

THE EFFECT OF MUSIC THERAPY ON JOINT ATTENTION SKILLS IN
CHILDREN WITH AUTISM SPECTRUM DISORDER

By

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ABSTRACT

The purpose of this study was to explore further whether children with Autism Spectrum Disorder displayed more joint attention behaviors—interacting and requesting joint attention—during music therapy, cooperative play, or independent play conditions. Joint attention is defined as the shifting of attention between an object or event and an individual. The effects of different types of music therapy interventions on these joint attention behaviors were also examined. Participants ($n = 4$) engaged in 3 session types: 1) cooperative music therapy, 2) cooperative play, and 3) independent play. Using a 15-second observe, 5-second record time sampling method, intervals were coded for the presence or absence of interacting and requesting behaviors. Data were graphed and a visual analysis of the data revealed that a higher percentage of interacting behaviors occurred during music conditions than both cooperative and independent play conditions across participants. Data for requesting behaviors was inconsistent across participants, and therefore the results were inconclusive. Graphic analysis of the effects of music therapy intervention types on joint attention behaviors revealed that when the participant and researcher played the same instrument more interactions occurred, whereas when the researcher and participant played different instruments more requesting behaviors occurred.

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Table of Contents

ACCEPTANCE PAGE.....	ii
ABSTRACT.....	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENTS.....	v
LIST OF TABLES AND FIGURES.....	vii
CHAPTER 1: INTRODUCTION.....	1
Autism Spectrum Disorder.....	1
Joint Attention and Autism Spectrum Disorder.....	2
Interventions for Joint Attention and Autism Spectrum Disorder	3
Music Therapy and Autism Spectrum Disorder.....	3
State of Research in Music Therapy and Autism Spectrum Disorder.....	4
Rationale for Study	5
CHAPTER 2: REVIEW OF LITERATURE.....	6
Introduction	6
Autism Spectrum Disorder	6
Joint Attention	11
Joint Attention and Children with Autism Spectrum Disorder	14
Interventions Addressing Joint Attention in Individuals with ASD.....	16
Music Therapy and Autism Spectrum Disorder.....	19
Music Therapy and Joint Attention	20
Summary and Purpose Statement	21
CHAPTER 3: METHODS.....	23

Institutional Review Board Approval, Recruitment and Informed Consent.....	23
Participants.....	23
Research Design	24
Independent Variable: Session Type	25
Dependent Variable: Joint Attention Behaviors.....	29
Data Collection	31
Data Analysis.....	33
CHAPTER 4: RESULTS.....	34
Interacting: Engaging in Joint Attention.....	34
Requesting: Initiating Joint Attention.....	37
Music Intervention Types and Joint Attention Behaviors.....	40
Inter-Observer Agreement and Treatment Integrity.....	41
CHAPTER 5: DISCUSSION.....	42
Conclusion.....	42
Observation During Data Collection.....	44
Limitations.....	46
Suggestions for Future Research.....	46
REFERENCES.....	49
APPENDIX A: Description of Study Provided to Facilities and Professionals.....	56
APPENDIX B: Informed Consent.....	57
APPENDIX C: Music Therapy Intervention Procedure and Type.....	60
APPENDIX D: Time Sampling Recording Sheet (Initial Viewing).....	62
APPENDIX E: Time Sampling Recording Sheet (Second Viewing).....	63

LIST OF TABLES AND FIGURES

TABLES

Table 1: Instruments, Props, and other Equipment Used During Cooperative Music Therapy Condition.....	26
Table 2: Non-Music Toys and Props Used During Cooperative Play and Independent Conditions.....	29
Table 3: Mean Percentage Comparisons for Interaction (Responding to Joint Attention) Behaviors Across Music Therapy, Cooperative Play and Independent Play Conditions.....	34
Table 4: Mean Percentage Comparison for Requesting across Music Therapy, Cooperative Play and Independent Conditions.....	37

FIGURES

Figure 1: Choice Sung Prompt.....	26
Figure 2: Sung Positive Reinforcement for Making a Choice.....	27
Figure 3: Sung Prompt if Child Does Not Make a Choice.....	27
Figure 4: Graphic Representation of Mean Percentage Comparisons for Interaction (Responding to Joint Attention) Behaviors Across Conditions for Jabar.....	35
Figure 5: Graphic Representation of Mean Percentage Comparisons for Interaction (Responding to Joint Attention) Behaviors Across Conditions for Victor.....	35
Figure 6: Graphic Representation of Mean Percentage Comparisons for Interaction (Responding to Joint Attention) Behaviors Across Conditions for Randy	36

Figure 7: Graphic Representation of Mean Percentage Comparisons for Interaction (Responding to Joint Attention) Behaviors Across Conditions for Trevor	37
Figure 8: Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred for Trevor	38
Figure 9: Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred for Randy	39
Figure 10: Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred for Victor	40
Figure 11: Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred for Jabar	40
Figure 12: Graphic Representation of Percentage of Intervals in Which the Child Engaged in Interaction (Responding to Joint Attention) During Music Intervention Types Across Subjects.....	41
Figure 13: Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred during each music intervention type across subjects and sessions.....	42

Chapter 1 Introduction

Autism Spectrum Disorder

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder that affects the development and functioning of a child throughout his or her life. People on the autism spectrum are characterized by two primary diagnostic criteria: deficits in social communication and interaction, and restricted and repetitive behavior patterns. Some manifestation of these diagnostic criteria must be present before the age of three in order for a child to be diagnosed with ASD (American Psychiatric Association (APA), 2013). These characteristics often result in intellectual delays, rigid behavioral patterns, and language impairments.

ASD is a spectrum disorder, therefore, the deficits mentioned above affect each child's development in a different way (Center for Disease Control and Prevention (CDC), 2013). Although many people with ASD have some sort of communication deficit, skills may vary from completely non-verbal with very little receptive communication skills to the ability to carry on complex conversations. Intellectual delays may present themselves in all areas of development or just one. A child with ASD may be able to function independently in a classroom with same aged peers, or in contrast, rely entirely on others in order to complete activities of daily living (i.e. bathing, dressing, toileting, etc.). Although children with ASD display a wide variety of delays in other developmental domains, research suggests that delays in social skills are the most prevalent, especially when compared to typically developing peers or children with intellectual delays (Mundy & Crowson, 1997).

Joint Attention and Autism Spectrum Disorder

Joint attention is a set of skills that involves alternating attention between an individual and an object or event. In typically developing children, these skills first present themselves around 6 months of age and continue to develop throughout the first two years of life (Mundy & Thorp, 2007). Joint attention behaviors are broken down into two skills: responding to and initiating joint attention. Responding to joint attention involves an individual following another person's eye gaze, head turn, or gestures (i.e. pointing) in order to share an object or experience. Initiating joint attention entails using eye contact and gestures to prompt focus on a shared object or experience with another person. Through this ability to share objects and experiences with the other individuals in his or her life, a child learns about their surrounding environment and uses this information to develop more advanced life skills (Mundy & Thorp, 2007).

Deficits in joint attention are some of the defining characteristics of children with ASD and have been considered by many experts as one of the most reliable early diagnostic indicators of the disorder (Mundy & Corwson, 1997). There are many thoughts as to why people with ASD have trouble with this skill, including the fact that children with ASD often make very little eye contact - a precursor skill to engaging in joint attention. Additionally, many researchers have discovered that people on the spectrum often have trouble with attentional functioning, including the ability to maintain a state of arousal in order to detect novel stimuli (i.e. alerting attention), shifting attention from one task to another (i.e. orienting), and attending to relevant stimuli when competing stimuli are present (i.e. executive attention) (Courchesne, Chism, & Townsend, 1995; Dawson et. al, 1998; Mezzacappa, 2004; Smith & Kossly, 2006). Regardless of the

cause of these deficits, impairments in engaging in joint attention have been associated with impaired communication skills and language delays (Bono, Daley, & Sigman, 2004; Kim, Wigram, & Gold, 2008). For these reasons, joint attention has been considered a pivotal skill in the development of children with ASD (Mundy & Crowson, 1997).

Interventions for Joint Attention and Autism Spectrum Disorder

Many programs have been established in order to provide services focused on the developmental needs of a young child with ASD. Research suggests that early intervention services can greatly improve the functioning level of a child throughout his or her life, including the ability to communicate and interact socially with others (Myers, Johnson, & Council on Children with Disabilities, 2007). Joint attention training during early intervention has been effective in improving these skills and consequently increasing language gains and communication skills (Bono, et. al, 2004; Kim et al., 2008; Whalen & Schreibamn, 2003). Due to the implications that joint attention can be taught to children with ASD, and that by developing these skills, development in other skills may follow, research should be conducted to determine the best ways to improve joint attention.

Music Therapy and Autism Spectrum Disorder

According to the American Music Therapy Association (AMTA) (2015), “the engaging nature and accessibility of music often elicits positive responses of individuals with ASD.” As the majority of people on the spectrum respond so well to musical stimuli, music interventions have increasingly been used as a treatment method to improve upon skills relevant to the child’s development and everyday life. Music has been known to increase language and communication skills (Lim, 2009), reduce problem behaviors

(Boso, Emanuele, Minazzi, Abbamonte, & Politi, 2007), increase understanding of emotional concepts (Katagiri, 2009), and improve social skills (Brownell, 2002) in people with autism. In fact, a meta-analysis conducted by Whipple (2004) revealed that, compared to no music conditions, music significantly improved skills in all developmental domains. Few studies have been conducted on the use of music to elicit joint attention behaviors, however, results from recent studies indicate that music is effective in increasing behaviors of joint attention (Arezina, 2011; Kalas, 2012; Kim, Wigram, & Gold, 2008; Yoo, 2010).

State of Research in Music Therapy and Autism Spectrum Disorder

Although there is a large amount of information that is available on the use of music as a treatment option for individuals with ASD, very little of it is evidence-based. The National Autism Center (2009) conducted a national standards project to determine effective, evidence-based treatments for individuals with ASD. The explored treatments included augmentative and alternative communication, cognitive and behavioral interventions, developmental and relationship based interventions, initiation training, language training, and sign instruction, among others. These treatment methods were rated based on the amount of research available to support the treatment and its effectiveness. Methods received an “established treatment” rating if they “produce(d) beneficial outcomes and [were] known to be effective for individuals on the autism spectrum” (p. 32). An “emerging treatment” rating was defined as “treatments that have some evidence of effectiveness, but not enough for us to be confident that they are truly effective” (p. 32) Finally, an “unestablished treatment” rating was given to treatment

methods for which “there is no sound evidence of effectiveness. There is no way to rule out the possibility these treatments are ineffective or harmful” (p. 32).

Music therapy was one of the many treatments evaluated by the National Autism Center (2009) and was awarded an emerging treatment rating. In order for music therapy to be rated as an established treatment, more evidence-based studies need to be published to show the benefits of music therapy for people with ASD.

Rationale for Study

Of the studies that have been conducted examining the impact of music therapy on joint attention skills in children with ASD, all have indicated that music therapy is an effective treatment for increasing joint attention behaviors (Arezina, 2011; Kalas, 2012; Kim, Wigram, & Gold, 2008; Yoo, 2003). Despite these positive results, only a few studies have been conducted on this topic; therefore, this study aims to further investigate the effectiveness of music therapy in developing joint attention skills in children with ASD.

Chapter 2

Review of Literature

Introduction

This chapter provides an overview of the current literature available related to deficits seen in joint attention skills in children with Autism Spectrum Disorder (ASD) and the effects music therapy has on these deficits. The information below will outline 1) characteristics of people on the autism spectrum as defined in the Diagnostic and Statistical Manual for Mental Disorders, 5th edition (2013) and hypotheses that surmise the cause of ASD, 2) what joint attention is and how the acquisition of these skills effect later development, 3) joint attention deficits seen in children with ASD and why it is considered a pivotal skill, 4) current treatments used by professionals in order to address joint attention deficits in children with ASD, 5) the use of music therapy as a treatment modality for people with ASD, and 6) current research in the use of music therapy as an intervention in order to increase joint attention skills in children with ASD. The purpose of this study will then be outlined in relation to the information provided above.

