapy Affects the Development of Children with Autism

By

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Introduction

How does music therapy affect students with Autism and their development? Music therapy is not a very popular field of work, often times people forget or do not acknowledge its existence as a professional career and underappreciate the value it holds. Music therapy helps patients with all different disabilities. The purpose of this paper is to explore the effects of music therapy on children with autism. There are so many positive effects and numerous proven strategies that improve social skills and alleviate impairments that allow for people with Autism to gain knowledge and abilities to allow them to live more independently. Most brain development and physical development occurs between birth and age three to five depending on the child (CA DOE, 2000). Therefore, starting children on music therapy can alter the lifelong effects of autism. This can change the entire course for their life.

Music Therapy and Autism

On the Autism Awareness Centre Inc. website, they define autism as “a lifelong, non-progressive neurological disorder typically appearing before the age of three years... The classic form of autism involves a triad of impairments- in social interaction, in communication and the use of language, and in limited imagination as reflected in restricted, repetitive, and stereotyped patterns of behavior and activity” (Bennie 2003). This definition is simply the basics of autism spectrum disorder (ASD), but in reality, ASD is a very broad spectrum. The most basic terms on the spectrum are high-functioning and low-functioning autism. These are really broad terms and there is a lot of gray area in defining where a person falls on the spectrum. Where is the line drawn, and under what criteria? While the spectrum provides a general range of symptoms for autism, actual diagnoses cannot be precisely defined. Overall, the level a person with ASD is at

is based on level of functioning that the person possesses, and how independent they are able to be. For someone considered “high-functioning”, they tend to have the most issues with social interactions. Their disability may not be identifiable to those around them, and they typically do not experience extreme intellectual struggles. They typically do not have issues with communication. “Moderate-functioning” individuals may also experience social issues. In addition to this, they may need some support with independent living. They tend to also need academic support, as they may have below-average IQ’s. They can struggle more with communication, especially with communicating their needs and emotions. “Low-functioning” individuals need a lot of assistance and cannot live independently. They tend to have low IQ’s which result in severe academic deficits. They may have trouble communicating or may not communicate at all (Chamberlain 2020). These are all generalizations, a way to provide guidelines and help professionals provide each individual with the support they need to succeed and live independently. They are not exact, and leave a lot of room for variability. Some people with ASD will not match with these characteristics at all, while others may check every symptom on this list.

Numerous interventions have been developed to assist individuals with autism. One of these is music therapy. Music therapy can be a life-changing intervention for people with ASD. Looking at the three main impairments listed in the above definition, music can help alleviate each of them. With social interaction, taking a music therapy class allows students with ASD to step out of their comfort zones and make music together. With limited imagination, there is no end to the amount of creativity that music allows for. There are no rules and no limits. For troubles with communicating, music can help with that as well. It is a common misconception that communication solely refers to spoken language. However, music can be a way someone

communicates and expresses their feelings. Hans Christian Andersen once said, “Where words fail, music speaks” (Andersen n.d.).

There are numerous benefits to music therapy for children with disabilities. For example, one thing about people with ASD is that some people on the spectrum are quite averse to change. They like everything to be controlled and stay the same. However, a musical therapist could help them to venture out of this fear and their comfort zone by exploring different instruments with them. They could try recorders, drums, guitars, pianos, singing; the options are endless. The schedule can also be flexible if the client starts feeling overwhelmed or needs a break. It is not like a classroom where the teacher must keep instructing; the therapist can cater to the client’s needs and moods. It also engages their brain in more ways than most activities do. There is a lot of sensory information that the brain is processing, and this can allow the client to form neural pathways to deal with sensory overload which can be generalized into other settings such as a classroom or workplace (Harvard Health Publishing, 2011).

Music therapy is such a broad spectrum full of so many things. The American Music Therapy Association defines music therapy as “a well-established professional health discipline that uses music as the therapeutic stimulus to achieve non-musical treatment goals” (Kaplan 2010). This organization lists the possible outcomes from music therapy. A few examples that they include are: increased attention, improved cognitive functioning, increased socialization, improved behavior, improved verbal skills, and much more. These are things that can inhibit a person’s quality of life when they have ASD. One real-world example of this is a video on YouTube with a girl singing to her younger brother who has ASD and is nonverbal. But she picks up a guitar and starts singing *You are my Sunshine* and the little boy sings along to some of the words, even though he was previously nonverbal. Music is so powerful; music therapy is so

