5-5-2011

The Effect of Music on the Social Behavior of a Child with Autism Spectrum Disorder

Rachel Weinzapfel
rachel.weinzpfel352@topper.wku.edu

THE EFFECT OF MUSIC ON THE SOCIAL BEHAVIOR OF A CHILD WITH AUTISM SPECTRUM DISORDER

A Capstone Experience/Thesis Project

Presented in Partial Fulfillment of the Requirements for

the Degree Bachelor of Science with

Honors Program Graduate Distinction at Western Kentucky University

By

Rachel Marie Weinzapfel

*****

Western Kentucky University
2011

CE/T Committee:

Mary Lloyd Moore, M.S. CCC-SLP, Advisor

Debbie Parsley, M.S. CCC-SLP

Ms. Lindsey Westerfield

Approved by

_____

Advisor
Department of
Communication Disorders

ABSTRACT

Autism Spectrum Disorder (ASD) is defined by the American Speech-Language Hearing Association as a developmental disability that causes problems with social skills and communication. The principle objective of this case study was to determine whether or not listening to music affects the social behaviors of a child with ASD. In addition, this study sought to determine if listening to different types of music caused a difference in the social behaviors of the child. Two types of music, nursery rhymes and classical instrumental, were used and four specific social behaviors; eye contact, joint attention, facial expressions, and attention seeking; were examined. Five minutes of listening to music was implemented at the beginning of each therapy session. The two musical types were alternated monthly over a semester of therapy. This study could have implications for future use of music in the treatment of social behaviors in children with ASD.

Keywords: autism, music, social behaviors, nursery rhymes, classical music

This study is dedicated to all those who are on the Autism Spectrum Disorder. Studies like this help to find better ways to help these individuals interact meaningfully with those around them.

ACKNOWLEDGEMENTS

There are many people without whom this project would not have been possible. I am so thankful to Mary Lloyd Moore, my CE/T advisor, for her support and encouragement during this study. Without her advice and assistance this project would not have been possible. I am extremely grateful to her for her support not only of this project but also of my development as a speech-language pathologist. Thanks should also be given to Debbie Parsley, my second reader and member of my thesis committee. Her support and suggestions throughout this study were greatly appreciated. Both Mrs. Moore and Mrs. Parsley have been instrumental in the success of this study and my professional development. I would also like to thank my third reader and member of my thesis committee, Lindsey Westerfield, for her assistance in understanding the thesis process. Her knowledge of this process was greatly beneficial in the completion of this study.

I would like to also thank the Honors College at Western Kentucky University for creating the opportunity for me to complete this thesis project. This project has been a great opportunity for me to grow as a professional and a clinician. The faculty of the Honors College has provided support and encouragement throughout my college career which has allowed me to become an Honors Program Graduate.

Finally, I would like to thank my family and friends for their unyielding support of myself and this thesis project. Their love and support has helped me become who I am

today as a person and a speech-language pathologist. Their encouragement has helped me to be where I am with this project.

VITA

December 31, 1988.....Born--Evansville, Indiana

2007.....Homeschool at the Kingdom Heritage Academy, Evansville, Indiana

2011.....Undergraduate presenter at Student Research Conference, Western Kentucky University

FIELDS OF STUDY

Major field: Communication Disorders

TABLE OF CONTENTS

LIST OF FIGURES

CHAPTER 1

LITERATURE REVIEW

Introduction

In researching the topic of the use of music to treat clients with autism it was discovered that music is used to treat a wide range of symptoms of autism. Some of these included language/communication skills, social/behavioral skills, motor abilities, cognition, and musical abilities. For this literature review the focus was narrowed to look at, firstly, the efficacy of music in treatment of the social/behavioral aspect of autism and, secondly, to examine more specifically the efficacy of listening to music on the social/behavioral aspect of autism.

With regards to the first focus of this literature review, there have been several studies done about the efficacy of the use of music to treat the social deficits of autism. Research regarding Autism is still in the early stages of development. A review of the various educational approaches for children with autism published in 2001 stated that at that time there were, "Very few studies that [had] examined the effectiveness of music therapy with individuals with autism." (Dempsey & Foreman, 2001) Since that time there has been more research concerning music therapy and autism, however, all of the studies have noted that there is still a great need for further research. Many of the studies that have been done have been either case studies with individual clients or have had a very

small number of subjects. There is a great need for larger studies to be done with a larger number of subjects which would allow the true efficacy of music on Autism to be examined. There are also several reviews that have been published over the last few years examining the studies that have been done, and the various types of music therapies that are commonly used. These reviews do not focus specifically on the social aspect of autism, rather they review literature regarding any use of music therapy and autism which often does involve a social aspect. These reviews have noted that there are flaws among many of the studies. These flaws cause the data to be unable to show the true efficacy of music in the treatment of social behaviors in children with autism.

With regards to the second focus of this review, no research was found on the efficacy of simply listening to music on the social/behavioral aspect of autism.

Literature Reviewed

Introduction

Most of the literature regarding music and autism has been produced by music therapists and involve specific music therapies. These therapies are often interactive between the clinician and the client with both parties actively engaging with the music in some way, rather than just listening to it. These interactive therapies are the most common way that social behaviors are treated with music.