Autism Spectrum Disorder

The recently published Diagnostic and Statistical Manual for Mental Disorders, 5th edition (2013), classifies Autism Spectrum Disorder (ASD) through the following diagnostic categories: deficits in social communication and interaction; and restricted, repetitive behaviors. These two categories can be broken down further into more specific observable behaviors and deficits.

Deficits in social communication and interaction can be observed in children with ASD in three specific ways: (1) the child may have trouble developing and maintaining

relationships with family and peers, (2) he or she may use very little or no nonverbal communicative behaviors (e.g., gestures, body language, etc.), and (3) the child may display deficits in social emotional reciprocity, such as the inability to participate in reciprocal conversations, and the failure to respond to or initiate social interaction (American Psychological Association [APA], 2013). For example, children with ASD may require scripted responses to questions such as “how are you today?” or “what is your name?” He may not be able to initiate conversation with his peers, or read important nonverbal cues to provide him with information on how the other person is reacting to the conversation at hand. In addition, people on the spectrum may avoid social situations due to a lack of ability to understand social norms and customs. This may lead a child with ASD to sit off to the side of a room instead of interacting with other children. Finally, he or she will often avoid eye contact and use very few gestures in order to share an experience or object with another individual.

The second diagnostic category, restricted, repetitive behaviors is most often observed in stereotypical movements such as hand flapping or rocking (American Psychological Association, 2013). Due to the brain’s inability to process and integrate sensory information received from the environment, self stimulating behaviors are often used by people with ASD in order to meet sensory needs when the individual is experiencing varying degrees of over or under-stimulation (Berger, 2002). Other characteristics defined by this diagnostic category include, becoming overly upset when a change in routine occurs - such as the difference in school and summer schedules - and restricted or fixated interests. Some children might be fixated on math, while other

children may be overly interested in sport statistics and facts. These fixated interests often lead to the child perseverating on a topic to the exclusion of everything else.

ASD is a spectrum disorder, meaning that the diagnostic criteria drastically vary in severity from one person to the next. Some children may develop complex verbal language, while others may never produce more than babbling sounds. Some children may engage in socially appropriate eye contact and others may be oversensitive to loud noises. Regardless of the severity, some form of both diagnostic criteria must be present before the age of three in order for the child to be diagnosed with ASD (American Psychological Association, 2013).

The specific cause of ASD is unknown, however, researchers suspect that ASD may be caused by a combination of these three things: certain genetic markers yet to be discovered, poor neurological connectivity, and environmental factors (LaGasse, Humpal, Kern, 2015). Furthermore, there are several theories as to why the symptoms stated above present themselves (LaGasse, 2014). The following potential theories are described below: executive dysfunction hypothesis theory, the empathizing-systematizing theory, the weak central coherence theory, and the temporo-spatial processing disorder theory.

The executive dysfunction hypothesis theory. The first theory - the executive dysfunction hypothesis - states that symptoms of ASD can be attributed to dysfunction in executive functioning skills such as planning, mental flexibility (i.e., the ability to shift to a different thought or action), and inhibition. Evidence to support this hypothesis can be found in both diagnostic categories. Deficits in mental flexibility may account for an individual with ASD's restrictive and repetitive behaviors. Deficits in social communication and interaction can be accounted for in the executive function skill of

inhibition along with poor mental flexibility. In addition, abnormal brain activity in the frontal lobe – the part of the brain responsible for executive functioning - in persons with ASD supports this theory (Hill, 2004a, 2004b; LaGasse, 2014; Rajendran & Mitchell, 2007). Finally, people who have experienced trauma to the frontal lobe later in life often exhibit some of the same behavioral patterns as people with ASD, which lends further support to this theory.

The empathizing-systematizing theory. The second theory, developed by Baron-Cohen (2009), theorizes that behaviors associated with ASD can be attributed to a lack of ability to empathize and an overly developed capability to systemize. This theory expands upon the theory of mind, which states that children with ASD have trouble accounting for other people's mental states – or mentalizing (Baron-Cohen, 2009; Rajendran & Mitchell, 2007). For example, if a typically developing child saw someone that they were interacting with turn his head to look at a door, that child might realize that the person they are interacting with has detected something of interest coming through the door and follow the other individual's gaze in order to find out what it is. Children with ASD, however, often lack this skill (Baron-Cohen, 2009). They would observe the person looking at the door and fail to understand why. The child would fail to follow the other person's gaze and miss out on potentially important information being provided by this non-verbal cue. This hypothesis may explain why people with ASD have trouble with social communication and interaction. If one cannot understand that people can have thoughts that differ from that of their own, they cannot then show interest in other people's points of view or have a need to understand what another person is thinking.

Although the theory of mind explains many of the social deficits in children with ASD, it only addresses one diagnostic category, deficits in social communication and interaction. By incorporating the systemizing component, Baron-Cohen (2009) also addresses the second diagnostic category, restricted and repetitive behaviors.

In a system, everything has rules and those rules cannot be broken. The empathizing-systemizing theory surmises that children with ASD cannot generalize rules from one social system to another. For example, a child with ASD learns that when someone cries, they are sad. Therefore, when they see a bride crying at her wedding, they come to the conclusion that the bride is not happy to be getting married.

The weak central coherence theory. Other experts focus on how individuals with ASD processes information, and how that differs from the way typically functioning individuals process the same information. This theory - the weak central coherence theory - hypothesizes that a typically developing individual processes information by taking in all the details and extracting the overall meaning, while someone with ASD focuses on the details, not as parts of a whole, but as individual units (LaGasse, 2014; Rajendran & Mitchell, 2007). If nonverbal social cues cannot be integrated with verbal communication, social communication and interaction will be a challenge. If a child cannot process the change in routine as a product of school being let out for the summer, he or she may have trouble with this transition.

The temporo-spatial processing disorder theory. The final theory, the temporo-spatial processing disorder, hypothesizes that children with ASD have trouble processing rapid moving objects and events in their environment. For example, the reason that children with ASD may avoid eye contact is due to the inability to process the small rapid

movements of another individual's eyes (Gepner & Tardif, 2006; LaGasse, 2014). If processing rapid moving objects and experiences are difficult, one might rely on a familiar routine in order to increase comprehension of the environment around them.

As evident in the information presented above, there are many hypotheses as to why people on the spectrum behave the way they do. Each theory has its strengths and weaknesses; however, all experts agree that one of the most defining deficits of people with ASD is their inability to understand and interact in social situations.

Joint Attention

Joint attention is used in social interactions to share an experience or object with another individual in a non-verbal way. The ability to engage in joint attention involves a shift in attention between an object or event and another individual (Bruinsma, Koegal, & Koegel, 2004; Dawson, Toth, Abbot, Osterling, Munson, Estes, & Liaw, 2004; Mundy & Thorp, 2007). This set of skills is first observed around 6 months of age in typically developing children, and continues to develop throughout the first two years of life. These behaviors only occur when the same aspect of the environment is shared (Yoo, 2003), and serve a social function that is reinforced by the shared experience that occurs between the infant and another individual (Mundy & Thorp, 2007).

Joint attention behaviors are divided into two categories: responding to joint attention and initiating joint attention (Bruinsma et. al, 2004; Mundy & Thorp, 2007; Yoo, 2003). Responding to joint attention involves following another person's eye gaze, head turn, or gesture in order to share an object or experience, while initiating joint attention involves the use of gestures (e.g., pointing) or eye contact in order to share an experience or object with another individual.

Joint attention behaviors serve as a significant milestone in childhood development (Mundy & Crowson, 1997). As in all development, joint attention is attained in a sequence. Gaze alteration is acquired first, in which a child alternates their eye gaze between an object and their caregiver. This behavior is followed in turn by responding to joint attention bids and initiating joint attention (Carpenter, Pennington, & Roger, 2002).

Joint attention behaviors are further categorized into two states of engagement (Whalen & Schreibman, 2003). Supported joint attention develops first, and involves an adult and child focusing on the same object; however, the child does not shift their attention between the object and adult. Next to develop is coordinated joint attention, in which a child successfully shifts their attention between the adult and object or event. This skill first develops with the shift of eye gaze from the adult to the object. Gestures are added soon after, followed by words to attract the adult's attention (Adamson, Bakeman, Deckner, & Ronski, 2009; Arezina, 2011). As these skills develop, children learn more about their environment, start making associations, and ultimately develop other life skills.

There is a strong correlation between the ability to respond to and initiate joint attention bids and language acquisition (Arezina, 2011). Language develops as a result of a parent referencing an item, or initiating joint attention. The child learns how to identify the item by responding to the joint attention bid provided by the parent. Further language development occurs when a child uses language incorrectly, and parents make corrections when wrong associations are made. These skills cannot develop if the child cannot first

respond to the original joint attention bid of the parent referencing an item (Arezina, 2011).

Many researchers have explored the relationship between joint attention and language acquisition. Toth, Munson, Metzlof, and Dawson (2006) discovered that initiating joint attention and immediate imitation were associated with language ability in 3 and 4 year-old children. Children with higher levels of language skills demonstrated more instances of joint attention and immediate imitation, whereas children with lower language ability did not demonstrate as many joint attention bids and immediate imitation. Adamson et al. (2009) discovered a correlation between symbol-infused joint engagement and language gain. The more the child was able to engage in joint attention, the greater their language gain. Bono, Daley, and Sigman (2004) examined the relationship between joint attention skills, amount of intervention, and language gains in children with ASD. They discovered that joint-attention skills and language gains were positively correlated, in that the more a child could engage in joint attention, the more sophisticated their language skills were. In addition, language gains as a result of specific interventions were conditional on the child's ability to engage in joint attention. Smith-Miranda, & Zaidman-Zait (2007), suggest that the more a child initiates joint attention bids the faster his/ her vocabulary grows. Joint attention impairments have also been associated with impairments in non-verbal communication (Chiang, Soong, Lin, & Rogers, 2008), and lack of interest to interact with others (Adamson, Deckner, & Bakeman, 2010). Deficits in joint attention, therefore, can ultimately effect a child's development in other areas including social interaction, communication skills, and language gains.

Joint Attention and Children with Autism Spectrum Disorder

In a study conducted by Dawson et al. (1998), children with ASD had significantly more errors in orienting and shared attention tasks when compared to children with Down Syndrome and typically developing children. The deficits observed in orienting tasks were more profound with social stimuli than nonsocial stimuli. In addition, the response times of children with ASD to above mentioned orienting tasks were greater to social stimuli than nonsocial stimuli. Further research has replicated the results of this study, reinforcing the concept that impairments in the social-communication development in children with ASD are syndrome-specific, and do not occur in the same manner in children with other developmental and intellectual disorders or their typically developing peers (Dawson et al., 2004).

Joint attention is one of the key impairments of social communication that differentiates children on the spectrum from their peers. Compared to same-aged peers, children on the spectrum are less likely to respond to and initiate joint attention bids (Charman et. al, 1997; Lewy & Dawson, 1992; Osterling & Dawson, 1994). In a study conducted by Osterling and Dawson (1994), videotapes of first birthday parties of children later diagnosed with ASD were compared to first birthday party videotapes of typically functioning children. They found that child with ASD had significantly more errors in social behaviors such as looking at the face of another, seeking contact, and imitating. In addition, children with ASD displayed delays in joint attention behaviors, specifically pointing and showing. There were no significant differences between groups in the number of errors made in communicative behaviors such as following directions

and babbling. These results suggest that joint attention deficits are present in children with autism much earlier than language delays.

