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Effects of Music Therapy on the Impulse Control of a Student with Autism Spectrum Disorder

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EFFECTS OF MUSIC THERAPY ON THE IMPULSE CONTROL OF A STUDENT WITH AUTISM SPECTRUM DISORDER

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
Agricultural and Mechanical College
in partial fulfillment of the
requirements for the degree of
Master in Special Education

in

The Department of Education

by
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Abstract

One academic concern of students with autism spectrum disorder is a lack of impulse control. Impulse control involves behaviors such as turn-taking, blurting out, waiting, and reaching for desirable items. To reduce problematic impulse control behavior in a student with autism spectrum disorder, a program of music therapy activities was performed with a second-grade student in a special education classroom. A single-subject reversal design was implemented during morning activities. Results suggest there was a slight reduction in observed impulsive behaviors within the classroom during the implementation of the music therapy activities.

Introduction

According to the American Music Therapy Association (n.d.), music therapy is the clinical and research-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. Music therapy can be used to address physical, behavioral, emotional, cognitive, and social needs of individuals. After assessing the strengths and needs of each client, the qualified music therapist provides an indicated treatment that can include some combination of activities related to creating, singing, moving to, and/or listening to music. The expectation is that through musical involvement in the therapeutic context, clients' abilities are strengthened and transferred to other areas of their lives (American Music Therapy Association; AMTA, n.d.).

Music therapy also can provide avenues for communication for individuals who find it difficult to express themselves in words (AMTA, n.d.). Research in music therapy supports its effectiveness in many areas such as improving physical rehabilitation and facilitating movement, increasing people's motivation to become engaged in their treatment, providing emotional support for clients and their families, and providing an outlet for expression of feelings (AMTA, n.d.). Music therapists are trained to assess emotional wellbeing, physical health, social functioning, communication abilities, and cognitive skills through musical responses; design music sessions for individuals and groups based on client needs using music improvisation, receptive music listening, song writing, lyric discussion, music and imagery, music performance, and learning through music; and participate in interdisciplinary treatment planning, ongoing evaluation, and follow up (AMTA, n.d.).

In schools, music therapy can be used to provide students with disabilities with interventions to address measurable goals and objectives listed in their Individualized Education

Programs or IEP (AMTA, n.d.). Music learning can be used to strengthen non-musical areas such as communication skills, behavioral skills, and physical coordination skills which are important for daily life. Music therapy is considered a related service under the Individuals with Disabilities Education Act (IDEA). Impulse control falls under behavioral skills for which music therapy has been suggested (AMTA, n.d.).

Impulse control is a very broad category of behaviors. A lack of impulse control can be defined as an inability to control impulsive urges or behaviors. Within the classroom this can be identified as problems with turn-taking, blurting out during class time, problems with waiting, and reaching for desirable items such as toys or rewards. Decreasing these behaviors in the classroom can make for a better and more beneficial learning environment. Students who practice impulse control cause less distractions, leading to a more focused and organized classroom. A lack of impulse control is a common symptom and behavior of Autism Spectrum Disorder (LaGasse, 2017).

Literature Review

Autism Spectrum Disorder (ASD) is a neurological developmental disorder that can cause difficulty with thinking, feeling, language and the ability to relate to others. ASD is diagnosed in every 1 in 100 people, about 2.3 million people have a relative who falls somewhere on the autism spectrum (Autism UK, 2019). As reiterated in many journals on autism, there is no cure. There are, however, ways to manage and maximize the potential of a developing child with ASD. One of these ways is through music therapy. In the research discussed below, the effectiveness of music therapy on behavior is the focus (Autism UK, 2019).

A study done in 2004, by D.J. Rickson, with adolescent boys with attention-deficit/hyperactivity disorder used music therapy to decrease their level of motor impulsivity. There were 13 boys aged 11-16 placed into 3 different groups. One control group had no music therapy. One group received what was described as improvisational music therapy. The third group received what was described as instructional music therapy.

Students in the experimental groups received eight sessions of music therapy. A synchronized tapping test (STT) was used to evaluate the students before and after sessions. During sessions, students would choose their own instruments and would be instructed to play all together and then “pass the beat.” One student would solo a measure and then stop and let the next student continue. The students would also have to repeat after the music therapist for the closing song, waiting their turn in a rehearsed four-part song. Each student was given an opportunity to choose a style and rhythm to start off the improvisation group with. Each session closed with a farewell song and a discussion of their current mood. While there was no major change in the STT, there was a noticeable change in the students receiving music therapy reported from the teachers. Teachers reported a decrease in restlessness and impulsive behaviors

within the classroom. There was not a significant difference between the two types of music therapy groups (Rickson, 2004).

In another study, Boso et al. (2007) provided eight students with ASD with music therapy sessions for 52 days, with each session lasting 60 minutes. In this experiment, the patients were exposed to different musical activities like singing simple and repetitive songs, playing drums and other percussion instruments, and listening to music. In order to assess and examine the results of the study a brief psychiatric rating scale and clinical rating scale were used. A Likert scale was used to rate the playing of different instruments, singing and rhythm absorption, as well as replicating a beat back to the therapist. Boso et al. (2007) reported that following intervention participants showed significant improvement in social, musical, and cognitive skills.