Theme 1: The efficacy of music in the treatment of social/behavioral aspects of autism

In 1995, a study was done by Dawn Wimpory (University College of North Wales, Bangor, and Gwynedd Health Authority) and Paul Chadwick and Susan Nash (University College of North Wales, Bangor). This study examined the efficacy of musical interaction therapy on a 3.3 year old child with autism who was described as "almost totally noncommunicative." (Wimpory, et. al 1995) The musical interaction therapy involved the client, the mother, and the clinician in singing actions that were initiated by the client and reinforced by the mother and clinician. The study looked at five social measures including social acknowledgment, frequency of eye contact, child-initiated involvement, positive changes to interaction, and symbolic play by the child. At the end of the study it was noted that the:

> "Onset of [musical interaction therapy] was followed by improvements in the child's use of social acknowledgement, eye contact, and initiations of interactive involvement. Creative child contributions to interaction…and symbolic play emerged later as predicted. Two-year follow-up confirmed that these positive changes were sustained. The child no longer showed frequent social withdrawal." Wimpory et. al. 1995.

Another study done in 2002 looked at the efficacy of musically adapted social stories on targeted social behaviors in children with autism. This study was done by Mike Brownell, University of Kansas. Brownell had a master of music education and was a

board certified music therapist. There were four participants who were recommended by their teachers and had shown positive reactions to previous music therapy. The study compared the efficacy of reading versus singing a social story to the client. Previous research had already shown positive results of using social stories to address social behaviors in individuals with autism, however this study wanted to see if the results were even higher when put to music. The results of the study indicated that:

> "The difference between the reading and music conditions was sometimes minute and difficult to detect, and only achieved significance in one case. Despite a lack of clear evidence indicating greater treatment efficacy, it can at least be stated that the musical adaptation was consistently at least as effective as the traditional model." (Brownell, 2002)

This study noted that there is a need for further research, although Brownell does state that the nature of autism itself makes it difficult for large and statistically accurate studies to be done. This study also states that it, "Provides no answers or definitive claims. Rather, it attempts to add one more piece to the difficult puzzle of remediating social skills with this population." (Brownell, 2002).

In 2006, Petra Kern (Frank Porter Graham Child Development Institute, University of North Carolina at Chapel Hill), Mark Wolery (Department of Special Education, Vanderbilt Univerisity), and David Aldridge (Chair of Qualitative Research in Medicine, University of Witten-Herdecke) did a research study to examine the effects of using songs on the independence of children with autism during a greeting routine. This study

involved two subjects who had both shown positive reactions toward music in the past. During this study the client's morning classroom greeting routine was put to music. There were two periods of baseline data taken followed by periods of intervention. It was noted that during the periods of intervention "[the first client's] performance steadily moved toward independence." (Kern, et. al. 2006) The second client's performance was initially variable, however after a modification was made to the routine he showed consistent and steady improvement. An increase of greetings by peers was also recorded with the second client after the song was added, however the numbers did not drop back down during the second baseline period. No data was presented on peer greeting for the first client. Caregivers of both the clients and the other children in the class reported positive results of the intervention. The conclusion of the study was that, "The data support the use of individualized songs implemented in this manner to facilitate independent entry into classrooms." (Kern, et. al. 2006).

A review was published in 2007 by Robert Accordino (Princeton University; Department of Experimental Psychology, University of Oxford), Ronald Comer (Princeton University), and Wendy Heller (Princeton University). This review examined the research that had been done concerning music therapy and autism. This review divided the articles into groups based on the area(s) of symptoms each study targeted. One of these grouping was social behaviors and included two studies that focused specifically on social interaction. One of these studies, Wimpory et. al., 1995, has been discussed earlier in this paper. The other study cited was by Starr and Zenker in 1998.

This study was a case study and reported higher socialization during the intervention. However, the review noted several things that caused the study to have limited impact. Other groupings of studies in the review included social behaviors as well as other areas such as communication. These sections included nine studies that included some aspect of social behaviors in the studies. Accordino et al. noted that although, "immense creativity in the design of [music therapy] reports that have shown the effects of [music therapy] on the behaviors, socializations, and communication of those with autism, there are several consistent flaws in the research." The review was concluded with a call to stricter research in order to truly understand whether music therapy is beneficial for clients with autism. The authors noted that very few studies had been statistically analyzed and that future researchers needed to examine the studies done in order to avoid the flaws that were common throughout the literature. These flaws included a lack of follow-up to establish long term efficacy of the therapies as well as lack of use of control groups in studies. The authors also addressed the argument made by therapists that case studies are the best way to research due to the variance between clients on the autism spectrum which made it difficult to find a regimen that can be used by multiple clients in a study. Accordino et al. said that "Researchers…can account for these subtle differences in therapy in sound empirical design, which have not yet taken place in this field."

Theme 2: The efficacy of listening to music on the social/behavior aspects of autism.

