

THESIS

EFFECTS OF MUSIC ON JOINT ATTENTION BETWEEN INDIVIDUALS WITH AUTISM  
AND NEUROTYPICAL SIBLINGS

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## ABSTRACT

### EFFECTS OF MUSIC ON JOINT ATTENTION BETWEEN INDIVIDUALS WITH AUTISM AND NEUROTYPICAL SIBLINGS

Given that a common social skills deficit for individuals with Autism Spectrum Disorder (ASD) is joint attention, and that development in joint attention can cause improvement in other social skill deficit areas such as affect, imitation, initiation of socialization, and expressive language (Ferraioli & Harris, 2011), it is necessary to examine treatment options that promote joint attention. This study measured the effects of music versus non-music interventions on joint attention between individuals with ASD and neurotypical siblings.

One sibling pair (dyad) participated in this study. To be eligible for the study, one sibling must have an ASD diagnosis, be between the ages of 6 to 10 years old, have a sibling up to three years older with no ASD or related diagnosis, speak English as a primary language, and both siblings free of significant visual or hearing impairments.

The sibling dyad received two fifteen-minute sessions a week for two weeks. The first session of each week was a music session designed to elicit joint attention in siblings. In the second session of each week, the group participated in a fifteen-minute non-music session designed to elicit joint attention between siblings. The neurotypical sibling primarily led these sessions, with video instruction shown to the participants before each task in the sessions.

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## CHAPTER ONE

### Introduction

Autism Spectrum Disorder (ASD) affects one in sixty-eight children in the United States (CDC, 2014), and now reaches approximately 1% of the population in Asia, Europe, and North America (American Psychosocial Association, 2013; CDC, 2014). The number of individuals diagnosed with ASD has grown considerably in less than a decade. In 2002 the prevalence rate was 1 in 150; in 2004 the rate rose to 1 in 125; in 2006 the rate increased to 1 in 110; in 2008 the rate was 1 in 88; and the most recent statistics were released in 2010 as 1 in 68 (CDC, 2014). This is an increase of approximately 120% in just eight years. Research remains inconclusive as to why this increase has occurred so rapidly, resulting in more research being produced that focuses on ASD, effective treatment and therapies, family dynamics, and family-centered treatment plans. Currently, there is no known cure for autism (LaGasse, 2014a).

One of the main deficit areas in ASD is in social skills. In the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, the first area listed for diagnostic criteria regards deficits in social communication. These areas include but are not limited to joint attention, reciprocity, affect, body language, eye contact, facial expressions, non-verbal communication, making and maintaining friendships, and difficulty with imaginative play (American Psychological Association, 2013). Perhaps one of the most important social skills to foster, critical to the development of other social skills, is joint attention. Joint attention is crucial to social development as it fosters language acquisition and can aid in the development of friendships as it aids in joint play (Ferraioli & Harris, 2011).

Effective treatment settings focusing on fostering joint attention include laboratory settings, natural home environments, and parent-led therapy. Favorable results have been indicated when peers are involved in the treatment process as well. In fact, peer training has been found to be more generalizable and more effective over all than training with adults. In addition, children with ASD have been found to generalize peer-trained social skills to their siblings rather than to other peers (Ferraioli & Harris, 2011). Children with ASD find sibling relationships more reinforcing than other relationships with peers or adults. There is a lack of research in the area of sibling-mediated therapy with the ASD population. As family-based therapy models are becoming more prevalent and seemingly successful, there is a need to research the effects of including the sibling in therapy models.

An issue with training joint attention goals with individuals with ASD is that they seem to be less intrinsically motivated to engage in joint attention (Ferraioli & Harris, 2011; Jones & Carr, 2004; Kalas, 2012) therefore, interventions generally need to focus on preferred activities or items. One therapy modality that has been effective in working on development of joint attention with individuals with ASD is music therapy (Kalas, 2012; LaGasse, 2014a; Wigram, & Gold, 2008). Many individuals with ASD may process music, pitch, and rhythm (Kern & Hummel, 2012) differently than typically developing peers (Kern & Hummel, 2012; LaGasse, 2014a). Music provides a framework of structure to focus on rehearsing social skills within a session. It offers a creative and improvisational flexibility that can adapt to client responses and emotions. This flexibility within the music, the way individuals with ASD process music, and the overall musical structure can aid in attention and motivation for individuals with ASD.

The objective of this study is to determine an answer to the following questions that are based on research involving the nature of sibling relationships and ASD; the efficacy in which



social skills, such as joint attention, are learned and generalized in a sibling setting with individuals with ASD; and how music affects joint attention in individuals with ASD. Given music therapy has been an effective method of training joint attention for individuals with ASD:

- 1) Will music alone be an effective modality for increasing joint attention between individuals with ASD and a neurotypical sibling?
- 2) Will the neurotypical sibling's perspective of the quality of sibling interaction improve following instruction?

## CHAPTER TWO

### Review of the Literature

#### *Autism*

In 1943, psychiatrist Leo Kanner published “Autistic Disturbances of Affective Contact.” In this publication, Kanner offers an overview of eleven children under the age of eleven: eight males and three females (Kanner, 1943). As these individuals were brought to Kanner to observe for research purposes, they were described as “idiots” (p.242), “imbeciles” (p. 242), or “feeble-minded” (p. 247), and two of the individuals were described as schizophrenic. Some of the common tendencies or character traits shared between individuals in Kanner’s research included lack of awareness of others in the environment, lack in social awareness, an overall state of obliviousness, contentment in being left alone, in addition was noted some of the individuals were “in a shell” (Kanner, 1943, p. 242).

Many of these observations seem consistent with current research on individuals with Autism Spectrum Disorder (ASD) such as impairment in social interaction and preference for “solitary activities” (American Psychiatric Association, 2013, p. 54). Kanner (1943) references echolalia and delayed echolalia, which is also discussed in the *Diagnostic and Statistical Manual of Mental Disorders – 5* (American Psychological Association, 2013). Furthermore, Kanner describes idiosyncratic lingual literalism, sensitivity to sound, feeding difficulties, transition issues, need for routine, and anxiety observed in some of the participants, which are also common characteristics currently attributed to individuals with ASD. Kanner notes, “even though most of these children were at one time or another looked upon as feeble-minded, they are

all unquestionably endowed with good cognitive potential. They all have strikingly intelligent physiognomies” (Kanner, 1943, p. 247).

In 1944, Hans Asperger, who was unaware of Kanner’s research, published an article, which discussed “autistic psychopathy” (Reschke-Hernández, 2011, p. 171). Asperger, like Kanner, attempted to differentiate the term autistic, which was used to describe hallucinations and symptoms related to schizophrenia, from its early meanings into a classification of it’s own (Kanner, 1943; Reschke-Hernández, 2011). Asperger described similar characteristics in individuals in his study as in the Kanner study, but stated that all individuals with autism spoke well and at an early age, had unique ideas, and were socially aware of others. The differences expressed in the Asperger article eventually aided in the delineation between Asperger’s Syndrome and Autistic Disorder (Reschke- Hernández, 2011).

In the nearly 40 years before the diagnosis was introduced and formally recognized as a diagnosis there seemed to be many misconceptions about ASD and outcomes for individuals with ASD as evidenced by the historic encouragement of institutionalization (Harris & Glasberg, 2003). Fortunately, with new research and understanding of ASD, institutionalization is becoming less prevalent. Individuals with ASD are now primarily cared for in their homes with a guardian, in an assisted living facility, generally independent and receiving part-time care, or higher functioning individuals may live completely independent.

Autism is a spectrum disorder; meaning individuals with ASD function at various levels and require various levels of support. Current research into ASD indicates that autism may be more neurologic in nature than previously thought. It is believed that the neuropathways in the brain of individuals with ASD are organized differently than in neurotypical individuals (LaGasse, 2014a). A greater focus in research has been on neuropsychology and neuroscience

when studying social skills in individuals with ASD (Reichow & Volkmar, 2014). As neurologic organization may be vastly different in individuals with ASD, a natural deduction would be that sensory information might become scrambled or overloaded, and motor control may also become disorganized or inhibited. Neurologic based sensory and motor regulation issues only compound difficulty in performing activities of daily living and communication skills (LaGasse, 2014a). Features present in individuals with ASD can include one or more of a variety of characteristics such as motor deficits, language deficits, social deficits, self-injurious behaviors, disruptive behaviors, problems maintaining or establishing relationships, and deficits in engaging in reciprocal interactions (American Psychiatric Association, 2013). More research should be conducted to determine which of these characteristics are rooted in neurological issues, rather than in behavioral issues.

In 1980, autism was officially recognized as a diagnosis in the *Diagnostic and Statistical Manual of Mental Disorders – III* (DSM) (Harris & Glasberg, 2003). Through the various editions of the DSM released since 1980, the criteria for ASD have gradually shifted. The largest shift in the diagnostic criterion for ASD came with the DSM – 5. The DSM – 5 broke away from “spectrum” terminology now classifying ASD into levels of support required. The new system breaks down the severity of symptoms in individuals with ASD into three levels. Level 1 requires the most basic level of care labeled “Requiring Support” (p. 52). Within Level 1 an individual exhibits social deficits, difficulties with social overtures, and decreased interest in social interaction, but is able to speak in full sentences and can engage in conversation although conversation attempts are often unsuccessful. The main restrictive behaviors this individual may express are difficulties with transitioning and problems with planning and organization (American Psychiatric Association, 2013).