Liao (2013) used music therapy to address the social and communication skills of students with ASD. Using behavior analytic prompts and fading procedures, Liao analyzed music therapist-child interaction for children with ASD. Three children with ASD and delays in social and communication skills and two therapists teaching the children music were selected to participate in the study. The music therapy session would vary slightly in times and activities but follow a similar format. Each session would begin with a “hello song” where the student was invited to play an instrument of their choice. Musical instruments included guitar, piano, xylophone, metallophones, claves, wood block, drum and mallets, palm drum, sound shapes, tambourine, triangle, temple blocks, and bells. Then there was a “follow the leader” type of experience in which the student would repeat musical phrases after the therapist (Liao, 2013).

The next activity involved movement to the student’s choice of music and prop (Liao, 2013). The props included scarves, balls, bubbles, or beanbags. An instrument playing intervention was the next activity, in which the student would select any song and instrument

they wanted but would have to follow the therapist's instructions throughout the song. The instructions would include to play the instrument louder, softer, faster, slower, stop, and go. The session would always close out with a "goodbye song." The therapists would record the response of the child after each activity (Liao, 2013). The children's appropriate responses were noted in every activity. The result of the study showed that the therapists documented the children having significantly improved their social, cognitive, language, and musical skills. The therapists reported this through an increase in eye contact, vocalizations to the therapist, and an increase in direction following. The students were reported to not only improve during their music therapy sessions, but teachers also reported them improving within the classroom (Liao, 2013).

LaGasse (2014) used music therapy to address the social skills of 17 students with ASD ages 6 to 9 years. Participants received music therapy for 50 minutes twice weekly over five weeks. Music therapy involved the following activities: a welcome, a sensory experience, a group interaction activity, a sensory experience, a cooperative play experience, and a farewell activity. The music therapy activities involved passing instruments, playing rhythms with the group, playing when instructed with certain cues, and breaking up into small groups and creating small songs with their separate group. Parent-rated social skills improved from pre- to post-intervention (LaGasse, 2014).

In a study done by Porter and colleagues (2016), music therapy was utilized to gauge its effectiveness in improving the communication and social skills of children and adolescents with emotional and behavioral disorders. The participants were sourced from six different child and adolescent mental health service community care facilities in northwest Ireland. There were 251 children ranging in age from 8 to 16 years old. The participants were separated into two groups, with 123 of them in regular care with music therapy included and 128 with regular care. The

study lasted for 26 weeks, with 12 sessions a week. The data was measured by using the Social Skills Improvement System Rating Scales (SSIS). The SSIS was administered to the students themselves as well as their guardians. The SSIS was given out prior to the study, the first day after the study began, the thirteenth week of the study (midway point), and after the study concluded.

The goal of this study was to measure not only the social skills between peers, but also the behavior and social skills at home with the children's guardians. The control group consisted of usual care such as psychiatric counseling and medication. The experimental group consisted of their usual care, but also had free improvisation music therapy. Each music therapy session was 30 minutes long, and the music therapist would lead them in free improvisation, meaning that the music therapist would start by playing an instrument while the rest joined in with whatever they would like to play. The results of this study were that at the 13-week mark, there was not much difference in the children's behaviors at home, yet their mood was enhanced, and their depression was decreased. After the final 26th week, the behaviors of the participants within the group improved significantly, while the behaviors at home (assessed and reported by their guardians) was only minimally increased. Overall, this study showed that the group with music therapy did improve behaviors in the school setting overall, and not only did it improve their social skills but it also improved their mood and decreased their depression levels (Porter, 2016).

In an outcomes review of music therapy studies (LaGasse, 2017), many music therapy studies dealing with social skills and children-adolescents with ASD were compared. LaGasse looked at things such as whether the clients received music therapy as a group or individually, the sex of the client, the ages of clients, whether the family of the client was involved, what types

of music therapy were used, and who gave the reports (parents, self-report, or clinician). The studies LaGasse looked at included children in the school setting ages 5-21.

According to LaGasse (2017), the studies she reviewed suggested that individuals with ASD are usually uniquely drawn to music and some have enhanced musical abilities. LaGasse suggested that this makes using music therapy to enhance non-music goals a very dynamic therapy, with the possibility of favorable results. LaGasse (2017) asserted that the use of improvisational music therapy is an effective and enjoyable intervention to use with clients with ASD. Improvisation has been shown to increase a client's joint attention, social-emotional skills, social engagement, and nonverbal social communication. The improvisation LaGasse discusses is when the client engages in live music making and the music therapist (and other clients if in a group setting) follow the client's lead.