important. It is a common misconception that music therapy is just sitting in front of a group of kids singing lullabies and dancing around. (Karadanaian, 2020). Media may actually misconstrue the music therapy profession because they represent it in this manner, and it is a relatively new career so therefore it is not well-known or well-understood. Music therapy is part of a patient's treatment plan. "A certified music therapist assesses the client(s) and creates a clinical plan for treatment in conjunction with team and client goals, which in turn determines the course of clinical sessions. A certified music therapist works within a client-centered, goal directed framework" (MTABC, 2020). Music therapy, much like every other aspect of special education, focuses primarily on individualized instruction in order to give each student the most equitable education possible. The goal is always to have them working in the least restrictive environment (LRE) for their ability level, with curriculum that has modifications and accommodations as needed for them to succeed to the maximum extent possible (Chamberlain, 2020).

Development of children with ASD versus without ASD

Much research has been done on the development of humans across the lifespan. There are countless theories, guidelines, norms to measure up to, this is an area that was not taken lightly. It has been highly examined and thoroughly researched. What is intriguing to identify are the specifics of how children with ASD develop in comparison to children without any disabilities present. It was much harder to locate information specifically on the development of children with ASD. Autism is typically detected by the age of three. Early detection makes an immense impact on the severity of the disability and which skills can be taught, which habits can be unlearned. It is difficult to catch ASD early because many of the behavioral characteristics that assist with diagnosing (restricted interests, repeated actions and behaviors, etc.) do not show

up noticeably until later on in life. As for the first year of life, this article says, “However, differences in other developmental areas have been reported in the first year of life, such as motor skills, visual reception, language, and eye gaze patterns of social scenes and faces. Deficits in fine and gross motor skills at 6 months of age in HR-ASD infants suggest that motor development in the first year of life may have a role in the development of autism” (Piven & Shen, 2017). Therefore, ASD can have an effect on a child’s motor skills development which will automatically put them behind other children of their same age. Music can help reverse the effects of this because you use fine and gross motor skills to make music. Some examples of using fine motor skills in music therapy are playing piano, strumming the guitar strings, etc.; small, refined motions like those. Some examples of using gross motor skills in music therapy are dancing, hitting a drum, etc.; large movements like these that involve the use of large muscles.

Music also uses a multitude of our senses, so it is very stimulating which can be very good for children with ASD. In the book *Music Therapy, Sensory Integration and the Autistic Child*, it talks about stimulation of the senses in people with ASD. It says, “Sensory Integration is the system’s process of taking in and organizing billions of bits of uncoordinated sensory input” (Berger, 2002). It is easy for people with ASD to go into sensory overload because they struggle with processing everything coming at them. When people without ASD experience extreme change in senses, their primary reflexive accommodation kicks in, which allows them to adapt and adjust quickly. People with ASD cannot perform this task quickly. Therefore, they are in a state of panic for an extended period of time. “Here is where music, a natural sedative able to induce the release of dopamine and other relaxants into the system, can play a prominent role in reducing the flow of chemicals that keep the system highly charged. Music can reduce fight-

or-flight responses by calming the system down long enough to allow efficient modulation. Paired with a music environment, a new situation often becomes more tolerable and acceptable...” (Berger, 2002). As stated in this book and in the study below, music naturally calms people down. This gives people with ASD enough time and calmness to adequately process their environment rather than just panicking. This can be generalized into other settings as well. For example, if a child were to get overwhelmed during class, they could get a set of headphones and take a break to listen to music. The techniques used in music therapy can prove to be very helpful in multiple aspects of a client’s life.

Children with ASD experience a delay in certain aspects of development. They struggle with social interaction, appropriate behavior, sometimes speech and language, and adequate communication just to name a few (Chamberlain, 2020). There are also some characteristics that affect their daily life, such as sensory processing deficits. While people without ASD can immediately begin processing a new environment when they enter it, people with ASD go into a panic and fear-driven state, and they shut down. Music can assist with all of this in so many ways. While music is by no means a cure for Autism (there is not a cure for Autism), it helps lessen the effects of these struggles and needs and allows them to gain skills to improve their daily living and independence. It also can assist with transitioning between activities and settings in real-life situations.

Three Main Impairments of ASD

There are three main impairments that are typical of an individual with ASD which are going to be the focal point of this paper. These are social interactions, communication and use of language, and limited imagination or repetitive behavior. Some people with ASD struggle with

some of these, others experience all of these, and some even experience none. That is why it is called autism spectrum disorder, because it is a fluid scale with no definite explanations.