Level 2 is labeled “Requiring Substantial Support” (p. 52). As with Level 1, an individual diagnosed Level 2 also experience social deficits, more specifically with verbal and nonverbal skills, even with supports in place. Such an individual may experience difficulty with social overtures, rarely initiate social situations with others, and if the individual is able to speak in complete sentences the conversations characteristically focus on a narrow special interest of the individual. Typically, the individual will also exhibit noted “odd” (p. 52) nonverbal communication. The main restricted behaviors exhibited are difficulty coping with change, repetitive behaviors are able to be noticed by others and interfere with functioning in various contexts, and struggles in changing attention or focus (American Psychiatric Association, 2013).

The most severe level, “Requiring Very Substantial Support” (p. 52), is Level 3. Within Level 3, speech and social communication are impaired and social interactions are quite limited. This individual, due to limited communication abilities, uses atypical measures to communicate wants and needs. At this Level restricted behaviors are similar to Level 2, yet more severe and these behaviors typically interfere with function across all contexts (American Psychiatric Association, 2013).

As of 2003, ASD ranked as the third highest handicap in the United States (Groene, 2003) and one researcher suggests that every four hours one child is diagnosed with autism (Groene, 2003). As previously stated, Center for Disease Control’s latest estimate is that the prevalence for ASD in the United States is one in sixty-eight (CDC, 2014). With such a high prevalence, there are a variety of theories and arguments regarding the cause of ASD, ultimately there is no known singular cause at this time, and there is no known cure (LaGasse, 2014a). A variety of treatments have yielded positive results addressing social functioning in individuals with ASD including video modeling (Hume, Loftin, & Lantz, 2009; LaGasse, 2014a; Wong et

al., 2014), peer mediated instruction and intervention (LaGasse, 2014a; Wong et al., 2014), and parent implemented intervention (Wong et al., 2014).

In the *New Evidence-Based Practice Report* published in 2014 by the National Professional Development Center on Autism Spectrum Disorders (NPDC), twenty-seven various therapies met the organization's criterion to be considered an Evidenced-Based Practice (EBP). Of 29,105 published research articles reviewing interventions for ASD, 456 articles were included in the evidenced based study. To be considered an evidenced-based practice, the study must meet the following criterion:

(a) two high quality experimental or quasi-experimental design studies conducted by two different research groups, or (b) five high quality single case design studies conducted by three different research groups involving a total of 20 participants across studies, or (c) there is a combination of research designs that music include at least one high quality experimental/quasi-experimental design, three high quality single case designs, and be conducted by more than one researcher or research group (Wong et al., 2014, p.15-16).

Of the included articles, twenty-seven interventions were studied, and the most prominent methodology was the Single Case Design (SCD). Some of the interventions that saw the greatest amount of support in the research were video modeling, antecedent-based therapies, prompting, and reinforcement. Using group methodologies or SCD, other interventions that had strong support in the research were “parent-implemented interventions, social narratives, social skills training, technology-aided instruction and intervention, [and] visual supports” (Wong et al., 2014). Music therapy was listed as a “Practice with Some Support” citing that it was excluded from being described as an EBP as the research presented only used one research group.

It is important to note that there is no conclusive evidence that proves one method is overall more effective than another (LaGasse, 2014a). The NPDC of ASD states, “...the most important evidence supporting an EBP at the individual student level is the progress the student makes when the EBP is implemented” (2014, p. 33). Each individual with ASD is unique;

therefore therapies and combinations of interventions deemed effective will vary upon the individual.

As therapies and interventions continue to develop and the prevalence of ASD continues to rise, it is important to focus not only on how the diagnosed individual is affected, but how ASD affects the family unit. Involvement by the parents and family in intervention or therapy programs particularly for children with ASD is essential (Reichow & Volkmar, 2014). As parent training and involvement in therapy is already being researched, it is important to also study the relationship of siblings and their role in the therapy model. This is not simply a priority so that the family may function as a more cohesive unit, but as parents or caregivers age, the role of the sibling becomes increasingly important in the care of an individual with ASD (Orsmond & Seltzer, 2007a). The sibling relationship aspect continues to rise in priority, as individuals with Level 3 ASD are finding new ways to communicate and are suggesting that it is not that they do not wish to interact with their environment, but rather they are unable to engage or tolerate desired interaction, or that there is an interference with the follow through of the interaction (LaGasse, 2014a). Siblings with ASD may desire communication and engagement with their sibling, but maybe unable to do so. Therefore, sibling involvement in therapies and interventions is needed to help both siblings understand their roles in interactions.

### *Autism and Sibling Relationships*

Numerous studies have been conducted on implementation and therapies for ASD (Rivers & Stoneman, 2008; Wong et al., 2014), and some of these studies have incorporated family dynamics and parent/guardian relationships (Allgood, 2005; Thompson 2012; Williams, Berthelsen, Nicholson, Walker, & Abad, 2012; Wong et al., 2014). Family centered therapy has become a leading philosophy in care for early intervention services over the last 20 years

(Thompson, McFerran, and Gold, 2013). In recent years, there has been a rise in the number of studies focusing specifically on the relationships with neurotypical individuals and their siblings with ASD (Aksoy & Yildirim, 2008; Gold, 1993; Gross-Tsur, & Shalev, 2004; Orsmond & Seltzer, 2007a; Orsmond & Seltzer, 2007b; Pilowsky, Yirmiya, Doppelt, Mates, 1990; Rivers & Stoneman, 2003). Though there have been several studies conducted on this dynamic, researchers are only just beginning to understand the development and characteristics of sibling relationships in this setting (Rivers & Stoneman, 2008). A large quantity of research on ASD and the family dynamic seems to focus mostly on the child with ASD. Ferraioli & Harris (2011) state that a child is more likely to interact with siblings than peers, and also find that sibling interaction is more meaningful than peer interaction. Focusing on the significant role individuals with ASD consciously, or subconsciously, place on the relationship with their sibling, it is important to view what research has been conducted on the perspective of the neurotypical sibling.

The relationship between siblings is important as it can be critical for younger individuals with ASD to be exposed to neurotypical siblings to aid in learning appropriate social interaction and learning social competencies in highly supportive conditions, such as the home (Tsao, Davenport, & Schmiege, 2012). Catering to an individual's natural instinct to communicate and interact while fostering social interaction requires learning in natural environments and a communicator who is also a focus in the intervention (Thompson, McFerran, & Gold, 2013). What a more natural environment than the home, and what a more natural communication partner than a sibling?

Neurotypical siblings seem to adjust differently to having a sibling with ASD based on a range of variables such as gender (Gold, 1993), birth order (Gold, 1993; Harris & Glasberg,



2003), socioeconomic status (Gold, 1993), state of marital stress in parents (Gold, 1993; Rivers & Stoneman, 2003), age of siblings (Rivers & Stoneman, 2003), and severity of the ASD (Gold, 1993). Regardless of the outcomes for the typically developing sibling, researchers indicate that most individuals with ASD have a positive view of their sibling relationship (Kaminsky & Dewey, 2001; Rivers & Stoneman, 2003). As well, neurotypical siblings often express feelings of being proud that they can teach their siblings how to do things (Rivers & Stoneman, 2003). Yet, as siblings age into adulthood, and parent/caregivers are no longer able to care for the individual with ASD, the neurotypical sibling's view of the relationship becomes less positive (Orsmond & Seltzer, 2007b; Rivers & Stoneman, 2003).

Some neurotypical siblings seem to exhibit little to no differences in adjustment than siblings with typically developing peers (Kaminsky & Dewey, 2001); however, some siblings do seem to have long term adjustment issues such as anxiety (Pilowsky et al., 2004), feelings of isolation or loneliness (Aksoy & Yildirim, 2008; Pilowsky et al., 2004; Rivers & Stoneman, 2003), and depression (Cebula, 2012; Gold, 1993). These issues, for which siblings at times seek professional treatment (Pilowsky et al, 2004), could be caused by a variety of stressors in the home such as sibling's perception of parenting styles, etc. For instance, studies seemed to indicate many siblings felt that the parents were giving preferential treatment to the sibling with ASD (Harris & Glasberg, 2003; Rivers & Stoneman, 2008), and that the neurotypical sibling was receiving less attention from parents to the point of some siblings reporting a feeling of neglect (Mates, 1990). In some instances, the neurotypical sibling self-reported feelings of embarrassment by the ASD sibling's outbursts and/or aggression issues (Orsmond & Seltzer, 2007a).