According to LaGasse (2017), the common element in all these interventions is the usage of music to stimulate social skills in the patients. Music therapy involves the patients in a unique and meaningful interaction with the social group. The reason that music stimulates social skills is due to its ability to activate the neural networks that enable a person to speak (LaGasse, 2017). Further, through optimization, music therapy targets specific parts of the brain that are responsible for specific social behaviors. Most of the assessments regarding the efficacy of music therapy on individuals with ASD are carried out with parent permission due to age and communication restrictions. The response of the parents is collected through questionnaires and then the results are examined by using an autism treatment evaluation checklist, parent-child relationship inventory, and social responsiveness scale. Additionally, parental opinion regarding the effectiveness of music therapy is collected through interviews and discussion groups. The results indicate that musical therapy sessions show a positive impact on the learning outcome.

Currently, there is ample research that supports the hypothesis that music stimulates verbal communication, social skills, and emotional reciprocity (LaGasse, 2017).

In an intervention by Yurtoğlu (2018), the relationship between music and improving social and behavioral skills of children with ASD was measured. 51 participants in the study whose ages ranged from 6-12 years old were divided into two groups: music and non-music. The division was random and there were 26 in the music therapy group and 25 in the non-music therapy group. The goals were to increase communication, turn-taking, sensorimotor integration, social appropriateness, and musical interaction. Both groups were held in the same place. Both groups were observed and had MRI scans before sessions began. Each session was videotaped and the only difference between them was the use of music in each activity (Yurtoğlu, 2018).

There was a repetition activity in which the music group would repeat a sung phrase and rhythm with a percussion instrument and the non-music group would repeat just spoken phrases (Yurtoğlu, 2018). The sessions were 45 minutes once a week. The music therapist led both sessions, the music therapy group as well as the non-music group (the control group). Their vocabulary after the sessions were tested by the Vineland Adaptive Behaviors Scale, as well as taking observations from the parents. Behaviors seemed to be more improved with the music group by 4% higher than the non-music group. Both therapies showed improvements, however the music therapy was seen as improving quality of life for the children in the parent's eyes (Yurtoğlu, 2018). Brain function was tested before and after the sessions with an MRI. The main thing the researcher was looking for with brain function was to see how musical engagement may alter functional connectivity in the brain. Improvements in all of these categories were shown with music in 8-12 weeks of therapy (Yurtoğlu, 2018).

Bharathi et al. (2019) noted that while music is known to initiate attention and engage different parts of the brain in a person with a neurological condition, it is observed that children with ASD are more interested in rhythmic music and they are more talented in music compared to other children. In this article, the relationship between the cognitive response of children with ASD was compared to rhythmic stimulation. After exposing children with ASD to rhythmic music, they were observed for signs of change in their cognitive response. It was observed that with a rhythmic intervention, sensory-motor response were activated in children dealing with ASD (Bharathi et al., 2019). Music is one of the tools that help generate rhythmic stimuli, which activates the motor system in the brain. With systematic rhythmic intervention, such as rhythmic drumming or other repetitive percussion instruments, the repetitive behavior in children with ASD is influenced (Bharathi et al., 2019).

In a separate study done by Bharathi, Venugopal, et al., (2019), music therapy was tested in a randomized clinical trial to see its effect on children with ASD's social skills. Different from studies done previously on the relation between music therapy and improving the social skills of children with ASD, this study not only wanted to see the amount of improvement the music therapy had, but also the duration of time in which the benefits lasted. The study included 54 children with mild to severe ASD. The ages were between 6-12 years old. None of the participants in the study had further disabilities such as; blindness, deafness, motor impairment, or speech impairment. The participants were also excluded if they were on any psychotropic drugs. Each child in the study was evaluated by two child psychologists, two occupational therapists, and a pediatrician. The Childhood Autism Rating Scale (CARS) was used to assess each participant before and after the study. This assessment would identify difficulties such as limitations with language, verbal communication, social communication, and behavioral issues.

In order to test the longevity of the music therapy the participants were given the TRIAD Special Skills Assessment (TSSA) three times throughout the study, once before, once directly after the last session, and once 3 months past the end of the study. The subjects were split into two groups. One group received active music therapy while the other received what the article called “passive music therapy.” The active group was involved in singing, dancing, and playing instruments. The passive group received music therapy without any interaction and listened to just music alone. Each group contained 26 children with 13 boys and 13 girls. Three songs were selected for the groups and after playing each song the group was observed in silence for 10 minutes. Each session lasted for 35 minutes and there were 3 sessions a week for 3 months (Bharathi, Venugopal et al., 2019).

Results of this study were that the results of both the CARS and the TSSA were higher immediately after the sessions ended. Both the active and the passive music therapy groups ranked about the same score on the assessments (Bharathi, Venugopal et al., 2019). However, three months after the final session and post-test, only the active music therapy group grew in scoring while the passive music therapy group’s score fell a few points. Overall, this study showed that while both music therapy methods showed a significant increase in the social skills of children with ASD, the Orff method (the active group) had more significant results within a longer period of time after the study (Bharathi, Venugopal et al., 2019).