Social Interaction

Many individuals with ASD need improvement with social interactions. This can look like many things; it can be not answering people, not initiating conversation, hitting or exerting other inappropriate behavior, not expressing emotions adequately, and lack of ability to identify emotions just to name a few. Stated in an article, it says, “Children with ASD display a range of skills in social communication and behaviors, making individualized treatment necessary” (Lagasse, 2017). The author goes on to say that children with ASD struggle in many social areas. They may struggle to form meaningful relationships, may not be able to reciprocate appropriate behavior, and may have issues adequately communicating needs and emotions.

Music therapy has been used to improve social skills for an extended period of time. When people with ASD are stimulated by music, it activates part of their brain that is used for musical tasks but also non-musical tasks. For example, singing and speaking are two different skills that come from the same area of the brain. Therefore, music therapists can activate musical tasks that correlate with tasks that will improve their clients’ social abilities.

Music therapy is a very structured activity. The clients know what to expect for the most part out of the experience. However, music is a very sensory-heavy experience, which can be overwhelming at first for individuals with ASD. Over time, exposing them to this sensory overload will allow them to develop healthy coping mechanism and techniques that they can use in other settings.

It is clear that music therapy can be an effective tool to improve social skills in a person with ASD. Music therapy can also assist with the other two impairments discussed.

Limited Imagination and Repetitive Behavior

“Children with ASD are often described as having deficient play skills...” (Bentenuto, Venuti, et. al., 2016). There are many ‘typical’ characteristics of ASD that explain why many individuals with ASD have limited imagination and may engage in repetitive behavior. It is very easy for a person with ASD to go into sensory overload. Socializing and playing can quickly cause them to shut down, as their brain does not have the ability to adapt to new sensory information as fast as a typically developing child’s brain (Harvard Health Publishing, 2011). Children with ASD often lack adequate social skills, and struggle to make friends. The issue is that a lack of social skills leads to a lack of imagination. Typically, children learn and discover together through playing. As shown in table 1 below, children with ASD develop much slower than children without ASD (Bentenuto, Venuti, et. al., 2016).

Table 1.

Child Characteristics	ASD		Typical Developing	
	Mean:	Standard Deviation:	Mean:	Standard Deviation:
Mental Age (Months)	24.21	9.82	20.01	0.21
Chronical Age (Months)	43.33	7.62	20.01	0.21

As shown here, children without ASD are pretty consistent between their mental and actual age, while children with ASD have a large gap between the two. This makes it difficult for children with ASD and children without ASD to play and interact with each other.

Incorporating music therapy has the potential to help alleviate some of these barriers. Music allows the children to experiment, play, and interact. There is no 'right' or 'wrong'. There are not any rules. By openly expressing themselves and immersing in the music therapy experience, children with ASD may be able to break down their walls and their stereotypical habits to be more social. Then, through peer learning, we may be able to see the gap begin to close.

Communication and the Use of Language

Communication is a term that includes both verbal and nonverbal cues (Ask Any Difference, 2020). If someone were to say that they felt sad, we would interpret that they are feeling sad. But, if we saw someone crying, we would also interpret that they are feeling sad without them even saying anything. Children with ASD have trouble communicating both verbally and nonverbally. They struggle to understand body language and might not comprehend social cues. These doctors said, "The predominant features of autism-related developmental disorders include qualitative impairments in both verbal and nonverbal communication (Mitchell, Brian, et. al., 2006).

One of the tell-tale signs of ASD in infancy and early childhood as written in this article is a late start in speaking. This isn't to say that every child that does not begin speaking by a certain age automatically has ASD. However, because early intervention is so important for the future development of children with ASD, professionals and parents both need to observe and monitor certain characteristics.

For children with ASD who struggle to communicate, this can have many negative impacts on their lives and the lives of those around them. Without being able to communicate, their needs, desires, and emotions all get bottled up inside. As a result, needs and

desires might be expressed through anger, sadness, or refusal to engage. Music can be an outlet for the emotions they cannot communicate. When listening to music, one often feels a certain emotion caused by the music that they are hearing. In that same way, it is possible for children with ASD to convey their emotions with music.