Deficits in joint attention are also a key part of the many theories that explain the characteristics of people with ASD, including the executive dysfunction hypothesis, empathizing-systematizing theory, the weak central coherence theory, and the temporo-spatial processing disorder. A link between executive functioning and joint attention has been discovered, which supports the executive dysfunction hypothesis described above (Hill, 2004a, 2004b). Griffith, Pennington, Whener, and Rogers (1999), examined this relationship between executive functioning and joint attention. They found a significant correlation between spatial reasoning tasks, an aspect of executive function, and joint attention. These data indicate that executive functioning predicts joint attention behaviors over time. The empathizing-systemizing theory accounts for a lack of joint attention skills in children with ASD through the individual's inability to empathize. The inability to follow another individual's eye gaze in order to share an object or experience can be explained by the individual's lack of ability to mentalize (Baron-Cohen, 2009). The weak central coherence theory accounts for deficits in joint attention through the inability to combine the details of an environment into a whole. This theory states that the reason someone on the spectrum is unable to follow another individual's eye gaze in order to share an object or experience is due to that individual's inability to integrate all the stimuli involved in processing a shift in someone's eye gaze and combine that stimuli into a whole unit. The temporo-spatial processing disorder accounts for a lack of joint attention behaviors to the individual's inability to process the rapid movements of someone's eyes in order to make eye contact (LaGasse, 2014). As eye contact is a

precursor to joint attention, it is reasonable to draw correlations between the inability to make eye contact and deficits in joint attention (Bruinsma et. al, 2004; Osterling & Dawson, 1994). Even though the cause of ASD is uncertain, all of the theories posited include deficits in joint attention as a central part of that theory. Therefore, joint attention is considered by many to be a pivotal skill in order to develop other essential life skills (Mundy & Crowson, 1997).

Interventions Addressing Joint Attention in Individuals with ASD

Methods for treatment of joint attention involve teaching joint attention behaviors by using reinforcers to increase the likelihood of the behaviors occurring in the future. In typical development, joint attention behaviors are reinforced socially through shared experiences (Mundy & Thorp, 2007); however, since children with ASD have deficits in social communication, there is a need for other reinforcers to shape these behaviors. Researchers suggest using contingent reinforcement – the offering of preferred activities or objects, only after desired behaviors are performed in order to increase the likelihood of the behavior occurring in the future (Madsen & Madsen, 1998).

Lewy and Dawson (1992) explored the effects of contingent responses to a child's behaviors on instances of coordinated joint attention. Children with ASD were compared to like-aged peers with Down Syndrome and typically developing children. Contingent responses were defined as an adult engaging in exact imitations or slight variations of play that the child was engaging in, whereas non-contingent responses involved the adult engaging in play schemes with the child accompanied by simple verbalizations that were determined by the adult. More instances of coordinated joint attention were observed in all three groups of children in the contingent response condition than in the non-

contingent response condition. Despite these positive results, children with ASD still scored significantly lower in coordinated joint attention tasks than like aged, typically developing peers, or peers with Down Syndrome. These data suggest that children with ASD must be trained in order to correctly respond to and initiate joint attention bids.

In order to train joint attention in children with ASD, two behavioral procedures have been adapted: Discrete Trial Training (DTT) and Pivotal Response Training (PRT) (Yoo, 2010). DTT is a behavioral technique to modify a behavior in 5 steps: 1) cue, 2) prompt, 3) response, 4) consequence, and 5) inter-trial interval. The first step, a cue, involves giving a brief instruction or question. This cue is the antecedent – or the stimuli that precedes the behavior being trained. While training the behavior of responding to joint attention, one might give a cue such as, “look over there” and pair it with a point in the direction of the object being shared. The next step, the prompt – involves assisting the child in responding to the cue. This prompt may be physical, verbal, or the correct behavior may simply be modeled for the child. A physical prompt would involve assisting the child by turning their head in the right direction in response to the cue, where as a verbal prompt would involve the therapist stating, “turn your head to look at what I am pointing at.” Depending on the child and type of behavior being modified, one or all of these types of prompts may be effective in producing the desired behavior. If the training is successful, the prompt will be faded out and the child will respond to the cue with the correct behavior without assistance. The child’s attentional response to the cue is then observed (i.e., the child either turns their head in the direction of the point, or the child does not turn their head). The consequence follows the response, and involves reinforcing correct responses and eliminating incorrect ones. For example, if the child

turns his head in the right direction, he is given the item that is being shown by the therapist. If the child does not turn his head towards the bid, the adult might say “no” and remove the object he is currently playing with. By reinforcing correct responses the therapist is increasing the likelihood that the correct response will occur again in the future. The final step in DTT, intertrial interval, is the amount of time given after the child receives the consequence before the therapist gives the cue again (Smith, 2001). Although this method is successful in training joint attention skills in a controlled setting, the skills are hard to transfer into less predictable environments (Whalen & Shreibman, 2003; Yoo, 2010).

In order to facilitate transferring joint attention behaviors to other settings, Pivotal Response Training (PTT) is used. PTT also uses cues, prompts, responses, consequences, and intertrial intervals; however, the child is motivated to perform the desired behavior through choices and reinforcing attempts. When training responding to joint attention using PTT, a therapist may determine which toy among many a child enjoys playing with most through observations and use it as a reinforcer. Reinforcers may be given for approximations of the correct behaviors (e.g., child looking in the wrong direction when given the cue) until the child is able to successfully perform the desired behavior. In addition, maintenance tasks – tasks that have been previously mastered – are interspersed throughout treatment in order to provide a feeling of success. Finally, all reinforcers are directly related to the task being targeted (e.g., the child is given the object that he/she looks at in response to the joint attention bid). PTT is used successfully in training both initiating and responding to joint attention bids and generalizing these skills to other situations (Whalen & Schreibman, 2003).

Music Therapy and Autism Spectrum Disorder

Music therapy uses music as a therapeutic tool in order to facilitate non-musical outcomes in the physical, cognitive, social-emotional, and communication developmental domains (Gfeller & Davis, 2008). Music therapy became a recognized profession after it was used in WWII to treat war veterans (Davis & Gfeller, 2008). Since then, the field of music therapy has grown and been recognized as a viable treatment option for people of all ages with many different diagnoses, including individuals with ASD.

Music is an effective medium for treatment of children with ASD as it is highly motivating and can be adapted to meet each child's needs and preferences (Adamek, Thaut, & Furman, 2008). In addition, children with ASD often show a preference for musical stimuli (Kolko, Anderson, & Campell, 2008). In a study conducted by Thaut (1998), typically developing children, children with developmental delays, and children with ASD were asked to improvise on a xylophone. Children with ASD scored higher on measures of rhythm, restriction, complexity, rule adherence, and originality than did children with intellectual delays. Furthermore, there were no significant differences in scores between typically developing children and children with ASD despite their functioning levels. These data suggest that children with ASD have intact musical perceptual and performance capabilities. In addition, Adamek et al. (2008) found that children with ASD display increased attention and responsiveness when music stimuli are present compared to no music conditions. Due to the positive responses exhibited by individuals with autism, music is being used as a therapeutic medium by board certified music therapists in order to improve communication skills, social interaction, behavior, academic skills, and physical skills (Adamek et. al, 2008).

Music Therapy and Joint Attention

Few research studies have been conducted on the effects of music therapy on joint attention behaviors in children with ASD, and even fewer have been replicated; however, those conducted suggest that more joint attention behaviors are observed in music conditions than in no music conditions (Kim, Wigram, & Gold, 2008). In addition, gains in joint attention skills have been reported following music intervention (Yoo, 2010).

Kim, Wigram, and Gold (2008) investigated the effects of improvisational music therapy on joint attention behaviors in children with autism. Children on the spectrum who had no previous experience with music or play therapy were observed during 12 weekly music therapy sessions, and compared to 12 weekly play sessions. Significantly more instances of joint attention were observed during music interactions than during play interactions. Although the results of this study indicate that music is effective in eliciting joint attention behaviors in children with autism, it does not examine how the music was presented or how it was used in order to facilitate these behaviors.

Yoo (2010) explored the effects of musical cues on frequency and accuracy of responding to joint attention bids in children with autism. This study compared musical prompts (i.e. sung prompts) to verbal prompts in their effectiveness in eliciting responses to joint attention bids. The data suggest that musical cues are more effective than verbal cues in facilitating responses to joint attention in children with autism. Children responded to joint attention bids more frequently and with more accuracy when musical prompts were given than when verbal prompts were given.

Arezina (2011) compared joint attention behaviors in children with autism during interactive music, interactive play, and independent play sessions. Interactive music

conditions involved the researcher engaging in instrument play, songs, and books set to music in addition to offering the child choices between preferred instruments. These music interactions were compared with interactive play - in which the researcher engaged the child with non-music toys, and independent play conditions. Results suggest that interactive music conditions were the most effective in facilitating engagement in joint attention. In addition, initiating joint attention bids were observed significantly more during interactive music and play conditions than in independent play conditions. The results of this study again, support the use of music to increase engagement in joint attention.

Summary, Purpose Statement and Research Questions

ASD is a neurodevelopmental disorder that is characterized by deficits in social communication and interaction, and restricted, repetitive behaviors (American Psychological Association, 2013). These diagnostic characteristics impact the development of a child with differing degrees of severity and presentation throughout his/her lifetime. ASD is caused by a combination of certain genetic markers, poor neurological connectivity, and environmental factors; however, the degree to which each of these factors contributes to a diagnosis of ASD is still unknown (LaGasse, et. al, 2015). Researchers do agree that joint attention is a key deficit in children with ASD (Bruinsma et. al, 2004; Charman, et. al, 1997; Mundy & Crowson, 1997; Osterling & Dawson, 1994).

Joint attention is the ability to shift attention between an object or event and another individual in order to share the experience or object with that individual (Dawson, et. al, 2004; Mundy & Thorp, 2007; Bruinsma et. al, 2004). Children with ASD often

have trouble in the development of both responding to and initiating joint attention bids (Charman, et. al, 1997; Lewy & Dawson, 1992; Osterling & Dawson, 1994). The lack of acquisition of these skills affects the development of other life skills such as social and language skills (Adamson et al., 2009; Adamson et al., 2010; Arezina, 2011; Bono, et al., 2004; Chiang, et al., 2008; Smith, et al., 2007; Toth, et al., 2006). As joint attention has been known to affect later development, many experts are now considering these behaviors pivotal skills for children with ASD (Mundy & Crowson, 1997), and interventions to increase these behaviors are now being examined.

Research suggests that joint attention behaviors are observed more often in children with ASD when music stimuli are present (Arezina, 2011; Kim et al., 2008; Yoo, 2010). Although there is evidence that supports increasing joint attention behaviors in children with ASD, very little of it has been replicated. For this reason, this study aims to further investigate the effectiveness of music therapy in developing joint attention skills in children with ASD by expanding upon the work of Arezina (2011). In Arezina's study, the researcher compared instances of interaction and initiating interactions between a child with ASD and the researcher during three different conditions: 1) interactive music therapy, 2) interactive play, and 3) independent play. Similarly, the research questions for this study were: 1) Are children with ASD more interactive in cooperative music therapy, non-music cooperative play or independent play? 2) Do children with ASD initiate or request more interactions in cooperative music therapy, non-music cooperative play or independent play?

Chapter 3

Methods

Institutional Review Board Approval, Recruitment and Informed Consent

Participants were recruited from a large Midwestern, suburban elementary school. Special education teachers and the principal of the elementary school chose participants based on a suspected diagnosis of ASD. In the state of Iowa, parents/guardians are not required to disclose diagnoses of their children to the school district; thus, as part of the consenting process, parents confirmed the diagnosis of ASD. Following the approval of the Institutional Review Board at the researcher's affiliated university, information about the study was provided to parents by the teachers and principal (see Appendix A for the description provided to parents). If parents confirmed the diagnosis of Autism Spectrum Disorder and signed the informed consent (see Appendix B for informed consent form), the child was enrolled in the study.