No research was found regarding the efficacy of listening to music on the social behaviors of children with autism. Although generally believed to be beneficial, especially in regards to classical music, no research has been done to evaluate the actual efficacy. Studies like this one, although limited, will help to determine whether or not listening to music is in and of itself beneficial for children with autism's socialization skills.

CHAPTER 2

RESEARCH QUESTIONS

Working Questions

This study seeks to answer two different questions. This first question is: Does listening to music at the beginning of the therapy session have an effect on the social behaviors and interactions of a child with autism spectrum disorder? The second question addresses the type of music that the client listens to: Do different types of music have different resulting social behaviors and interactions in a child with autism spectrum disorder? To be more specific, this study addressed the effect of listening to music on the social behaviors and interactions of a 12.6 year old male who was diagnosed with autism. The client exhibited social behavioral deficits often seen in children with autism. These deficits made it difficult for the client to interact meaningfully with those around him.

Limitations

As with any study, this case study has some limitations. These limitations can come from the structure of the study as well as from the client. The first limitation came through the fact that this study was done in a university clinic. This limited the number of weeks for the study as well as how often the client could be seen per week. During the study there was a one week scheduled break in which time the client did not receive any therapy and was not able to be observed to see if there was a difference in his social

behaviors. Another limitation of this study was the fact that the client was nonverbal. He could therefore not inform the clinician if he liked the music or if he had a preference between the two types listened to. This had to be judged by the researcher through observation. Another potential limitation presented by the client was his attitude before and upon entering the therapy session. If the client was not feeling well or was tired or upset, this could potentially cause lower resulting data than would normally be seen. Although this study had some limitations, they were noted by the researchers and taken into account.

Expected Outcomes

Before this study was begun, predictions were made regarding the expected outcomes of the implementation of the music. It was hypothesized that the client's social behaviors would show an increase during the therapy sessions after listening to the music. It was also hypothesized that the two different types of music would have differing results on the client's social behaviors. Baseline data was taken during the first week of the study and the results were mixed with the first day showing extremely high instances of the four target social behaviors and the second day showing extremely low instances of the behaviors. It was hypothesized that the client's social behaviors would increase over the course of the implementation of the music. If an increase in the target behaviors was seen during the study then it would indicate that listening to music before the therapy session was beneficial to the client's social behaviors and should be continued in the future. Also,

if there was a difference in the results seen with the two different musical types then it would show which type of music had a greater effect on the client. This would indicate which type of music would be most beneficial for use with the client in future therapy sessions.

CHAPTER 3

METHODOLOGY

Participants

The participant of this case study was a 12.6 year old nonverbal male. He had a diagnosis of autism and exhibited social behavioral deficits often seen in children with autism. These included lack of appropriate eye contact, with the client often focusing on an object while ignoring the communication partner or looking past his communication partner instead of making eye contact. The client also exhibited a deficit with appropriate joint attention as well as a limited use of facial expressions in social contexts. The attention seeking behaviors of the client were also limited and at times inappropriate, such as hitting.

Procedures

This study was conducted over ten weeks during the Spring 2011 semester at the Western Kentucky University Communication Disorders Clinic. During this time there was a weeklong break where no data was taken. Baselines were established during the first week of the study to indicate where the client was performing without the implementation of music at the beginning of his sessions. Two types of music were used during the course of this study: a) classical instrumental music and b) nursery rhymes. The first four weeks following the baseline were spent listening to the classical

instrumental music while the nursery rhymes were used during the remaining four weeks of the study. Data was taken on four specific areas of social behaviors: a) eye contact, b) joint attention, c) use of facial expressions, and d) attention seeking. The client listened to the music for approximately five minutes at the beginning of each therapy session and then continued on with the activities planned by his clinician. During the time that was spent listening to music the client was given toys to play with in order to keep his hands occupied. Data was recorded each time the client exhibited any of the four target behaviors during the therapy sessions. Headphones were attempted in order to help the client focus on the music, however he refused to wear them and they were eliminated from the study.

A student clinician was assigned to work with the client for one hour sessions for the semester. The clinician planned and implemented the therapy sessions while the researcher observed the sessions and took data on the four areas of social behavior and charted the progress. The researcher spent the first five minutes of each session in the room playing with the client while he listened to the music. After this time the researcher moved into the observation room and took data for the rest of the session. This allowed the clinician to implement the rest of the therapy session without interruption while also allowing the researcher to take data and observe without interruption. Data was recorded using a grid on which the researcher recorded how many times per session the client exhibited each of the four social behaviors.

The biggest part of the methodology was the selection of the music used. Two types of music were chosen for this study. The first type was soothing classical instrumental music. The term "classical music" is generally used to identify music composed in Europe during three specific musical periods: The Baroque period, the Classical period, and the Romantic period. Three songs written by three different composers were used for this study, one from each of the three periods. The three composers chosen were Johann Sebastian Bach, Wolfgang Amadeus Mozart, and Edvard Grieg. The second type of music chosen was nursery rhymes. Nursery rhymes are simple traditional songs or poems for children. These songs have repetitive and rhythmic musical structures and lyrics. The nursery rhymes chosen were taken from a collection of children's songs. The researcher used two groups of nursery rhymes which were alternated during the four weeks. The first group of nursery rhymes included the songs London Bridge, The Farmer in the Dell, and an Activity Medley-Itsy Bitsy Spider/Ring Around the Rosy/One, Two, Buckle My Shoe. The second group of nursery rhymes included This Old Man, Mary had a Little Lamb, and Twinkle, Twinkle, Little Star.