In learning how to manage depression, feelings of isolation, and other issues that may arise with having a sibling with ASD, positive outcomes for neurotypical siblings may include developing successful coping mechanisms (Kaminsky & Dewey, 2001; Orsmond & Seltzer, 2007b; Ross & Cuskelly, 2006) and a more positive self-concept (Pilowsky et al., 2004). Coping mechanisms are important as Orsmond & Seltzer (2007) state, “Increasing siblings’ use of effective coping strategies may result in more positive sibling relationships, which may become increasingly important as the parents age” (p. 694). Rivers and Stoneman (2008) reported that as long as some siblings have an understanding and are able to perceive the reasoning why, they do not object to parents treating siblings differently. Similarly, as long as siblings understand that treatment from parents is fair, children do not always disagree with being treated differently (Rivers and Stoneman, 2008). Knowledge about ASD seems to be an important factor in a neurotypical sibling’s development and emotional outcomes later in life. Overall sibling adjustment seems to have a better outcome when parents and caregivers more openly speak about the ASD diagnosis and as siblings become more educated on the subject. Another benefit is that siblings who felt more educated on the diagnosis of their sibling reported a more positive relationship with their sibling than those who were not as educated on the subject (Ross & Cuskelly, 2006).

It could be due to the nature of the disability in aspects of socialization that many NT siblings report experiencing a less intimate or emotionally close relationship with their sibling with ASD (Orsmond & Seltzer, 2007b; Rivers & Stoneman, 2003). With more autistic self-advocates beginning to communicate their desire for relationships, and as greater understanding occurs in difficulties in involuntary sensory responses of movement or vocalizations, perhaps

neurotypical siblings will be encouraged to a greater level to foster more meaningful relationships with their sibling.

Models of sibling therapy have resulted in some success. Tsao, Davenport, and Schmige (2012) reference several studies in which sibling play interventions have resulted in more initiations for play from the autistic sibling following the intervention, and both siblings seemed to be more socially engaged following interventions. The researchers stated, "...empowering siblings to be effective intervention partners can potentially yield great benefits for the sibling, the child with a disability, and the greater family constellation" (Tsao et al., 2012, p. 53).

### *Music Therapy and Autism*

The use of music in or as therapy is not a new idea. Throughout the 19<sup>th</sup> century a variety of medical journals, dissertations, and other academic publications were issued supporting the use of music as treatment to mental and physical illness. The earliest academic publication supporting music in healthcare was in 1804 (Davis, 1987). Since that time, music therapy has grown to be a viable healthcare profession in many nations addressing health related needs for individuals from birth through end of life care with a variety of abilities and disabilities, including ASD (The American Music Therapy Association, 2012).

In a review of meta-analyses pertaining to music therapy treatment, music therapy was found to be effective for the following populations: "pediatric medical settings, child and adolescent mental health settings, premature infants, adults with symptoms of psychosis, individuals with dementia, and decrease arousal during periods of stress" (Kern & Hummel, 2012, p. 61). Though music therapists conducted the meta-analyses on each of these populations, other outside organizations also recognize music therapy as a valid form of treatment. In the 2014 Evidence-Based Practice report published by The National Professional Development

Center on Autism Spectrum Disorders music therapy was considered and current music therapy research was reviewed. Though it was not considered an EBP by the NPDC on ASD, it was listed as an “Intervention with Some Support,” only citing that the research reviewed was not conducted with the appropriate amount of research groups to meet the criterion (Wong et al., 2014). In 2009, the National Autism Center stated that music therapy is an “Emerging Practice” (Kern & Humpal, 2012, p. 43).

Music therapists first began working with individuals with ASD in institutions in the 1940’s (Reschke-Hernández, 2011). Many individuals with ASD have a heightened interest in music, respond positively to music, and often have increased musical abilities (Kern & Hummel, 2012). With this in mind, it seems natural that music therapy would be a beneficial therapeutic medium for individuals with ASD (American Music Therapy Association, 2013). Music therapists work with individuals with ASD to address goals and objectives focusing on behavior, social skills, cognition, language, and communication skills amongst other areas. The benefits and clinical outcomes of music therapy with individuals with ASD in areas of communication, cognition, behaviors, social skills and interaction, and emotional regulation appear in peer-reviewed journals (American Music Therapy Association, 2012).

Reschke-Hernández (2011) reviewed research regarding music therapy and ASD from 1969-2009. In this review, it is clear that music therapy goals and approaches have become more focused and have expanded and refined techniques used over the previous 40 years. As more is discovered about ASD, therapists are better able to tailor treatment plans to the specific needs of the clients (Reschke-Hernández, 2011).

In 2014, a meta-analysis was conducted to determine if music was an effective method of treatment for young children with ASD. Eight articles met the criterion for this study. Of the

eight, four of the articles reviewed were from publications released by the American Music Therapy Association (*The Journal of Music Therapy* and *Music Therapy Perspectives*), two of the articles were from *The Journal of Autism and Developmental Disabilities*, and two articles were from *Autism*. It can be determined from the results of this analysis that music therapy may be considered an exceptionally effective treatment for young children with ASD. Goals and objectives supported in this research are communication development, play skills, and personal responsibilities (Kern and Hummel, 2012).

Other studies have shown music therapy is an effective tool for ASD to foster communication and social skills, which may result in fostering relationships with peers (Gooding, 2011; Sussman, 2009). Music therapy can be used to increase meaningful exchanges between individuals with ASD and peers when peers are directly involved in the treatment process (Kern & Aldridge, 2006). This therapy is also being used to train and support parents of children with ASD. Support and training groups are available for parents with children with ASD (Allgood, 2005; Thompson, 2012; Williams et al., 2012). Allgood (2005) notes the effects of music therapy in a small group family model are positive.

Music therapy has been used as a tool to enhance social skills (Kern & Aldridge, 2006; Sussman, 2009), peer interaction (Kern & Aldridge, 2006; LaGasse, 2014a), turn taking and imitation (Finnigan & Starr, 2010), increased instances of eye gaze (Finnigan & Starr, 2010), and joint attention (Kalas, 2012; LaGasse, 2014a; Kim, Wigram, & Gold, 2008). Researchers indicate as individuals with ASD develop joint attention skills other gains in social skills seem to increase in areas of “social initiations, positive affect, imitation, and expressive language” (Ferraioli & Harris, 2011, p. 262). If music therapy can be used to enhance or improve social

skills (Gooding, 2011; Sussman, 2009), can music enhance or improve aspects of sibling relationships, measured through the targeted behavior of joint attention?

### *Joint Attention*

Joint attention occurs in social communication. It refers to a behavior of two parties gazing at the same items of interest or one person directing another's interest to a particular item or event (Kalas, 2012; LaGasse, 2014a). This can occur by gesturing or pointing. According to Ferraioli and Harris, joint attention is "the ability to use gestures and eye contact to coordinate attention with another person" (2011, p. 261). The purpose of joint attention is to share mutual experiences of events or objects (Ferraioli & Harris, 2011; Kalas, 2012).

Kalas further explained joint attention as a result of the anterior and posterior attention-regulation systems. The anterior system is responsible for goal-driven behaviors. Portions of the brain engaged in the anterior system include, "frontal eye fields, the prefrontal association cortex, the dorsal anterior cingulate, and the orbital prefrontal association cortex" (Kalas, 2012, p.431-432). The posterior attention-regulation system is formed within the first few months of life and is "controlled by the posterior parietal association area, the superior temporal cortex, and the parietal, temporal, and occipital association areas" (Kalas, 2012, p. 432). Viewing ASD as more of a neurologic disorder regarding abnormal organization or disturbances of neuropathways, possibly leading to disruption of sensory and motor issues (Bono, Daley, & Sigmann, 2004; Kalas, 2012; LaGasse, 2014a), it is no wonder individuals with ASD often struggle with joint attention.

Joint attention is an important social skill to develop. Joint attention makes it possible for two people to engage in the same activity, game, or experience. Without joint attention, it is difficult to encounter or initiate a shared social experience with another individual. A profound

statement in the literature indicates that as joint attention is developed in individuals with ASD, other social skills begin to develop and improve such as increased “social initiations, positive affect, imitation, and expressive language” (Ferraioli & Harris, 2011, p.262). One research group also indicated that joint attention can also be a precursor to language development (Bono, Daley, & Sigman, 2004).

A variety of interventions has been used to teach joint attention to individuals with ASD. These interventions typically focus on a preferred object or activity, and involve the therapist encouraging a response of attention by pointing, gesturing, or gazing at the object (Kalas, 2012). Other therapies that are able to address joint attention are occupational therapy, speech therapy, applied behavior analysis, social skills interventions (Jones & Carr, 2004), and parent training (Warreyn, Van Der Paelt, & Roeyers, 2014). A common difficulty within interventions addressing joint attention is that the client has to be motivated to share interest in the desired object or event. It seems that individuals with ASD are less motivated to share in joint attention is less than neurotypical peers (Ferraioli & Harris, 2011; Jones & Carr, 2004; Kalas, 2012). Music therapy is an effective treatment for developing joint attention (Kalas, 2012; Kern & Aldridge, 2006; Kim, Wigram, & Gold, 2008; LaGasse, 2014a; Wigram & Gold, 2006), as music seems to be motivating to individuals with ASD (Kern & Aldridge, 2006; LaGasse, 2014a), therefore keeping and maintaining the interest of individuals against competing stimuli.

The goal of this research is to determine if music will have a positive influence on the relationship between individuals and their siblings with ASD in a group music therapy session focusing on the targeted behavior of joint attention. To this effect the research questions are 1) Will music alone be an effective modality for increasing joint attention between individuals with ASD and a neurotypical sibling?