Participants

Participants (N = 4; 0 females, 4 males) ranged in age from 6-7 years old. Participants had a formal diagnosis of Autism Spectrum Disorder as confirmed by their parents. A description of each participant and their functioning level is provided below. Descriptions are based on information provided by the participant's special education teacher and the researcher's observations during the study. In order to protect the participant's privacy, each participant has been given a pseudonym.

Trevor is a 6-year-old boy who uses some verbal language to communicate, however, is mostly non-verbal. He uses vocalization as a form of communication and imitates words being spoken. Trevor uses agitated vocalizations in order to communicate

dislikes and will occasionally throw items, yet has an overall very pleasant demeanor. Trevor knows a few letters and sight words. During social interactions, Trevor watches his peers play, but, will not interact with them unless prompted verbally.

Randy is a 6-year-old boy who is academically at grade level. He uses verbal language to communicate wants and needs, and will talk to himself when given choice time. In his classroom, Randy has an aggressive behavior plan in order to increase his ability to follow directions and remain in the classroom. Randy is working towards better socialization skills with his peers and answering their questions when prompted.

Jabar is a 7-year-old boy who uses verbal language to communicate and reads at grade level. He socializes in small groups of peers, however, prefers to play alone. Jabar follows directions with verbal and visual support.

Victor is a 6- year-old boy who is mostly non-verbal, however, has started using more verbal language to communicate wants and needs. His chosen mode of communication is a voice-output system and Picture Exchange Communication System (PECS) to make requests. Victor follows simple directions and reads approximately 15 sight words. Victor typically engages socially with one preferred peer, however, requires prompting in order to interact with anyone else.

Research Design

Each participant engaged in six, individual 20-minute sessions that ranged one to two sessions per week over five weeks. Session length was determined from clinical experience of the researcher who allotted enough time for a sufficient amount of trials, however, not too much time (15 to 20 minutes), as members of this population within the intended age range have a tendency to have short attention spans. The number of sessions

was chosen to allow each of the session types described below to be performed twice for more opportunities to trial each condition.

A Board Certified Music Therapist (MT-BC), who has worked with children and adults with ASD in variety of settings (e.g. music therapy clinic, at home, community facilities) for approximately 3 years, conducted each session. The six sessions were split into three conditions: cooperative music therapy (music), cooperative play (play), and independent play (independent). The participants engaged in each of the three conditions two times throughout the 5-week period. The order of sessions was randomized using a Latin Square to control for order effect.

Independent Variable: Session Type

During **Cooperative Music Therapy (Music)** the participant engaged in playing a variety of instruments, reading a book in which the rhyming words were put to music, and singing interventions (See Appendix C for Music Therapy Intervention Procedures). The researcher responded to verbalizations of the participant and gave positive reinforcement statements in a primarily sung manner. Verbal praise was used on occasion in order to provide contrast to the material that was already being sung by the therapist during the intervention. Sessions started with a greeting song accompanied by guitar and incorporated the participant's name. The participant was given the opportunity to strum the guitar during the verse that sang hello to the researcher. Following the greeting song, the participant was offered a choice of instruments, props, or books (see Table 1 for a list of materials available for the participant to choose). The researcher offered these choices by holding up two different pictures representing instruments, props or books at eye level and singing "What do you want? (Figure 1)" If the participant did not choose after

approximately 5 seconds, the researcher repeated the prompt. If the participant made a choice, the researcher sang “you chose the _____, nice choice”

Table 1
Instruments, Props, and other Equipment Used During Cooperative Music Therapy Condition

-
1. Instruments
 - a. Guitar
 - b. 2 Shaker Eggs
 - c. 1 Jingle Bell
 - d. 1 Ocean Drum
 - e. 1 Remo Frame Drum (Medium Size)
 - f. 2 Drum Mallets
 - g. Woodblock and Mallet
 - h. Desk Bells G and D
 2. Props
 - a. Picture representations of each instrument or song
 - b. “Blue and Orange Cue Cards (to match desk bells)
 3. Books
 - a. Is Your Mama a Llama” book by Deborah Guarino
 4. Equipment
 - a. Repeat timer app on iPad (to time interventions)

(Figure 2) in response. If the participant did not respond following the second prompt, the researcher made the choice for the participant singing “I choose the _____.
(Figure 3)”

Figure 1. Choice Sung Prompt



Figure 2. Sung Positive Reinforcement for Making a Choice



Figure 3. Sung Prompt Given if the Child Does Not Make a Choice



Each intervention was timed, lasted approximately 2-3 minutes and involved start/stop, turn-taking, imitation, and cooperative instrument play and were very repetitive. These tasks were targeted as they required the participant to engage in the joint attention behaviors being measured as described under the heading dependent variables. Following each intervention, the researcher sang “We are all done with _____, let’s see what’s next,” (Figure 4) in order to facilitate transitions between interventions. Following the transition song, the participant was given another choice in the same manner in which he was given a choice the first time. The participant participated in six of the seven planned interventions so as to always provide the participant with a novel

choice (see Appendix C for Music Therapy Intervention Procedures). The participant participated in at least one of each intervention type (e.g. start/stop, turn taking, imitation, cooperative instrument play) during the 20-minute session. Following the six interventions, a goodbye song, accompanied by the guitar, was sung that incorporated the participant's name. The participant was invited to strum the guitar during the verse in which the researcher's name was sung.

Cooperative Play (Play) sessions involved the participant engaging with non-music toys and books (see Table 2 for a list of materials available for the participant to choose). The researcher responded to verbalizations made by the participant and offered positive reinforcement verbally. Sessions started with a verbalized greeting of "Hello (insert participant's name), it's nice to see you today." Following the verbal greeting, the researcher offered the participant a choice of toys or books by holding a picture representation of the object or book at eye level and asking "Which one do you want?" If the participant did not choose after approximately 5 seconds, the researcher repeated the prompt. If the participant made a choice the researcher stated "You chose _____, nice choice" in response. If the participant did not respond after the second prompt, the researcher made the choice for the participant stating, "I choose the _____."

Each intervention lasted approximately 2-3 minutes in which the researcher attempted to engage the participant with a non-music toy or book. The researcher modeled functional play with toys, encouraged imitation of play and vocalization and turn taking. Each intervention was timed, and the researcher provided transitional cues such as "it is almost time to choose another toy" when the 3-minutes were almost up.

Following each intervention, the researcher stated, “We are all done with _____“, in order to facilitate transitions between interventions. Following this interaction, the participant was given another choice. The participant participated in six out of seven interventions, after which, the researcher stated, “We are all done today. It was nice to see you.”

Table 2

Non-Music Toys and Props Used During Cooperative Play and Independent Conditions

1. Toys
 - a. Set of Velcro plastic fruit with plastic knives and cutting board
 - b. Fisher Price Blocks of different shapes and Tub with cut-outs to place the blocks in
 - c. Duplo Blocks
 - d. Little People house set
 - e. Plastic Giraffe Tower and Blocks
 - f. Stuffed Bear with different clothing options
 2. Books
 - a. “Max Found Two Sticks”
-

Independent play (Independent) involved the researcher sitting quietly while the participant interacted with the same non-music toys offered during the non-music condition. The researcher interacted with the participant, only if the participant initiated the interaction. The researcher intervened if the participant becomes upset or destructive.

Dependent Variable: Joint Attention Behaviors

For the purpose of this study, the following joint attention behaviors were measured: interaction (responding to joint attention), and requesting (initiating joint attention) behaviors (Arezina, 2011). These two behaviors are further defined through description of observable behaviors that were or were not considered as either responding to or initiating joint attention.

Interaction or responding to joint attention was defined through three specific categories: 1) imitation in which the participant imitated movement, vocal sounds, or verbalizations of researcher; 2) spontaneous vocalization or verbalizations in response to the actions of the researcher; and 3) functionally playing the instrument or manipulating the toy designated for the intervention for a minimum of 3 seconds. Interaction did not include: 1) the participant staring at an item without being redirected, 2) using the item inappropriately (e.g. throwing), 3) moving in a manner that did not relate to the activity (e.g. rocking, hand flapping, etc.), 4) physically manipulating or holding the designated object for the intervention without functional use, 5) self-stimulation, and 6) crying or yelling (Arezina, 2011).

The second joint attention behavior, **requesting** or initiating joint attention, was defined as 1) reaching for an instrument, prop, toy or visual aid being held by the therapist and holding it for 3 seconds; 2) pointing or pushing an item away when offered; 3) giving or attempting to give an item to the therapist; 4) touching the researcher or pulling on her clothing; 5) vocalizing while making eye contact; and 6) using spoken language or adaptive means of communication (i.e. sign language, communication devices, PECS, etc.) to request an item or song. Requesting did not include: 1) reaching for an instrument, prop, toy, or visual from the researcher or somewhere in the room and holding it less than 3 seconds 2) vocalizations without reaching or establishing eye contact; 3) hitting or aggressive behaviors; 4) verbalizations for the purpose of self-stimulation; and 5) crying or throwing equipment.

Data Collection

Each session was videotaped to ensure accurate data collection. During an initial viewing of the tape, joint attention behaviors were recorded using a 15-second observe, 5-second record method (Arezina, 2011) using a time-sampling recording sheet (see Appendix D). If joint attention behaviors occurred within that the 15-second observe interval, that interval was recorded as having joint attention behaviors present. An ‘R’ indicated requesting joint attention (initiating joint attention) and an ‘I’ indicated an interaction or responding to joint attention. If both requesting and interacting behaviors occurred within one interval both an ‘R’ and ‘I’ were recorded during that interval.

The researcher viewed the music condition tapes a second time using the same 15-second observe, 5-second record method using a second time sampling recording sheet (see Appendix E) to determine which types of musical interventions elicited the greatest amount of joint attention behaviors. As in the initial time sampling recording sheet, interacting and responding behaviors were recorded. If an interaction occurred within an interval, a + would be placed in the I box, where as a – would be placed in the box if an interaction did not occur. The same coding was used for requesting behaviors, however, in the R column. Unlike the initial time sampling recording sheet, the secondary time sampling recording sheet also took note of the type of musical intervention that was being used during each interval. If the researcher and participant were playing the same instrument (i.e. both playing the same drum) during an interval, the observer would circle IPS. If the participant and the researcher were playing different instruments (i.e. the researcher playing a guitar and the participant playing jingle bells, or the researcher playing a shaker and the participant playing a different shaker) during the interval the

observer would circle IPD. If the researcher was singing and no instruments were present during the interval the observer circled SA, and if body movement without instruments occurred within the interval the observer circled MVMT. If two types of music interventions occurred within the same interval, both types of interventions were circled (i.e. the end of the shaker egg intervention and the transition, in which the researcher sang the transition prompts occurred within the same 15-second interval, both IPD and SA were circled).

A second Board Certified Music Therapist (MT-BC) watched the videos in order to calculate inter-observer reliability of the presence or absence of observed joint attention behavior intervals. Reliability was calculated using the formula $(\text{agreements} + \text{disagreements}) / (\text{agreements})$ to determine the percentage of agreement of 15-second observed intervals between the researcher and the inter-reliability observer. The same formula was used to determine percentage of agreement between music intervention types. The second MT-BC also reviewed sessions for treatment fidelity in order to ensure that each treatment type was being implemented accurately. The sessions were reviewed for the presence or absence of musical instruments singing, and music or non-music interactions in order to determine whether the session was correctly described as cooperative music therapy session. In order to determine whether a session was considered cooperative play or independent play, the second MT-BC analyzed the video to determine if the researcher initiated any interactions. If the researcher did not initiate interactions, the session was coded as an independent play condition. If the researcher did initiate interaction during the session, it was considered cooperative play. The second MT-BC indicated the type of session on the data collection sheet by circling M for

cooperative music therapy, CP for cooperative play, or IP for independent play (see Appendix – for Time Sampling Recording Sheet (Initial Viewing)). These indications were then compared to a record of what condition each session was to determine treatment intervention fidelity.