Data was collected using the chart below. The number of times the client exhibited each of the target behaviors was recorded in the appropriate box on the chart.

Date:_____ Music:_____

Eye Contact	Joint Attention	Facial Expressions	Attention Seeking

Notes:

Figure 3.1 Data Collection Chart, 2011. Used to document the eye contact, joint attention, facial expressions, and attention seeking exhibited by the client during the therapy sessions.

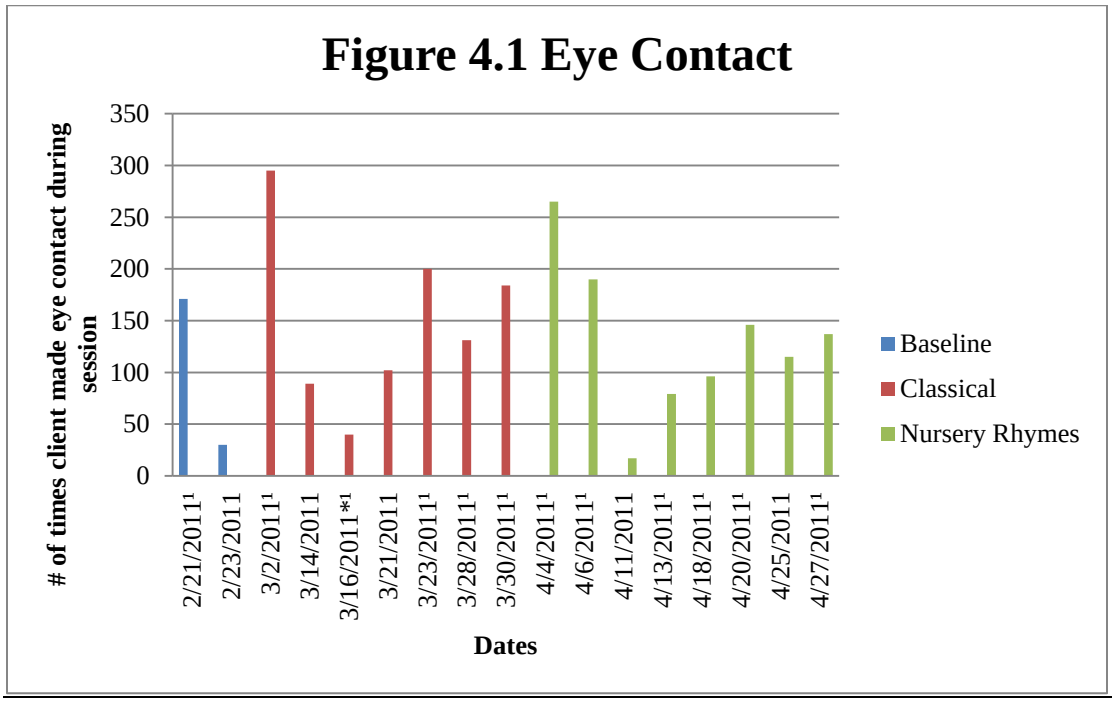
CHAPTER 4

RESULTS

The results of the ten weeks of this study were examined using graphs to track the client's behaviors over the course of the study. Figures 4.1 through 4.4 show each of the four different behaviors by session. The baseline data is recorded in blue, the classical music data in red, and the nursery rhymes data in green.

The study was conducted over ten weeks documenting eye contact, joint attention, facial expressions, and attention seeking. During this time there was a scheduled weeklong break during which no data was able to be recorded. This break came after the first week of listening to classical music. It should also be noted that there was one less session with the classical music due to client illness on one of the therapy days. One of the classical music sessions was also shortened to half the regular time due to delay in arrival by the client. This session has been noted with an asterisk on the graphs. Because the client only received a half day of therapy his opportunities to exhibit the target behaviors was lessened and a decrease of data was seen for that session. Also during this study a junior buddy was placed with the student clinician and was in the room during some of the sessions. The sessions in which the junior buddy was present have been noted with a ([1]) following the date on the graphs.