Music therapy studies relating to individuals with ASD and its certain effects on their behaviors have taken place all over the world. These studies in particular focus on the population of school aged children between ages 4-21. This population relates to the study below as the participant in this study is a 2nd grader in the school setting. While all of these articles and studies range in methods, they all focus on the relationship music therapy has on the outside of music

therapy behavior. The current study's main goal is to see how the behavior of the student changes in the classroom after music therapy. The present study uses music therapy implementations similar to those in the aforementioned studies. Follow the leader drumming exercises are done in the studies by Boso (2007) and Bharathi, Venugopal, et al. (2019). These helped determine participation, turn-taking, socialization, and patience, and memory recall. In the studies by Boso (2007), Bharathi et al. (2019), and Yurtoğlu (2018), only percussion instruments were given and used by the students. This is also the case for the current study, as only a drum and shaky egg were given to be used by the student. This current study follows a session set up similar to the layout of the sessions mentioned above. They contain an introductory song, specific goal-oriented music activities, and then a closing song.

Method

Setting

The experiment took place at a special needs private school in the southern United States. The school only accepts children medically diagnosed with significant developmental delays. Every student has an already established IEP or is in the process of obtaining one. The school ranges from preschool students to high school. The study took place in the second-grade class of the subject. The classroom is broken into two areas. The front of the classroom includes desks and a white board. The back of the classroom is an open area closed off by cabinets and cubbies. There is a large rug with cube chairs set up in a semi-circle. The back of the classroom is where the experiment sessions occurred. The student sat approximately 2 feet from the experimenter on the rug.

Participant

The student was a 2nd grader attending the private school. The student was 1 of 7 students in the 2nd grade classroom. The student was a white male, age 8 with Down Syndrome and ASD. The student was selected by the classroom teacher and an administrator of the school with the suggestion to choose a student with significant impulse control issues. The student actively participated in classroom activities. He commonly got up out of his chair to complete morning activities following reminders from his teacher. The student was described as one of the more vocal students in the classroom, participating in group responses. He was said to often have outbursts when not called on. The student was said to respond well to music morning time and enjoyed participating in all the songs, such as days of the week, months of the year, and exercise time. The student was observed and demonstrated that he knew the words to each song and sang along with almost all of them. When the student does not initiate participation, his teacher noted

that she prompts he and that he eventually engages with the routine. His teacher noted that the student encourages his classmates to participate in classroom activities and cheers on other students when they answer questions correctly. He was described as often talking out of turn and yelling when excited or looking for attention.

Materials

Musical instruments were used in the study during the music therapy intervention. Instruments used were a ukulele, egg shakers, and a hand drum measuring 12 inches in diameter. Stamps were given as a reward for the student participating in the music therapy intervention. The stamp was a smiley face with a green felt ink pad.

Intervention

The intervention sessions took place within the classroom during morning break, between 8:30-8:45a.m., and the teacher was present during sessions to observe and assist. The experimenter had the student come to the back part of the classroom once he arrived at school over the course of the experiment.

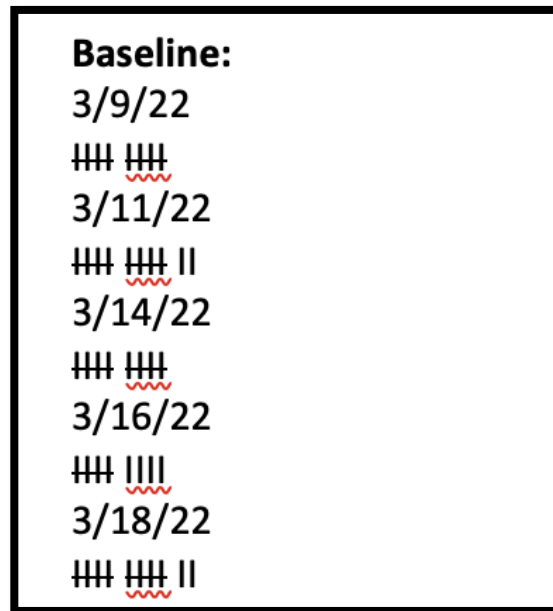
The music therapy session included an introductory “hello” song to help the student transition into music time. Using the chord progressions C, G, and D on the ukulele the experimenter sang “hello to ____, it is music time to day. We will play and we will sing. Let’s get excited for music” 4 times through, encouraging the student to sing along. The next activity was a shaker activity. The student was given a shaky egg. It was placed on the ground in front of them. The student was instructed to wait and only grab the shaky egg once the music started, and shake it until the music stopped. The music stopped randomly, and the student was given four separate trials to follow the instruction.

The next activity was a drumming exercise. the therapist had one drum set in-between the student and herself. The therapist played a simple rhythm and then passed the drum to the student. The student repeated the rhythm. The student was given three separate trials. The session closed with a “goodbye song” to help the student transition back into class time. The goodbye song used the chord progression of C, G, C, D, G, C: “see you later _____, music time is over, we had fun, and now we are done.” The student was then given a stamp for participating in the music intervention. Once the intervention was finished, the student went and sat at his desk and prepared for the first time period of the day.