Data Analysis

Data of the dependent variables (responding to joint attention and initiating joint attention) from the initial viewing of the tapes were graphed using bar graphs to conduct a graphic analysis of the effect of each treatment type on joint attention behaviors. In addition, descriptive statistics were conducted to describe trends. Data from the second viewing of the tape (musical interventions) were displayed on a bar graph in order to conduct a graphic analysis of the differential impact of each musical intervention type on joint attention behaviors. In addition, descriptive statistics were completed to describe trends.

Chapter 4

Results

Interaction: Responding to Joint Attention

Graphic analysis revealed that the music therapy condition resulted in the highest percentage of intervals in which a participant responded to joint attention, which is consistent with the results found by Arezina (2011) (see Table 3). In addition, participants scoring the lowest in independent play conditions showed the greatest discrepancy between the other two conditions. For example, Jabar and Victor, who had the lowest mean percentage scores during independent play conditions ($M = 1.50$, $M = 0.00$ respectively), exhibited large differences between their cooperative play (Jabar $M = 55.50$, Victor $M = 38.50$) and music therapy conditions (Jabar $M = 86.50$, Victor $M = 69.00$) (See Figures 4 and 5 respectively and Table 3).

Table 3

Mean Percentage Comparisons for Interaction (Responding to Joint Attention) Behaviors Across Music Therapy, Cooperative Play and Independent Play Conditions

Subject		Music Therapy	Cooperative Play	Independent Play
Randy	Mean	74.50	72.50	30.50
	Std. Deviation	2.12	3.54	10.61
Jabar	Mean	86.50	55.50	1.50
	Std. Deviation	2.12	0.71	2.12
Victor	Mean	69.00	38.50	0.00
	St. Deviation	19.79	9.20	0.00
Trevor	Mean	79.00	65.00	3.00
	Std. Deviation	15.56	4.24	1.41

Figure 4. Graphic Representation of Percentage of Intervals in which Jabar Engaged in Interaction (Responding to Joint Attention) Across Conditions

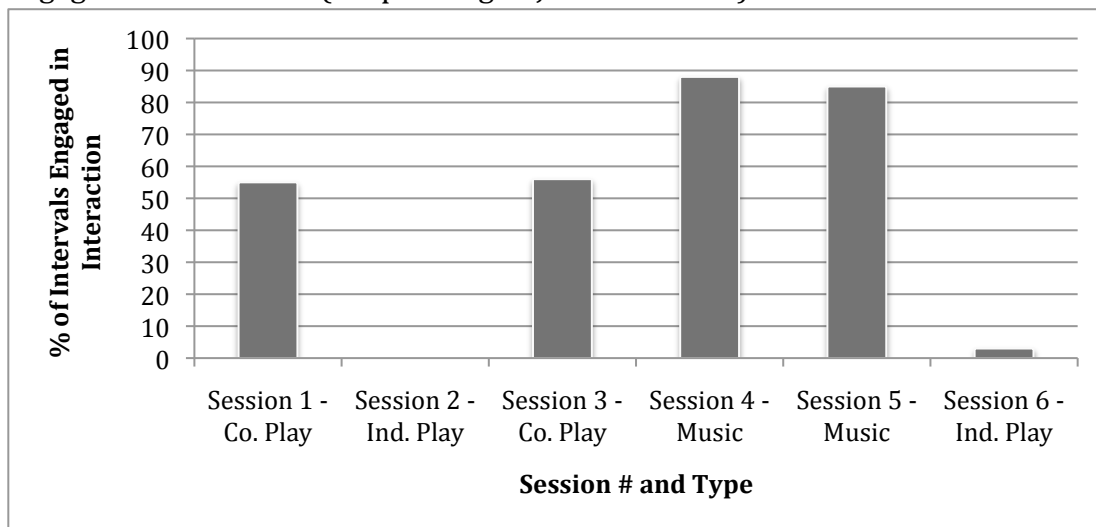
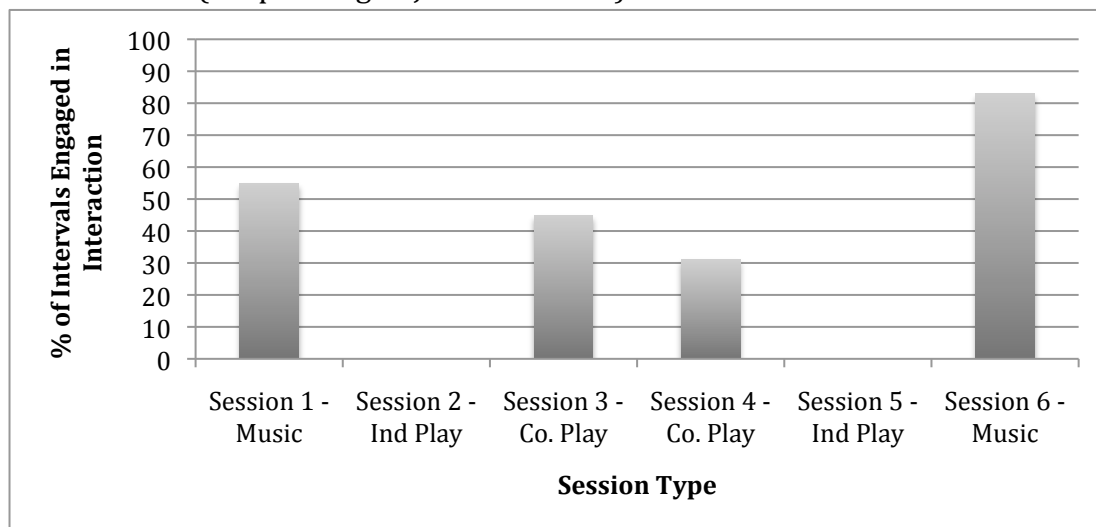


Figure 5. Graphic Representation of Percentage of Intervals in which Victor Engaged in Interaction (Responding to Joint Attention) Across Conditions



In contrast, Randy, who displayed higher levels of interaction during the independent play condition ($M = 30.50$), displayed less difference between the cooperative play ($M = 72.50$) and music therapy conditions ($M = 74.50$) (See Figure 6 and Table 3). Trevor fell in between these two groups of participants, with the highest percentage of interactions in the music condition ($M = 79.00$), slightly lower during the cooperative play conditions ($M = 65.00$), and then much less during independent play conditions ($M = 3.00$) (See Figure 7 and Table 3).

Figure 6. Graphic Representation of Percentage of Intervals in which Randy Engaged in Interaction (Responding to Joint Attention) Across Conditions

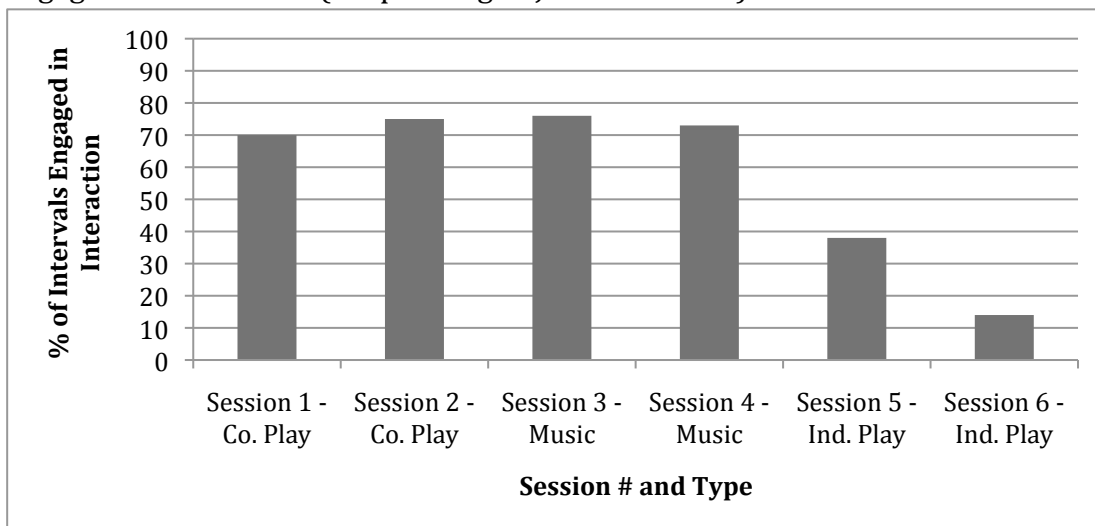
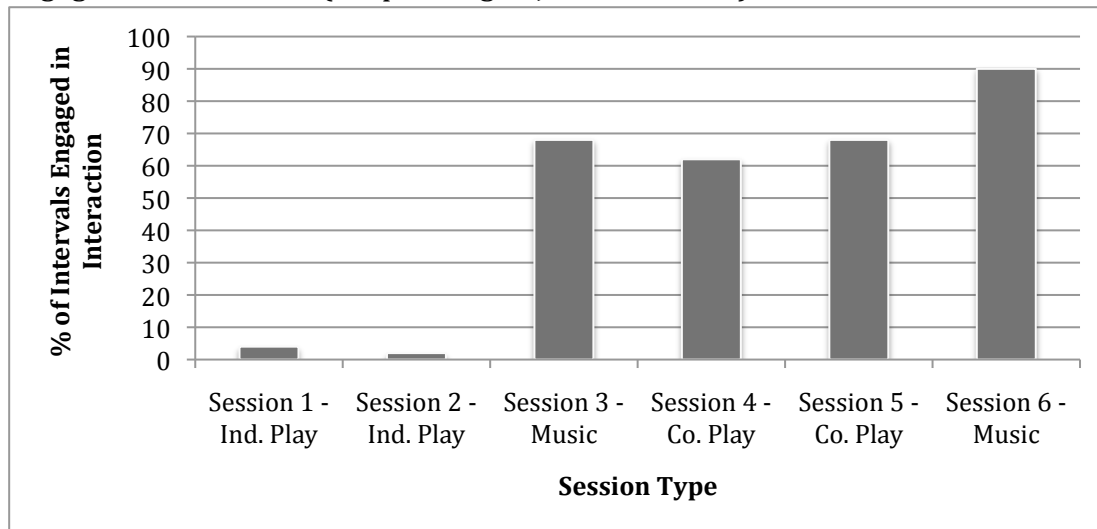


Figure 7. Graphic Representation of Percentage of Intervals in which Trevor Engaged in Interaction (Responding to Joint Attention) Across Conditions



Requesting: Initiating Joint Attention

Graphic analysis revealed that bids for joint attention were generally higher in music and cooperative play conditions than in independent play conditions for Jabar and Victor, yet higher in independent play conditions for Randy and Trevor (see Table 4 and Figures 8 through 11 for individual participants). This latter result is inconsistent with the results of the study conducted by Arezina (2011).