Music is a great strategy that shows great hope for allowing individuals with ASD to live the most independent life that is possible for their individual circumstances. The challenges that they face are hurdles that can be jumped if they have the correct resources. It is the job of professionals to find good techniques that fit the individual needs of each and every client. However, it is equally as important that parents be collaborators and be included in all planning so that they can generalize the skills they work on in school or therapy at home.

Parental Involvement

Research shows that family involvement for children with ASD is “an emerging and effective intervention” (Schwartzberg & Silverman, 2017). Parents today tend to view themselves as co-therapists or collaborators with their child. Short-term music therapy sessions were shown to improve the relationship between parents and children with ASD. There was a study done on 358 families with social disadvantages where they participated in a 10-week group music therapy program. The parents were calmer, engaged further in their child’s education, and showed an overall improved relationship between the parents and the child with ASD (Nicholson, Berthelsen, et. al 2008). These results were further analyzed through a study targeting a more specific group of people, a group of mothers who engaged in family-centered music therapy with their child.

Family-centered music therapy (FCMT) is a practice where the parents are an active agent in their child's music therapy experience. One study focused on FCMT and involved interviews with mothers. From the interviews conducted with 11 mothers who did FCMT, there were 3 positive changes noted between the parent and child relationship. These changes were the quality of the relationship, the parents' perception of the child, and the parents' response to the child. There was another study done involving a group of four mothers whose children were using FCMT. This study was done to better understand how parents perceive music therapy sessions done in an on-campus university clinic. For this study, the clients received one-to-one thirty-minute sessions. The main purpose for these on-campus music therapy sessions was to allow music therapy to be more widely accessible, to better educate the music therapy students, and to increase awareness and acceptance for individuals with disabilities. During the study, the clients' mothers actively participated in and observed the music therapy sessions. They also had the opportunity to give feedback and observations to the therapist. The researcher did an initial assessment for each client in order to gain an understanding of the client's level of performance as well as their strengths and needs. Then, their progress was monitored weekly and the researcher collaborated with the therapist and parent to assess and adapt client's goals. The sessions consisted of many activities that included, "instrument playing, movement with music, song writing, lyric analysis, and music-based social stories" (Schwartzberg & Silverman, 2017).

The results of this study narrowed down all of the findings into five themes. The first was that music therapy is an enjoyable and engaging experience for the clients. The second is that music therapy was beneficial to those with ASD because it allowed for flexibility in routine. The third is that the collaboration between parents, therapists, and clients allowed the parents to give feedback and suggestions in order to enhance their child's experience. A fourth theme was that

this collaboration allowed the parents to extend the music therapy techniques into their homes which would allow their child to grow so much more. A final benefit to FCMT was that the skills that were obtained through therapy can then be generalized into other aspects of a client's life. This can build on their needs and allow them to live more independently.

Parents play the biggest part in their child's social development during their pre-adolescence years, so it is important that they be involved and always have full comprehension of what is going on. It is also important to note that parents spend the most time with their child by far. Their teachers see them seven hours a day, their therapists may only see them one hour every two weeks. If parents are not viewed as collaborators, there is only so much that teachers and therapists can do. By sharing techniques and giving suggestions as to how to continue working with the client at home, we can advance the client's skills at a much more efficient and effective level.

Types of Music Therapy

To get to the specifics of what music therapy is and how it works, there are different types of music therapy that people are experimenting with and researching. On the Medical Life Sciences News website, they explored several different variations to music therapy and explain how they work.

Bonny Method

The first type that they discuss is called the Bonny Method. "The Bonny Method of Guided Imagery and Music (GIM) is a music-centered depth approach to transformational therapy that uses selected sequences of classical music to support the generation of and

movement through inner experiences” (McKinney, 2020). It was developed by Helen Bonny and is used to assist clients who have physiological and/or psychological issues. This method involves showing the client an image and telling them to focus on it, while music plays in the background. The purpose of it is to increase awareness and focus to help the client reach solutions and heal from their trauma (Smith, 2018).

This method of music therapy is mood-based. When the client comes in for a session, the therapist evaluates their mood and chooses music accordingly. The client lies in a chair as the music is played and the purpose is to calm the patient, so they feel relaxed. This particular method of music therapy is not particularly efficient for ASD. Of course, every client is different, so it is not fair nor accurate to say that the Bonny method will not work for anyone with ASD. However, as a generalization, people with ASD would have a hard time sitting still just listening to music. They need something a bit more stimulating, and that situation may have the opposite effect of the desired result. It might stress them out to be told to lie still instead of relaxing them. There are definitely benefits for this method, and collaborators must do it case-by-case to find one that fits each person, but this would not be a method generally used with individuals with ASD.