Dependent Measures and Procedures for Data Collection

The experimenter sat in the back of the classroom to complete data collection, which occurred during the first class period of the day (between 8:45-9:15am). During baseline and intervention the data collected was a frequency count of distracting behavior performed by the student. The student’s measurable behavior of interest was defined as reaching for various classroom objects, touching and hugging other students, moving other students’ arms and bodies during morning stretches and dances, getting out of chair during group time and moving about the classroom, and shouting off topic verbiage during group time. Data collection actions were completed on the experimenter’s laptop through a tally system. The tallies were marked underneath each session’s date.

Image 1. Example of Data Collection



Experimental Design

This study was a single subject reversal design. Baseline data were collected first for seven sessions then the intervention data were collected during the session of music therapy for five sessions. After the original intervention period was complete, there was a return to baseline. The return to baseline lasted three observation sessions. After the return to baseline, there was a return to intervention for three more sessions.

Interobserver Agreement

To ensure that the data reported by the experimenter were accurate, the experimenter had the classroom paraprofessional take data for one session in baseline and one session in intervention. The classroom paraprofessional was given the definition of the behavior and told to mark tally marks for each time the behavior occurred. Agreement data were collected in session 3 during baseline. The classroom paraprofessional reported 10 measures of behavior while the experimenter reported 12. A difference of 2 occurrences of behavior (83.3% accuracy). The

paraprofessional reported data during session 9 in the intervention. The experimenter reported 7 and the paraprofessional reported 6 occurrences, a difference in 1 occurrence of behavior (85.7% accuracy). The paraprofessional was also correcting other students during the observation time which could explain the difference in observations.

Treatment Fidelity

The teacher was present to observe every session and activity. A checklist was provided to the teacher and she was asked to mark a yes for each checklist item observed and a no for each checklist item not observed. Across all observed sessions, all intervention components were observed to be implemented by the teacher.

Results

Data were collected for 18 sessions. The results of the study show that fewer behaviors were reported during intervention than during baseline sessions. In initial baseline, the mean frequency of behaviors was 11.4 (see Table 1). The highest frequency count was 13 and the lowest 9, showing some stability of behavior. A slightly increasing trend line is noted in Figure 1.

On the first day of intervention, there was a change in level. Data during the initial intervention period were relatively stable, with data points ranging between 5 and 8. There was a slightly decreasing trend line noted across sessions with no overlapping data reported between initial baseline and intervention sessions (see Figure 1).

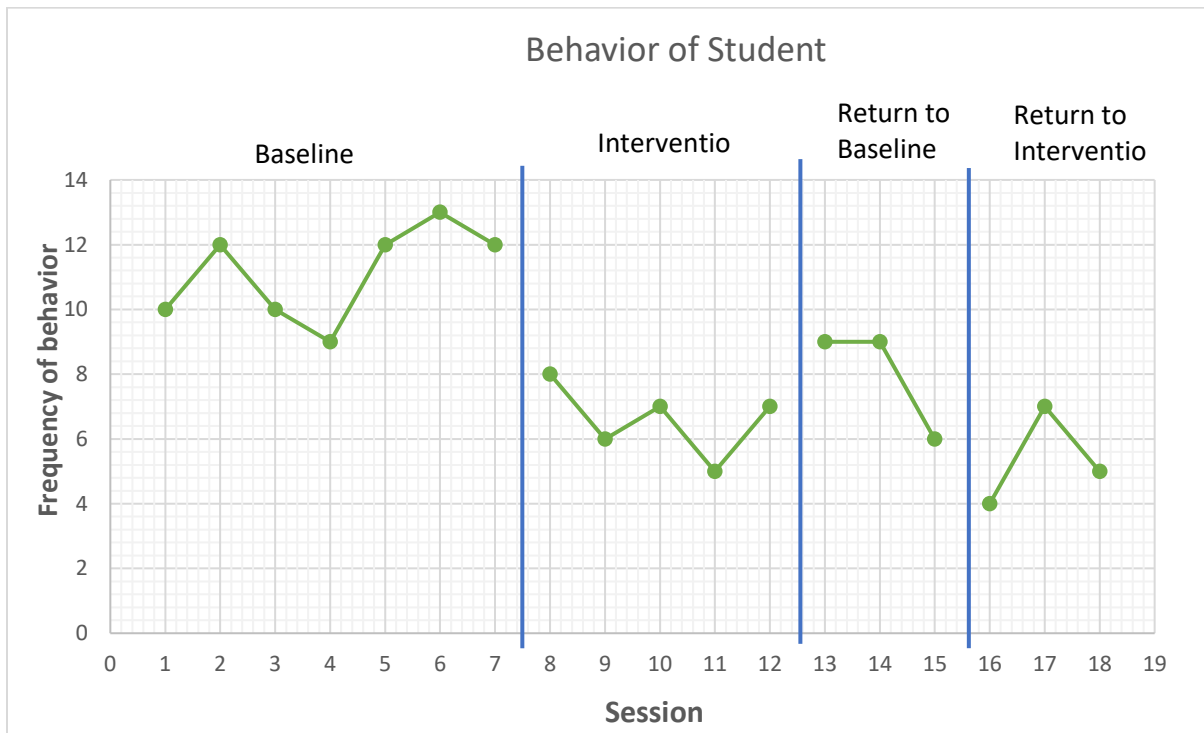
During the return to baseline, there was a slight increase in data reported initially but not to the levels of the initial baseline and only briefly. Across the return to baseline session, there was a slight decrease in trend, with the last baseline data point overlapping with the previous intervention range of scores. In the return to intervention, there again was an immediate level