Table 4

Mean Percentage Comparison for Requesting across Music Therapy, Cooperative Play and Independent Conditions

Subject		Music Therapy	Cooperative Play	Independent Play
Randy	Mean	6.00	7.00	70.50
	Std. Deviation	8.49	0.00	17.68
Jabar	Mean	7.50	3.00	2.50
	Std. Deviation	6.36	1.41	3.53
Victor	Mean	11.50	4.00	1.50
	Std. Deviation	2.12	5.66	2.12
Trevor	Mean	11.50	9.00	29.50
	Std. Deviation	2.12	1.41	3.53

Trevor's results varied across conditions, and were slightly higher in the music conditions ($M = 11.50$) than in cooperative play conditions ($M = 9.00$), however, requesting joint attention behaviors were the highest in the independent play conditions ($M = 29.50$) (see Figure 8 for graphic representation of percentage of requests per session). Randy on the other hand, had very few requests during both music ($M = 6.00$) and cooperative play conditions ($M = 7.00$), however, he had a much higher percentage of requests during the independent play conditions ($M = 70.50$) (see Figure 9 for graphic representation of percentage of requests).

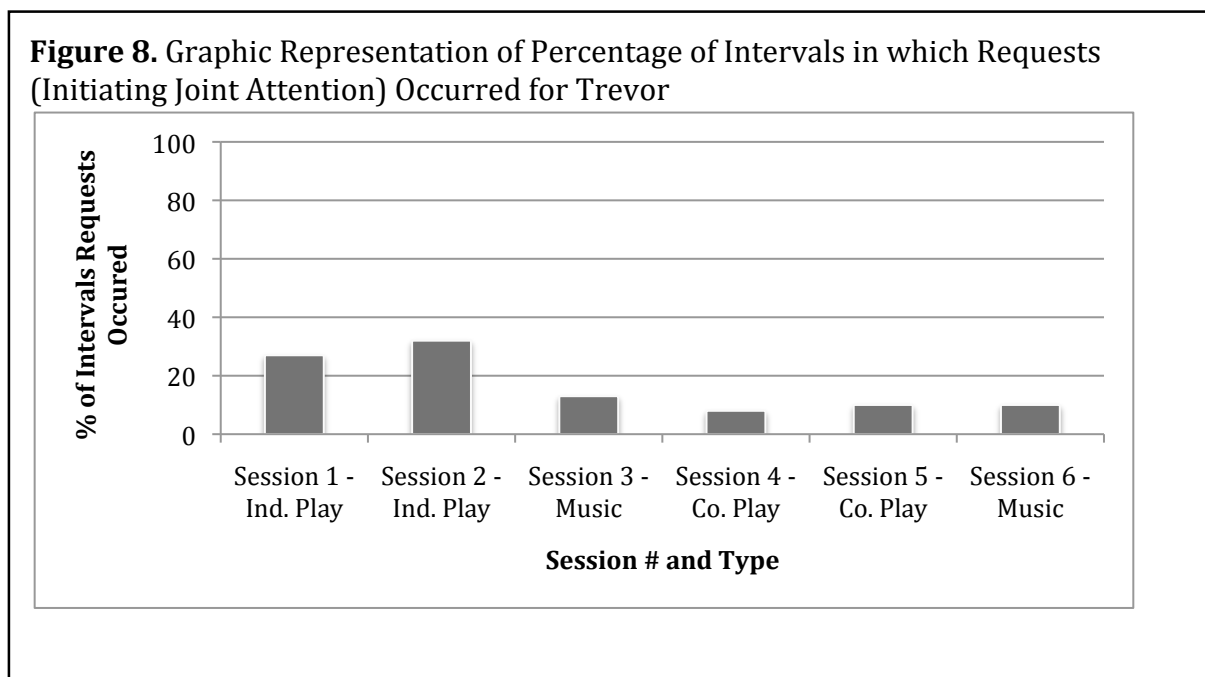
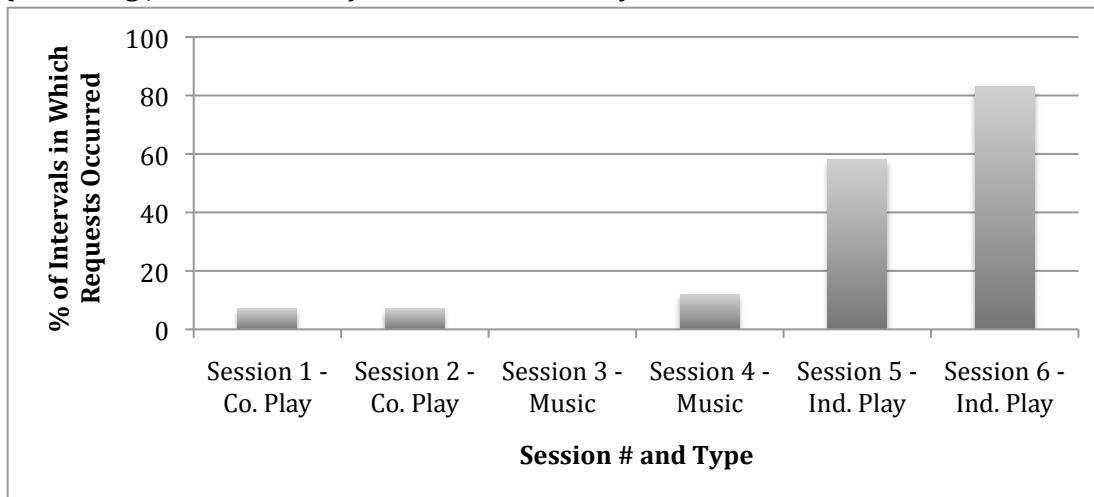


Figure 9. Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred for Randy



Jabar and Victor's scores are more consistent with the results from the study conducted by Arezina (2011). Although not high for any treatment condition, Victor had the highest percentage of request during the music therapy condition ($M = 11.50$), scored lower during the cooperative play conditions ($M = 4.00$), and scored the lowest in independent play conditions ($M = 1.50$) (see Figure 10 for graphic representation of percentage of requests). Alternately, Jabar's scores varied a little bit more. He had the greatest percentage of requests during the music conditions ($M = 7.50$), with the highest being in the second music session. He had a slightly higher percentage of requests during the cooperative play ($M = 3.00$) than independent play conditions ($M = 2.50$) (see Figure 11 for graphic representation of percentage of requests per session).

Figure 10. Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred for Victor

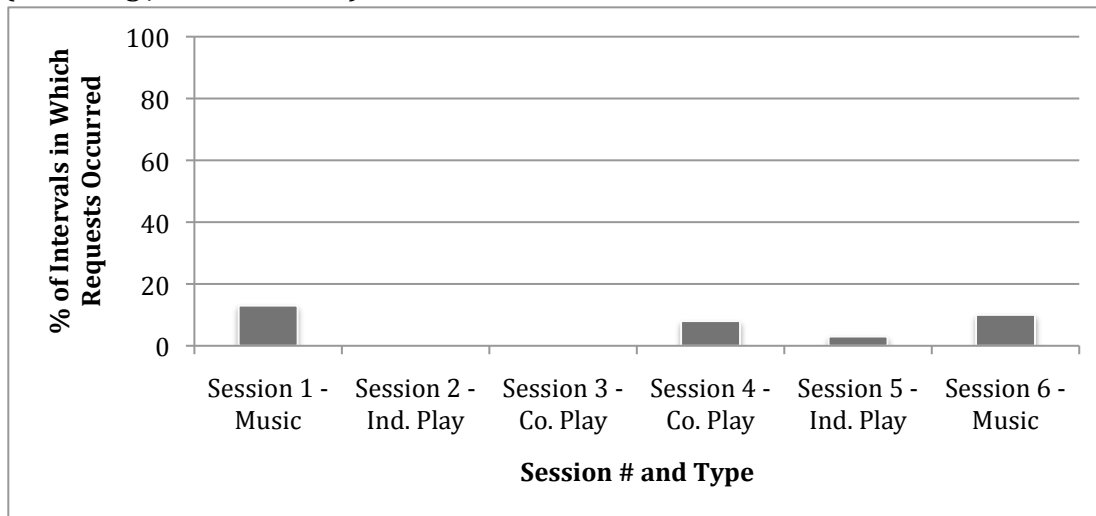
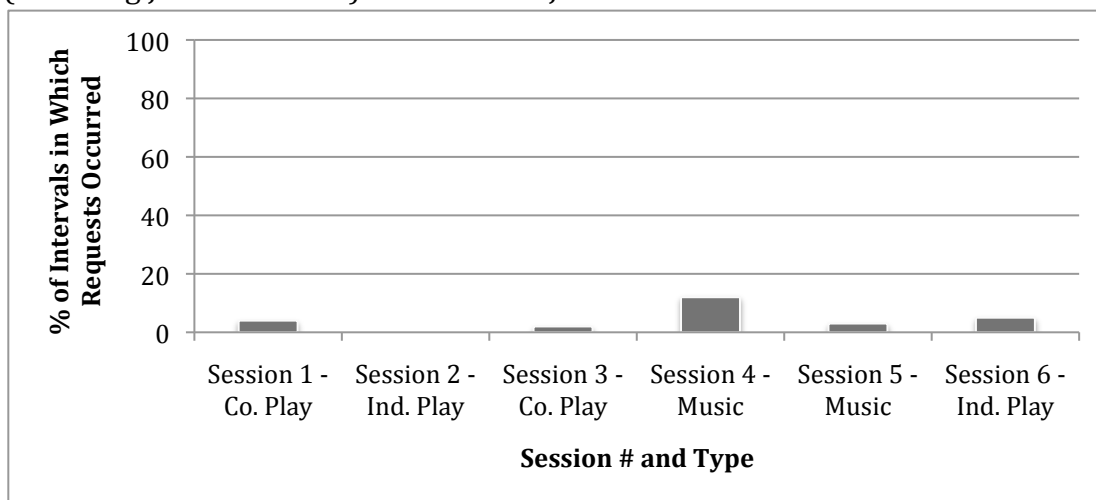


Figure 11. Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred for Jabar



Music Intervention Types and Joint Attention Behaviors

Overall, playing on the same instrument as the therapist yielded the highest percentage of interaction intervals (85.00%) (see Figure 12), while playing a different instrument from the therapist elicited the percentage of requests for joint attention (13.00%) (see Figure 13). The lowest percentage of requests was during movement interventions (2.00%), whereas the lowest percentage of intervals in which the child was engaged in interactions was during sing alone conditions (54.00%)

Figure 12. Graphic Representation of Percentage of Intervals in Which the Child Engaged in Interaction (Responding to Joint Attention) During Music Intervention Types Across Subjects