Dalcroze Education

A second type of music therapy is the Dalcroze Method. For this type of therapy, the client is focusing on “rhythm, structure and movement expression in the learning process” (Smith, 2018). The purpose is to improve the clients motor abilities by increasing their physical awareness. This method could allow the music therapist to focus on improving fine and gross motor skills. This method uses rhythmic movements, ear-training, and improvisation to inspire

and develop musicality in students. This is designed for people of all levels of musical ability. The goal is for everyone to develop an enriching relationship with music and experience it in their own personal way.

This approach could be very good for a person with ASD because it involves movement, and more specifically intentional movement of their bodies as a musical instrument. This is rewarding for them because it is stimulating and makes good use of gross motor skills. It engages them and allows them to experience music in a way that utilizes most of their senses. This method uses rhythmic movements, ear-training, and improvisation to inspire and develop musicality in students. This is designed for people of all levels of musical ability. The goal is for everyone to develop an enriching relationship with music and experience it in their own personal way.

Kodály Method

Another type of music therapy discussed is the Kodaly method. Developed by Zoltán Kodály, this method is “considered to be the inspiration for the development of this philosophy of music therapy. It uses a base of rhythm, notation, sequence and movement to aid in the learning and healing of the patient” (Smith, 2018). This method has been observed and shown to improve music literacy as a whole and helps a client with perceptual function, motor skills, and concept formation among other things. This method also might not fit best for a person with ASD, however if the client has shown an interest in music and excels at it, this could help them focus their talents to make music.

There are many approaches to music therapy that positively impact people with ASD. One article was found that wrote about a study done using the Kodály method with clients who

have Autism, and they experienced a big change. They wrote, “Music therapy is one of the alternate treatments for the purpose of enhancing joint attention behaviors of children with ASD. Music therapists can use the elements of music (melody, rhythm, pitch, dynamics, form) to enhance attention, sharing emotions, and social interaction” (Chiengchana & Trakarnrung, 2014).

This approach to music therapy involves more advanced musical skills. It uses several types of songs and builds from beginner-level songs to more advanced melodies and rhythms. This method engages students oral, kinesthetic, visual, and tactile skills. This multi-sensory method is good for clients with ASD because it keeps them focused and uses multiple parts of their brain at one time. This could be one of the most effective approaches to music therapy for clients with ASD.

Orff-Schulwerk Method

Another method listed in the Medical Life Sciences News article is called the Orff-Schulwerk method. This was developed by Gertude Orff. Gertrude realized that medication was not enough to assist children with disabilities, so she developed this method of music therapy that uses music as a means to improve the learning ability of children. (Chiengchana & Trakarnrung, 2014).

Nordoff-Robbins Method

A final type of music therapy discussed is the Nordoff-Robbins method. This was developed by both Paul Nordoff and Clive Robbins over the span of almost two decades. This article says, “They piloted projects with children affected by autism, mental disorders, emotional

disturbances, developmental delays and other learning difficulties, using music as the means of therapy” (Smith, 2018). The purpose of this method is to prove that everyone can benefit from music as a means to create and be expressive. This would be great for patients with ASD who struggle especially with communicating. Often times we see people with ASD lash out in anger because they cannot be understood and cannot express their emotions verbally. To provide them an outlet for expression could really be the difference between independence and having to be monitored in public settings. It provides safer ways to project anger, sadness, or other unpleasant emotions that will not hurt the client or those around them.

This method has grown from an idea to a method used all around the world and with multiple categories of disabilities across all ages. They started in Europe, just exploring and experimenting with children who have disabilities. In 1961, they started working at multiple businesses in America that supported children with autism, emotional behavioral disorders, developmental delays, and those with multiple disabilities. Further along down the road, they adapted their method to support children with orthopedic impairments and speech impairments. Over the next several years, their method spread worldwide as they wrote books, composed music, and went on lecture-demonstration tours. In 1975, Robbins joined with his wife and together they once again adapted the method so that they could now serve children with a hearing impairment. The following years were filled with more tours, a film by BBC, and an opening of the Nordoff-Robbins Music Therapy Center in Australia. This school combined music therapy with physical therapy to better assist those with orthopedic impairments. In 1975, the Nordoff-Robbins approach extended its focus to not only children with disabilities, but also adolescents and adults. This method is currently used all across the world, and as stated above, they now serve all ages and all disabilities.