2) Will the neurotypical sibling's perspective of the quality of sibling interaction improve following instruction?



## CHAPTER THREE

### Methods

#### *Participants*

One sibling dyad participated in this study. Three additional sibling dyads, verbally or through electronic communication, committed to participate in the study. These three dyads dropped out before the first meeting. Two families determined not to participate due to scheduling issues and one was unable to participate due to prolonged illness. Of the dyad that participated in the study, the individual with ASD was eight years old. The neurotypical sibling was twelve years old and was free from ASD or a related diagnosis. The neurotypical sibling was able to identify and match basic colors. Both siblings were free from significant hearing or visual impairments. The sibling with ASD was able to independently communicate needs and preferences through verbal communication. Participants were recruited from the researcher, other therapists, caregivers of individuals with ASD, and by word of mouth.

#### *Study Design*

The study was a Single Systems or a Single – Case Design following the ABAB design (Christensen, Johnson, & Turner, 2014). The group received a music session (A, A1) on Wednesdays at 5:15pm, followed by a non-music session (B, B1) on Friday at 1:30pm. This occurred for two weeks. Each session lasted approximately 15 minutes.

Table 1.  
*Study Design*

Week 1		Week 2	
<b>Session A</b> Music Wednesday	<b>Session B</b> Non-music Friday	<b>Session A-1</b> Music Wednesday	<b>Session B-1</b> Non-music Friday

The initial meeting lasted approximately 30 minutes as the neurotypical sibling attended a short video training about ASD and effective methods of interaction with individuals with ASD. Following the video the NT sibling completed a short questionnaire to see if the information was retained (Appendix A). The NT sibling also filled out a pre-test sibling questionnaire (Ferraioli & Harris, 2011), which was completed again at the end of the last session (Appendix B). After the final meeting, approximately 30 minutes in duration, the neurotypical sibling filled out a post survey (Ferraioli & Harris, 2011) regarding thoughts about the experience and about being a “teacher” to his sibling (Appendix C). Ferraioli & Harris initially developed the pre- and post-surveys, the social validation form, and the post-treatment sibling questionnaire for a study they conducted on a sibling mediated behavioral intervention focused on joint attention. The researcher contacted Ms. Ferraioli and was given written consent to use the surveys and questionnaires from the study.

During the sessions, the participants were placed in a room with a television. The researcher played the DVD in which the researcher, who left the room after starting the DVD, read a book and then discussed instructions on how to complete a task asking the sibling dyad to work together to complete the given task. No music was used or required to complete these tasks for the non-music sessions (B and B1). For the music sessions, the researcher provided a similar session format. For both session formats, the researcher delivered initial guidance at the beginning of the session via a video recording. In the music sessions, the researcher sang the

books at the beginning of the video. The researcher and the caregiver observed the session from a two-way mirror in a nearby observation area. The researcher and the caregiver were able to hear what was occurring in the sessions and were close enough to quickly intervene if any emergencies or unforeseen circumstances occurred, which none did.

Before participants began to engage in sessions, the legal guardian signed a formal letter of informed consent (Appendix D) allowing both siblings to participate in the study for the duration of the study. The letter clearly stated that participants had the right to withdraw from the study at any time. At this time, the NT sibling was given an assent form to sign (Appendix E). The researcher offered to read the assent form if needed, but the sibling opted to read the form independently and independently signed the form. The sibling with ASD was also given an assent form to sign (Appendix F). The researcher offered to read the form to the sibling, at which time the sibling requested the form be read aloud. As the researcher finished reading the form, the researcher asked if the sibling would like to participate in the study. The sibling nodded “yes” and also verbalized “yes.” The researcher then instructed the sibling to sign the form, but as the sibling asked for assistance, the researcher asked the sibling to take the form to the caregiver sitting near the sibling who signed the paper.

### *Measurement Tools*

The four sessions were video recorded. The video equipment used was mounted into the wall on the side of the room, and another video recording device was used to record sessions from behind the television in order to attempt to track eye gaze. The researcher and two other trained observers reviewed the same randomly selected five-minute portion of each of the four sessions, and tracked data via visual observation on the data-tracking sheet (Appendix G). The observers tracked instances of joint attention and the duration that siblings were engaged in each

instance of joint attention. Joint attention was defined as: coordinating attention to a social partner and an object of mutual interest simultaneously (Mash & Wolfe, 2010). Sibling will draw attention of opposite sibling to item by pointing, verbalizing, and/or eye gaze. The duration of joint attention was measured in seconds. To measure the time each observer utilized a stopwatch application. The duration began when both siblings' heads were turned to face the same object, eye gaze was on the same object, and/or both parties were pointing to the same object; until one or both parties turned away gaze or head.

### *Procedure*

Sessions were held at Easter Seals Midwest Autism Services in Southeast Missouri twice weekly for two weeks. Sessions occurred on Wednesday evenings and Friday afternoons. Initially sessions were going to be held at the same time each day, but this was not possible due to scheduling conflicts with the dyad.

Each session was designed to last approximately 15 minutes. To begin the first session, the neurotypical sibling was taken to a separate room, while the remaining sibling was left under the supervision of the caregiver. The neurotypical (NT) sibling completed a short survey (Appendix B) regarding opinion and thoughts about playing and interacting with sibling. The researcher was outside of the room with the NT sibling in sight while the sibling completed the survey and was available to provide clarification if needed. After this survey was completed the sibling watched a short, basic introductory video on ASD, which included positive ways to interact with and redirect individuals with ASD. Following this video the sibling took a short multiple choice and short answer test (Appendix A) to determine what information was retained. Both siblings then engaged in the first session.

In the first music session (A), the siblings were shown a short video. The video was of the researcher singing an illustrated songbook “The Ants Go Marching.” The video instructed siblings to sing along, point to and identify pictures, and fill in the blanks while singing. The researcher also asked the dyads to participate in small motor movements and other simple tasks during the accompaniment.

When the literacy section had been completed, the researcher offered directions through video modeling for the next intervention. The siblings were instructed, as the researcher demonstrated, to roll shaker eggs back and forth to each other across two small xylophones in the order listed on a sheet. The siblings were instructed to complete the sequence twice. Following the video instructions the researcher entered the room, paused the video, and handed the siblings a bag of shaker eggs with a color-coded sequence sheet. The researcher also brought two small xylophones into the room and instructed the siblings to begin the process. Once the sequence had been completed twice, the researcher entered the room and informed the dyad that they would be given two minutes to explore the instruments independently. The researcher then left the room and started an iPhone stopwatch application. During this time the siblings interacted with each other and both siblings played the instruments that were in the room. When the two minutes had passed, the researcher entered the room to end the session and took the dyad to the caregiver. At this point the session ended.

For the first non-music session (B), through a video the researcher read a short, age appropriate picture book “Giraffes Can’t Dance” to the siblings. The siblings were instructed to point to pictures, identify objects in the illustrations, and read simple sight words. The dyad was also instructed to participate in simple movement directives related to the book.

Following the book, the researcher offered instructions through video modeling on how to complete the next task. When the instructions were completed, the researcher entered the room and gave the NT sibling a bag of six multi-colored balls and a color-coded sequence sheet. The siblings were instructed to roll the balls back and forth to each other in the order listed on the color sheet, as modeled in the video. This sequence occurred twice. Once the sequence of color-coded balls were rolled back and forth to each other twice, the researcher entered the room and informed the dyad that they may play independently with the balls for two minutes. The researcher left the room and started a stopwatch through an iPhone application for two minutes. Though the balls were soft and unlikely to cause injury, the researcher observed throughout and was able to re-enter the room if the dyad began to throw the balls at each other in a dangerous manner. The dyad threw the balls back and forth to each other catching them and playfully tagging one another with the balls. As both siblings were laughing and smiling, and no one seemed to be exhibiting any signs or symptoms of distress or injury the researcher allowed the full two minutes to pass. Once the two minutes were finished, the session ended and the researcher took the dyad to the caregiver.

In the second music session (A1), the researcher appeared on video and offered instructions, and sang the songbook, “Roar! A Counting Book.” This protocol remained the same for the songbook portion of the (A) session. Following the book the researcher, through the video, gave directives on how use the color-coded lyric sheets to play two different instruments. The instruments were a single octave, multi-colored tone bar set, and a seven note diatonic flip-flop-aphone instrument similar to “Joia Tubes” made primarily from PVC pipe. After the directions were completed, the researcher entered the room, paused the video and brought the NT sibling a case with 8 multi-colored tone bars and the flip-flop-aphone, with corresponding color-

coded lyric sheets. The NT sibling led the other sibling through playing “Twinkle, Twinkle, Little Star,” “Row, Row, Row Your Boat,” and “Mary Had a Little Lamb” on the tone bars using the color-coded lyric sheet. When the songs were completed, the siblings went to the flip-flop-aphone and the NT sibling led the alternate sibling through the same three songs using the same color-coded sheets on the new instrument. Once the tasks were completed, the researcher entered the room and informed the dyad they may play the instruments independently for two minutes. When the timer was complete, the researcher entered the room and brought the dyad to the caregiver.