Eye Contact

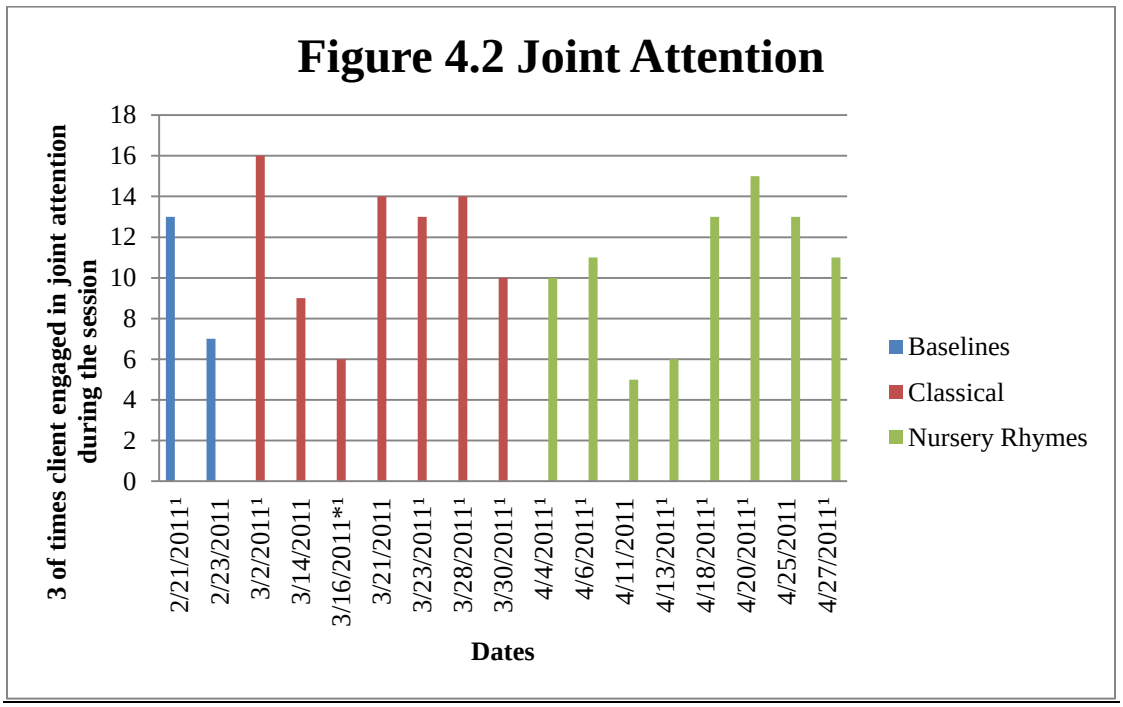


Eye contact was recorded any time the client successfully made eye contact with the clinician or junior buddy. During the baseline period the client's eye contact was varied. The first day his eye contact was very high, 171 times, and the second it was much lower, only 30 times. Upon implementation of the classical music the client's eye contact increased significantly to 295 instances during the session, but then proceeded to drop down for the next two sessions, 89 and 40 times. Over the next four sessions his eye contact again increased and stayed within the range of 102 to 200 times per session. During the period of listening to classical music the client's eye contact showed a great deal of fluctuation and did not show a clear trend of either positive or negative results.

During the nursery rhyme period the client's eye contact was once again highest during the first session. During this session he made eye contact 265 times. It dropped down during the next session to 190 times, but this was still above the baseline data. The third session showed a significant drop in eye contact to only 17 times which was below the baseline data. The next three sessions showed a steady increase from 79 times to 146 times, but then the scores dropped slightly during the last two sessions to 115 and 137 times. The client's eye contact during listening to nursery rhymes showed wide variance and did not show consistently positive or negative results.

In comparing the two types of music it is clear that neither of them had any significant effect on the eye contact of the client. Both types began with very high instances of eye contact, but both dropped off after the initial session and showed a great deal of variance throughout the sessions. Classical music stayed above the lower baseline of 30 during all of the sessions, while eye contact did drop below baseline during one of the nursery rhyme sessions. During the classical music sessions the client's eye contact went above the higher baseline three times as compared to twice during the nursery rhymes sessions.

Joint Attention



Joint attention involves consciously focusing attention on the same event or object as another person. This requires the individuals to be aware of the shared experience, not just for them both to be looking at the same thing. Data was taken each time the client engaged in joint attention with either the clinician or the junior buddy. Baselines of 13 and 7 times were established for the client's engagement in joint attention during the session. This baseline was not quite as varied as the eye contact baseline, however it did follow the pattern of higher scores during the first baseline session followed by lower scores the second day. The first session of classical music showed the greatest number of times that the client engaged in joint attention for the entire study. He engaged in joint