drop in the reported data. Overall, the data reported during the second intervention phase were similar to those reported in the first intervention phase. There was overlap in the scores across the last two phases. There was also a slight trend line increase in the final intervention phase. Mean scores across phases are reported in Table 1.

Table 1. Means of Frequencies of Behavior in Baselines and Interventions

Baseline Mean	11.14
Intervention Mean	6.6
Return to Baseline Mean	8
Return to Intervention Mean	5.33

Graph 1. Student Frequency of Behavior



Discussion

A visual analysis of Figure 1 suggests that daily counts of impulsive behavior for the student during the first class of the day were lower during intervention sessions than there were during non-intervention sessions. However, review of the data do not support a statement that a functional or causal relation was observed between the implementation of early morning musical activities and a clear reduction in the observance of the student's impulsive behaviors. More research is needed to determine whether implementation of the set of music activities that served as the intervention could reliably reduce impulsive behaviors of students with ASD.

In the present experiment, though the student was hesitant to participate alone at the beginning of the first session, he began to warm up by the time the first session had ended. Positive behaviors were observed throughout the intervention phases, with the student regularly smiling when the music began and saying "yay, music time!" when the researcher entered the classroom.

The student was observed at the same time every day. The music therapy session would occur as soon as the student got to school, between 8:30 and 8:45 a.m. This period of time was right before morning assembly and the first class of the day. The first class of the day included going over the weather, the date, the day of the week, and the season of the year. It also included morning exercises, stretches, and ended in a reading lesson. The schedule in the classroom was repeated daily and every day that the experimenter was there to observe and work with the student, the schedule did not change. This helped maintain a stable data collection process. The student was never thrown off by a different schedule, until the experimenter began music therapy sessions during the intervention.

The reductions in problem behavior noted during the intervention phases were similar to the music therapy literature related to students with ASD. Similar to the 2014 study by LaGasse, the age of the participant in this study was 8. That study contributed to the way this study was organized. The music therapy session was set up into three distinct separate parts. The beginning of the session was started by an introductory song, such as a “hello” song or a “welcome to music” song. This was set here to help the child transition into the music session. The middle of the session consisted of the goal-oriented activities. These activities, which included the egg shaker and drumming activities, addressed session purposes to improve impulse control. The session ended with a closing song, such as a “goodbye” song or a “music time is over” song, to help the student transition out of music and back into the classroom.

The approximately 15-minute intervention sessions implemented in the present study were shorter than those completed in Porter (2016). That study targeted a similar population of students. It took place over a longer period of time and included sessions that were about twice as long, with positive findings. Longer sessions might have positively impacted the results of this study. After the 15-minute session was over, the student still seemed active and energetic. Many times after the session, the student wanted to continue with the music therapy session. If the session was increased the 30 minutes, which is the amount of time the studies done by Porter and the suggested time for sessions for children under the age of 5, the researcher believes the student could have benefited. The student might not have been able to stay engaged for sessions longer than Porter (2016), however, such as the 45- to 50-minutes sessions in Yurtoglu (2018) and LaGasse (2014).

Previous studies have collected data for a longer period of time. The Porter (2016) study lasted a total of 26 weeks and the Boso (2007) study lasted 52 days. Both of these previous

studies have timelines much longer than the current study. Extending the length of time of this study would have provided more data points in each of the baseline and intervention areas. This could have been beneficial in seeing a more concrete trend line throughout the study.

While the studies described previously range in methods, they all focused on the relationship music therapy has on the outside of music therapy session behavior. The current study's main goal was the same, the researcher is observing how the behavior of the student changes in the classroom after music therapy. Similar to the articles by Bharathi et al. (2019), Liao (2003), and Porter (2016), this study not only wanted to see if the behavior changed, but if it did, how long lasting were the effects. It is hard to characterize what kinds of longer-term impacts could be observed in the present study since behavior was only observed immediately after the music therapy sessions. In future studies using the combination of music activities in the present study, data collection would need to be expanded to include more of the school day and time after school. The impact of music therapy activities on behavior at home was noted in Bharathi, Venugopal et al. (2019), with parents reporting seeing positive effects of the music therapy session in their children up to three months after the intervention concluded.