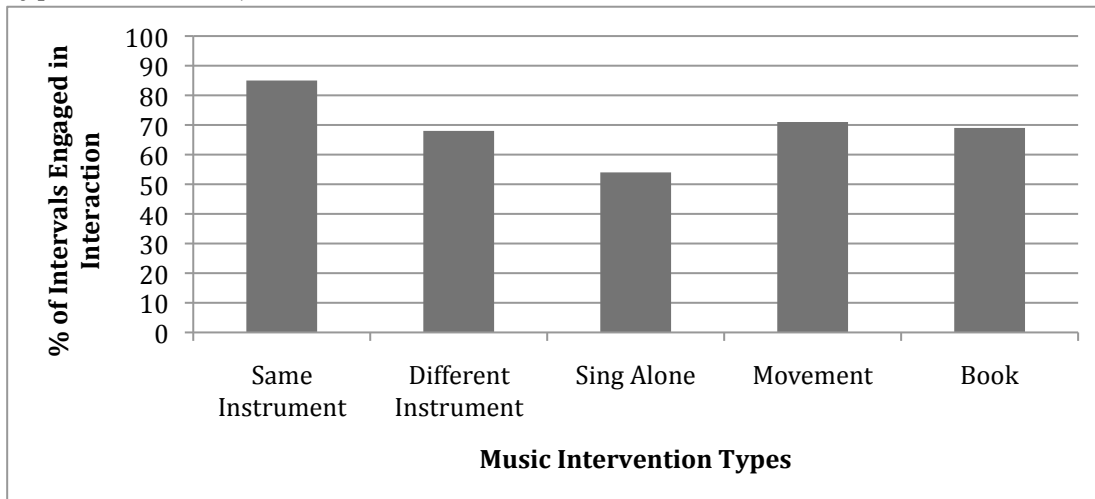
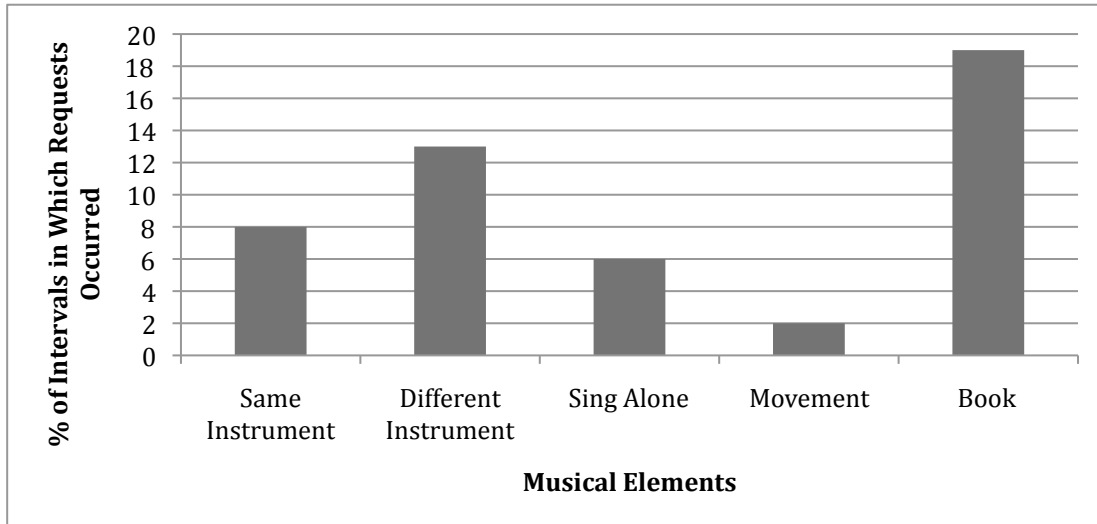


Figure 13. Graphic Representation of Percentage of Intervals in which Requests (Initiating Joint Attention) Occurred during each music intervention type across subjects and sessions.



Inter-Observer Agreement and Treatment Integrity

The measure of inter-observer agreement revealed high levels of agreement for requesting and interacting joint attention behaviors combined across sessions for all participants was 89% with a range from 73 to 100%. The treatment integrity measure revealed high levels of treatment integrity (100%).

Chapter 5

Discussion

Conclusions

The purpose of this study was to determine whether cooperative music therapy, non-music cooperative play, or independent play conditions was more effective in eliciting interaction and requesting of joint attention in children with Autism Spectrum Disorder. The study found that overall, cooperative music therapy is more effective in eliciting interaction than both cooperative play and interactive play, which is consistent with the findings of Arezina, (2011). In addition, participants that interacted less during independent play conditions tended to have larger differences in interactions between music and play conditions than participants who scored higher in independent play condition. This is also consistent with the findings of Arezina (2011).

These findings have implications as to what type of student will benefit most from music therapy services. Students who exhibit less interaction skills during independent classroom play, may be considered a higher priority for music therapy services if funding or the therapist's time is limited, as joint attention behaviors are more likely to increase during music therapy. Because joint attention is considered a pivotal skill for children with ASD (Mundy & Crowson, 1997), these children have a better chance of acquiring language, social, and communication skills during music sessions that can be then transferred into every day life.

There were some inconsistencies in the current study's findings with those of Arezina (2011). Two of the participants showed a higher percentage of requests for interactions (initiating joint attention) during independent play conditions than either the

music therapy or cooperative play conditions. Results from the other two participants were more consistent with the findings of Arezina (2011). This latter group exhibited the highest percentage of requests during music therapy conditions, however, there were not as large of differences between music, cooperative play and independent play conditions as in the interaction data. Therefore, the effects of music therapy on requesting (initiating) joint attention during this study were inconclusive. This may be due to diversity in the functioning level of the participants in this study or that self-stimulation behaviors were labeled as requests within the context of this study. For example, when looking at a book during independent play sessions, Randy would make comments such as, “he is hitting bottles, that is not safe.” As he made a lot of comments about actions “not being safe,” this could be functioning as a self-stimulation behavior. For the context of this study it was labeled as a request as Randy made eye contact with the researcher and then made a comment.

Finally, when examining intervals by music intervention type, data suggest that during music therapy conditions, interactions are greatest when the researcher and student play the same instrument (i.e. both playing the same drum) rather than different instruments (i.e. participant is playing the drum and therapist is playing the shaker, or participant is playing a shaker and therapist is playing a different shaker). Whereas, the number of requests for interaction increase when the participant and therapist are playing different instruments rather than the same instruments. The least number of requests and interactions occurred when no instruments, books, or props were present, and the only musical stimulation was the researcher singing.

These data have implications for the clinician designing interventions in order to increase joint attention skills in children with ASD. When designing interventions to increase interaction, therapists should play the same instrument as the child. However, the opposite is true when designing interventions in order to increase the number of requests for joint attention; the therapist and child should be playing different instruments in order to elicit this response.

Therefore, this study supports the use of music therapy in order to increase joint attention between therapist and child. However, as results for requesting joint attention behaviors were inconsistent, more research is needed to determine the effect of music therapy on this behavior.

Observations During Data Collection

There were many observations made during data collection that may have affected the outcome of this study. First, was the type of requests that were made by both Randy and Trevor during independent play conditions. Randy, who had a large number of requests during independent play conditions, would often make comments on perseverated topics to the therapist or recite a scripted initiation. Once the therapist responded to these requests for interaction or scripted initiations, Randy often moved onto the next perseverated topic (i.e. many comments were made to the effect “we don’t hit people, that’s not safe,” and “we don’t jump on tables, that’s not safe”) without continuing the conversation with the therapist. Randy never offered the researcher any toys or requested interaction via the use of toys. Although the scripted and perseverated comments were considered initiation of joint attention within the context of this study,

Randy showed no interest in continuing a reciprocal conversation after the initial request for joint attention.

Trevor, who also had a high number of requests during independent play conditions, would often show the researcher a toy by establishing eye contact and vocalizing. However, when the researcher responded to the interactions, Trevor would often turn away and start playing on his own again. Like Randy, Trevor showed little interest in continuing a reciprocal interaction after the initial request for joint attention.

Further observations dealt with behaviors exhibited during music therapy conditions that were not seen during other conditions. For example, Jabar was much more likely to use spoken language during music conditions over either non-music conditions. In fact, during one of his independent play sessions, Jabar requested the drum (which was not within eye sight). Once the researcher handed Jabar the drum, Jabar initiated turn taking with the researcher by singing the song that was paired with the drum during previous music conditions. Jabar seemed to interact most when the therapist matched the tempo of his internal self-stimulatory rhythm with the tempo of the music. He anticipated stop and go interactions with chord changes and put his hands over the strings of the guitar to stop the vibrations after seeing the researcher do this once. Finally, Jabar was much more likely to alternate eye contact between an object and researcher during music conditions than other conditions.

Victor also displayed many more pro-social behaviors during music conditions than he did in non-music and independent play conditions. When off-task, it was often easier to redirect Victor using music. During one music therapy session, Victor walked to

the other side of the room, and was brought back to the music therapy area through the use of the researcher playing the guitar.

Limitations

Due to the small sample size, data may not be indicative of the broader population of children with ASD. In addition, those enrolled in the study were a convenience sample, which makes it hard to generalize across individuals with Autism Spectrum Disorder. Also, all of the participants enrolled in the study were male. As ASD is more prevalent in males than females, this is not entirely unexpected, however, it could be a factor for transferability.

Despite controlling for an order effect, one may have occurred which may explain the high number of requests that Randy made during his independent play sessions as they were the last sessions in which he participated in. He may have made more bids for joint attention during independent play sessions as he had learned that social interactions were reinforcing due to the cooperative play and music therapy sessions that occurred in the four sessions prior to the independent play sessions. The opposite was true for Trevor as both of his independent play sessions occurred at during the first two sessions. He may have requested more interactions during his independent play sessions, as the researcher was not initiating. However, once the researcher initiated the interaction, Trevor stopped trying to request as he knew the researcher would initiate for him.

Suggestions for Future Research

Studies have shown that music can increase the frequency of interaction between a child with ASD and a clinician (Arezina, 2011; Kim, Wigram, & Gold, 2008; Yoo, 2010). Now that the effects of music therapy on the interaction between participant and

researcher have been established, future research should focus on the effects of music therapy on interaction between a child with ASD and his/her peers and/or parents and siblings. In addition, further inquiries could look at the length of interaction as opposed to the frequency.

The effects of music therapy on initiating joint attention are still inconsistent. Future research should focus specifically on the effects of music therapy on initiating behaviors and how to design interventions in order to increase initiation. Future researchers should consider adapting the non-musical protocols outlined by Whalen & Schreibman (2003) for gaze shift and pointing to a music setting and compare outcomes. In addition, the specific musical intervention types that best elicit joint attention behaviors should be confirmed through longer studies with larger sample sizes.

Finally, future research should focus on how music therapy can affect the skills that children on the Autism Spectrum need to work on the most: language, communication, and social skills. By focusing on these three areas, music therapy can become a more widely accepted form of treatment for children with ASD, and access treatment for these children can become more widespread.

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Appendix A

Description of Study Provided to Facilities and Professionals Music Therapy Research Study for Young Children with Autism Spectrum Disorder

Megan Davis, MT-BC (Music Therapist – Board Certified) is conducting a study for children with Autism Spectrum Disorder. Every child that participates in the study must have a formal diagnosis of Autism Spectrum Disorder and be between the ages of 3 and 7.

The purpose of the study will be to compare joint attention behaviors of children with ASD during play and music conditions.

Each child will participate in 6, 20-minute sessions, 2 cooperative music therapy sessions in which your child will engage in instrument playing, singing, and movement to music interventions designed to promote joint attention behaviors; 2 interactive play sessions in which the MT-BC will attempt to engage your child in joint attention behaviors using typical toys; and 2 independent play sessions in which the therapist will engage with the your child only when play is initiated by your child. Each session will be video taped in order to facilitate data collection.

Video tapes will not be used for any other reason than to collect data unless a parent or guardian of the child gives special permission for the video to be used otherwise.

If you are interested in participating please contact Megan Davis, MT-BC by phone at (515) 230-0083 or email at megan.davis.m@gmail.com.

Appendix B Informed Consent

Informed Consent

The Effect of Music Therapy on Joint Attention Skills in Children with Autism Spectrum

INTRODUCTION

The Department of Music Education and Music Therapy at the University of Kansas supports the practice of protection for human subjects participating in research. The following information is provided for you to decide whether you wish your child to participate in the present study. You may refuse to sign this form and not allow your child to participate in this study. You should be aware that even if you agree to allow your child to participate, you are free to withdraw at any time. If you do withdraw your child from this study, it will not affect your relationship with this unit, the services it may provide to you, or the University of Kansas.

PURPOSE OF THE STUDY

The purpose of the study will be to compare the number of joint attention behaviors of children with Autism Spectrum Disorder during play and music therapy conditions.

PROCEDURES

Each child will participate in 6, 20-minute sessions, 2 cooperative music therapy sessions in which your child will engage in instrument playing, singing, and movement to music interventions designed to promote joint attention behaviors; 2 interactive play sessions in which the MT-BC will attempt to engage your child in joint attention behaviors using typical toys; and 2 independent play sessions in which the therapist will engage with the your child only when play is initiated by your child. Each session will be video taped in order to facilitate data collection. Video tapes will not be used for any other reason than to collect data unless a parent or guardian of the child gives special permission for the video to be used otherwise.