In the second non-music session (B1), the researcher, through a video, read an appropriate level picture book “Commotion in the Ocean” to the dyad. The protocol followed the same format for the reading intervention in session (B). Following the book, the researcher instructed the dyad on how to complete the next task. Once the instructions were given, the researcher entered the room, paused the video and gave the NT sibling two puzzle cards instructing the siblings how to build the foam puzzles. On the front of each card was a picture of the materials and pieces needed to form the puzzle, and on the back of each card was a picture depicting what the finished puzzle should look like. The researcher then left the room. Each puzzle was nine pieces and the pieces were all solid colors. When the puzzles were completed, the researcher entered the room and directed the clients to spend the next two minutes putting the puzzle pieces back into the bag. Once the two minutes were completed the researcher re-entered the room, the session ended, and the researcher brought the dyad back to the caregiver.

### *Data Analysis*

Data were collected through visual inspection (Christensen, Johnson, & Turner, 2014). Upon gathering all data taken from each observer, an intra-class correlation coefficient (LaGasse,

2014b) was conducted via the SPSS software application to determine the inter-rater reliability (Salkind, 2014). The researcher used charts and graphs to show averages and trends in the data. The standard deviation was calculated and was expressed in the results. To calculate the mean and standard deviation for the non-music sessions, the researcher added together the mean values from the non-music groups for each behavior tracked and divided them by two to determine the combined mean. The two standard deviation scores for the non-music sessions were also added together and divided by two. The same procedure was used to determine the mean values and standard deviation for the music sessions.



## CHAPTER FOUR

### Results

#### *Intraclass Correlation*

To begin the data analysis the researcher used the SPSS software application to perform an intra-class correlation coefficient to determine the consistency between the three observers. There was a strong average measures intraclass correlation between observers tracking instances of joint attention ( $ICC = .852$ ). The ICC was calculated using the number of instances of joint attention tracked by each observer over a randomly selected five-minute segment of each session. The observers rated the same randomly selected footage of two minutes and thirty seconds of the siblings participating in the literacy portion of each intervention and two minutes and thirty seconds of the dyad completing the desired task. This occurred for each of the sessions, except in the B1 video the final non-music video. In this instance both cameras were unable to capture either siblings eye gaze during the task portion of the intervention, therefore the footage of B1 was five minutes of the literacy intervention.

#### *Joint Attention Means*

Descriptive statistics were calculated via SPSS to determine the mean and standard deviation of the average duration of instances of joint attention that occurred during the sessions, as shown in Table 2. This process was also used to determine the mean instances of joint attention recorded in each type of session, as described in Table 3. In a Microsoft Excel program, the duration of all recorded joint attention instances were added together for the music sessions and also for the non-music sessions. These numbers were then divided by six, three sets of

observer data from two sessions, to determine the mean time the dyad was engaged in joint attention in both non-music and both music sessions. These results are listed in Figure 3. Excel was used to create a bar graph to further supplement a visual representation of the data analysis for Table 2 (Figure 1) and Table 3 (Figure 2).