In the previous research studies listed above, there was no one specific activity that was assessed as being the direct relation to improvement of the student. Similar to those studies, this study only tested the effect of a certain music therapy activity program. It cannot be determined what exactly in the music therapy program effected the behavior, as the study was set up to encompass the entire music therapy program and not the individual activities in the music therapy intervention. Future research could tease out the effects of particular packages of activities such as that included in this study.

The main difference between the previous studies above and the current study is the number of participants. This current study is a single subject design, while the studies above were group designs that compared intervention to control conditions. This current study involved only one student, meaning the music therapy sessions were one on ones. In the previous studies mentioned above, the music therapy sessions were a group setting, and the data was taken on all of the participating students. While the researcher sees having the student one on one in the music therapy session as a more beneficial way to conduct this study, having other students in the music therapy group could have provided different sources of positive feedback and reinforcement. If the student was off-task, the researcher could have verbally praised another member in the group who was on-task, in order for the student to participate accordingly in order to receive the same praise. Another useful tool in having a group of students in the music therapy session rather than just one, is having less hesitancy from the student. When a student is surrounded by classmates that are participating, they may be more likely to participate once they see that the classmates are partaking in the activities. This can also serve as another type of social reinforcement.

Having a group for the music therapy session can also be beneficial to carrying over the goal of increasing impulse control from the session to the classroom. The participant having his fellow classmates in the music therapy session could help him associate the behaviors being reinforced in the music therapy sessions to the behaviors needing to be improved on in the classroom. The group of students participating in the music session together could also form a stronger classroom cohesion and improve the way the students interact together in different settings.

While the body of previous research summarized above focuses on many domains for goals and objectives, this current study focuses only on behavior, defined as impulse control. The studies by LaGasse (2014), Bharathi, Venugopal et al. (2019), and Yurtoğlu (2018) focused on improving the social skills of children with special needs in the school system. Their studies use similar techniques to the current study. Parallel to the music therapy session activities in the current study, the music therapy activities used in their studies included drum imitation, turn taking, and stop and go direction playing using percussion instruments. While these activities were used to increase impulse control in this study, it was shown in those studies to significantly improve their participants' social skills. Social skills were not assessed in the present study but could be in future replications in order to evaluate the impact of music therapy activities on social skills.

The experimenter recognized the possible benefits of including other students in this particular classroom when other students would pass by and see the music therapy session occurring, they appeared to want to join and participate. The other students would walk up to the experimenter and the teacher asking if they could have music next time. The participating student also asked the experimenter if his friends were able to join for music. This may have been beneficial for morale, and the exact study could be done in the future with the classmates involved.

While a functional relationship between implementation of the present intervention and reduction in impulse control in a student with ASD, the reductions in mean noted in Table 1 and Figure 1 do support the previous positive findings reported in the literature for music therapy and its impact on behavior. During the intervention of music therapy sessions, the behavior in the classroom decreased, supporting a notion that the student showed better control of his impulses.

Limitations

Due to time restrictions, the researcher was not able to observe the student for longer periods of time. The effect of the music therapy intervention was only able to be collected immediately after the session for 30 minutes within the first class period. So statements regarding the effectiveness of treatment can only be directed to the time immediately following treatment. Also, the complete set of data are harder to interpret given the non-therapeutic trend lines noted in the return to baseline and second intervention phases. For example, it could be argued that the student's impulsive behaviors were improving as the second baseline continued. That trend was interrupted by the reinstatement of intervention.

The data collected were only on how music therapy intervention effected the impulse control of the student. Future research could be conducted on specific music therapy intervention activities.

Also, only two data points regarding interobserver reliability were collected during the study. Agreement was above 80% in both cases, with baseline and intervention conditions covered. The paraprofessional in the classroom, that was the other data collector during these observations, was correcting other students in the classroom during the observation period which could have affected their ability to collect accurate data. However, given that there was disagreement in each case, that calls into question the data reported in the non-reliability sessions.

Conclusions

The research literature supports use of music therapy as an intervention vehicle to address the social-emotional-behavioral concerns of children with ASD. The improvements in behavior noted by the participating student in the present study, though not causally connected to the implementation of the intervention, suggest that future music therapy research to tease out questions brought up by the present study continue to be warranted.