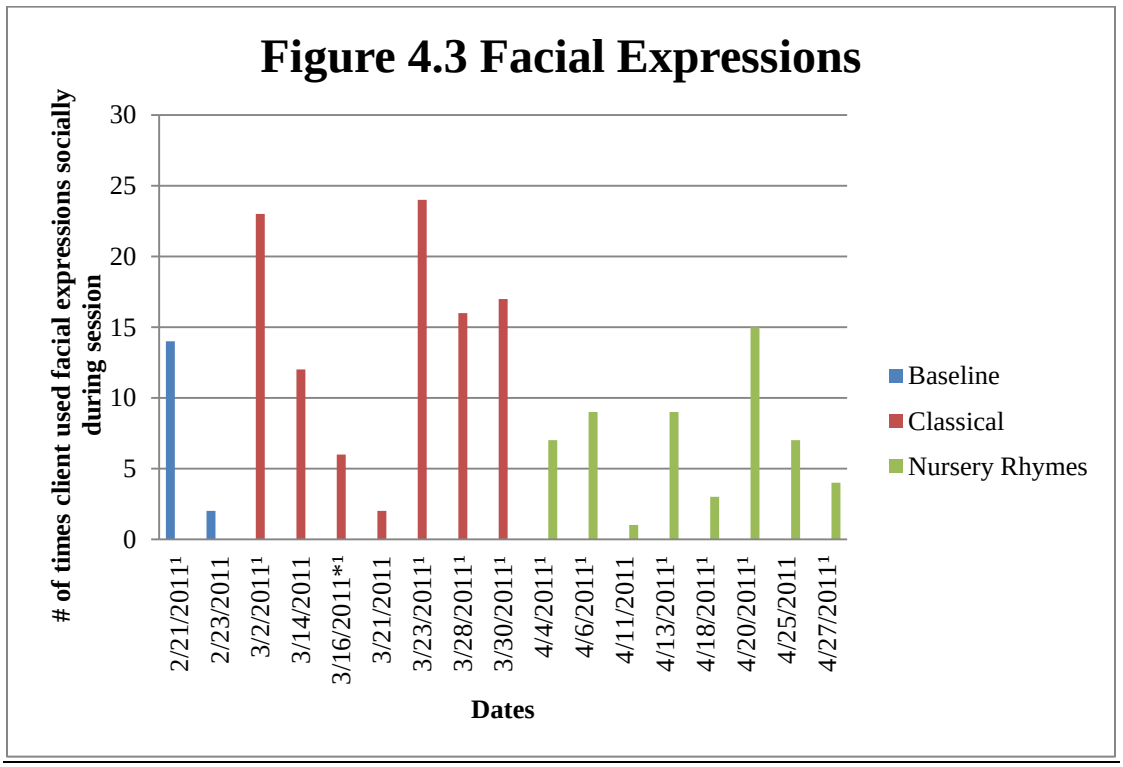
attention 16 times during this session. During the next session the number of times dropped to 9 times and during the third session the scores dropped to below the baseline to only 6 times. This drop below baseline was possibly the result of the client arriving late to the session which resulted in only half of the regular time spent in session. After this the number increased to roughly about the same range as the higher baseline for the next three sessions. During the last day of classical music the number of times dropped slightly again down to 10 times. Scores were varied throughout the period of classical music. For the most part the client stayed at roughly the same level as the baseline.

During the period of listening to nursery rhymes the number of times the client engaged in joint attention was again varied. The first session of nursery rhymes the client stayed at engaging in joint attention 10 times which was the same as the preceding session of classical music. His score increased to 11 times the next session and then dropped down to the lowest scores of the study at 5 and 6 times during the next two sessions. After this the number of times jumped up to at or above the baseline until the last session when it dropped down to 11 times. These results were unable to show a clear effect, either positive or negative, of nursery rhymes on the joint attention of the client during the therapy session.

When comparing the two types of music it is seen that both had a wide range of scores. Classical music went at or above baseline four times while nursery rhymes went at or above baseline three times. Both of the types had days in which the scores went below baseline as well, however the one day that went below baseline during the classical music

period was a half day which could have been the reason for this lower data. Overall, the classical music seems to have slightly higher results, but there is no significant difference between the two musical types.

Facial Expressions



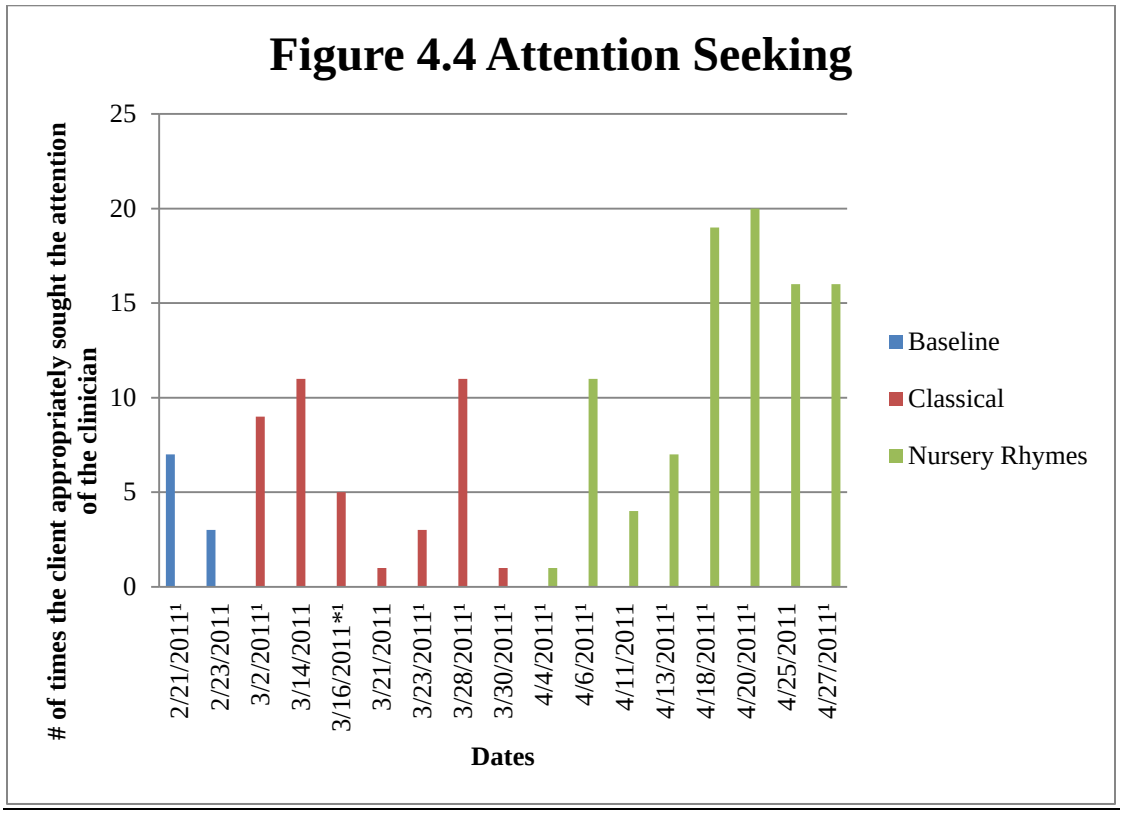
Baselines taken for the client's social use of facial expressions were extremely varied. The first day of baseline data the client used facial expressions 14 times as compared to only twice the second day. The facial expressions used by the client during the study included smiling and occasionally frowning. The client often used an excited expression