“The Nordoff-Robbins approach to music therapy is based on the belief that everyone possesses a sensitivity to music that can be utilized for personal growth and development” (Norman, 2021). In this short article by NYU Steinhardt, it states that the Nordoff-Robbins approach is about more of a collaboration between the client and the therapist. Rather than the therapist playing music and the client listening, they are immersed in the experience. They are encouraged to create and be active in the process of making music. This method allows for more freedom and maybe puts some clients out of their comfort zones which can be such a good thing. This can improve social skills as it activates multiple areas of the brain such as creativity, interaction, fine and gross motor skills, seeing, hearing, and feeling. It is a very sensory heavy experience, and when actively included, the clients may just be more comfortable.

With this “person-centered approach” (Norman, 2021), this method can positively impact students with ASD. One common characteristic that is often found with individuals with ASD is struggles with communication and interactions. Think about this: if we had no way to adequately communicate how we were feeling, how misunderstood and frustrated would we feel? Music can be a way for individuals with ASD to communicate, if not a place to get out their frustration and bad feelings. On the Nordoff-Robbins website, it says, “Through music, our therapists help them establish meaningful communication, develop an increased awareness of themselves and others, build self-esteem and confidence and support physical, emotional and social development” (Norman, 2021). Although clients may be resistant at first, as the therapist breaks them out of their comfort zone, it is very possible that they could use music as their outlet, as a way to communicate.

There are pros and cons to each of these methods, and there is not one that is perfect for everyone. It must be very individualized as it is important to realize that what works for one

client will not necessarily work for another client. Even two clients who have ASD will not have the same needs, strengths, abilities, and wants. Collaborators must use their best judgement for each individual client to decide which method will work best for them. However, the method that seemed most widely used was the Nordoff-Robbins method, as it has been used world-wide across all disabilities and ages. I examined each of these to look at the pros and cons for each method of music therapy in relation to working with clients with ASD. Next, I will discuss a meta-analysis that was conducted to explore different music therapy techniques.

Studies

The first study was a meta-analysis conducted in 2014. A meta-analysis study is “a quantitative, formal, epidemiological study design used to systematically assess previous research studies to derive conclusions about that body of research” (Haidich, 2010). In other words, it is when a researcher uses multiple studies and research done on one common theme and puts them together to formulate conclusions and gain information on the topic. This study, of which the findings are summarized in Table 2 below, examined 10 previous studies including a total of 165 participants. They studied the effects of short- and medium- term music therapy interventions. There were groups receiving the music interventions and placebo groups receiving the “typical therapy” for ASD. The results, shown in the graph below, show that groups with music therapy interventions saw a greater improvement in social or life skills (such as initiating interactions, communication skills, parent-child relationships, etc.) than the placebo group. Speaking about the relationship between music therapy and ASD, the article said, “The central impairments of people with autism spectrum disorder (ASD) affect social interaction and communication. Music therapy uses musical experiences and the relationships that develop

through them to enable communication and expression, thus attempting to address some of the core problems of people with ASD” (Geretsegger, Gold, Elefant, & Mössler, 2014). Music uses all of the senses, and therefore can assist with so many needs people with ASD have.

Table 2. Results of participants included in music therapy sessions

Outcomes	# of participants	Quality of evidence	Standard Deviation
Social interactions	57	Moderate	0.71 higher
Non-verbal communication	57	Low	0.48 higher
Verbal communication	47	Low	0.30 higher
Initiating behavior	22	Moderate	0.73 higher
Social-emotional reciprocation	10	Low	2.28 higher
Social adaption	22	Moderate	1.15 higher
Parent-child relationship	33	Moderate	0.82 higher

The next study is from Harvard Medical School. They spoke about the effects that music has on different parts of our brain. They said, “Studies using MRI and positron emission tomography (PET) scans suggest that nerve networks in different parts of the brain bear primary responsibility for decoding and interpreting various properties of music. For example, a small area in the right temporal lobe is essential to perceive pitch, which forms the basis of melody (patterns of pitch over time), chords (several pitches that sound at the same time), and harmony (two or more melodies at the same time). Another nearby center is responsible for decoding timbre, the quality that allows the brain to distinguish between different instruments that are playing the same note. A different part of the brain, the cerebellum, processes rhythm, and the frontal lobes interpret the emotional content of music. And music that's powerful enough to be

‘spine-tingling’ can light up the brain's ‘reward center,’ much like pleasurable stimuli ranging from alcohol to chocolate” (Harvard Health Publishing, 2011). The brain of any human can process music in this way. It is fascinating, because very few things activate these many parts of the brain at one time. The study said that while any healthy human brain can perform all of these tasks, a musician’s brain completes these at a higher velocity.