APPENDIX A – PARENT PERMISSION FORM

Parental Permission Form

1. Study Title: Effects of Music Therapy on Impulse Control in Student in Special Education
2. The purpose of this research project is to see how music therapy can improve impulse control in the classroom. Over a period of 3 weeks, 2-3 days per week, the investigator, will observe subjects' general classroom impulse control difficulties. Over the course of 3 more weeks the investigator will perform 15-minute music therapy sessions 2-3 times a week and then observe general classroom time immediately after. There will be data taken, no name will be mentioned, and no video or photos will be taken.
3. Risks: There are no known risks.
4. Benefits: Subject will be provided with music therapy. Opportunity to sing and play various instruments with therapeutic benefits. The study could minimize their difficulties with impulse control within the classroom.
5. Investigators: The following investigators are available for questions, Danielle Bella, LSU Graduate Student, dbella6@lsu.edu , Dr. Paul Mooney, Special Education Dept., LSU, pmooney@lsu.edu.
6. Performance Site: St. Lillian Academy
7. Number of subjects: 1
8. Student was chosen by teacher.
9. Right to Refuse: Participation is voluntary, and a child will become part of the study only if both child and parent agree to the child's participation. At any time, either the subject may withdraw from the study or the subject's parent may withdraw the subject from the study without penalty or loss of any benefit to which they might otherwise be entitled.
10. Privacy: The school records of participants in this study may be reviewed by investigators. Results of the study may be published, but no names or identifying

information will be included for publication. Subject identity will remain confidential unless disclosure is required by law.

11. Financial Information: There is no cost for participation in the study, nor is there any compensation to the subjects for participation.

12. Signatures: I may direct additional questions regarding study specifics to the investigator. For injury or illness, call your physician, or the Student Health Center if you are an LSU student. If I have questions about subjects' rights or other concerns, I can contact Alex Cohen, Chairman, Institutional Review Board, (225) 578-8692, irb@lsu.edu, or www.lsu.edu/research. I will allow my child to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

Parent's Signature: _____ Date: _____

APPENDIX B – SCHOOL ADMINISTRATOR FORM

School Administrator Form

1. Study Title: Effects of Music Therapy on Impulse Control in Student in Special Education
2. The purpose of this research project is to see how music therapy can improve impulse control in the classroom. Over a period of 3 weeks, 2-3 days per week, the investigator, will observe subjects' general classroom impulse control difficulties. Over the course of 3 more weeks the investigator will perform 15-minute music therapy sessions 2-3 times a week and then observe general classroom time immediately after. There will be data taken, no name will be mentioned, and no video or photos will be taken.
3. Risks: There are no known risks.
4. Benefits: Subject will be provided with music therapy. Opportunity to sing and play various instruments with therapeutic benefits. The study could minimize their difficulties with impulse control within the classroom.
5. Investigators: The following investigators are available for questions, Danielle Bella, LSU Graduate Student, dbella6@lsu.edu , Dr. Paul Mooney, Special Education Dept., LSU, pmooney@lsu.edu.
6. Number of subjects: 1
7. Student was chosen by teacher.
8. Right to Refuse: Participation is voluntary, and a child will become part of the study only if both child and parent agree to the child's participation. At any time, either the subject may withdraw from the study or the subject's parent may withdraw the subject from the study without penalty or loss of any benefit to which they might otherwise be entitled.
9. Privacy: The school records of participants in this study may be reviewed by investigators. Results of the study may be published, but no names or identifying

information will be included for publication. Subject identity will remain confidential unless disclosure is required by law.

10. Financial Information: There is no cost for participation in the study, nor is there any compensation to the subjects for participation.

11. The study has been discussed with me and all my questions have been answered. I may direct additional questions regarding study specifics to the investigator. For injury or illness, call your physician. If I have questions about subjects' rights or other concerns, I can contact Alex Cohen, Chairman, Institutional Review Board, (225) 578-8692, irb@lsu.edu, or www.lsu.edu/research. I will allow the student to participate in the study described above and acknowledge the investigator's obligation to provide me with a signed copy of this consent form.

School Administrator Signature: _____ Date: _____

APPENDIX C – CHILD ASSENT FORM

Child Assent Form

I, _____, agree to be in a study to find ways to help children act better in school. I will have to do special school work for the teacher's aide in my classroom. I will participate in music times in the morning. Where I will play a drum, an egg shaker, and use my voice to sing. I have to follow all the classroom rules, even when I am working with the teacher's aide. I can decide to stop being in the study at any time without getting in trouble.

Child's Signature: _____ Age: _____ Date: _____

Witness* _____ Date: _____

* (N.B. Witness must be present for the assent process, not just the signature by the minor.)

APPENDIX D – TREATMENT FIDELITY

Teacher Name: _____ **If observed, please check yes under each session.**

Intervention Session #	Activity	Yes	No
1			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	
2			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	
3			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	
4			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	
5			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	
6			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	
7			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	

(Table cont'd.)

Intervention Session #	Activity	Yes	No
8			
	Introduction Song using ukulele	<input checked="" type="checkbox"/>	
	Shaker Activity	<input checked="" type="checkbox"/>	
	Drum Activity	<input checked="" type="checkbox"/>	
	Closing Song	<input checked="" type="checkbox"/>	

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VITA

Danielle Amelie Bella, Born in Baton Rouge, Louisiana, was a musician throughout her childhood. She graduated with a music therapy degree from Loyola University New Orleans. Danielle then later worked with the public school system of Atlanta in their special needs programs using music therapy. She now attends Louisiana State University in order to receive her master's in special education. She plans on completing her master's this August 2022. Upon completion of her master's degree, she will enter back into teaching music in the special education setting.