when he was engaging in an activity that he enjoyed, however these expressions were not counted unless they were directed towards the clinician thus making them a social behavior. Data collection of the client's use of facial expressions was extremely varied during the classical music period. The first and fifth session had the highest numbers of facial expressions for the study with the client using 23 and 24 facial expressions respectively. The sessions in between these two showed much lower use of facial expressions lowering from 12 to 2 before jumping back up in the fifth session. In the last two sessions the client's use of facial expressions dropped slightly but was still above baseline.

During the nursery rhyme period the use of facial expressions began lower than the preceding sessions. The first session the client used facial expressions 7 times, followed by 9 times the next session. During the third session the client only used a facial expression once. This was the only time that the use of facial expressions went below the baseline. The scores jumped up to 9 times again in the next session but dropped down again to 3 times after that. The sixth session showed the highest number of facial expressions during the nursery rhyme period with the client using them 15 times. The following two sessions showed a drop back down to 7 and 4 times. Nursery rhymes did not seem to have a positive effect on the use of facial expressions and for all but one session the scores were below the higher baseline.

In comparison it would seem that classical music had a more positive effect than nursery rhymes on the use of facial expressions by the client. However, both types had an extremely wide range of scores which seemed to indicate that neither really had an effect on the use of facial expressions by the client.

Attention Seeking



During the week of establishing baselines the client sought the clinician's attention 7 times during the first session and 3 times during the second. When classical music was introduced his attention seeking behaviors at first jumped up to 9 and 11 times during the

first two sessions. In the third session the number of times dropped down to 5, which was still above the lower baseline. During the following two sessions the number of times dropped further to below and at the baseline. The next session showed a jump back up to 11 times followed by a decrease to below the baseline once again. The number of times the client sought the clinician's attention showed wide variance from high numbers one session and very low the next. This fluctuation shows that there is not a discernable impact on this client's attention seeking behaviors from listening to classical music.

The first session of listening to nursery rhymes continued to show the below baseline numbers seen in the previous classical music sessions. This was followed by a session of increased numbers in which the client sought the clinician's attention 11 times. The next two sessions dropped down slightly again to 4 and 7 times. During this first half of the period of listening to nursery rhymes the client continued to show the fluctuation seen during the classical music period. However, the second half of the nursery rhyme period showed a marked increase in the number of times the client sought the clinician's attention. During these sessions the client sought the clinician's attention from between 16 to 20 times throughout the session. These sessions would seem to indicate that listening to the music may have had an effect on his attention seeking. Further research would be advisable before making this assertion when compared with the inconsistency of the previous two weeks' numbers.

When comparing the two musical types it is quickly apparent that the last four sessions of the nursery rhyme period were significantly higher than the previous sessions. However, the numbers from the classical period and the first four sessions of the nursery rhyme period have roughly the same results. The highest number of times the client sought attention was 11 and the lowest was 1. Both of these high and low scores happened twice during the classical music and once during the first half of the nursery rhyme period. During these six weeks of research there was no clear effect on the client's attention seeking behavior from listening to either type of music. As noted previously, the last two weeks of nursery rhymes were significantly higher and could possibly indicate an effect on the client's attention seeking behaviors. Further research would be necessary in light of the fluctuating numbers of the previous two weeks to truly say that the music had an effect on the client's behavior. Thus, no clear effect can be seen on the client's attention seeking from either the classical music or nursery rhymes.

CHAPTER 5

CONCLUSIONS

Data for this study was recorded over a ten week period. This time period included one week of baseline data collection in which no music was implemented in the therapy session, eight weeks of music implementation at the beginning of the therapy session, and one weeklong scheduled break in which no therapy was administered.