Table 2.  
*Mean Duration of Instances of Joint Attention in Seconds*

Session Type	Mean	SD
Music	14.77	25.52
Non-Music	11.56	16.37

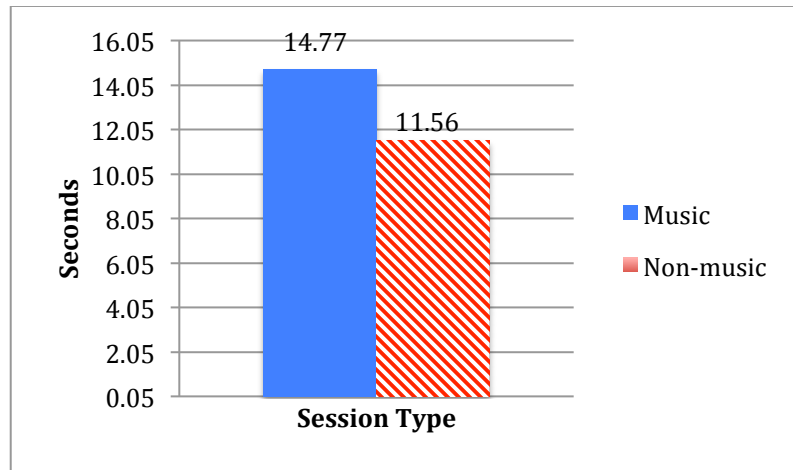


Figure 1. *Mean Duration of Instances of Joint Attention*

Table 3  
*Mean Instances of Joint Attention*

Session Type	Mean	SD
Music	15.67	6.47
Non-Music	19.83	7.68

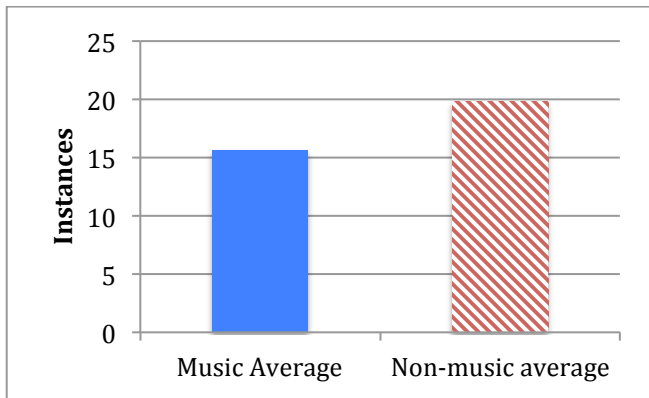


Figure 2. Mean Instances of Joint Attention

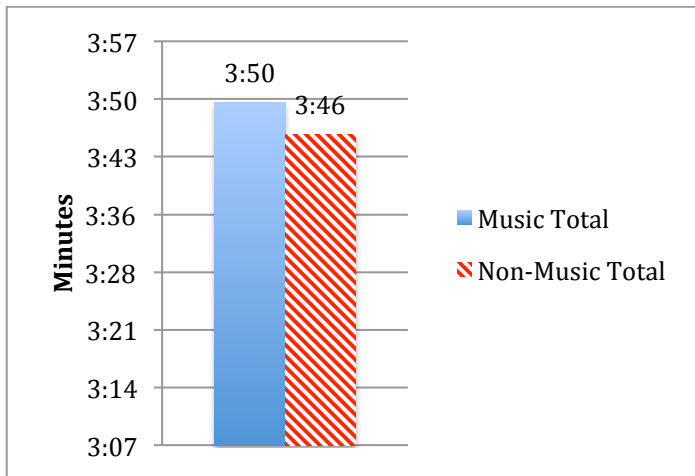


Figure 3. Mean Total Time of Joint Attention in 5-Minute Segment

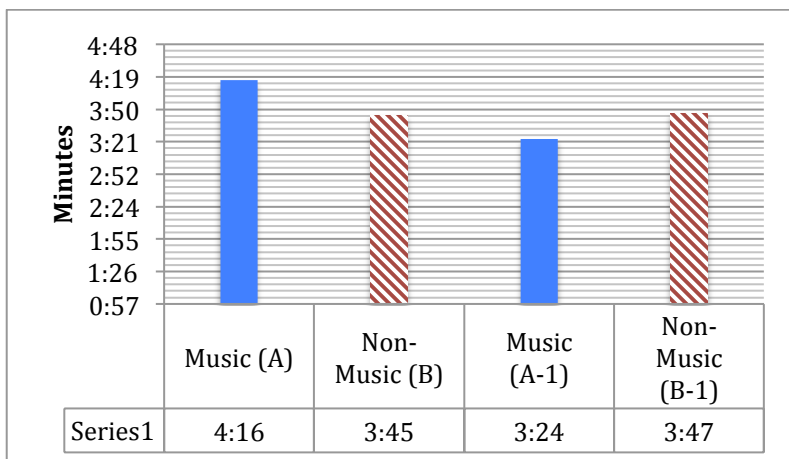


Figure 4. Duration of Joint Attention in Each Session

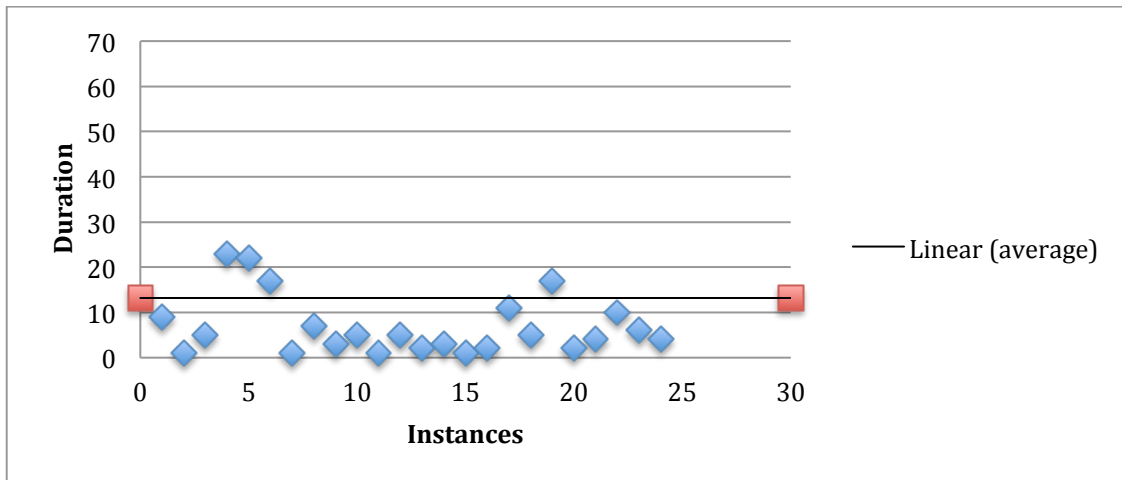


Figure 5. *Session A (Music), Instances and Duration of Joint Attention*

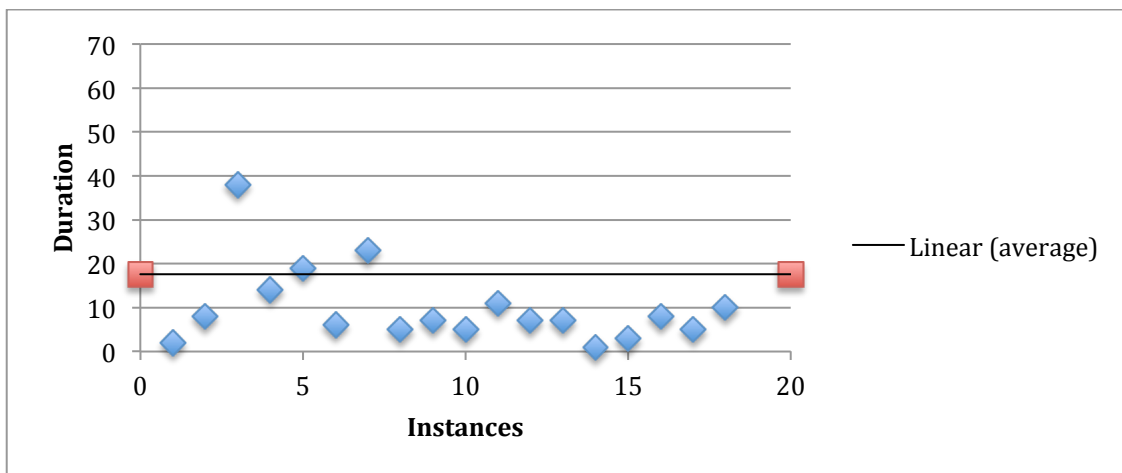


Figure 6. *Session B (Non-music), Instances and Duration of Joint Attention*

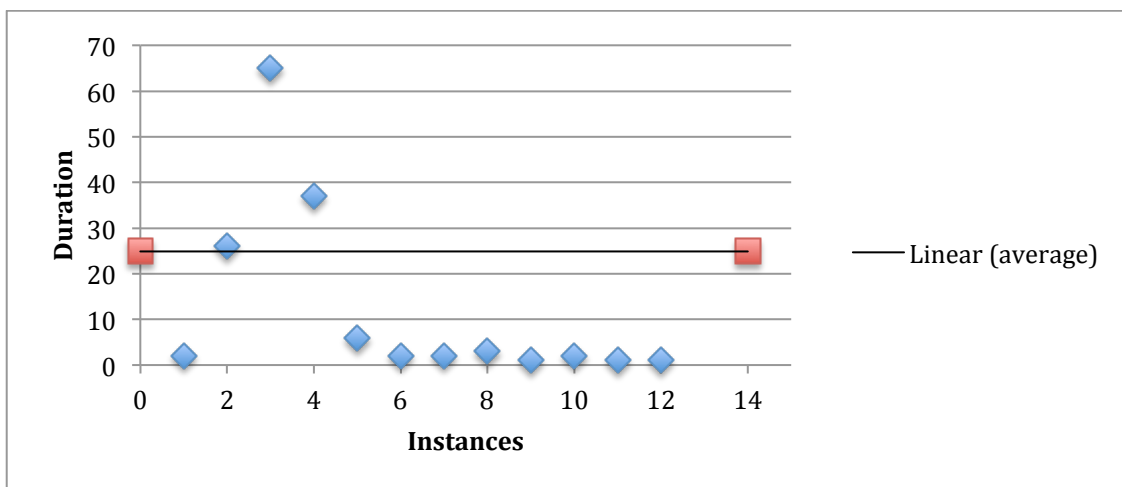


Figure 7. *Session A1 (Music), Instances and Duration of Joint Attention*

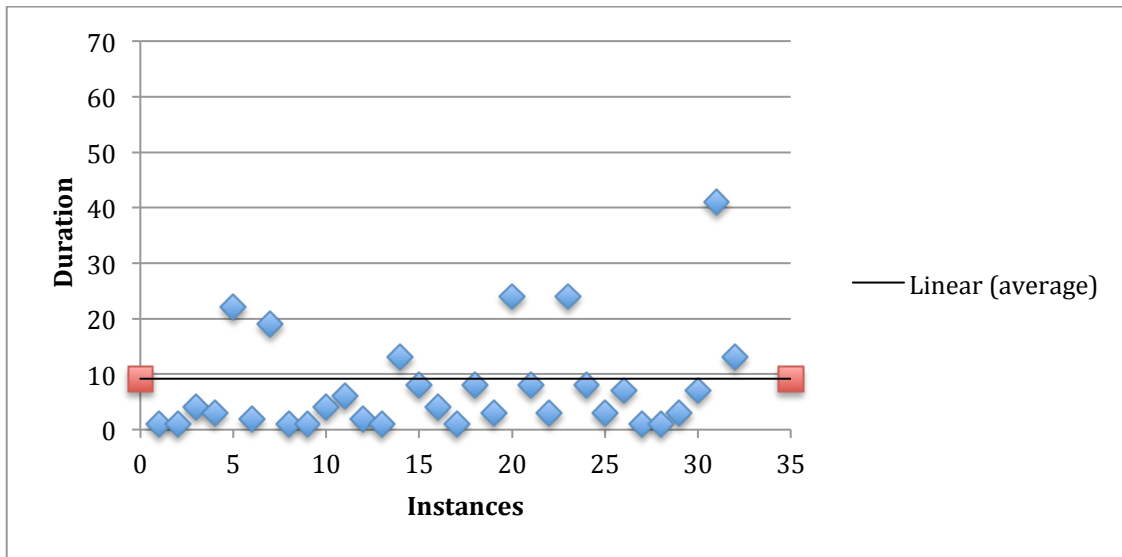


Figure 8. *Session B1 (Non-music), Instances and Duration of Joint Attention*

During music sessions, the mean duration of each instance of joint attention was 14.77 seconds (SD = 25.52). The mean duration of each instance of joint attention for the non-music session was 11.56 seconds (SD = 16.37). On average, the duration of joint attention was 2.88 seconds longer during the music sessions than in the non-music sessions. In reviewing the mean number of instance of joint attention that occurred, it was found that more instances occurred during the non-music sessions  $M = 19.83$ , (SD = 7.86). In the music sessions, the mean number of instances recorded was 15.67, (SD = 6.47). While there were fewer instances of joint attention that occurred during the music sessions, it is important to note that the average duration during the music sessions was slightly longer. Further more, the total mean time engaged in joint attention during the music sessions was slightly more,  $M = 3:50$ , than in the non-music sessions  $M = 3:46$ . Figure 5 through figure 8 demonstrates an example of the spread of the all of the instances of joint attention that occurred in each session and duration as depicted by one of the three observers. The mean line represents the mean duration of the total instances of joint attention during each session combining all three of the observer's data.

### *Neurotypical Sibling Response*

Before the first session began, the NT sibling watched a short informational video regarding ASD. After the video the sibling completed a quiz in which all of the questions were answered correctly except one. The missed question was, “What are some things that your brother or sister may do if he or she doesn’t like a something?” The sibling answered, “C. He/she is holding hands over ears.” The correct answer was “D. All of the above.” The sibling may have answered with this selection because this may be a common behavior that the sibling with ASD exhibits. Also completed were an identical pre- and post- test before the first session began and following the last session. The sibling answered the questions the same on the pre- as the post-test. The sibling stated that the dyad plays together frequently and typically have fun while playing, but occasionally the NT sibling becomes bored. Moreover the NT sibling reported feeling frustrated “a lot” when playing with sibling. After the posttest, the NT sibling completed a “Sibling Treatment Questionnaire” (Ferraioli & Harris, 2011). In the questionnaire the sibling reported that being a teacher to his sibling was “kind of hard.” According to the questionnaire, the sibling enjoyed playing and reported a desire to continue to be a teacher to his brother. The most difficult thing for the NT sibling during this process was trying to calm his brother, but this is also something the sibling reported learning more about through the study, along with sibling’s interests.

The three observers filled out a Social Validation Questionnaire (Ferraioli & Harris, 2011), which consisted of a Likert Scale and a small comment section regarding the quality of play and interaction occurring between the siblings. This questionnaire was filled out after the observation of the first session and again after observing the last session. The scores for the second questionnaire were on average slightly lower than the original questionnaire following

the first session. Comments through both forms remained consistent stating that the sibling with ASD seemed to respond well when NT sibling turned tasks into silly games and used silly voices. Two of the observers used the word “silly” in their comments describing the NT sibling’s positive interaction with sibling.