RISKS

All sessions will take place during the school day, and therefore your child may be taken out of their classroom for the 20-minute period of the study.

BENEFITS

Many experts in ASD see joint attention as a pivotal skill that other skills such as reading, verbal language, and social skills develop from. During the course of this study your child will engage in interventions specifically designed to practice these skills.

PARTICIPANT CONFIDENTIALITY

Your child's name will not be associated in any publication or presentation with the information collected about your child or with the research findings from this study. Instead, the researcher(s) will use a study number or a pseudonym rather than your child's name. Your child's identifiable information will not be shared unless (a) it is required by law or university policy, or (b) you give written permission.

REFUSAL TO SIGN CONSENT AND AUTHORIZATION

You are not required to sign this Consent and Authorization form and you may refuse to do so without affecting your right to any services you are receiving or may receive from the University of Kansas or to participate in any programs or events of the University of Kansas. However, if you refuse to sign, your child cannot participate in this study.

CANCELLING THIS CONSENT AND AUTHORIZATION

Data will be collected over the course of approximately 6 weeks. You may withdraw your consent to allow participation of your child in this study at any time. You also have the right to cancel your permission to use and disclose further information collected about your child, in writing, at any time, by sending your written request to: megan.davis.m@gmail.com

If you cancel permission to use your child's information, the researchers will stop collecting additional information about your child. However, the research team may use and disclose information that was gathered before they received your cancellation, as described above.

QUESTIONS ABOUT PARTICIPATION

Questions about procedures should be directed to the researcher(s) listed at the end of this consent form.

PARTICIPANT CERTIFICATION:

I have read this Consent and Authorization form. I have had the opportunity to ask, and I have received answers to, any questions I had regarding the study. I understand that if I have any additional questions about my child's rights as a research participant, I may call (785) 864-7429, write to the Human Subjects Committee Lawrence Campus (HSCL), University of Kansas, 2385 Irving Hill Road, Lawrence, Kansas 66045-7568, or email irb@ku.edu.

I agree to allow my child to take part in this study as a research participant. By my signature I affirm that I am at least 18 years old and that I have received a copy of this Consent and Authorization form.

Type/Print Participant's Name

Date

Parent/Guardian Signature

Researcher Contact Information

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Kansas

Cynthia Colwell, PhD, MT-BC
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Director of Music Therapy at The University of
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Music Therapy Intervention Procedure and Type

Intervention Name	Procedures	Type
"I Know a Chicken"	<ol style="list-style-type: none"> 1. Participant choose shaker egg picture 2. The MT-BC handed a shaker egg to the participant 3. The MT-BC sings "I Know a Chicken" while accompanying herself on the guitar. 4. The MT-BC provided a model for the actions described in the song (shake up high, shake down low, etc.) <ol style="list-style-type: none"> a. If the participant imitated the movement the MT-BC verbally praised the participant (verbal praise is used at this point to contrast the music that is already occurring) b. If the participant does not imitate the movement, the MT-BC continues to model, but does not verbally prompt the participant to imitate 	Imitation
"Shake it to the Music"	<ol style="list-style-type: none"> 1. Participant chose the jingle bell picture 2. The MT-BC handed the participant the jingle bells 3. The MT-BC sang "Shake it to the Music" while accompanying herself on the guitar 4. MT-BC over exaggerated stopping when the lyrics indicated to stop by placing her hand on the guitar strings to stop the sound in order to encourage the participant to stop with the MT-BC <ol style="list-style-type: none"> a. If the participant stopped playing, the MT-BC will provide verbal praise such as "good stopping." (verbal praise is used at this point to contrast the music that is already occurring) 	
"Ocean Drum"	<ol style="list-style-type: none"> 1. Child chose ocean drum picture 2. MT-BC held drum out to child with top of the drum facing up so that the drum is parallel to the floor <ol style="list-style-type: none"> a. If the participant did not stop playing the MT-BC will wait 3 seconds for the participant to stop before starting the music again 3. MT-BC gave child a sung prompt to grab the drum while MT-BC holds onto the other side of the drum 5. Repeat for approximately 2 minutes 	Cooperative instrument play Start/Stop
"Dem Bones"	<ol style="list-style-type: none"> 1. Participant chose the skeleton picture 2. MT-BC initiated rocking from left to right in order to tilt the drum 	

"Is Your Mama a Llama"	<ol style="list-style-type: none"> 5. Child chose "Is Your Mama a Llama" picture card 6. MT-BC handed child woodblock mallet and put woodblock in her lap 6. MT-BC sang "My Bonnie Lies Over the Ocean" 7. MT-BC sang "is your mama a llama" 7. MT-BC stopped singing before the page turn between pages 4 and 5 	Cooperative Instrument Play
"Drum Turn Taking"	<ol style="list-style-type: none"> 5. MT-BC held out woodblock for child to hit 6. MT-BC held drum out flat for child to experiment with 6. Child experimented with the drum 7. MT-BC sang "I can play a little" 7. MT-BC sang "I can play a little" while hitting woodblock, the MT-BC waited 5 seconds before repeating 8. MT-BC sang "I can play a little" while holding drum out flat for the child to play 8. Repeat steps 6 through 8 for approximately 2 minutes. 	Turn-Taking
"Tone Bars"	<ol style="list-style-type: none"> 1. Child chose tone bars 2. MT-BC handed play blocks to child in front of the child, playing them with a mallet, and allowed child to play the drum for 5 seconds 3. MT-BC played the drum 	Cooperative Instrument Play
"Is Your Mama a Llama"	<ol style="list-style-type: none"> child to play c. If child did not play the drum, MT-BC will return to playing the drum singing "I can play a little" and offer the child the drum again singing "and you can play a little" 7. Following this interaction the MT-BC sang "Now it's my turn" 8. Repeat steps 6 through 8 for approximately 2 minutes. 1. Child chose "Is Your Mama a Llama" picture card 2. MT-BC handed child woodblock mallet and put woodblock in her lap 3. MT-BC sang "is your mama a llama" 4. MT-BC stopped singing before the page turn between pages 4 and 5 5. MT-BC held out woodblock for child to hit with the mallet 	Cooperative Instrument Play

Appendix D
Time Sampling Recording Sheet (Initial Viewing)
 15-second observe, 5-second record

Participant: _____

Session (circle one): 1 2 3 4 5 6

Session Type (circle one) M IP CP

Key:

Session Type: M = Music, IP = Independent Play, CP = Cooperative Play

R = Requesting, I = Interacting, - = Joint Attention Behavior Did Not Occur

	R and/or I or -		R and/or I or -
0:00 – 0:15		10:00 – 10:15	
0:20 – 0:35		10:20 – 10:35	
0:40 – 0:55		10:40 – 10:55	
1:00 – 1:15		11:00 – 11:15	
1:20 – 1:35		11:20 – 11:35	
1:40 – 1:55		11:40 – 11:55	
2:00 – 2:15		12:00 – 12:15	
2:20 – 2:35		12:20 – 12:35	
2:40 – 2:55		12:40 – 12:55	
3:00 – 3:15		13:00 – 13:15	
3:20 – 3:35		13:20 – 13:35	
3:40 – 3:55		13:40 – 13:55	
4:00 – 4:15		14:00 – 14:15	
4:20 – 4:35		14:20 – 14:35	
4:40 – 4:55		14:40 – 14:55	
5:00 – 5:15		15:00 – 15:15	
5:20 – 5:35		15:20 – 15:35	
5:40 – 5:55		15:40 – 15:55	
6:00 – 6:15		16:00 – 16:15	
6:20 – 6:35		16:20 – 16:35	
6:40 – 6:55		16:40 – 16:55	
7:00 – 7:15		17:00 – 17:15	
7:20 – 7:35		17:20 – 17:35	
7:40 – 7:55		17:40 – 17:55	
8:00 – 8:15		18:00 – 18:15	
8:20 – 8:35		18:20 – 18:35	
8:40 – 8:55		18:40 – 18:55	
9:00 – 9:15		19:00 – 19:15	
9:20 – 9:35		19:20 – 19:35	
9:40 – 9:55		19:40 – 19:55	

Appendix E

Time Sampling Recording Sheet (Second Viewing) 15-second observe, 5-second record

Participant: _____ Session (circle one): 1 2 3 4 5 6

Key:

Joint Attention Behaviors: I = Interaction, R = Requesting

Music Intervention Type: IPD = Playing Different Instruments, IPS=Playing Same Instrument, MV= movement, SA = Sing Alone

	Joint Attention Behaviors		Music Intervention Type	Instrument Played		Joint Attention Behaviors		Music Intervention Type	Instrument Played
	I.	R.				I.	R.		
0:00 – 0:15			IPD IPS MV SA		10:00 – 10:15			IPD IPS MV SA	
0:20 – 0:35			IPD IPS MV SA		10:20 – 10:35			IPD IPS MV SA	
0:40 – 0:55			IPD IPS MV SA		10:40 – 10:55			IPD IPS MV SA	
1:00 – 1:15			IPD IPS MV SA		11:00 – 11:15			IPD IPS MV SA	
1:20 – 1:35			IPD IPS MV SA		11:20 – 11:35			IPD IPS MV SA	
1:40 – 1:55			IPD IPS MV SA		11:40 – 11:55			IPD IPS MV SA	
2:00 – 2:15			IPD IPS MV SA		12:00 – 12:15			IPD IPS MV SA	
2:20 – 2:35			IPD IPS MV SA		12:20 – 12:35			IPD IPS MV SA	
2:40 – 2:55			IPD IPS MV SA		12:40 – 12:55			IPD IPS MV SA	
3:00 – 3:15			IPD IPS MV SA		13:00 – 13:15			IPD IPS MV SA	
3:20 – 3:35			IPD IPS MV SA		13:20 – 13:35			IPD IPS MV SA	
3:40 – 3:55			IPD IPS MV SA		13:40 – 13:55			IPD IPS MV SA	
4:00 – 4:15			IPD IPS MV SA		14:00 – 14:15			IPD IPS MV SA	
4:20 – 4:35			IPD IPS MV SA		14:20 – 14:35			IPD IPS MV SA	
4:40 – 4:55			IPD IPS MV SA		14:40 – 14:55			IPD IPS MV SA	
5:00 – 5:15			IPD IPS MV SA		15:00 – 15:15			IPD IPS MV SA	
5:20 – 5:35			IPD IPS MV SA		15:20 – 15:35			IPD IPS MV SA	
5:40 – 5:55			IPD IPS MV SA		15:40 – 15:55			IPD IPS MV SA	
6:00 – 6:15			IPD IPS MV SA		16:00 – 16:15			IPD IPS MV SA	
6:20 – 6:35			IPD IPS MV SA		16:20 – 16:35			IPD IPS MV SA	
6:40 – 6:55			IPD IPS MV SA		16:40 – 16:55			IPD IPS MV SA	
7:00 – 7:15			IPD IPS MV SA		17:00 – 17:15			IPD IPS MV SA	
7:20 – 7:35			IPD IPS MV SA		17:20 – 17:35			IPD IPS MV SA	
7:40 – 7:55			IPD IPS MV SA		17:40 – 17:55			IPD IPS MV SA	
8:00 – 8:15			IPD IPS MV SA		18:00 – 18:15			IPD IPS MV SA	
8:20 – 8:35			IPD IPS MV SA		18:20 – 18:35			IPD IPS MV SA	
8:40 – 8:55			IPD IPS MV SA		18:40 – 18:55			IPD IPS MV SA	
9:00 – 9:15			IPD IPS MV SA		19:00 – 19:15			IPD IPS MV SA	
9:20 – 9:35			IPD IPS MV SA		19:20 – 19:35			IPD IPS MV SA	
9:40 – 9:55			IPD IPS MV SA		19:40 – 19:55			IPD IPS MV SA	