At the beginning of the study the client exhibited many of the social behavioral deficits often seen in children with autism. He often did not make appropriate eye contact, instead he would stare past the person at some other point in the room. The client also showed limited use of facial expressions, often wearing a neutral face with no expression. When the client became excited he would often smile and wear an excited expression, however this expression was rarely used socially to indicate his excitement to those around him. Instead he would remain focused on whatever object or toy was causing his excitement. The client's engagement in joint attention was limited as well. He would often focus on an object to the exclusion of the other person. The attention seeking behaviors exhibited by the client were often inappropriate, such as hitting when he wanted something from someone. When the client did seek attention appropriately it was always with the use of vocalizations.

During the course of this study it was hoped that the client's appropriate social behaviors in the four target areas would increase. When examining the data there is no clear effect, either positive or negative on the client's behavior in the four target areas. With regards to attention seeking behaviors the second half of the nursery rhyme period showed significantly higher instances of the target behavior which would seem to indicate a positive effect. However the previous weeks with the same music had not shown this so it would be advisable for further study to be done in order to establish the true efficacy of listening to nursery rhymes on the attention seeking behaviors of this client.

Thus, listening to music, either classical or nursery rhymes, did not show an effect on the social behaviors of this client. Due to the client's enjoyment of music, further research using a more interactive implementation of music is recommended.

BIBLIOGRAPHY

Accordino, R., Comer, R., Heller, W. B. (2007). Searching for music's potential: A critical examination of research on music therapy with individuals with autism. *Research in Autism Spectrum Disorders, 1,* 101-115. Retrieved March, 2011 from www.sciencedirect.com.

Ball, C. M. (2004). Music therapy for children with autistic spectrum disorder. In Bazain Ltd. (Ed) STEER: Succinct and Timely Evaluated Evidence Reviews 2004; 4(1). Bazain Ltd and Wessex Institute for Health Research & Development, University of Southampton. [WWW document] Retrieved March 2011 from http://www.signpoststeer.org.

Bhatara, A. K., Quintin, E., Heaton, P., Fombonne, E., & Levitin, D. J. (2009). The effect of music on social attribution in adolescents with autism spectrum disorders. *Child Neuropsychology, 15,* 375-396. Retrieved March, 2011, from Ebscohost database.

Boso, M., Emanuele, E., Minazzi, V., Abbamonte M., & Politi, P. (2007). Effect of long-term interactive music therapy on behavior profile and musical skills in young adults with severe autism. *The Journal of Alternative and Complementary Medicine, 13*(7), 709-712. Retrieved March, 2011, from Ebscohost database.

Brownell, M. D. (2002). Musically adapted social stories to modify behaviors in students with autism: Four case studies. *Journal of Music Therapy, 39*(2), 117-144. Retrieved August, 2010, from Ebscohost database.

Dempsey, I. & Foreman, P. (2001). A review of educational approaches for individuals with autism. *International Journal of Disability, Development and Education, 48*(1), 103-116. Retrieved August, 2010, from Ebscohost database.

Gold, C., Wigram, T., & Elefant, C. (2006). Music therapy for autistic spectrum disorder. *Cochrane Database of Systematic Reviews, 2.*

Kaplan, R. S. & Steele, A. L. (2005). An analysis of music therapy program goals and outcomes for children with diagnoses on the autism spectrum. *Journal of Music Therapy, 42*(1), 2-19. Retrieved March, 2011, from Ebscohost database.

Katagiri, J. (2009). The effect of background music and song texts on the emotional understanding of children with autism. *The Journal of Music Therapy, 46*(1), 15-31. Retrieved March, 2011, from Google Scholar.

Kern, P., Wolery, M., & Aldridge, D. (2007). Use of songs to promote independence in morning greeting routines for young children with autism. *Journal of Autism & Developmental Disorders, 37*(7), 1264-1271. Retrieved August, 2010, from Ebscohost database.

Kim, J., Wigram, T. & Gold, C. (2008). The effects of improvisational music therapy on joint attention behaviors in autistic children: A randomized controlled study. *Journal of*

Autism & Developmental Disorder, 38(9), 1785-1766. Retrieved August, 2010, from Ebscohost database.

Kim, J., Wigram, T., & Gold, C. (2009). Emotional, motivational and interpersonal responsiveness of children with autism in improvisational music therapy. *Autism: the International Journal of Research and Practice, 13*(4), 389-409. Retrieved March, 2011, from Google Scholar.

Whipple, J. (2004). Music in intervention for children and adolescents with autism: A meta-analysis. *Journal of Music Therapy, 41*(2), 90-106. Retrieved March, 2011, from Ebscohost database.

Wigram, T. & Gold, C. (2005). Music therapy in the assessment and treatment of autistic spectrum disorder: Clinical application and research evidence. *Child: Care, Health, and Development, 32*(5), 535-542. Retrieved March, 2011, from Google Scholar.

Wimpory, D., Chadwick, P., & Nash, S. (1995). Brief report: Musical interaction therapy for children with autism: An evaluative case study with two-year follow-up. *Journal of Autism and Developmental Disorders, 25*(5), 541-552. Retrieved August, 2010, from Ebscohost database.