## CHAPTER FIVE

### Discussion

The purpose of this study was to determine if music could be effective in eliciting joint attention between siblings with ASD and their neurotypical siblings, and to examine the effects of education on ASD and structured play time on the NT sibling's perspective of the relationship. The first question was: Will music alone be an effective modality for increasing joint attention between individuals with ASD and a neurotypical sibling? According to the analysis of the data in this study only, it remains undetermined if music may be an effective modality for increasing joint attention. The results do not depict a great difference between the music and non-music sessions: however, in the area of duration of time engaged in joint attention and average duration of each instance of joint attention that occurred, the music session scored higher than the non-music sessions. In the non-music sessions, there were a greater number of instances of joint attention recorded.

It stands to reason that a longer duration of joint attention would ultimately be desired over instances of joint attention. In one observation video, the NT sibling looked away from the television many times in a short period of time, breaking instances of joint attention each time, and the NT sibling seemed bored. Most frequently the NT sibling seemed disengaged during the literacy intervention. The NT sibling often said, "Oh no, not another book. Please, not another book." On the contrary, the sibling with ASD seemed highly engaged in the literacy intervention as evidenced by laughing, eye gaze toward the television, verbal interaction with the video, and making comments such as, "You're a good story teller." However, the sibling with ASD seemed



disengaged and broke joint attention often when there was increased activity and loud noises in the hallway outside of the treatment room. During three of the sessions there was not any activity going on in the hallway and the area by the treatment room was relatively quiet. During one session, a social group was occurring during which many of the participants were in the hallway playing loudly. In addition, the child with ASD broke attention when perseverating on weather and thunderstorms, which, as the session during the social group was occurring the client seemed fearful that the loud noises were related to the weather and that a storm was coming, though no storms were predicted and the sun was shining. The sibling also stated that the loud and at times abrupt noises the group down the hall was making the client afraid. During another session, the sibling with ASD seemed quite distracted and anxious upon entering the building. The child with ASD insisted on only participating in one intervention and consistently said, "I'm scared." This sibling seemed highly distracted throughout the session despite the brother, mother, and researcher consoling and encouraging the sibling. The sibling with ASD did willingly stay in the room and finished the session.

While the siblings both engaged in many instances of joint attention, it was clear that the quality of joint attention seemed improved when the instances of joint attention lasted for longer periods of time. When both siblings were able to engage with each other for longer periods of time, the siblings seemed more productive. For instance, if the NT sibling was responding to the researcher's questions in the video during the literacy intervention, the alternate sibling often engaged with greater enthusiasm. Also, when the sibling with ASD was more engaged in the task portion of the intervention, the NT sibling seemed to adlib more which continued the duration of the joint attention between siblings and typically resulted in both siblings laughing. When the siblings were disengaged due to boredom or anxiousness, the instances of joint attention seemed

shorter and more labored as the NT sibling occasionally commented, “Come on, only one more, let’s just get through this and then we are done,” in a seemingly exasperated tone, but seemed determined and willing to stay in the room and finish the task.

The second question was: Will the neurotypical sibling’s perspective of the quality of sibling interaction improve following instruction? According to the NT sibling’s pre- and post-tests, it seems that the NT sibling’s perspective of playing with the alternate sibling remained the same, or there was not a large enough change in perspective to elicit a change in answers. The NT sibling did report that the instruction yielded new information on how to calm the alternate sibling when the sibling is feeling frustrated. In ongoing interviews with the dyad’s mother during observation of the sessions, it seemed that the NT sibling, prior the study, interacted quite well with sibling. Mother reported that since the NT sibling was quite young, it seemed that the NT sibling has been able to soothe and be a source of comedic relief for the sibling with ASD. She also reported that the older sibling celebrates the sibling with ASD as buddy and friend, which behavior was also observed in other NT siblings in the Rivers & Stoneman study (2003). The researcher observed this to be true during the sessions as the NT sibling often told jokes or funny stories while the dyad was playing together. During the ball rolling intervention, the NT sibling pretended that some of the balls were puppets and made them talk to each other, which made both siblings laugh. When the sibling with ASD was concerned about noises in the hallway, the researcher noted that the NT sibling spoke louder and attempted to tell more jokes and stories to divert the sibling’s attention from the noise. If the NT sibling was unsuccessful in calming the alternate sibling, the NT sibling changed approaches and offered more affirming and encouraging comments. In addition to observing that the NT sibling seemed quite knowledgeable about interacting appropriately with the alternate sibling, when asked general thoughts about the

instructional video, the sibling reported that he knew most of what was in the video already. Knowing about and being educated on ASD has been linked to stronger sibling relationships for the NT sibling (Ross & Cuskelly, 2006), and could be why this particular relationship seems to be so strong.

It seemed the observers also noted the NT sibling interacted well with his sibling as evidenced by the comment section on the Social Validation Questionnaire that all three observers completed after the first session and following the last session. Two of the observers used the word, “silly” in describing the NT’s interaction with the alternate sibling and all of the raters commented positively about how the NT sibling comforted and seemed to make his sibling at ease during the process. The observers rated the sibling’s overall interaction slightly lower quality on the post-questionnaire than the pre-questionnaire. Many variables may have contributed to the lower score. During the last recording, only the literacy portion of the session could be observed by the raters due to a camera error, which as previously stated seemed to disengage the NT sibling. Also, at the beginning of the sessions, the sibling with ASD began a new medication. Two weeks after beginning the new medication, which was at the end of the sessions, the family had noticed increased anxiety and mood swings from the sibling. In the final session the sibling with ASD seemed quite anxious and insisted on only completing one task, though ultimately willingly finished both tasks. The NT sibling attempted to calm the sibling with ASD since they entered into the facility, and seemed slightly frustrated as the sibling’s anxiety seemed to fluctuate throughout the session.

### *Limitations and Recommendations*

There were several limitations to this study; perhaps the greatest limitation was the sample size. The study was originally designed for approximately 10-15 sibling dyads. A greater

sample size is preferred to reduce the possibility for sampling error. In this study, as only one group was utilized, a high sampling error occurred meaning that the sample did not accurately reflect the true population that was to be studied (Creswell, 2012). To ensure a smaller sample error and more accurate representation of the population, a greater sample size is recommended for future studies. This dyad represented a sibling relationship that was already strong and functioning well. Other relationships may not be as strong and may even be strained. In these instances, the data would have potentially yielded much different results. In addition to changing the age criterion, it would also be beneficial to consider a mixed methods research design to include more comprehensive and qualitative data regarding the sibling relationship.

Though two video recording devices were used in this process, one of which the researcher was able to control the angle of from outside the room, the task portion of the final session could not be used for data collection purposes as both clients were out of view from one camera and had their backs turned to the other camera. This may have skewed the results, as attending to a television in joint attention is different than actually interacting with siblings and engaging in joint attention while completing a task. In order to ensure appropriate camera angles in future studies, the researcher recommends marking the floor with tape where the participants should sit in order to attempt to capture eye gaze with greater accuracy.

During the instrument-playing portion of the intervention (A1), the researcher recommends directing the dyad to play only two songs on each instrument. Playing six songs seemed to be somewhat boring and frustrating to the dyad, particularly because the same three songs played on one instrument were required to be played again on the second instrument. The sibling with ASD seemed frustrated when mistakes were made and as the progression of songs continued, more mistakes were made which seemed to increase the frustration level more. As the

sibling with ASD became more frustrated the NT sibling's responses went from light hearted and encouraging to suggesting that the NT sibling was becoming frustrated as well. When the instruments switched and the three songs were required to be played again on the new instrument the NT sibling sighed and rolled his eyes.

If this study is replicated, it is recommended that the researcher also use the video instruction format. Using the video directive model allowed the researcher to create more control in the sessions, reducing potential variables. This would have been of even greater value to the study had there been more participants. The method seemed to create a greater opportunity to examine more precisely if music alone elicits a response verses the person providing the musical experience, as the instruction is standardized on the video. It should be considered that attention could have been increased due to the use of a television screen, which may elicit more attention than if a researcher was present, following a script, not interacting with the participants.

The final recommendation for the study is to modify the criterion for who is eligible to participate. The 8 year-old seemed to greatly enjoy most the interventions as evidenced by laughing and offering many light hearted comments about having fun, but the 12 year-old NT sibling made several quiet comments indicating that the sibling was bored or too old to engage in certain interventions, such as the literacy interventions. The researcher recommends recruiting younger participants. In reviewing the population of possible participants, many dyads were not eligible due to the fact that the NT sibling was younger than the sibling with ASD. Allowing younger NT siblings to participate, ensuring that the rest of the criteria are still met, may yield more participants. As the research question does not specify birth order of the siblings, and the general goal is to improve sibling relationships in general, the researcher does not see a necessity to exclude younger NT siblings from this study.

### *Feasibility*

This study could easily be replicated, keeping in mind the considerations listed above as well as scheduling of the sessions. The study was held during the last week of school and/or the first week of summer for the local school systems. Due to the timing of this study and the transitioning between school and summer schedules for the participants, families found it difficult to commit to times. Families were unsure of childcare and transportation at this time and for some the prospect of adding an additional commitment during this time seemed overwhelming, which was reflected in the 75% attrition rate that occurred in this study. However, the family that did commit to the study had an exceptionally full school and summer schedule, but commented that the brevity of each session and only meeting four times made it possible for the family to participate in the study. The researcher strongly feels that if a different time of year had been selected to give the study that more families would have participated.