There is a condition called savant syndrome that appears in some people with ASD. To define it, “Savant syndrome is a rare, but extraordinary, condition in which persons with serious mental disabilities, including autistic disorder, have some ‘island of genius’ which stands in marked, incongruous contrast to overall handicap” (Treffert, 2009). There have been many people with ASD and savant syndrome who are musical geniuses. One example is Kodi Lee, a man who is blind and has ASD. He sings and plays piano, and he won *America’s Got Talent* in 2019. He was gifted musically in ways none of us can understand. Music can help all people though. It is such an interpretive thing that everyone can enjoy it in their own way, whether they are musically inclined or not.

As stated in the first study, people with ASD enter fight or flight mode when overstimulated or presented with new tasks or environments that are unfamiliar. However, this study speaks on the effects that music has on stress and a person’s mood. Many studies have shown that music reduces stress and makes a person’s mood calmer and happier. Therefore, music could be a way to deescalate a person with ASD who is experiencing a sensory overload and having a panic attack or episode. Music is helpful for so many situations.

Savant Syndrome

Savant syndrome is when a person with disabilities excels in one area of expertise above the average skill level. One of the categories that people can identify someone with savant

syndrome is musical ability. If a music therapist has a child with savant syndrome, they can focus on methods to help improve their musical ability. The client should have much freedom to express themselves and perform music in whatever way they see fit. Music can be their 'safe space'. It is obvious that clients with savant syndrome will benefit from music therapy. However, savant syndrome is a rare condition. Music therapy is for everyone. We need to explore ways music therapy can benefit those without savant syndrome, and how to get them connected to the music.

Serving Clients without Savant Syndrome

Even though people with ASD and savant syndrome show promising and phenomenal musical abilities, all people with ASD show some receptiveness to music. It is perceived to be quite beneficial, and people with ASD experience much success in music.

One study showed that children with ASD were able to more successfully reproduce melodies than children without ASD (Applebaum, 1979). Children with ASD have increased pitch recognition because they listen to music more sensitively. Because of this, they are also able to identify between instrument sounds at a higher accuracy. Some people with ASD expressed discomfort with slow-tempo music. This can indicate a temporal processing issue, which results in a slight musical impairment. This was a very small percentage of people in the study. When given the opportunity, people with ASD were able to associate music in a major key with a happy face and music in a minor key with a sad face. This is a massive discovery for those with ASD who struggle socially with both expressing and identifying emotions. Music might be able to help them jump that barrier. Upon further testing, children with ASD were able to match music with feelings and actions. They did well with it too, especially with the feelings. They could identify a piece of music as portraying happiness, sadness, anger, and a multitude of other

emotions. When prompted, they also could identify actions that might be portrayed through the music; such as dancing, running, laughing, etc. (Heaton, 2009).

Much more research needs to be done to determine if people with ASD naturally excel at music. This article was stating the discovery that because people with ASD have heightened sensory intake, it is logical for them to be more musically inclined than a person without ASD, and many experiments proved this hypothesis to be valid (Heaton, 2009).

Conclusion

Music therapy has been proven to positively affect students with Autism and their development in a multitude of ways. It is helpful to patients with all different needs and abilities, but this paper focuses solely on how music therapy affects the development of children with ASD. There were many research studies on the effects that music therapy has for that specific disability. Music therapy improves social skills and behavioral issues that can inhibit the independency of people with Autism. Especially with early interventions, we can stop unwanted behaviors from forming and instill replacement behaviors. It is important to recognize that one cannot simply stop or remove a behavior. First, the target behavior must be identified. Next, the collaborators determined the function of the behavior so that they could adequately create a replacement behavior and start interventions. Music can be a replacement behavior for children with ASD. It can be life-changing, as some cases have improved verbal skills for clients that were previously non-verbal. Music therapy is not a cure for Autism, as there is none, however this can be such a positive part of their life and can positively impact their families or caregiver's life as well by assisting in the client's needs.

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