A difficult logistical part of the study, other than recruiting participants, was obtaining a television, DVD player, and video camera and moving the equipment in and out of the treatment room between sessions. The researcher used a rented flat screen 32" TV that was lightweight. This aided in moving the equipment, but left high concern for accidental damage that could occur to the television during the session.

### *Conclusion*

A review of the data seems to suggest that music is able to elicit longer instances of joint attention between siblings. Joint attention is critically important as development of joint attention corresponds with vocabulary development (Bono, Daley, & Sigman, 2004; Presmanes, Walden, Stone, Paul, & Yoder, 2007) and promotes growth in other crucial social skills (Ferraioli & Harris, 2011; Gooding, 2011; Sussman, 2009). As music has been shown, though marginally in

this study, to improve joint attention which can lead to improved social skills (Ferraioli & Harris, 2011; Gooding, 2011; Sussman, 2009) further research in this area is needed. With the continuing development of joint attention and social and communication skills, it seems to reason that relationships individuals with ASD have with others will improve – including siblings. Engaging NT siblings in education regarding ASD, in family therapy models, and in music-based, sibling-mediated, joint attention interventions the NT sibling is being empowered, which ultimately could yield benefits to both siblings, the parents, and the overall family unit (Tsao et al., 2012).

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## APPENDIX A

### Sibling Instructional Video Response Questionnaire

- 1) What is something you could say to your sibling to help them if they are having a hard time doing something?
  
  
  
  
  
  
  
  
  
  
- 2) What are two things that your brother or sister might not like?
  - a) Bananas and Monkeys
  - b) Bright Lights and Loud Noises
  - c) Chores and Homework
  
  
  
  
  
  
  
  
  
  
- 3) How long should you wait for your brother or sister to answer a question you ask them?
  - a) 5 minutes
  - b) 10 seconds
  - c) 30 seconds
  - d) an hour
  
  
  
  
  
  
  
  
  
  
- 4) What are some things that your brother or sister may do if he or she doesn't like a something?
  - a) He/she is making loud noises
  - b) He/she is squinting or wrinkling their eyebrows
  - c) He/she is holding hands over ears
  - d) All of the above
  
  
  
  
  
  
  
  
  
  
- 5) What is one thing your brother or sister might do because he or she has Autism?  
\_\_\_\_\_.
  
  
  
  
  
  
  
  
  
  
- 6) My brother or sister with Autism is an important part of my family
  - a) Yes
  - b) No

APPENDIX B

Sibling Questionnaire\*

Participant #

Date:   /   /

PRE

POST

1. Is it easy or hard to play with your brother/sister?

Very hard

Kind of hard

Kind of easy

Very easy



2. Do you ever get frustrated while playing with your brother/sister?

A lot

A little

Never



3. How much fun do you have playing with your brother/sister?

No fun

A little fun

Some fun

A lot of fun



4. Do you ever get bored while playing with your brother/sister?

A lot



A little

Never



5. How much do you play with your brother/sister?



A lot

A little

Never

Note. Used with permission from “Teaching Joint Attention to Children with Autism Through a Sibling-Mediated Behavioral Intervention,” by S. J. Ferraioli and S. L. Harris, 2011, *Behavioral Interventions*, 26(4), p. 261-281.



## APPENDIX C

### Sibling Treatment Questionnaire

1. What did you think about being a teacher to your brother/sister?
  
2. What was easy about being a teacher?
  
3. What was hard about being a teacher?
  
4. Do you think you will still be a teacher to your brother/sister when you play?
  
5. What did you learn by being a teacher?

Note. Used with permission from “Teaching Joint Attention to Children with Autism Through a Sibling-Mediated Behavioral Intervention,” by S. J. Ferraioli and S. L. Harris, 2011, *Behavioral Interventions*, 26(4), p. 261-281.

## APPENDIX D

### **Consent to Participate in a Research Study Colorado State University**

**TITLE OF STUDY:** Effects of Music on Joint Attention Between Individuals with Autism and Neurotypical Siblings

**PRINCIPAL INVESTIGATOR:** Jaley A. Montgomery. Mailing Address: 1413 Brookshire Rd. Apt. 3, Cape Girardeau, MO 63701. Phone: (812) 319-3268.

**WHY AM I BEING INVITED TO TAKE PART IN THIS RESEARCH?** This study will examine the effects of music in eliciting joint attention between sibling dyads. If you are between the ages of 6 – 10, have a diagnosis of Autism Spectrum Disorder, have a sibling up to 3 years older with no ASD or related diagnoses, speak English as a primary language, and you and your sibling do not have any significant hearing or visual impairments, you will be invited to participate in this study.

**WHAT IS JOINT ATTENTION?** For the purposes of this study, “joint attention” will be defined as coordinating attention to a social partner and an object of mutual interest simultaneously. Siblings will draw attention of opposite sibling to item by pointing, verbalizing, and/or eye gaze.

**WHO IS DOING THE STUDY?** The primary investigator, Jaley A. Montgomery, is a music therapist at Easter Seals Midwest Autism Services, and is completing this study in partial fulfillment of the requirements for the degree of Master of Music in Music Therapy from Colorado State University.

**WHAT IS THE PURPOSE OF THIS STUDY?** The purpose of this study is to determine and further investigate if music will aid in eliciting joint attention between two individuals. A secondary purpose of this study is to determine if basic instruction on ASD and interacting with individuals with ASD, coupled with structured peer interaction can enhance the nature of the neurotypical sibling’s perception of the sibling relationship.

**WHERE IS THE STUDY GOING TO TAKE PLACE AND HOW LONG WILL IT LAST?** This study will take place at Easter Seals Midwest Autism Services located at 611 N. Fountain Street, Cape Girardeau, MO 63701. The participants will be asked to attend two sessions per week for three weeks. The first and last session will last approximately 30 minutes; all other sessions will be approximately 15 minutes in duration.

**WHAT WILL I BE ASKED TO DO?** The neurotypical (NT) sibling will watch a short video about ASD and how to effectively communicate and redirect individuals with ASD. Following the video, the sibling will fill out a short test, and a questionnaire. During sessions, the NT sibling will be “teaching” the sibling by reading and at times singing a book to sibling. Both siblings will be involved in rolling lightweight balls back and forth to each other as well as rolling shaker eggs to each other. Siblings will be guided through playing instrument interventions, which include shaker eggs, a xylophone, and a flip-flip-aphone (a PVC instrument). Both siblings will be given video instructions before each intervention begins. No musical skills or knowledge of music is required to participate in this study.

**ARE THERE REASONS WHY I SHOULD NOT TAKE PART IN THIS STUDY?** You should not participate in this study if your sibling has an autism related diagnosis, if you or your sibling have a significant visual or hearing impairment, or if you and/or your sibling will not be able to commit to attending two sessions a week for three weeks.



## APPENDIX E

### Assent Form NT Sibling

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Colorado State University

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Hi!

I'm a student at Colorado State University. I study music therapy. This is called research. My research is about what helping brothers and sisters play better together. I am asking you if it is OK that I study you while you participate in some playtime with your brother or sister.

If you say it is OK, I'll ask you to watch a short video about Autism do a worksheet before the playtime starts. It will ask questions about what you learned in the video, and a worksheet about playtime with your brother or sister. There isn't a right or wrong answer --- it is just about what you think. It will take about 15 minutes. Then, you will have playtimes that I lead through a video with your brother or sister. During the playtimes, I will videotape you. After four playtime sessions, I will ask you to fill out another worksheet, like the first one about your playtimes, to see if you have any new ideas. Your name won't be on the worksheets or the videotape, so no one will know how you answered or what you did.

Agreeing to be in this project cannot hurt you. It won't help you, either. You won't get any gift for doing it. You don't have to do it. If you say "yes" now but later change your mind, you can stop being in the research any time by just telling me.

I will ask your parents if it is OK that you do this, too. If you want to be in this research, sign your name and write today's date on the line below.

\_\_\_\_\_

Student

\_\_\_\_\_

Date

\_\_\_\_\_

Researcher

\_\_\_\_\_

Date

## APPENDIX F

### Assent Form Sibling with ASD

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Colorado State University

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Hi!

I'm a student at Colorado State University. I study music therapy. This is called research. My research is about what helping brothers and sisters play better together. I am asking you if it is OK that I study you while you participate in some playtime with your brother or sister.

If you say it is OK, you will have playtimes that I lead through a video with your brother or sister. During the playtimes, I will videotape you. Your name will not be written on the videotape. While you are playing you will be asked to watch short videos, play some games, and play instruments with your brother or sister.

Agreeing to be in this project cannot hurt you. It won't help you, either. You won't get any gift for doing it. You don't have to do it. If you say "yes" now but later change your mind, you can stop being in the research any time by just telling me.

I will ask your parents if it is OK that you do this, too. If you want to be in this research, sign your name. If you need help writing the signing or writing date please let me know and I will ask your parents to help you.

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Student

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Date

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Researcher

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Date

